

Draft Programmatic Environmental Impact Statement for

Solar Energy Development in Six Southwestern States



Volume 7

Chapter 13: Utah Proposed Solar Energy Zones

On the cover:

Typical Solar Fields for Various Technology Types (clockwise from upper left):
Solar Parabolic Trough (Source: Hosoya et al. 2008),
Solar Power Tower (Credit: Sandia National Laboratories. Source: NREL 2010a),
Photovoltaic (Credit: Arizona Public Service. Source: NREL 2010b), and
Dish Engine (Credit: R. Montoya. Source: Sandia National Laboratories 2008).
Reference citations are available in Chapter 1.

Background photo: Parabolic trough facility from an elevated viewpoint
(Credit: Argonne National Laboratory)

Draft Programmatic Environmental Impact Statement (PEIS) for Solar Energy Development in Six Southwestern States (DES 10-59; 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; Dona 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.

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Abstract: The BLM and DOE are considering taking actions to facilitate solar energy development in compliance with various orders, mandates, and agency policies. For the BLM, these actions include the evaluation of a new BLM Solar Energy Program applicable to all utility-scale solar energy development on BLM-administered lands in six southwestern states (Arizona, California, Colorado, Nevada, New Mexico, and Utah). For DOE, they include the evaluation of developing new program guidance relevant to DOE-supported solar projects. The Draft PEIS assesses the environmental, social, and economic effects of the agencies' proposed actions and alternatives.

For the BLM, the Draft 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 for implementing a new BLM Solar Energy Program. Under the solar energy development program alternative (BLM's preferred alternative), the BLM would establish a new Solar Energy Program of administration and authorization policies and required design features and would exclude solar energy development from certain BLM-administered lands. Under this alternative, approximately 22 million acres of BLM-administered lands would be available for right-of-way (ROW) application. A subset of these lands, about 677,400 acres, would be identified as solar energy zones (SEZs), or areas where the BLM would prioritize solar energy and associated transmission infrastructure development. Under the SEZ program alternative, the same policies and design features would be adopted, but development would be excluded from all BLM-administered lands except those located within the SEZs.

For DOE, the Draft PEIS analyzes a no action alternative, under which DOE would continue to conduct environmental reviews of DOE-funded solar projects on a case-by-case basis, and one action alternative, under which DOE would develop programmatic guidance to further integrate environmental considerations into its analysis and selection of solar projects that it will support.

The EPA Notice of Availability (NOA) of the Draft PEIS was published in the *Federal Register* on December 17, 2010. Comments on the Draft PEIS are due by March 17, 2011.

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Reader's Guide

The detailed analysis of the proposed solar energy zones (SEZs) in Utah, provided in Sections 13.1 through 13.3, will be used to inform BLM decisions regarding the size, configuration, and/or management of these SEZs. These sections also include proposed mitigation requirements (termed "SEZ-specific design features"). Please note that the SEZ-specific summaries of Affected Environment use the descriptions of Affected Environment for the six-state study area presented in Chapter 4 of the PEIS as a basis. Also note that the SEZ-specific design features have been proposed with consideration of the general impact analyses for solar energy facilities presented in Chapter 5, and on the assumption that all programmatic design features presented in Appendix A, Section A.2.2, will be required for projects that will be located within the SEZs.

BLM will implement its SEZ-specific decisions through the BLM Record of Decision for the Final PEIS. Comments received during the review period for the Draft PEIS will inform BLM decisions.

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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

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

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

1	Colorado DWR	Colorado Department of Water Resources
2	CPUC	California Public Utilities Commission
3	CPV	concentrating photovoltaic
4	CRBSCF	Colorado River Basin Salinity Control Forum
5	CREZ	competitive renewable energy zone
6	CRSCP	Colorado River Salinity Control Program
7	CSA	Candidate Study Area
8	CSC	Coastal Services Center
9	CSFG	carbon-sequestration fossil generation
10	CSP	concentrating solar power
11	CSQA	California Stormwater Quality Association
12	CSRI	Cultural Systems Research, Incorporated
13	CTG	combustion turbine generator
14	CTPG	California Transmission Planning Group
15	CTSR	Cumbres & Toltec Scenic Railroad
16	CUP	Conditional Use Permit
17	CVP	Central Valley Project
18	CWA	Clean Water Act
19	CWCB	Colorado Water Conservation Board
20	CWHR	California Wildlife Habitat Relationship System
21		
22	DC	direct current
23	DHS	U.S. Department of Homeland Security
24	DNA	Determination of NEPA Adequacy
25	DNI	direct normal insulation
26	DNL	day-night average sound level
27	DoD	U.S. Department of Defense
28	DOE	U.S. Department of Energy
29	DOI	U.S. Department of the Interior
30	DOL	U.S. Department of Labor
31	DOT	U.S. Department of Transportation
32	DRECP	California Desert Renewable Energy Conservation Plan
33	DSM	demand side management
34	DTC/C-AMA	Desert Training Center/California–Arizona Maneuver Area
35	DWMA	Desert Wildlife Management Area
36		
37	EA	environmental assessment
38	ECAR	East Central Area Reliability Coordination Agreement
39	ECOS	Environmental Conservation Online System (USFWS)
40	EERE	Energy Efficiency and Renewable Energy (DOE)
41	Eg	band gap energy
42	EIA	Energy Information Administration
43	EIS	environmental impact statement
44	EISA	Energy Independence and Security Act of 2007
45	EMF	electromagnetic field
46	E.O.	Executive Order

1	EPA	U.S. Environmental Protection Agency
2	EPRI	Electric Power Research Institute
3	EQIP	Environmental Quality Incentives Program
4	ERCOT	Electric Reliability Council of Texas
5	ERO	Electric Reliability Organization
6	ERS	Economic Research Service
7	ESA	Endangered Species Act of 1973
8	ESRI	Environmental Systems Research Institute
9		
10	FAA	Federal Aviation Administration
11	FBI	Federal Bureau of Investigation
12	FEMA	Federal Emergency Management Agency
13	FERC	Federal Energy Regulatory Commission
14	FHWA	Federal Highway Administration
15	FIRM	Flood Insurance Rate Map
16	FLPMA	Federal Land Policy and Management Act of 1976
17	FONSI	Finding of No Significant Impact
18	FR	<i>Federal Register</i>
19	FRCC	Florida Reliability Coordinating Council
20	FSA	Final Staff Assessment
21	FTE	full-time equivalent
22	FY	fiscal year
23		
24	G&TM	Generation and Transmission Modeling
25	GCRP	U.S. Global Climate Research Program
26	GDA	generation development area
27	GHG	greenhouse gas
28	GIS	geographic information system
29	GPS	global positioning system
30	GTM	Generation and Transmission Model
31	GUAC	Groundwater Users Advisory Council
32	GWP	global warming potential
33		
34	HA	herd area
35	HAP	hazardous air pollutant
36	HAZCOM	hazard communication
37	HCE	heat collection element
38	HCP	Habitat Conservation Plan
39	HMA	Herd Management Area
40	HMMH	Harris Miller Miller & Hanson, Inc.
41	HRSG	heat recovery steam generator
42	HSPD	Homeland Security Presidential Directive
43	HTF	heat transfer fluid
44	HVAC	heating, ventilation, and air-conditioning
45		
46		

1	I	Interstate
2	IARC	International Agency for Research on Cancer
3	IBA	important bird area
4	ICE	internal combustion engine
5	ICWMA	Imperial County Weed Management Area
6	IEC	International Electrochemical Commission
7	IFR	instrument flight rule
8	IID	Imperial Irrigation District
9	IM	Instruction Memorandum
10	IMPS	Iron Mountain Pumping Station
11	IMS	interim mitigation strategy
12	INA	Irrigation Non-Expansion Area
13	IOP	Interagency Operating Procedure
14	IOU	investor-owned utility
15	IPPC	Intergovernmental Panel on Climate Change
16	ISA	Independent Science Advisor; Instant Study Area
17	ISB	Intermontane Seismic Belt
18	ISCC	integrated solar combined cycle
19	ISDRA	Imperial Sand Dunes Recreation Area
20	ISEGS	Ivanpah Solar Energy Generating System
21	ITP	incidental take permit
22	IUCNNR	International Union for Conservation of Nature and Natural Resources
23	IUCNP	International Union for Conservation of Nature Pakistan
24		
25	KGA	known geothermal resources area
26	KML	keyhole markup language
27	KOP	key observation point
28	KSLA	known sodium leasing area
29		
30	LCC	Landscape Conservation Cooperative
31	LCOE	levelized cost of energy
32	L _{dn}	day-night average sound level
33	LDWMA	Low Desert Weed Management Area
34	L _{eq}	equivalent sound pressure level
35	LLA	limited land available
36	LLRW	low-level radioactive waste (waste classification)
37	LRG	Lower Rio Grande
38	LSA	lake and streambed alteration
39	LSE	load-serving entity
40	LTVA	long-term visitor area
41		
42	MAAC	Mid-Atlantic Area Council
43	MAIN	Mid-Atlantic Interconnected Network
44	MAPP	methyl acetylene propadiene stabilizer; Mid-Continent Area Power Pool
45	MCAS	Marine Corps Air Station
46	MCL	maximum contaminant level

1	MFP	Management Framework Plan
2	MIG	Minnesota IMPLAN Group
3	MLA	maximum land available
4	MOA	military operating area
5	MOU	Memorandum of Understanding
6	MPDS	maximum potential development scenario
7	MRA	Multiple Resource Area
8	MRI	Midwest Research Institute
9	MRO	Midwest Reliability Organization
10	MSDS	Material Safety Data Sheet
11	MSL	mean sea level
12	MTR	military training route
13	MWA	Mojave Water Agency
14	MWD	Metropolitan Water District
15	MWMA	Mojave Weed Management Area
16		
17	NAAQS	National Ambient Air Quality Standards
18	NADP	National Atmospheric Deposition Program
19	NAGPRA	Native American Graves Protection and Repatriation Act
20	NAHC	Native American Heritage Commission (California)
21	NAIC	North American Industrial Classification System
22	NASA	National Aeronautics and Space Administration
23	NCA	National Conservation Area
24	NCCAC	Nevada Climate Change Advisory Committee
25	NCDC	National Climatic Data Center
26	NCES	National Center for Education Statistics
27	NDCNR	Nevada Department of Conservation and Natural Resources
28	NDEP	Nevada Division of Environmental Protection
29	NDOT	Nevada Department of Transportation
30	NDOW	Nevada Department of Wildlife
31	NDWP	Nevada Division of Water Planning
32	NDWR	Nevada Division of Water Resources
33	NEAP	Natural Events Action Plan
34	NEC	National Electric Code
35	NED	National Elevation Database
36	NEP	Natural Events Policy
37	NEPA	National Environmental Policy Act of 1969
38	NERC	North American Electricity Reliability Corporation
39	NHA	National Heritage Area
40	NHNM	National Heritage New Mexico
41	NHPA	National Historic Preservation Act of 1966
42	NID	National Inventory of Dams
43	NM DOT	New Mexico Department of Transportation
44	NLCS	National Landscape Conservation System
45	NMAC	<i>New Mexico Administrative Code</i>
46	NMBGMR	New Mexico Bureau of Geology and Mineral Resources

1	NMDGF	New Mexico Department of Game and Fish
2	NMED	New Mexico Environment Department
3	NMED-AQB	New Mexico Environment Department-Air Quality Board
4	NMFS	National Marine Fisheries Service
5	NMOSE	New Mexico Office of the State Engineer
6	NMSU	New Mexico State University
7	NNHP	Nevada Natural Heritage Program
8	NNL	National Natural Landmark
9	NNSA	National Nuclear Security Administration
10	NOA	Notice of Availability
11	NOAA	National Oceanic and Atmospheric Administration
12	NOI	Notice of Intent
13	NPDES	National Pollutant Discharge Elimination System
14	NP	National Park
15	NPL	National Priorities List
16	NPS	National Park Service
17	NRA	National Recreation Area
18	NRCS	Natural Resources Conservation Service
19	NREL	National Renewable Energy Laboratory
20	NRHP	<i>National Register of Historic Places</i>
21	NRS	<i>Nevada Revised Statutes</i>
22	NSC	National Safety Council
23	NSO	no surface occupancy
24	NSTC	National Science and Technology Council
25	NTS	Nevada Test Site
26	NTTR	Nevada Test and Training Range
27	NVCRS	Nevada Cultural Resources Inventory System
28	NV DOT	Nevada Department of Transportation
29	NWCC	National Wind Coordinating Committee
30	NWI	National Wetlands Inventory
31	NWPP	Northwest Power Pool
32	NWR	National Wildlife Refuge
33	NWSRS	National Scenic River System
34		
35	O&M	operation and maintenance
36	ODFW	Oregon Department of Fish and Wildlife
37	OHV	off-highway vehicle
38	ONA	Outstanding Natural Area
39	ORC	organic Rankine cycle
40	OSE/ISC	Office of the State Engineer/Interstate Stream Commission
41	OSHA	Occupational Safety and Health Administration
42	OTA	Office of Technology Assessment
43		
44	PA	Programmatic Agreement
45	PAD	Preliminary Application Document
46	PAH	polycyclic aromatic hydrocarbon

1	PAT	peer analysis tool
2	PCB	polychlorinated biphenyl
3	PCM	purchase change material
4	PCS	power conditioning system
5	PCU	power converting unit
6	PEIS	programmatic environmental impact statement
7	PFYC	potential fossil yield classification
8	PIER	Public Interest Energy Research
9	P.L.	Public Law
10	PLSS	Public Land Survey System
11	PM	particulate matter
12	PM _{2.5}	particulate matter with a mean aerodynamic diameter of 2.5 µm or less
13	PM ₁₀	particulate matter with a mean aerodynamic diameter of 10 µm or less
14	POD	plan of development
15	POU	publicly owned utility
16	PPA	Power Purchase Agreement
17	PPE	personal protective equipment
18	PSD	Prevention of Significant Deterioration
19	PURPA	Public Utility Regulatory Policy Act
20	PV	photovoltaic
21	PVID	Palo Verde Irrigation District
22	PWR	public water reserve
23		
24	QRA	qualified resource area
25		
26	R&I	relevance and importance
27	RCI	residential, commercial, and industrial (sector)
28	RCRA	Resource Conservation and Recovery Act of 1976
29	RD&D	research, development, and demonstration; research, development, and
30		deployment
31	RDBMS	Relational Database Management System
32	RDEP	Restoration Design Energy Project
33	REA	Rapid Ecoregional Assessment
34	REAT	Renewable Energy Action Team
35	REDI	Renewable Energy Development Infrastructure
36	ReEDS	Regional Energy Deployment System
37	REPG	Renewable Energy Policy Group
38	RETA	Renewable Energy Transmission Authority
39	RETAAC	Renewable Energy Transmission Access Advisory Committee
40	RETI	Renewable Energy Transmission Initiative
41	REZ	renewable energy zone
42	RF	radio frequency
43	RFC	Reliability First Corporation
44	RFDS	reasonably foreseeable development scenario
45	RGP	Rio Grande Project
46	RGWCD	Rio Grande Water Conservation District

1	RMP	Resource Management Plan
2	RMPA	Rocky Mountain Power Area
3	RMZ	Resource Management Zone
4	ROD	Record of Decision
5	ROI	region of influence
6	ROS	recreation opportunity spectrum
7	ROW	right-of-way
8	RPG	renewable portfolio goal
9	RPS	Renewable Portfolio Standard
10	RRC	Regional Reliability Council
11	RSEP	Rice Solar Energy Project
12	RSI	Renewable Systems Interconnection
13	RTTF	Renewable Transmission Task Force
14	RV	recreational vehicle
15		
16	SAAQS	State Ambient Air Quality Standards
17	SAMHSA	Substance Abuse and Mental Health Services Administration
18	SCADA	supervisory control and data acquisition
19	SCE	Southern California Edison
20	SCRMA	Special Cultural Resource Management Area
21	SDRREG	San Diego Regional Renewable Energy Group
22	SDWA	Safe Drinking Water Act of 1974
23	SEGIS	Solar Energy Grid Integration System
24	SEGS	Solar Energy Generating System
25	SEI	Sustainable Energy Ireland
26	SEIA	Solar Energy Industrial Association
27	SES	Stirling Energy Systems
28	SETP	Solar Energy Technologies Program (DOE)
29	SEZ	solar energy zone
30	SHPO	State Historic Preservation Office(r)
31	SIP	State Implementation Plan
32	SLRG	San Luis & Rio Grande
33	SMA	Special Management Area
34	SMP	suggested management practice
35	SNWA	Southern Nevada Water Authority
36	SPP	Southwest Power Pool
37	SRMA	Special Recreation Management Area
38	SSA	Socorro Seismic Anomaly
39	SSI	self-supplied industry
40	ST	solar thermal
41	STG	steam turbine generator
42	SUA	special use airspace
43	SWAT	Southwest Area Transmission
44	SWIP	Southwest Intertie Project
45	SWPPP	Stormwater Pollution Prevention Plan
46	SWReGAP	Southwest Regional Gap Analysis Project
47		

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

1	WGFD	Wyoming Game and Fish Department
2	WHA	wildlife habitat area
3	WHO	World Health Organization
4	WRAP	Water Resources Allocation Program; Western Regional Air Partnership
5	WRCC	Western Regional Climate Center
6	WREZ	Western Renewable Energy Zones
7	WRRRI	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		
15	YPG	Yuma Proving Ground
16		
17	ZITA	zone identification and technical analysis
18	ZLD	zero liquid discharge
19		
20		

21 **CHEMICALS**

23	CH ₄	methane	NO ₂	nitrogen dioxide
24	CO	carbon monoxide	NO _x	nitrogen oxides
25	CO ₂	carbon dioxide		
26	CO _{2e}	carbon dioxide equivalent	O ₃	ozone
27				
28	H ₂ S	hydrogen sulfide	Pb	lead
29	Hg	mercury		
30			SF ₆	sulfur hexafluoride
31	N ₂ O	nitrous oxide	SO ₂	sulfur dioxide
32	NH ₃	ammonia	SO _x	sulfur oxides
33				

35 **UNITS OF MEASURE**

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

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

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1 **13 AFFECTED ENVIRONMENT AND IMPACT ASSESSMENT FOR**
2 **PROPOSED SOLAR ENERGY ZONES IN UTAH**

3
4
5 **13.1 ESCALANTE VALLEY**

6
7
8 **13.1.1 Background and Summary of Impacts**

9
10
11 **13.1.1.1 General Information**

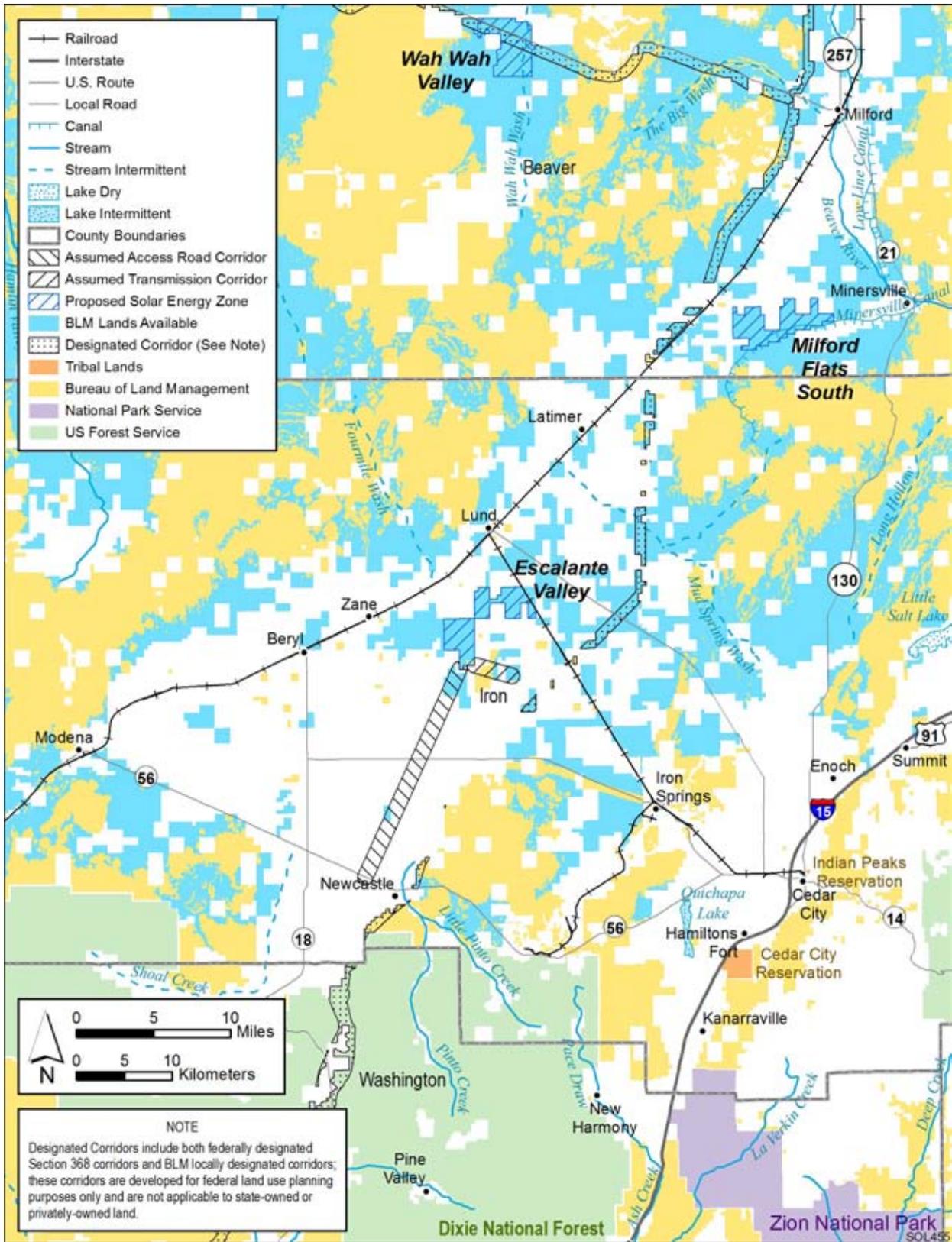
12
13 The proposed Escalante Valley solar energy zone (SEZ) is located in Iron County in
14 southwestern Utah (Figure 13.1.1.1-1). The SEZ has a total area of 6,614 acres (27 km²). In
15 2008, the county population was 45,833, while adjacent Washington County to the south had a
16 population of 148,256. The largest nearby town is Cedar City on Interstate 15 (I-15) in Iron
17 County; Cedar City had a 2008 population of 28,667 and is located about 30 mi (48 km) to the
18 east-southeast. Several small towns are located closer to the SEZ; Lund is about 4 mi (6 km) to
19 the north, and Zane is about 5 mi (8 km) to the west. Salt Lake City is located about 220 mi
20 (354 km) to the north–northeast.

21
22 The nearest major road is State Route 56, about 15 mi (24 km) south of the SEZ. Access
23 to the Escalante Valley SEZ is via county road; Lund Highway passes northeast of the SEZ.
24 Access to the interior of the SEZ is by dirt roads. The Union Pacific (UP) Railroad passes to the
25 west and has a rail stop in Lund. A rail spur off the main line at Lund passes through the
26 northeastern edge of the SEZ. Both state and private lands are nearby. The nearest public airport
27 is the Cedar City Regional Airport near Cedar City. A 138-kV transmission line ends about 3 mi
28 (5 km) from the southeastern area of the southernmost part of the SEZ.

29
30 As of February 2010, there were no right-of-way (ROW) applications for solar projects
31 within the SEZ.

32
33 The proposed Escalante Valley SEZ is in a rural area. The overall character of the
34 surrounding land is rural. The SEZ is located in the south-central portion of the Escalante Desert,
35 a large, southwest–northeast trending valley. The Escalante Desert is bounded by the Mineral
36 Mountains to the northeast, the Black Mountains and the Antelope Range to the south and
37 southeast, and the Shauntie Hills and Wah Wah Mountains to the northwest. Land within the
38 SEZ is undeveloped scrubland characteristic of a high-elevation, semiarid basin.

39
40 The proposed Escalante Valley SEZ and other relevant information are shown in
41 Figure 13.1.1.1-1. The criteria used to identify the proposed Escalante Valley SEZ in Utah as an
42 appropriate location for solar energy development included proximity to existing transmission
43 lines or designated corridors, proximity to existing roads, a slope of generally less than 2%, and
44 an area of more than 2,500 acres (10 km²). In addition, the area was identified as being relatively
45 free of other types of conflicts, such as U.S. Fish and Wildlife Service (USFWS)-designated
46 critical habitat for threatened and endangered species, Areas of Critical Environmental Concern



1

2 **FIGURE 13.1.1.1-1 Proposed Escalante Valley SEZ**

1 (ACECs), Special Recreation Management Areas (SRMAs), and National Landscape
2 Conservation System (NLCS) lands (see Section 2.2.2.2 for the complete list of exclusions).
3 Although these classes of restricted lands were excluded from the proposed Escalante Valley
4 SEZ, other restrictions may be appropriate. The analyses in the following sections evaluate the
5 affected environment and potential impacts associated with utility-scale solar energy
6 development in the proposed SEZ for important environmental, cultural, and socioeconomic
7 resources.
8

9 As initially announced in the *Federal Register* on June 30, 2009, the proposed Escalante
10 Valley SEZ encompassed 6,581 acres (27 km²). Subsequent to the study area scoping period,
11 the boundaries of the proposed SEZ were altered somewhat to facilitate the Bureau of Land
12 Management's (BLM's) administration of the SEZ area. Borders with irregularly shaped
13 boundaries were adjusted to match the section boundaries of the Public Lands Survey System
14 (PLSS) (BLM and USFS 2010a). Some small, higher slope areas internal to and at the borders
15 of the site were also added to the SEZ; although included in the SEZ, these higher slope areas
16 would not likely be utilized for solar facilities. The revised SEZ is approximately 33 acres
17 (0.13 km²) larger than the original SEZ as published in June 2009.
18
19

20 **13.1.1.2 Development Assumptions for the Impact Analysis**

21

22 Maximum solar development of the proposed Escalante Valley SEZ is assumed to be
23 80% of the SEZ area over a period of 20 years, a maximum of 5,291 acres (21 km²). These
24 values are shown in Table 13.1.1.2-1, along with other development assumptions. Full
25 development of the Escalante Valley SEZ would allow development of facilities with an
26 estimated total of 588 MW of electrical power capacity if power tower, dish engine, or
27 photovoltaic (PV) technologies were used, assuming 9 acres/MW (0.04 km²/MW) of land
28 required, and an estimated 1,058 MW of power if solar trough technologies were used,
29 assuming 5 acres/MW (0.02 km²/MW) of land required.
30

31 Availability of transmission from SEZs to load centers will be an important consideration
32 for future development in SEZs. The nearest existing transmission line is a 138-kV line 3 mi
33 (5 km) southeast of the SEZ. It is possible that this existing line could be used to provide access
34 from the SEZ to the transmission grid, but the 138-kV capacity of that line would be inadequate
35 for 588 to 1,058 MW of new capacity (a 500-kV line can approximately accommodate the load
36 of one 700-MW facility). At full build-out capacity, it is clear that new transmission and/or
37 upgrades of existing transmission lines would be required to bring electricity from the proposed
38 Escalante Valley SEZ to load centers; however, at this time the location and size of such new
39 transmission facilities are unknown. Generic impacts of transmission and associated
40 infrastructure construction and of line upgrades for various resources are discussed in Chapter 5.
41 Project-specific analyses would need to identify the specific impacts of new transmission
42 construction and line upgrades for any projects proposed within the SEZ.
43

44 To evaluate locations and amount of disturbed acreage for new transmission lines, it was
45 assumed that a transmission line segment would be constructed from the proposed Escalante
46 Valley SEZ to the nearest existing transmission line to connect the SEZ to the transmission

TABLE 13.1.1.2-1 Proposed Escalante Valley SEZ—Assumed Development Acreages, Maximum Solar MW Output, Access Roads, and Transmission Line ROWs

Total Acreage and Assumed Developed Acreage (80% of Total)	Assumed Maximum SEZ Output for Various Solar Technologies	Distance to Nearest State, U.S. or Interstate Highway	Distance and Capacity of Nearest Existing Transmission Line	Assumed Area of Transmission Line ROW and Road ROW	Distance to Nearest Designated Transmission Corridor ^e
6,614 acres and 5,291 acres ^a	588 MW ^b and 1,058 MW ^c	State Route 56: 15 mi ^d	3 mi and 138 kV	91 acres and 109 acres	4 mi

- ^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 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.

1
2
3 grid. This assumption was made without additional information on whether the nearest
4 existing transmission line would actually be available for connection of future solar facilities.
5 Establishing a connection to the line closest to the Escalante Valley SEZ would involve the
6 construction of about 3 mi (5 km) of new transmission line outside of the SEZ. The ROW for
7 this transmission line would occupy approximately 91 acres (0.37 km²) of land, assuming a
8 250-ft (76-m) wide ROW, a typical width for such an ROW. If a connecting transmission line
9 was constructed in the future to connect facilities within the SEZ to a different offsite grid
10 location from the one assumed here, site developers would need to determine the impacts from
11 construction and operation of that line. In addition, developers would need to determine the
12 impacts of line upgrades if they were needed.

13
14 State Route 56 lies about 15 mi (24 km) to the southeast of the proposed Escalante Valley
15 SEZ. Assuming construction of a new access road to reach State Route 56 would be needed to
16 support construction and operation of solar facilities, approximately 109 acres (0.44 km²) of land
17 disturbance would occur (a 60-ft [18.3-m] wide ROW is assumed).

18
19
20 **13.1.1.3 Summary of Major Impacts and SEZ-Specific Design Features**

21
22 In this section, the impacts and SEZ-specific design features assessed in Sections 13.1.2
23 through 13.1.21 for the proposed Escalante Valley SEZ are summarized in tabular form.
24 Table 13.1.1.3-1 is a comprehensive list of the impacts discussed in these sections; the reader
25 may reference the applicable sections for detailed support of the impact assessment.

TABLE 13.1.1.3-1 Summary of Impacts of Solar Energy Development within the Proposed Escalante Valley SEZ and SEZ-Specific Design Features^a

Resource Area	Environmental Impacts—Proposed Escalante Valley SEZ	SEZ-Specific Design Features
Lands and Realty	Full development of the SEZ (80% of the total area) could disturb up to 5,291 acres (21.4 km ²). Solar development would introduce a new and discordant land use into the area.	None.
	Establishing connection to the existing 138-kV transmission line located about 3 mi (5 km) to the southeast would disturb as much as 91 acres (0.37 km ²) of land.	None.
	Construction of a new access road could disturb up to 109 acres (0.44 km ²).	Priority consideration should be given to utilizing existing roads to provide construction and operational access to the SEZ.
Specially Designated Areas and Lands with Wilderness Characteristics	None.	None.
Rangeland Resources: Livestock Grazing	Up to 6,482 acres (26.2 km ²) of the Butte grazing allotment (~20% of the allotment) could be removed from grazing with potential adverse economic impacts on two permittees.	Consideration should be given to the feasibility of replacing all or part of the lost AUMs through changes in grazing management or in development of additional range improvements on public lands remaining in the allotment.
Rangeland Resources: Wild Horses and Burros	None.	None.
Recreation	Recreation use would be excluded from developed portions of the SEZ, but the loss of recreation use is expected to be minimal.	None.
Military and Civilian Aviation	None.	None.

TABLE 13.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Escalante Valley SEZ	SEZ-Specific Design Features
Geologic Setting and Soil Resources	Impacts on soil resources would occur mainly as a result of ground-disturbing activities (e.g., grading, excavating, and drilling) during the construction phase. Impacts include soil compaction, soil horizon mixing, soil erosion and deposition by wind, soil erosion by water and surface runoff, sedimentation, and soil contamination. These impacts may be impacting factors for other resources (e.g., air quality, water quality, and vegetation).	None.
Minerals (fluids, solids, and geothermal resources)	Existing oil and gas leases represent a prior existing right that could affect solar energy development of the SEZ.	None.
Water Resources	<p>Ground-disturbance activities (affecting up to 45% of the total area in the peak construction year) could affect surface water quality due to surface runoff, sediment erosion, and contaminant spills.</p> <p>Water requirements for dust suppression and potable water supply during the peak construction year could be as high as 1,261 ac-ft (1.5 million m³).</p> <p>Potential impacts on water resources related to land-disturbance activities associated with utility-scale solar energy development include direct and indirect impacts on surface waters and groundwater.</p> <p>Runoff of water and sediments from the proposed SEZ could potentially impact natural drainage patterns and natural groundwater recharge and discharge properties.</p> <p>Up to 74 ac-ft (91,000 m³) of sanitary wastewater could be generated during the peak construction year.</p>	<p>Wet-cooling options would not be feasible; other technologies should incorporate water conservation measures;</p> <p>During site characterization, hydrologic investigations would need to identify 100-year floodplains and potential jurisdictional water bodies subject to Clean Water Act Section 404 permitting. Siting of solar facilities and construction activities should avoid areas identified as being within a 100-year floodplain;</p> <p>Land disturbance and operations activities should prevent erosion and sedimentation in the vicinity of the ephemeral washes and dry lake present on the site;</p> <p>Groundwater rights must be obtained from the Utah Division of Water Rights (Utah DWR 2005);</p>

TABLE 13.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Escalante Valley SEZ	SEZ-Specific Design Features
Water Resources (Cont.)	<p>Assuming full development of the SEZ, the following amounts of water would be used during operations:</p> <ul style="list-style-type: none"> • For parabolic trough facilities (1,058-MW capacity), 756 to 1,602 ac-ft/yr (0.93 to 2.0 million m³/yr) for dry-cooled systems; and 5,306 to 15,888 ac-ft/yr (6.5 to 20 million m³/yr) for wet-cooled systems; • For power tower facilities (588-MW capacity), 418 to 888 ac-ft/yr (0.51 to 1.1 million m³/yr) for dry-cooled systems; and 2,946 to 8,825 ac-ft/yr (3.6 to 11 million m³/yr) for wet-cooled systems; • For dish engine facilities (588-MW capacity), 301 ac-ft/yr (0.37 million m³/yr); and • For PV facilities (588-MW capacity), 30 ac-ft/yr (37,000 m³/yr). <p>Assuming full development of the SEZ, operations would generate up to 15 ac-ft/yr (18,000 m³/yr) of sanitary wastewater and up to 301 ac-ft/yr (0.37 million m³/yr) of blowdown water.</p>	<p>Groundwater monitoring and production wells should be constructed in accordance with Utah standards (Utah DWR 2008);</p> <p>Stormwater management plans and BMPs should comply with standards developed by the Utah Division of Water Quality (UDWQ 2008); and</p> <p>Water for potable uses would have to meet or be treated to meet Utah drinking water standards as defined by Utah Administrative Code Rule R309-200.</p>
Vegetation ^b	<p>Up to 80% (5,291 acres [21.4 km²]) of the SEZ would be cleared of vegetation. Additional acreage would be cleared for transmission line construction and road improvements. Re-establishment of shrub communities in temporarily disturbed areas would likely be very difficult because of the arid conditions.</p> <p>Project disturbance could potentially increase the prevalence of noxious weeds and invasive species in the disturbed areas of the proposed SEZ and increase the probability that weeds could be transported into adjacent undisturbed habitats, thus reducing restoration success and potentially resulting in widespread habitat degradation.</p>	<p>An Integrated Vegetation Management Plan addressing invasive species control and an Ecological Resources Mitigation and Monitoring Plan addressing habitat restoration should be approved and implemented to increase the potential for successful restoration of affected habitats and minimize the potential for the spread of invasive species, such as those occurring in Iron County, that could be introduced as a result of solar energy project activities. Invasive species control should focus on biological and mechanical methods where possible to reduce the use of herbicides.</p>

TABLE 13.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Escalante Valley SEZ	SEZ-Specific Design Features
Vegetation ^b (Cont.)	The deposition of fugitive dust from disturbed soil areas in habitats outside the SEZ and transmission line and access road ROWs could result in reduced productivity or changes in plant community composition.	<p>All playa, sand dune and sand transport areas, and dry wash habitats shall be avoided to the extent practicable, and any impacts shall be minimized and mitigated. A buffer area should be maintained around playas and dry washes to reduce the potential for impacts on these habitats on or near the SEZ.</p> <p>Appropriate engineering controls should be used to minimize impacts on dry wash and dry lake habitats, including downstream occurrences, resulting from surface water runoff, erosion, sedimentation, altered hydrology, accidental spills, or fugitive dust deposition to these habitats. Appropriate buffers, best management practices, and engineering controls would be determined through agency consultation.</p>
Wildlife: Amphibians and Reptiles ^b	Direct impacts on amphibians and reptiles from development on the SEZ would be small (loss of $\leq 1.0\%$ of potentially suitable habitats identified for the species in the SEZ region). With implementation of programmatic design features, indirect impacts would be expected to be negligible.	<p>Avoid the ephemeral washes and dry lakebed in the southwestern portion of the SEZ.</p> <p>Indirect impacts should be reduced by implementing design features and engineering controls that reduce runoff, sedimentation, spills, and fugitive dust.</p>
Wildlife: Birds ^b	Direct impacts on bird species would be small (loss of $\leq 1.0\%$ of potentially suitable habitats identified for the species in the SEZ region) for all but one species (Le Conte’s thrasher would experience moderate impacts, with 1.1% of potentially suitable habitat in the SEZ region lost).	The requirements contained within the 2010 Memorandum of Understanding between the BLM and USFWS to promote the conservation of migratory birds will be followed.

TABLE 13.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Escalante Valley SEZ	SEZ-Specific Design Features
Wildlife: Birds ^b (Cont.)	Other impacts on birds could result from collision with vehicles and infrastructure (e.g., buildings and fences), surface-water and sediment runoff from disturbed areas, fugitive dust generated by project activities, noise, lighting, spread of invasive species, accidental spills, and harassment.	<p>Take of golden eagles and other raptors should be avoided. Mitigation regarding the golden eagle should be developed in consultation with the USFWS and UDWR. A permit may be required under the Bald and Golden Eagle Protection Act.</p> <p>The steps outlined in the <i>Utah Field Office Guidelines for Raptor Protection from Human and Land Use Disturbances</i> should be followed.</p> <p>Ephemeral washes and the dry lakebed in the southwestern portion of the SEZ should be avoided.</p>
Wildlife: Mammals ^b	<p>Direct impacts on big game, small game, furbearers, and small mammals from habitat disturbance and long-term habitat reduction/fragmentation would be small (loss of $\leq 1.0\%$ of potentially suitable habitats identified for the species in the SEZ region).</p> <p>The pronghorn is the only big game species with crucial habitat contained within the SEZ; however, direct impacts could occur to only about 0.3% of crucial habitat; thus impacts on pronghorn would be expected to be small.</p>	<p>The fencing around the solar energy development should not block the free movement of mammals, particularly big game species.</p> <p>Avoid the ephemeral washes and dry lakebed in the southwestern portion of the SEZ.</p> <p>Indirect impacts should be reduced by implementing design features and engineering controls that reduce runoff, sedimentation, spills, and fugitive dust.</p>
Aquatic Biota ^b	Because there are no intermittent or permanent water bodies, streams, or wetlands present within the boundaries of either the Escalante Valley SEZ or the presumed access road and transmission line corridors, there would be no direct impacts on aquatic habitats or aquatic biota. Likewise, indirect effects to aquatic habitats would be unlikely because there are no perennial aquatic habitats within 13 mi (21 km) of the SEZ or within approximately 2 mi (3 km) of the access road corridor.	None.

TABLE 13.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Escalante Valley SEZ	SEZ-Specific Design Features
Special Status Species ^b	Potentially suitable habitat for 18 special status species occurs in the affected area of the Escalante Valley SEZ. For all of these special status species, <1% of the potentially suitable habitat in the region occurs in the area of direct effects.	<p>Pre-disturbance surveys should be conducted within the SEZ to determine the presence and abundance of special status species. Disturbance to occupied habitats for these species should be avoided, or impacts on occupied habitats minimized to the extent practicable. If avoiding or minimizing impacts on occupied habitats is not possible for some species, translocation of individuals from areas of direct effect; or compensatory mitigation of direct effects on occupied habitats could reduce impacts. A comprehensive mitigation strategy for special status species that used one or more of these options to offset the impacts of development should be developed in coordination with the appropriate federal and state agencies.</p> <p>Avoidance of pinyon-juniper and oak/mahogany woodlands in the area of direct effects could reduce impacts on two special status species.</p> <p>Consultation with the USFWS and the UDWR should be conducted to address the potential for impacts on the Utah prairie dog, a species listed as threatened under the ESA. Consultation would identify an appropriate survey protocol, avoidance measures, and, if appropriate, reasonable and prudent alternatives, reasonable and prudent measures, and terms and conditions for incidental take statements.</p>

TABLE 13.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Escalante Valley SEZ	SEZ-Specific Design Features
Special Status Species ^b (Cont.)		<p>Coordination with the USFWS and the UDWR should be conducted to address the potential for impacts on the greater sage-grouse, a candidate species for listing under the ESA. Coordination would identify an appropriate pre-disturbance survey protocol, avoidance measures, and any potential compensatory mitigation actions.</p> <p>Harassment or disturbance of special status species and their habitats in the affected area should be mitigated. This can be accomplished by identifying any additional sensitive areas and implementing necessary protection measures based upon consultation with the USFWS and UDWR.</p>
Air Quality and Climate	<p><i>Construction:</i> Temporary exceedances of AAQS for PM₁₀ and PM_{2.5} at the SEZ boundaries possible during construction; higher concentrations would be limited to the immediate area surrounding the SEZ boundary and would decrease quickly with distance. In addition, construction emissions from the engine exhaust from heavy equipment and vehicles could cause some impacts on air quality-related values (e.g., visibility and acid deposition) at the nearest federal Class I area, Zion NP, which is not located directly downwind of prevailing winds, but would be temporary in nature.</p> <p><i>Operations:</i> Positive impact due to avoided emission of air pollutants from combustion-related power generation: 2.8 to 5.0% of total emissions of SO₂, NO_x, Hg, and CO₂ from electric power systems in the state of Utah avoided (up to 1,845 tons/yr of SO₂, 3,528 tons/yr of NO_x, 0.007 tons/yr of Hg, and 2,000,000 tons/yr of CO₂).</p>	None.

TABLE 13.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Escalante Valley SEZ	SEZ-Specific Design Features
Visual Resources	<p>The SEZ is in an area of low scenic quality. Residents, workers, and visitors to the area may experience visual impacts from solar energy facilities located within the SEZ (as well as any associated access roads and transmission lines) as they travel area roads. Residents nearest to the SEZ could be subjected to large visual impacts from solar energy development within the SEZ.</p> <p>The SEZ and surrounding lands within the SEZ viewshed would incur large visual impacts due to major modification of the character of the existing landscape.</p> <p>Utility-scale solar energy development within the proposed Escalante Valley SEZ is unlikely to cause even moderate visual impacts on highly sensitive visual resource areas, the closest of which is more than 6 mi (10 km) from the SEZ. The closest community is approximately 15 mi (24 km) from the SEZ and is likely to experience minimal visual impacts from solar development within the SEZ.</p> <p>The communities of Modena, Enterprise, and Newcastle are located within the 25-mi (40-km) viewshed of the SEZ. Slight variations in topography and vegetation provide some screening. Visual impacts on these communities would be expected to be minimal.</p>	None.
Acoustic Environment	<p><i>Construction.</i> For construction activities occurring near the nearest residences (about 1.1 mi [1.8 km]) beyond the northwestern SEZ boundary, estimated noise levels at these residences would be about 42 dBA, which is below the Iron County regulation of 50 dBA for a solar facility but a little higher than typical daytime mean rural background level of 40 dBA.</p>	<p>Noise levels from cooling systems equipped with TES should be managed so that levels at the nearest residences to the northwest of the SEZ are kept within applicable guidelines. This could be accomplished in several ways, for example, through placing the power block approximately 1 to 2 mi (1.6 to 3 km) or more from residences, limiting operations to a few hours after sunset, and/or installing fan silencers.</p>

TABLE 13.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Escalante Valley SEZ	SEZ-Specific Design Features
Acoustic Environment (Cont.)	<p><i>Operations.</i> For a facility located near the northwestern corner of the SEZ, the predicted noise level for parabolic trough or power tower technologies would be about 40 dBA at the nearest residences, located about 1.1 mi (1.8 km) from the SEZ boundary, which is lower than the Iron County regulation of 50 dBA and the same as typical daytime mean rural background levels of 40 dBA. However, in the case of 6-hour TES, the estimated nighttime noise level at the nearest residences would be 50 dBA, which is equivalent to the Iron County regulation of 50 dBA but much higher than typical nighttime mean rural background levels of 30 dBA. The day-night average noise level is estimated to be about 52 dBA L_{dn}, which is lower than the EPA guideline of 55 dBA for residential areas.</p> <p>If 80% of the SEZ were developed with dish engine facilities, the estimated noise level of 45 dBA at the nearest residences would be lower than the Iron County regulation of 50 dBA but higher than a typical daytime mean rural background level of 40 dBA. Assuming 12-hour daytime operation, the estimated 44 dBA L_{dn} at these residences would be well below the EPA guideline of 55 dBA L_{dn} for residential areas.</p>	Dish engine facilities within the Escalante Valley SEZ should be located more than 1 to 2 mi (1.6 to 3 km) from the nearest residences (i.e., the facilities should be located in the eastern or southwestern area of the proposed SEZ). Direct noise control measures applied to individual dish engine systems could also be used to reduce noise impacts at nearby residences.
Paleontological Resources	Few, if any, impacts on significant paleontological resources are likely to occur in the proposed Escalante Valley SEZ or in the additional ROWs for the associated access road and transmission line. However, a more detailed look at the geological deposits of the SEZ and within the ROWs is needed to determine whether a paleontological survey is warranted.	None.

TABLE 13.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Escalante Valley SEZ	SEZ-Specific Design Features
Cultural Resources	<p>Direct impacts on significant cultural resources could occur during site preparation and construction activities in the proposed SEZ. A cultural resource survey of the entire area of potential effect would first be required to identify archaeological sites, historic structures and features, and traditional cultural properties, and an evaluation would follow to determine whether any are eligible for listing in the NRHP.</p> <p>The proposed SEZ has a high potential for containing archeological sites in the dune area in the southwest portion of the SEZ.</p> <p>The potential for direct impacts on cultural resources from access road construction from the southwest corner of the SEZ to State Route 56 exists, but would depend on the results of a cultural resources survey.</p>	<p>SEZ-specific design features would be determined in consultation with the Utah SHPO and affected Tribes.</p> <p>Avoidance of the dune area within the southwest portion of the proposed SEZ is recommended.</p>
Native American Concerns	<p>While no specific concerns regarding the proposed Escalante Valley SEZ have been expressed, as consultation with the Tribes continues and project-specific analyses are undertaken, it is possible that Native American concerns over potential effects of solar energy development within the SEZ will emerge.</p>	<p>The need for and nature of SEZ-specific design features would be determined during government-to-government consultation with the affected Tribes.</p>
Socioeconomics	<p><i>Construction of solar facilities within the SEZ:</i> 264 to 3,518 total jobs; \$13.4 million to \$177.6 million income in ROI for facilities in the SEZ. Ten total jobs and \$0.4 million in total income for peak-year transmission line construction.</p> <p><i>Operations of solar facilities within the SEZ:</i> 16 to 380 annual total jobs; \$0.5 million to \$11.6 million annual income in the ROI for facilities in the SEZ. No jobs and less than \$0.1 million total income annually for transmission line operation.</p> <p><i>Construction of new transmission line:</i> 15 total jobs; \$0.6 million income.</p> <p><i>Construction of access road:</i> 346 total jobs; \$10 million income.</p>	<p>None.</p>

TABLE 13.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Escalante Valley SEZ	SEZ-Specific Design Features
Environmental Justice	<p>Low-income populations, as defined by CEQ guidelines, occur within the 50-mi (80-km) radius around the boundary of the SEZ; therefore, although impacts are likely to be small, any adverse impacts of solar projects could disproportionately affect low-income populations.</p> <p>Because there are no minority populations within the 50-mi (80-km) radius, according to CEQ guidelines, there would be no impacts on minority populations.</p>	None.
Transportation	<p>The primary transportation impacts would be from commuting worker traffic. Single projects could involve up to 1,000 workers each day, with an additional 2,000 vehicle trips per day (maximum).</p>	None.

Abbreviations: AAQS = ambient air quality standards; AQRV = air quality-related value; AUM = animal unit month; CEQ = Council on Environmental Quality; CO₂ = carbon dioxide; dBA = A-weighted decibel; EPA = U.S. Environmental Protection Agency; ESA = Endangered Species Act; Hg = mercury; L_{dn} = day-night average sound level; NO_x = nitrogen oxides; NP = National Park; NRHP = *National Register of Historic Places*; PM_{2.5} = particulate matter with an aerodynamic diameter of 2.5 μm or less; PM₁₀ = particulate matter with an aerodynamic diameter of 10 μm or less; PV = photovoltaic; ROI = region of influence; ROW = right-of-way; SEZ = solar energy zone; SO₂ = sulfur dioxide; TES = thermal energy storage; UDWR = Utah Division of Wildlife Resources; USFWS = U.S. Fish and Wildlife Service.

- a The detailed programmatic design features for each resource area to be required under BLM’s Solar Energy Program are presented in Appendix A, Section A.2.2. These programmatic design features would be required for development in the proposed Escalante Valley SEZ.
- b The scientific names of all plants, wildlife, aquatic biota, and special status species are provided in Sections 13.1.10 through 13.1.12.

1 Section 13.1.22 discusses potential cumulative impacts from solar energy development in the
2 proposed SEZ.
3

4 Only those design features specific to the proposed Escalante Valley SEZ are included in
5 Sections 13.1.2 through 13.1.21 and in the summary table. The detailed programmatic design
6 features for each resource area to be required under BLM's Solar Energy Program are presented
7 in Appendix A, Section A.2.2. These programmatic design features would also be required for
8 development in this and other SEZs.
9

10

1 **13.1.2 Lands and Realty**

2
3
4 **13.1.2.1 Affected Environment**

5
6 The proposed Escalante Valley SEZ is located in an area of fragmented public land
7 ownership, and numerous parcels of both state and private land abut portions of the area. The
8 overall character of the land around the SEZ area is rural and undeveloped. There are no surface
9 water resources within the SEZ, but areas with irrigated agriculture served by either surface or
10 groundwater sources are located within 10 mi (16 km). Access to Escalante Valley is via county
11 roads and numerous dirt roads. A railroad spur runs through the eastern edge of the SEZ. Iron
12 County has asserted Revised Statute 2477 Class B and D road ROWs within the Escalante
13 Valley SEZ.

14
15 In the Escalante Valley SEZ, there are existing ROWs for two small electric lines and for
16 a railroad. As of February 2010, there were no applications for solar facility ROWs on BLM-
17 administered lands in the vicinity of the Escalante Valley SEZ or in the state of Utah. There is
18 a 138-kV transmission line that ends about 3 mi (5 km) south of the SEZ, and there is a 2-mi
19 (3-km) wide Section 368 (of the Energy Policy Act of 2005) designated energy corridor about
20 4 mi (6 km) southeast of the area.

21
22
23 **13.1.2.2 Impacts**

24
25
26 ***13.1.2.2.1 Construction and Operations***

27
28 Full development of the proposed Escalante Valley SEZ could disturb up to 5,291 acres
29 (21 km²) (Table 13.1.1.2-1). Development of the SEZ for utility-scale solar energy production
30 would establish a large industrial area that would exclude many existing and potential uses of the
31 land, perhaps in perpetuity. Since the SEZ is undeveloped and rural, utility-scale solar energy
32 development would be a new and discordant land use to the area. It also is possible that with
33 landowner agreement, the state and private lands adjacent to the SEZ would be developed in the
34 same or a complementary manner as the public lands. Development of additional industrial or
35 support activities also could be induced on additional state and private lands near the SEZ.

36
37 Existing ROW authorizations on the SEZ would not be affected by solar energy
38 development because they are prior rights. Should the proposed SEZ be identified as an SEZ
39 in the Record of Decision (ROD) for this programmatic environmental impact statement (PEIS),
40 the BLM would still have discretion to authorize additional ROWs in the area until solar energy
41 development was authorized, and then future ROWs would be subject to the rights granted for
42 solar energy development. Because the area currently has so few ROWs, it is not anticipated that
43 approval of solar energy development would have a significant impact on ROW availability in
44 the area.

1 **13.1.2.2.2 Transmission Facilities and Other Off-Site Infrastructure**
2

3 Delivery of energy produced in the SEZ would require establishing connection to the
4 regional grid; for analysis it is assumed that connection would be made to the existing 138-kV
5 transmission line located south of the SEZ, since this line might be available to transport the
6 power produced in this SEZ (see Section 13.1.1.2 for a description of analysis assumptions). This
7 connection would likely cross private, state, and BLM-administered lands and could disturb as
8 much as 91 acres (0.37 km²).
9

10 At full build-out capacity, it is clear that additional new transmission lines and/or
11 upgrades of existing transmission lines would be required to bring electricity from the proposed
12 Escalante Valley SEZ to load centers; however, at this time, the location and size of such new
13 transmission facilities is unknown. Generic impacts of transmission and associated infrastructure
14 construction and of line upgrades for various resources are discussed in Chapter 5. Project-
15 specific analyses would need to identify the specific impacts of new transmission construction
16 and line upgrades for any solar projects requiring additional transmission capacity.
17

18 Because the SEZ is 15 mi (24 km) from the nearest state highway, it is assumed that a
19 new road would need to be constructed to State Route 56 south of the SEZ, disturbing
20 approximately 109 acres (0.44 km²) of land, most of which is private land. Existing county roads
21 also could provide access to the SEZ, but upgrades to these roads may be required to support
22 construction and operation. Roads and transmission lines would also be constructed within the
23 SEZ to facilitate development of the area.
24
25

26 **13.1.2.3 SEZ-Specific Design Features and Design Feature Effectiveness**
27

28 Implementing the programmatic design features described in Appendix A, Section A.2.2,
29 as required under BLM’s Solar Energy Program would provide adequate mitigation for some
30 identified impacts. The exceptions may be impacts related to the exclusion of many existing and
31 potential uses of the public land, perhaps in perpetuity; the visual impact of an industrialized-
32 looking solar facility within an otherwise rural area; and any induced changes in land use on
33 private and State lands.
34

35 The following is a proposed design feature specific to the proposed SEZ.

- 36
- 37 • Priority consideration should be given to utilizing existing roads to provide
38 construction and operational access to the SEZ.
39

1 **13.1.3 Specially Designated Areas and Lands with Wilderness Characteristics**
2
3

4 **13.1.3.1 Affected Environment**
5

6 There are two specially designated areas near the proposed SEZ. The first is the route
7 of the Old Spanish National Historic Trail, which lies about 6 mi (10 km) south of the SEZ
8 (see Section 13.1.17 for the description of this area). The second is the Three Peaks SRMA,
9 which is located about 13 mi (21 km) southeast of the SEZ. The SRMA was established
10 cooperatively by the BLM and Iron County to provide recreation opportunities in the area. The
11 area contains unique volcanic rock formations and is popular for horseback riding, mountain
12 biking, and off-highway vehicle (OHV) use (see Figure 13.1.3.1-1 for locations of these areas).
13

14 The latest revision to the 1999 Utah inventory for wilderness characteristics within
15 BLM’s Cedar City district office was completed in January 2005. No lands with wilderness
16 characteristics have been identified within 25 mi (40 km) of the proposed Escalante Valley SEZ.
17
18

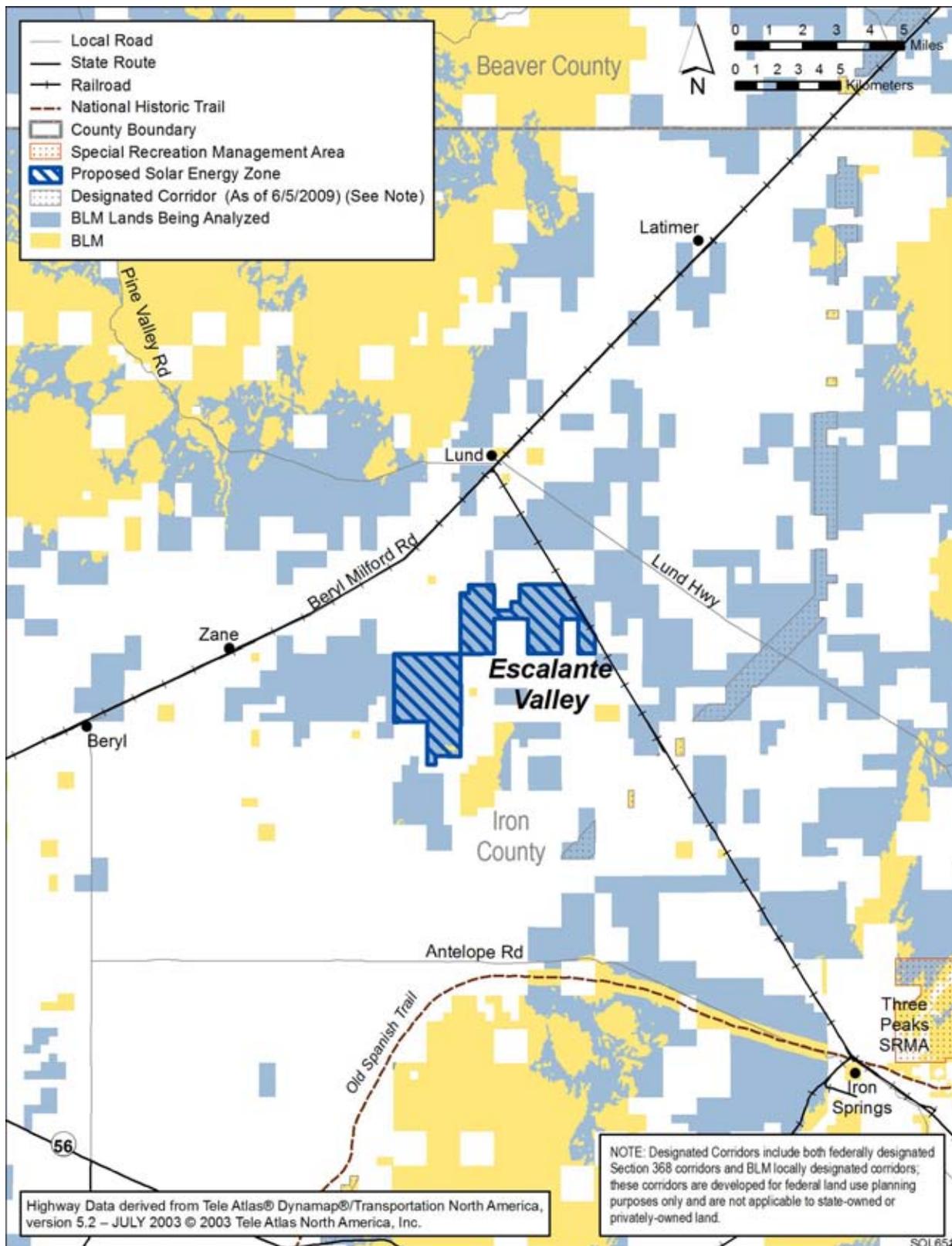
19 **13.1.3.2 Impacts**
20
21

22 ***13.1.3.2.1 Construction and Operations***
23

24 The potential impact from solar development on specially designated areas possessing
25 unique or sensitive visual resources is difficult to quantify and would vary by solar technology
26 employed, the size of area developed for solar energy, the specific area affected, and the
27 perception of individuals viewing the development. In general, the closer a viewer is to solar
28 development, the greater the apparent size and level of detail visible, usually resulting in greater
29 perceived impacts on various resources. Although impact levels are usually “banded” based on
30 distance (e.g., 0 to 5 mi, 5 to 15 mi [0 to 8 km, 8 to 24 km]), in general, actual perceived impacts
31 decrease gradually as distance increases. Additionally, dense solar development and/or large
32 solar facilities may have very large visual impacts, even at longer distances. Section 13.1.14
33 provides a more thorough discussion of the potential visual impacts associated with solar energy
34 development.
35

36 The viewing height above a solar development area also is important to perceived impact
37 levels, as higher-elevation viewpoints show more of the facilities, make the regular, man-made
38 geometry of the solar arrays more apparent, and can cause increased incidence of glare and other
39 reflections from the facilities. An individual viewer’s expectations can also influence perceived
40 impacts. For example, recreationists seeking a wilderness experience would likely be more
41 adversely affected by the sight of intensive solar development than workers traveling along the
42 highway for commuting purposes.
43

44 The occurrence of glint and glare at solar facilities could potentially cause large, but
45 temporary, increases in brightness and visibility of the facilities. The visual contrast levels
46 projected for sensitive visual resource areas that were used to assess potential impacts on
47 specially designated areas do not account for potential glint and glare effects; however, these



1
 2 **FIGURE 13.1.3.1-1 Specially Designated Areas in the Vicinity of the Proposed Escalante**
 3 **Valley SEZ**

1 effects would be incorporated into a future site- and project-specific assessment that would be
2 conducted for specific proposed utility-scale solar energy projects.

3
4 Depending on the specific location within the SEZ and the solar technology deployed,
5 solar development may be visible from portions of the route of the Old Spanish National Historic
6 Trail. Because the nearest boundary of the SEZ is about 6 mi (10 km) from the route of the trail,
7 it is not anticipated that there would be any adverse impacts on the management of the trail.

8
9 At the closest point, the Three Peaks SRMA is about 13 mi (21 km) from the border of
10 the SEZ, and visitors in about 28% of the SRMA would have a clear but long-distance view of
11 solar development within the SEZ. Because of the distance from the SEZ, the visual contrast
12 caused by solar development would be very weak, and it is anticipated that there would be no
13 impact on visitor use within the SRMA from solar development in the SEZ.

14 15 16 ***13.1.3.2 Transmission Facilities and Other Off-Site Infrastructure***

17
18 Construction of a new transmission line would add up to 91 acres (0.37 km²) of surface
19 disturbance, and construction of an access road to State Route 56 would add about 109 acres
20 (0.44 km²) of surface disturbance to the impact associated with the SEZ facilities. The road and
21 power line would not be sufficiently close to sensitive areas to be likely to cause additional
22 adverse impacts on specially designated areas.

23 24 25 **13.1.3.3 SEZ-Specific Design Features and Design Feature Effectiveness**

26
27 No SEZ-specific design features would be required. Implementing the programmatic
28 design features described in Appendix A, Section A.2.2, as required under BLM's Solar Energy
29 Program would provide adequate mitigation for specially designated areas.

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1 **13.1.4 Rangeland Resources**

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3 Rangelands resources include livestock grazing and wild horses and burros, both of
4 which are managed by the BLM. These resources and possible impacts on them from solar
5 development within the proposed Escalante Valley SEZ are discussed in Sections 13.1.4.1
6 and 13.1.4.2.

7
8
9 **13.1.4.1 Livestock Grazing**

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11
12 **13.1.4.1.1 Affected Environment**

13
14 Grazing is currently authorized for the Butte allotment on the proposed Escalante Valley
15 SEZ. Table 13.1.4.1-1 summarizes the size of the grazing allotment, along with the percentage of
16 the allotment that lies within the SEZ. The allotment is used by two permittees and supports the
17 production of 541 animal unit months (AUMs) of forage per year. These AUMs are allocated to
18 cattle.

19
20
21 **13.1.4.1.2 Impacts**

22
23
24 **Construction and Operations**

25
26 Should utility-scale solar development occur in this SEZ, grazing would be excluded
27 from the areas that would be developed, as provided for in the BLM grazing regulations
28 (43 CFR 4100). This would include reimbursement of permittees for their portion of the
29 value for any range improvements in the area removed from the grazing allotment. The
30
31

TABLE 13.1.4.1-1 Grazing Allotments within the Proposed Escalante Valley SEZ

Allotment	Total Acres ^a	Percentage of the Total in SEZ ^b	Active BLM AUMs	Number of Permittees in the Allotment
Butte	32,258 (131 km ²)	20	541	2

^a Includes all federal, state, and private acreage in the allotment.

^b Represents the percentage of public land in the allotment within the SEZ.

Source: Data were derived from BLM (2009a) and are for the 2008 grazing year since these are the most current data available.

1 impact of this change on the grazing permits would depend on several factors: (1) how much of
2 the allotment each permittee might lose to the development, (2) how important the specific land
3 lost is to each permittee's overall operation, and (3) the amount of actual forage production that
4 would be lost by each permittee. On the basis of an assumed loss of AUMs comparable to the
5 percentage of the allotment included in the SEZ, a total of 109 AUMs could be lost from the
6 allotment. Section 13.1.19 provides more information on the economic impact of the loss of
7 grazing capacity.
8

9 Defining the impacts on individual grazing permits and permittees would require a
10 specific analysis of each case on the basis of, at a minimum, the three factors identified above.
11 For this PEIS and on the basis of an assumed loss of 109 AUMs as described above, there would
12 be no significant impact on livestock use within the Cedar City Field Office from the designation
13 and development of the Escalante Valley SEZ. This conclusion was derived from comparison of
14 the loss of the 109 AUMs with the total BLM-authorized AUMs in the Cedar City Field Office
15 for grazing year 2008, which totaled 139,998 AUMs. While small from an overall perspective,
16 the loss of 20% of the AUMS from a relatively small livestock operation could have a significant
17 impact on specific permittees, depending how important the public lands in the allotment are to
18 their overall livestock operation and whether or not any mitigation of the loss (e.g., new range
19 improvements) could be accomplished on the remaining public lands in the allotment.
20

21 Although the degree of impact on the permittees in this allotment would vary with their
22 individual situations, there would be an adverse economic impact on each of them from the loss
23 of use of a portion of the allotment. It is possible that solar energy development proponents could
24 pay livestock operators for the loss of all or portions of the existing grazing permits and range
25 improvements for the allotment to facilitate solar operations and to minimize the impact on
26 existing permittees; however, that is not required by BLM regulations.
27
28

29 **Transmission Facilities and Other Off-Site Infrastructure**

30

31 Construction of a new transmission line would add about 91 acres (0.37 km²) of surface
32 disturbance and would cross a small portion of the Butte grazing allotment. Construction of an
33 access road to State Route 56, depending on the terminus of the connection, would disturb an
34 additional area of 15 acres (0.06 km²) within the Butte allotment, but most of the road would be
35 on lands that are not included within a grazing allotment. The total disturbance of 106 acres
36 (0.43 km²) is so small compared to the size of the Butte allotment there would be no additional
37 impact on grazing use.
38
39

40 ***13.1.4.1.3 SEZ-Specific Design Features and Design Feature Effectiveness***

41

42 Implementing the programmatic design features described in Appendix A, Section A.2.2,
43 as required under BLM's Solar Energy Program would provide some mitigation for some
44 identified impacts. The exception would be any adverse economic impact on the grazing
45 permittees.
46

1 The following is a proposed design feature specific to the proposed SEZ:
2

- 3 • Consideration should be given to the feasibility of replacing all or part of the
4 lost AUMs through changes in grazing management or in development of
5 additional range improvements on public lands remaining in the allotment.
6

7 8 **13.1.4.2 Wild Horses and Burros**

9 10 ***13.1.4.2.1 Affected Environment***

11
12
13 Section 4.4.2 discusses wild horses (*Equus caballus*) and burros (*E. asinus*) that occur
14 within the six-state study area. Nineteen wild horse and burro herd management areas (HMAs)
15 occur within Utah. Figure 13.1.4.2-1 shows the location of the HMAs within the proposed
16 Escalante Valley SEZ region. The SEZ is about 7 mi (11 km) south of the Four Mile HMA and
17 6 mi (10 km) north of the Chloride Canyon HMA.
18

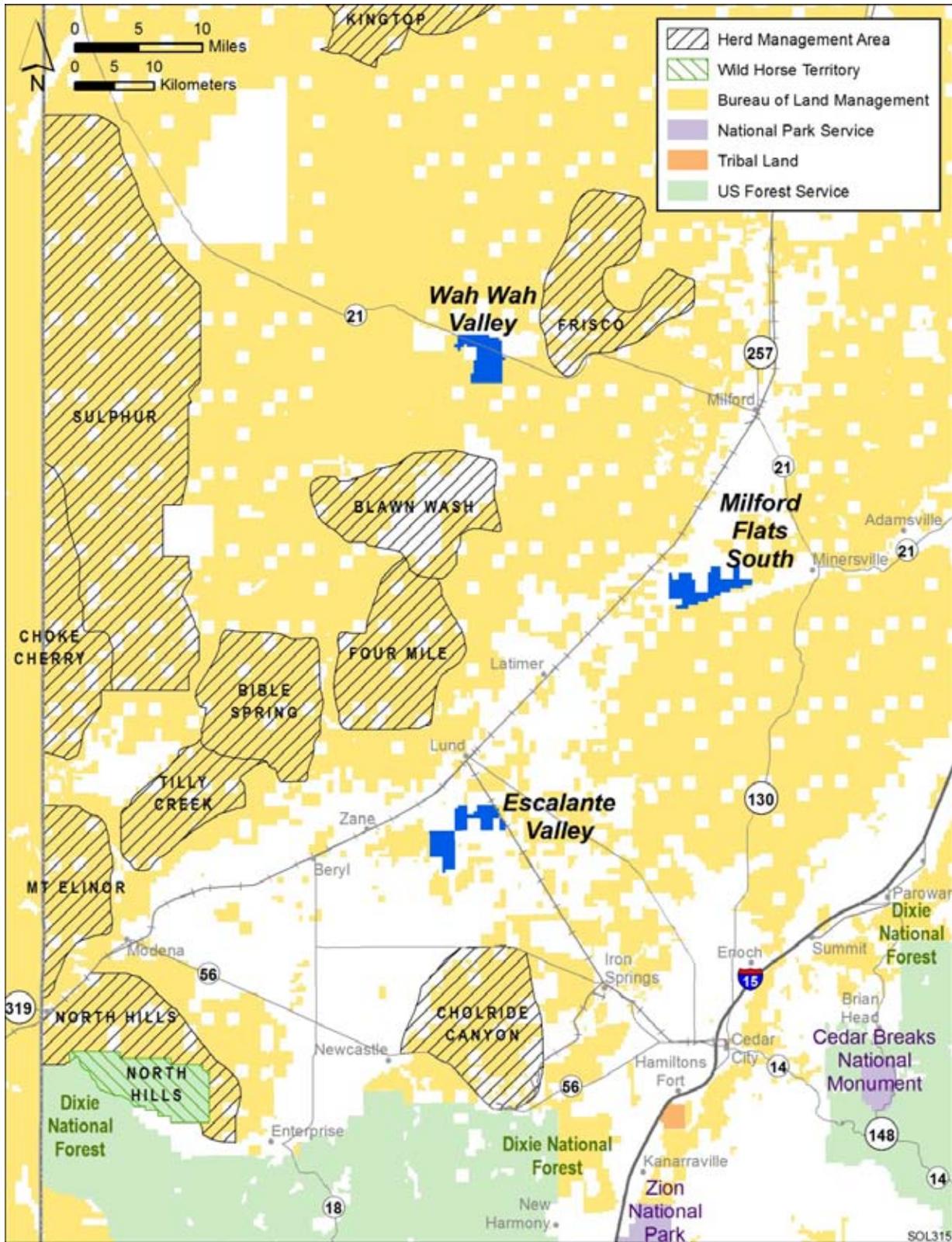
19 In addition to the BLM-managed HMAs, the U.S. Forest Service (USFS) has
20 51 established wild horse and burro territories in Arizona, California, Nevada, New Mexico,
21 and Utah and is the lead management agency that administers 37 of the territories (Giffen 2009;
22 USFS 2007). The closest territory to the proposed Utah SEZs is the North Hills Territory within
23 Dixie National Forest. This territory is adjacent to the North Hills HMA managed by the BLM
24 and is located southwest of the SEZ (Figure 13.1.4.2-1). The proposed Escalante Valley SEZ is
25 more than 24 mi (39 km) from the North Hills Territory.
26

27 28 ***13.1.4.2.2 Impacts***

29
30 Because the proposed Escalante Valley SEZ is 6 mi (10 km) or more from any wild horse
31 and burro HMA managed by the BLM and more than 24 mi (39 km) from any wild horse and
32 burro territory administered by the USFS, solar energy development within the SEZ would not
33 affect any wild horses and burros managed by these agencies.
34

35 36 ***13.1.4.2.3 SEZ-Specific Design Features and Design Feature Effectiveness***

37
38 No SEZ-specific design features would be necessary to protect or minimize impacts
39 on wild horses and burros due to solar energy development within the proposed Escalante
40 Valley SEZ.



1
 2 **FIGURE 13.1.4.2-1 Wild Horse and Burro Herd Management Areas and Territories within the**
 3 **SEZ Region for the Proposed Escalante Valley SEZ (Sources: BLM 2009b; USFS 2007)**

1 **13.1.5 Recreation**

2
3
4 **13.1.5.1 Affected Environment**

5
6 The site of the proposed Escalante Valley SEZ is flat, and its unremarkable nature offers
7 little potential for recreation use. The area would not be expected to attract recreational visitors
8 from outside the area; however, it may be used by local residents for general outdoor recreation,
9 including backcountry driving and OHV use, recreational shooting, and small and big game
10 hunting. Site visits in September 2009 showed signs of recent vehicle and OHV use. The SEZ
11 area has not been designated for vehicle travel in a BLM land use plan but will be considered in
12 the upcoming revision of the land use plans in the Cedar City Field Office.
13

14
15 **13.1.5.2 Impacts**

16
17 Recreational users would be excluded from any portions of the SEZ that are developed
18 for solar energy production. Whether recreational visitors would continue to use any remaining
19 undeveloped portions of the SEZ is unknown. Public access through areas developed for solar
20 power production could be lost unless access routes were identified and retained. It is anticipated
21 that the loss of recreational use if the SEZ were developed would be minimal.
22

23 Solar development within the SEZ would affect public access along OHV routes
24 designated open and available for public use. There may be routes designated as open within the
25 proposed SEZ. Such open routes crossing areas granted ROWs for solar facilities would be re-
26 designated as closed (see Section 5.5.1 for more details on how routes coinciding with proposed
27 solar facilities would be treated).
28

29
30 **13.1.5.3 SEZ-Specific Design Features and Design Feature Effectiveness**

31
32 No SEZ-specific design features would be required. Implementing the programmatic
33 design features described in Appendix A, Section A.2.2, as required under BLM's Solar Energy
34 Program would provide adequate mitigation for some identified impacts.
35

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1 **13.1.6 Military and Civilian Aviation**

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3

4 **13.1.6.1 Affected Environment**

5

6 The SEZ is not located under any military training routes (MTRs) or special use airspace
7 (SUA) and is not identified as a DoD consultation area in the BLM’s land records (BLM and
8 USFS 2010b).

9

10 The closest civilian municipal aviation facility is the Cedar City Regional Airport, about
11 30 mi (48 km) east-southeast of the Escalante Valley SEZ.

12

13

14 **13.1.6.2 Impacts**

15

16 On the basis of comments received from the military, there are no concerns with respect
17 to military aviation for the proposed Escalante Valley SEZ.

18

19 Because the closest municipal airport is about 30 mi (48 km) from the SEZ, no impacts
20 on civilian aviation from solar development of the SEZ are expected.

21

22

23 **13.1.6.3 SEZ-Specific Design Features and Design Feature Effectiveness**

24

25 No SEZ-specific design features would be necessary to protect military or civilian
26 aviation uses. The programmatic design features described in Appendix A, Section A.2.2, would
27 require early coordination with the DoD to identify and mitigate, if possible, potential impacts on
28 the use of MTRs.

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1 **13.1.7 Geologic Setting and Soil Resources**

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4 **13.1.7.1 Affected Environment**

5
6
7 **13.1.7.1.1 Geologic Setting**

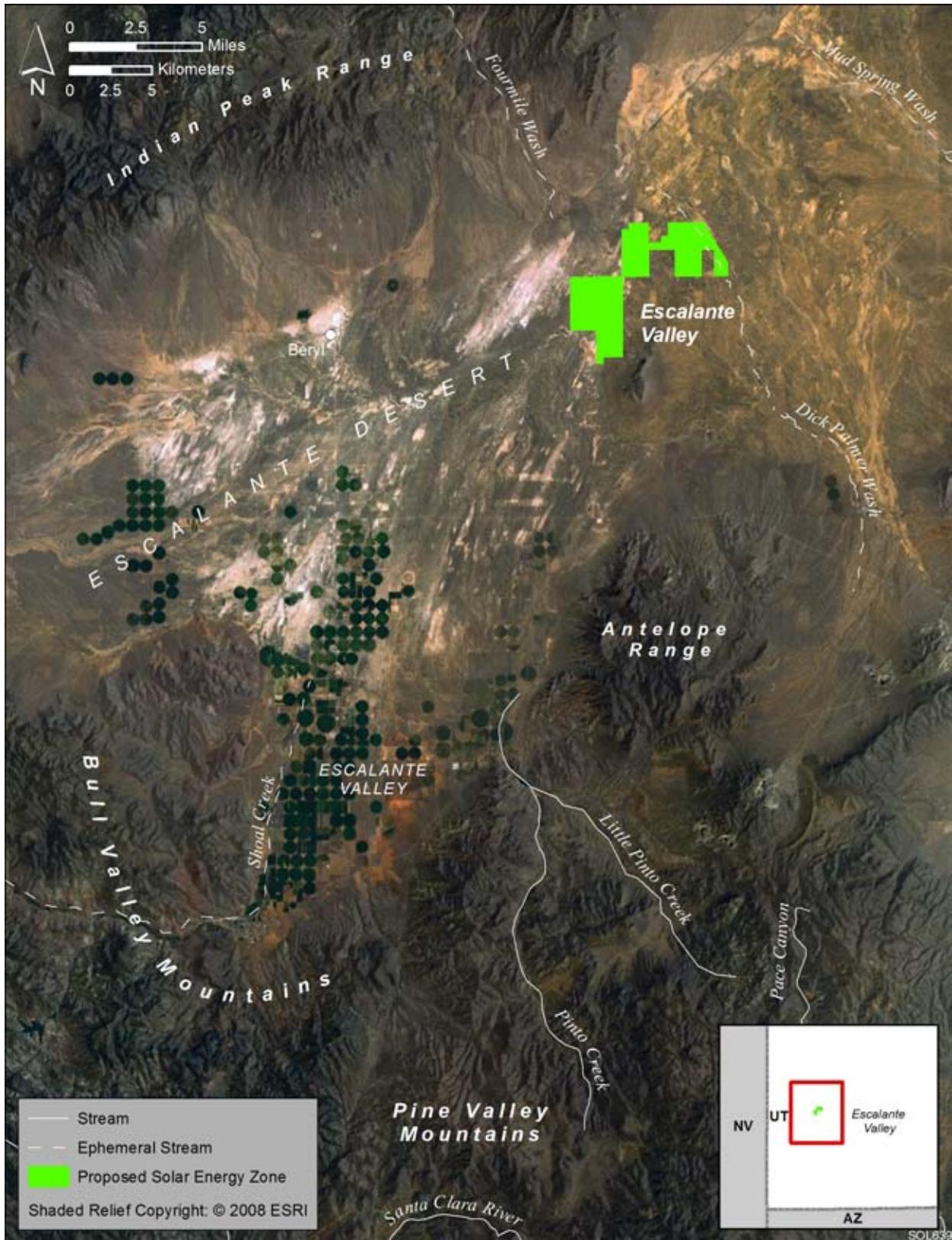
8
9
10 **Regional Setting**

11
12 The proposed Escalante Valley SEZ is located in the Escalante Desert region of the Basin
13 and Range physiographic province in southwestern Utah. The SEZ sits in Escalante Valley,
14 which occupies the southernmost portion of the Escalante Desert. Escalante Valley is surrounded
15 by the Indian Peak Range and Wah Wah Mountains on the northwest, the Bull Valley and Pine
16 Valley Mountains on the south, and the Antelope Range on the southeast. The valley opens to the
17 northeast into the Escalante Desert (Figure 13.1.7.1-1).

18
19 Escalante Valley has a long depositional history, with thick sequences of marine
20 miogeosynclinal sediments (carbonates, sandstone, siltstone, and shale) deposited throughout the
21 Late Precambrian and Paleozoic, followed by several orogenic episodes (from the Early Triassic
22 to Oligocene). Volcanic activity in southwestern Utah during the Oligocene and Miocene
23 produced extensive deposits of ignimbrites, lava flows, and volcanic breccias in the region.
24 Block faulting associated with crustal extension in the Basin and Range province began in the
25 Miocene, about 20 million years ago. The Escalante Valley SEZ overlies a large northeast-
26 trending gravity low (near Lund) that indicates the presence of a graben (Klauk and
27 Gouley 1983; Mason 1998).

28
29 Basin fill sediments are estimated to be up to 4,900 ft (1,490 m) thick, with the
30 uppermost layer consisting of lacustrine deposits of fine-grained clay, silt, and marl in the valley
31 center, intertongued with deltaic and alluvial deposits of clay, silt, sand and gravel along the
32 valley margins (Mason 1998; Lund et al. 2005). The thickness of the upper layer is estimated by
33 Gerston and Smith (1979) to range from 300 ft (90 m) near the valley margins to as much as
34 3,900 ft (1,190 m) along the valley axis. The lacustrine and deltaic sediments are associated with
35 Lake Bonneville, an ancient (Pleistocene) lake that covered most of western Utah and parts of
36 eastern Nevada and southern Idaho from 32,000 to 14,000 years ago (UGS 2010). Shoreline
37 deposits of Lake Bonneville occur at elevations up to about 5,200 ft (1,585 m) (White 1932;
38 Mason 1998). The composition of deeper sediments (greater than 3,900 ft [1,190 m]) is
39 unknown, but seismic refraction profiles indicate they are more consolidated (i.e., cemented and
40 compacted) than sediments of the upper layer. These sediments overlie basement rocks
41 composed of Precambrian gneiss (Mason 1998).

42
43 Exposed sediments in Escalante Valley are predominantly modern alluvium and Lake
44 Bonneville lacustrine deposits (Figure 13.1.7.1-2). Dune sands are common and occur along the
45 edges or in close proximity to the exposed lake deposits. The surrounding mountains are
46 composed of volcanic rocks of Tertiary and Quaternary age (Hintze 1980; Mason 1998).



1

2 **FIGURE 13.1.7.1-1 Physiographic Features of the Escalante Desert Region**

1 **Topography**

2
3 Escalante Valley is a northeast-trending basin with an area of about 1,500 mi²
4 (3,885 km²), a length of about 60 mi (100 km), and a width of 25 mi (40 km) (Lund et al. 2005).
5 Elevations along the valley axis range from about 5,740 ft (1,750 m) along the valley sides to
6 less than 5,120 ft (1,560 m) in the valley center, where the proposed Escalante Valley SEZ is
7 located. Gently sloping alluvial fan deposits occur along the mountain fronts and coalesce toward
8 the valley center. The valley center is flat except for a few sand dunes. It is drained by numerous
9 ephemeral streams.

10
11 The proposed Escalante Valley SEZ is located just north of the Antelope Range in the
12 Escalante Desert (Figure 13.1.7.1-3). Its surface is relatively flat, with elevations ranging from
13 5,094 ft (1,553 m) along the northern border of the site to 5,242 ft (1,600 m) in the southeast
14 corner of its lower portion. The highest point in the area is Table Butte, just to the southeast
15 of the SEZ, which has a maximum elevation of 5,845 ft (1,782 m). The Dick Palmer Wash
16 (flowing to the northwest across the northeast corner) and several unnamed ephemeral streams
17 cross the site.

18
19
20 **Geologic Hazards**

21
22 The types of geologic hazards that could potentially affect solar project sites and their
23 mitigation are discussed in Sections 5.7.3 and 5.7.4.2. The following sections provide a
24 preliminary assessment of these hazards at the proposed Escalante Valley SEZ. Solar project
25 developers may need to conduct a geotechnical investigation to assess geologic hazards locally
26 to better identify facility design criteria and site-specific mitigation measures to minimize their
27 risk.

28
29
30 **Seismicity.** Southwestern Utah is tectonically active. The Escalante Desert lies within the
31 Intermountain Seismic Belt (ISB), a north-trending zone of seismic activity that coincides with
32 the eastern margin of the transitional zone between the Basin and Range and Colorado Plateau
33 provinces, stretching from northwestern Montana through Wyoming, Idaho, and Utah to
34 southern Nevada and northern Arizona. The major active faults in southwestern Utah are located
35 within the ISB. Earthquake activity in southwestern Utah typically occurs in dense clusters or
36 swarms with magnitudes less than 4.0 (University of Utah 2009a; UGS 2009; Lund et al. 2007).
37 Historically, several earthquakes with magnitudes greater than 6.0 have occurred in southwestern
38 Utah. A 1992 earthquake in the St. George area (magnitude of 5.9), about 60 mi (100 km) to the
39 south of the proposed Escalante Valley SEZ, caused little damage to local buildings but triggered
40 the largest landslide known for an earthquake of its magnitude (University of Utah 2009a;
41 Christensen 1995).

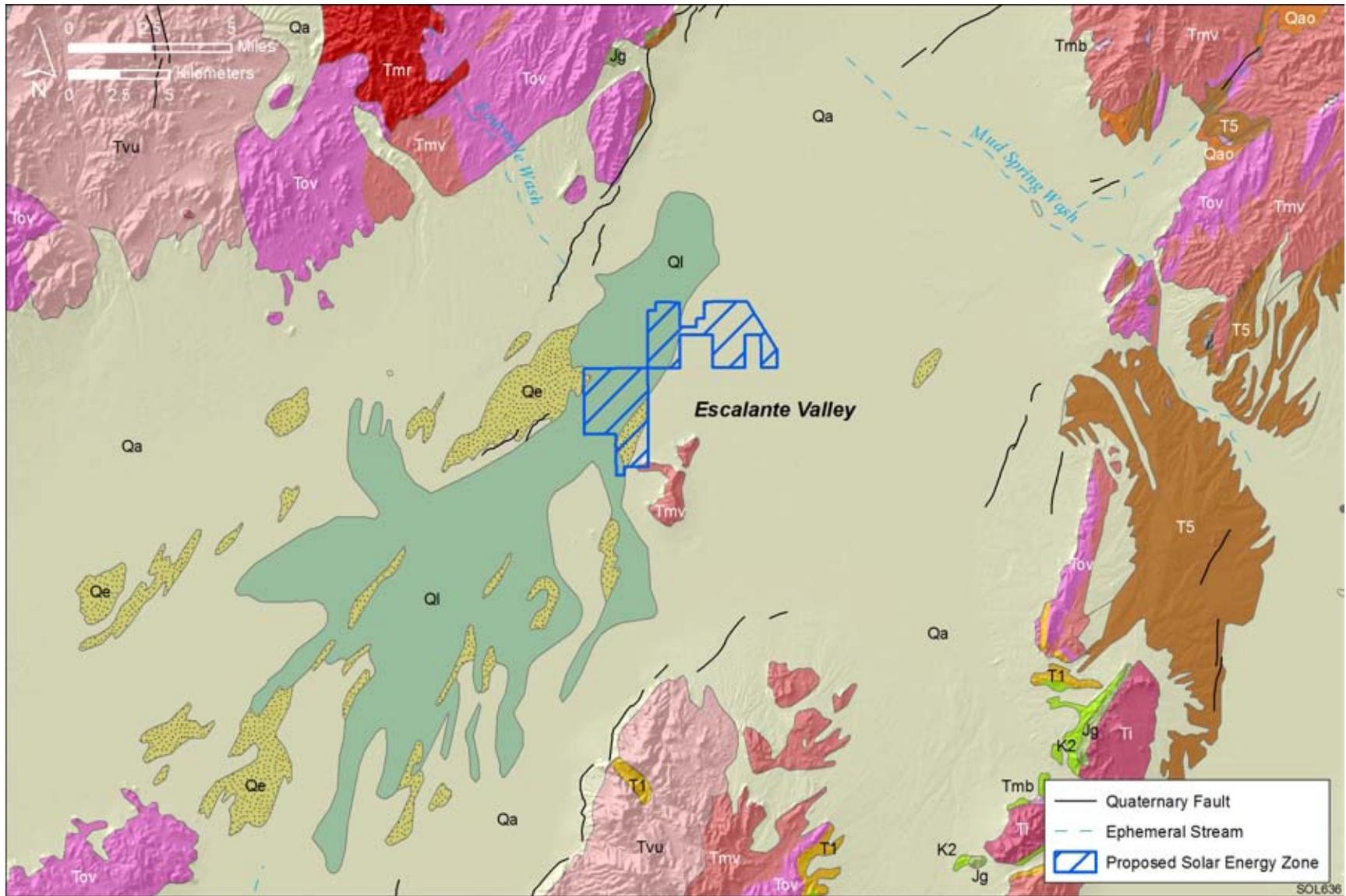


FIGURE 13.1.7.1-2 Geologic Map of the Escalante Desert Region (adapted from Ludington et al. 2007 and Hintze 1980)

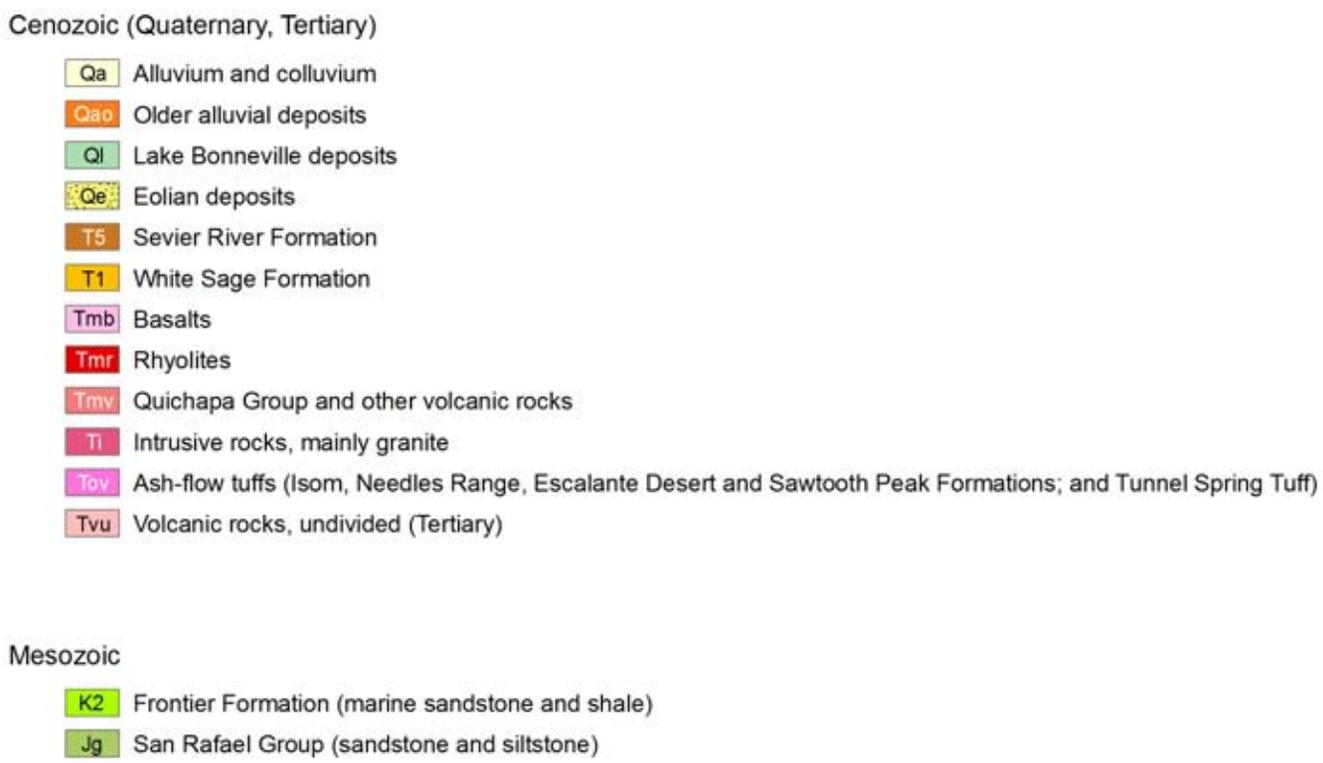


FIGURE 13.1.7.1-2 (Cont.)

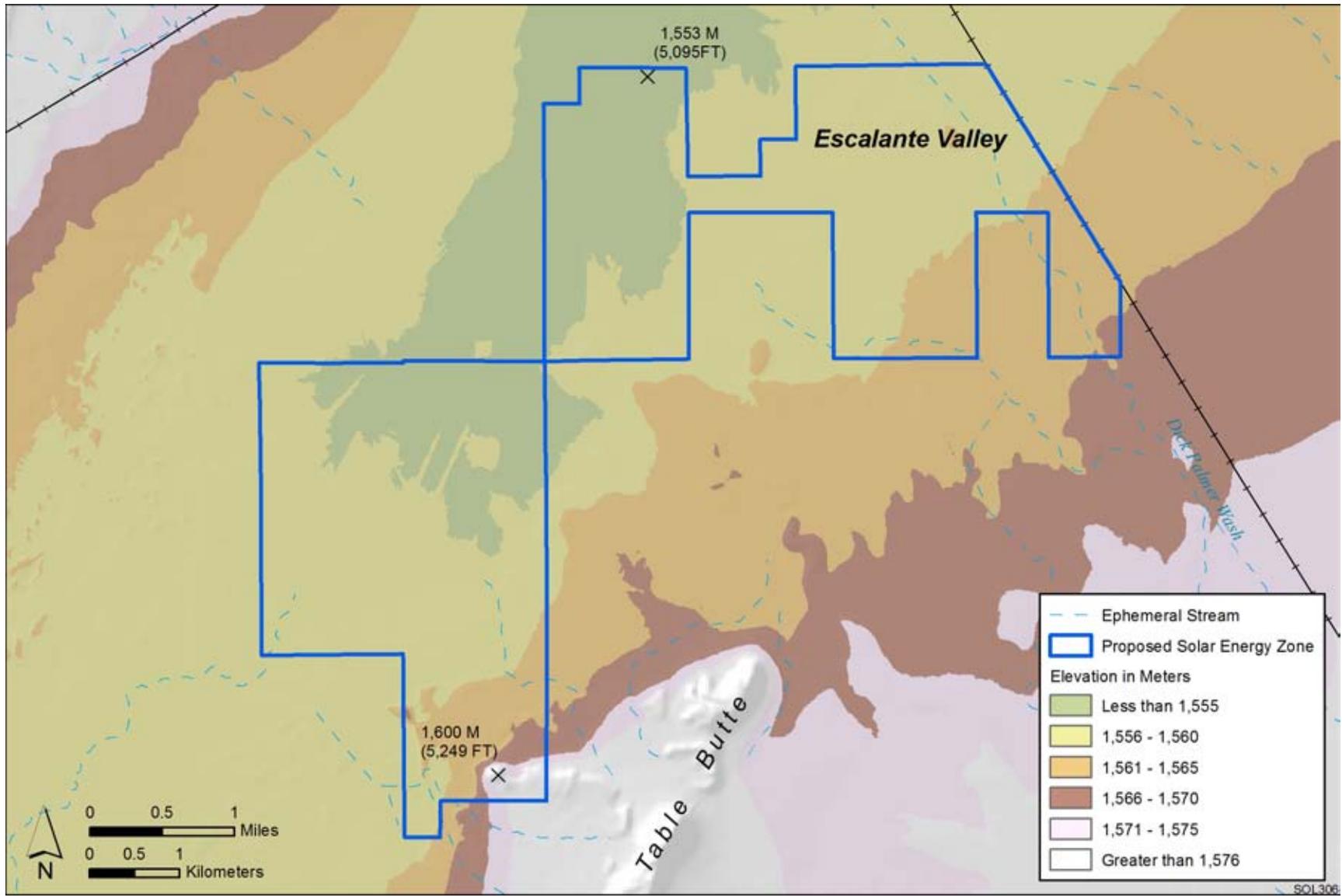


FIGURE 13.1.7.1-3 General Terrain of the Proposed Escalante Valley SEZ

1 No known Quaternary age faults occur within the proposed Escalante Valley SEZ. The
2 closest Quaternary fault is the south end of the Wah Wah Mountains fault, a north-to-northeast-
3 striking normal fault that lies about 1.7 mi (2.7 km) to the west (Figure 13.1.7.1-4). Highly
4 dissected scarps along this fault suggest multiple faulting events, the most recent less than
5 130,000 years ago (Black and Hecker 1999a). The Antelope Range fault, which runs along
6 the western front of the Antelope Range, is located about 7 mi (11 km) to the south of the
7 proposed Escalante Valley SEZ. The normal northeast-striking fault is much older and less
8 well understood than the Wah Wah Mountains fault. Movement along this fault dates to the
9 middle to late Pleistocene (between 17,000 and 750,000 years ago) (Hecker 1993; Black and
10 Hecker 1999b).

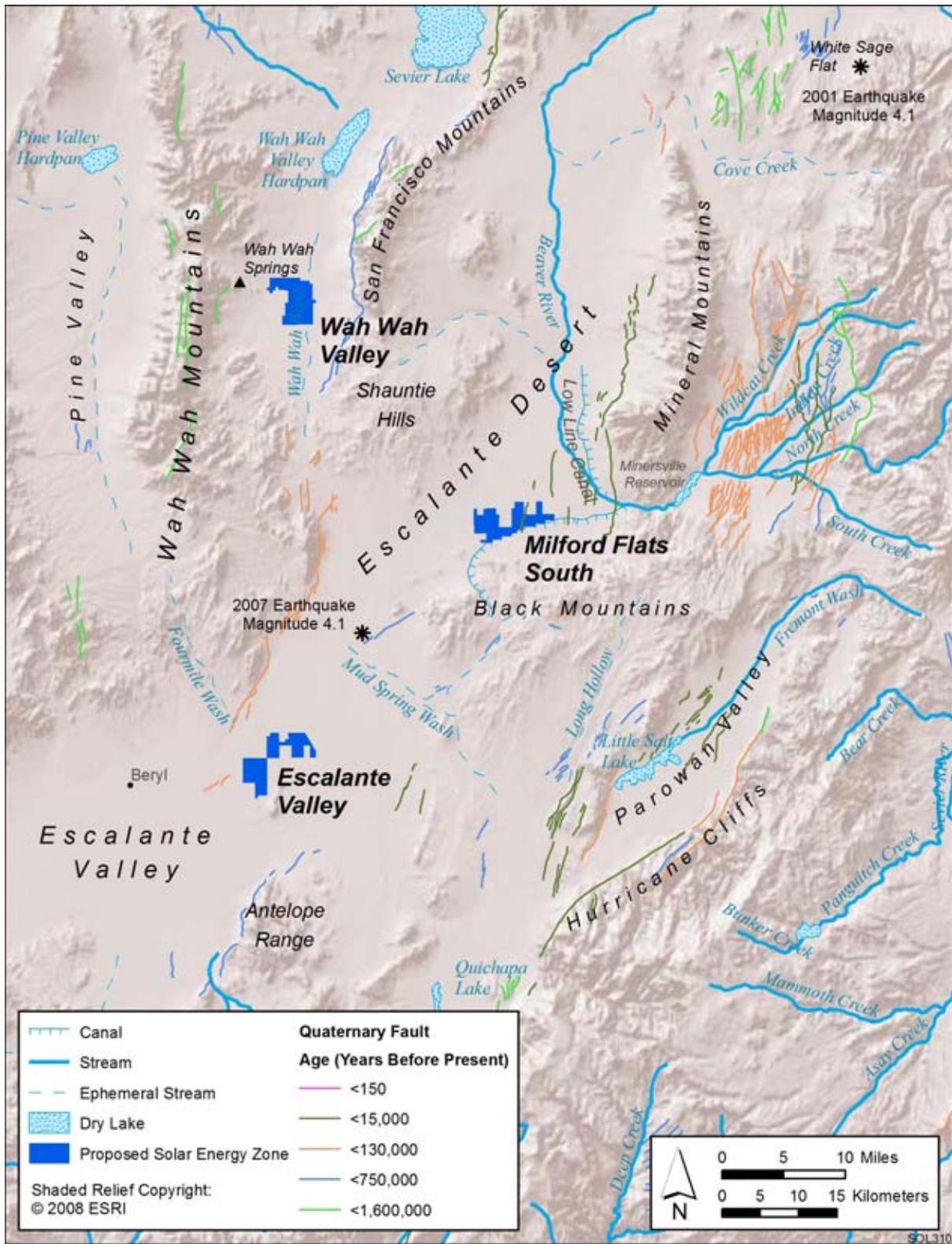
11
12 From June 1, 2000, to May 31, 2010, 55 earthquakes were recorded within a 61-mi
13 (100-km) radius of the proposed Escalante Valley SEZ. The largest earthquake during that period
14 occurred on August 18, 2007. It was located about 10 mi (16 km) to the northeast of the SEZ
15 near Mud Spring Wash and registered a moment magnitude¹ (M_w) of 4.1 (Figure 13.1.7.1-4).
16 During this period, 19 (35%) of the recorded earthquakes within a 61-mi (100-km) radius of the
17 SEZ had magnitudes greater than 3.0; none were greater than 4.1 (USGS 2010b).

18
19
20 **Liquefaction.** The proposed Escalante Valley SEZ lies within an area where the peak
21 horizontal acceleration with a 10% probability of exceedance in 50 years is between 0.08 and
22 0.09 g. Shaking associated with this level of acceleration is generally perceived as moderate to
23 strong; however, the potential damage to structures is light (USGS 2008). Given the low
24 intensity of ground shaking estimated for the Escalante Valley, the potential for liquefaction in
25 Escalante Valley sediments is also likely to be low. The Utah Geological Survey (UGS) has
26 published liquefaction susceptibility maps for several counties within Utah (mainly those
27 counties encompassing portions of the Great Salt Lake shoreline and other lakes and rivers);
28 however, none have been prepared for Iron County.

29
30
31 **Volcanic Hazards.** Extensive volcanic activity occurred in southwestern Utah throughout
32 the Tertiary period, shifting in composition from calc-alkaline ash flow tuff eruptions to basalt
33 and rhyolite lava flows about 23 million years ago, when extensional faulting in the eastern
34 Basin and Range province began. Although there are numerous Quaternary age volcanic
35 (basaltic and lesser quantities of rhyolite) vents and flows in the region, there is little evidence
36 of volcanic activity in the past 1,000 years (Anderson and Christenson 1989; Klauk and
37 Gourley 1983; Hecker 1993).

38
39

¹ Moment magnitude (M_w) is used for earthquakes with magnitudes greater than 3.5 and is based on the moment
of the earthquake, equal to the rigidity of the earth times the average amount of slip on the fault times the amount
of fault area that slipped (USGS 2010c).



1
 2 **FIGURE 13.1.7.1-4 Quaternary Faults in the Escalante Desert Region (Sources: USGS and**
 3 **UGS 2009; USGS 2010b)**

1 The nearest active volcano is Mount St. Helens in the Cascade Range (Washington),
2 about 750 mi (1,200 km) northwest of Escalante Valley, which has shown some activity as
3 recently as 2008. The nearest volcano that meets the criterion for an unrest episode is the Long
4 Valley Caldera in east-central California, about 290 mi (470 km) to the west, which has
5 experienced recurrent earthquake swarms, changes in thermal springs and gas emissions, and
6 uplift since 1980 (Diefenbach et al. 2009). The Long Valley Caldera is part of the Mono-Inyo
7 Craters volcanic chain that extends from Mammoth Mountain (on the caldera rim) northward
8 about 25 mi (40 km) to Mono Lake. Small to moderate eruptions have occurred at various sites
9 along the volcanic chain in the past 5,000 years at intervals ranging from 250 to 700 years.
10 Windblown ash (tephra) from some of these eruptions is known to have drifted as far east as
11 Nebraska. While the probability of an eruption within the volcanic chain in any given year is
12 small (less than 1%), serious hazards could result from a future eruption. Depending on the
13 location, size, timing (season), and type of eruption, hazards could include mudflows and
14 flooding, pyroclastic flows, small to moderate volumes of tephra, and falling ash (Hill et al.
15 1998, 2000; Miller 1989).

16
17
18 ***Slope Stability and Land Subsidence.*** The incidence of rock falls and slope failures can
19 be moderate to high along mountain fronts and can present a hazard to facilities on the relatively
20 flat terrain of valley floors such as Escalante Valley if they are located at the base of steep
21 slopes. The risk of rock falls and slope failures decreases toward the flat valley center.

22
23 The UGS has documented earth fissures along the surface due to ground subsidence near
24 Beryl Junction to the south of the proposed Escalante Valley SEZ. These fissures are thought to
25 result from groundwater withdrawal in the area, which has caused compaction in the Escalante
26 Valley aquifer. Lund et al. (2005) observed that between the late 1940s and 2002 water levels in
27 monitoring wells have fallen as much as 105 ft (32 m). The earth fissures tend to occur in areas
28 of high drawdown. Even if stabilized (by increased recharge or decreased pumping), residual
29 compaction may still occur at a reduced rate for several decades (Galloway et al. 1999).

30
31
32 ***Other Hazards.*** Other potential hazards at the proposed Escalante Valley SEZ include
33 those associated with soil compaction (restricted infiltration and increased runoff), expanding
34 clay soils (destabilization of structures), and hydro-compactable or collapsible soil (settlement).
35 Disturbance of soil crusts and desert varnish (and pavement) on soil surfaces may also increase
36 the likelihood of soil erosion by wind.

37
38 Alluvial fan surfaces, such as those found in some areas of Escalante Valley, can be the
39 sites of damaging high-velocity flash floods and debris flows during periods of intense and
40 prolonged rainfall. The nature of the flooding and sedimentation processes (e.g., stream flow
41 versus debris flow) will depend on the specific morphology of the fan (National Research
42 Council 1996). Section 13.1.9.1.1 provides further discussion of flood risks within the proposed
43 Escalante Valley SEZ.

1 **13.1.7.1.2 Soil Resources**
2

3 The dominant soil orders in southwestern Utah are Aridisols, Entisols, and Molisols
4 (see Table 4.2.1-1). They are generally very deep, loamy soils that are well drained to somewhat
5 excessively drained. Soils in the regions of the three Utah SEZs were formed on alluvial fans
6 and flats and on lake terraces and lake plains. Parent material consists mainly of alluvium and
7 colluvium (with some eolian materials) derived from mixed igneous and sedimentary rocks and
8 lake sediments (NRCS 2009). Although mechanical and microbiotic crusts are common on Utah
9 soils (Milligan 2009), none have been reported for soils covering the three SEZs, and none were
10 observed in the field.
11

12 Soils within the proposed Escalante Valley SEZ are predominantly the silt loams of the
13 Bullion-Antelope Springs complex, the Bullion-Berent complex, the Bullion Series, and the
14 Bullion-Taylorflat complex, which together make up about 93% of the soil coverage at the site
15 (Figure 13.1.7.1-5). These soils are very deep and well drained, with high surface runoff
16 potential and moderately high permeability (although the smectitic silt loams of the Bullion
17 Series tend to have low permeability). Playa lake sediments occur along the western boundary of
18 the lower portion of the site, covering less than 1% of the SEZ. The natural soil surface is
19 suitable for roads, with a slight to moderate erosion hazard when used as roads or trails (except
20 for the sloping soils of the Saxby Series, which have a severe erosion hazard). The water erosion
21 hazard is severe for most soils. The susceptibility to wind erosion is moderate, with as much as
22 86 tons (78 metric tons) of soil eroded by wind per acre (4,000 m²) each year. All the soils
23 within the SEZ have features that are favorable for fugitive dust formation (NRCS 2010). Soil
24 map units are described in Table 13.1.7.1-1. Biological soil crusts and desert pavement have not
25 been documented within the SEZ, but may be present.
26

27 None of the soils within the SEZ is rated as hydric.² Flooding is not likely for soils at the
28 site (occurring less than once in 500 years). The Escalante sandy loam (covering about 1% of the
29 SEZ) is classified as farmland of statewide importance (NRCS 2010).
30

31 Soils in this region are used mainly as rangeland for grazing cattle and sheep,
32 pastureland, and irrigated cropland. The major crops in the region are irrigated alfalfa hay,
33 wheat, barley, potatoes, and corn (USDA 1998).
34

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

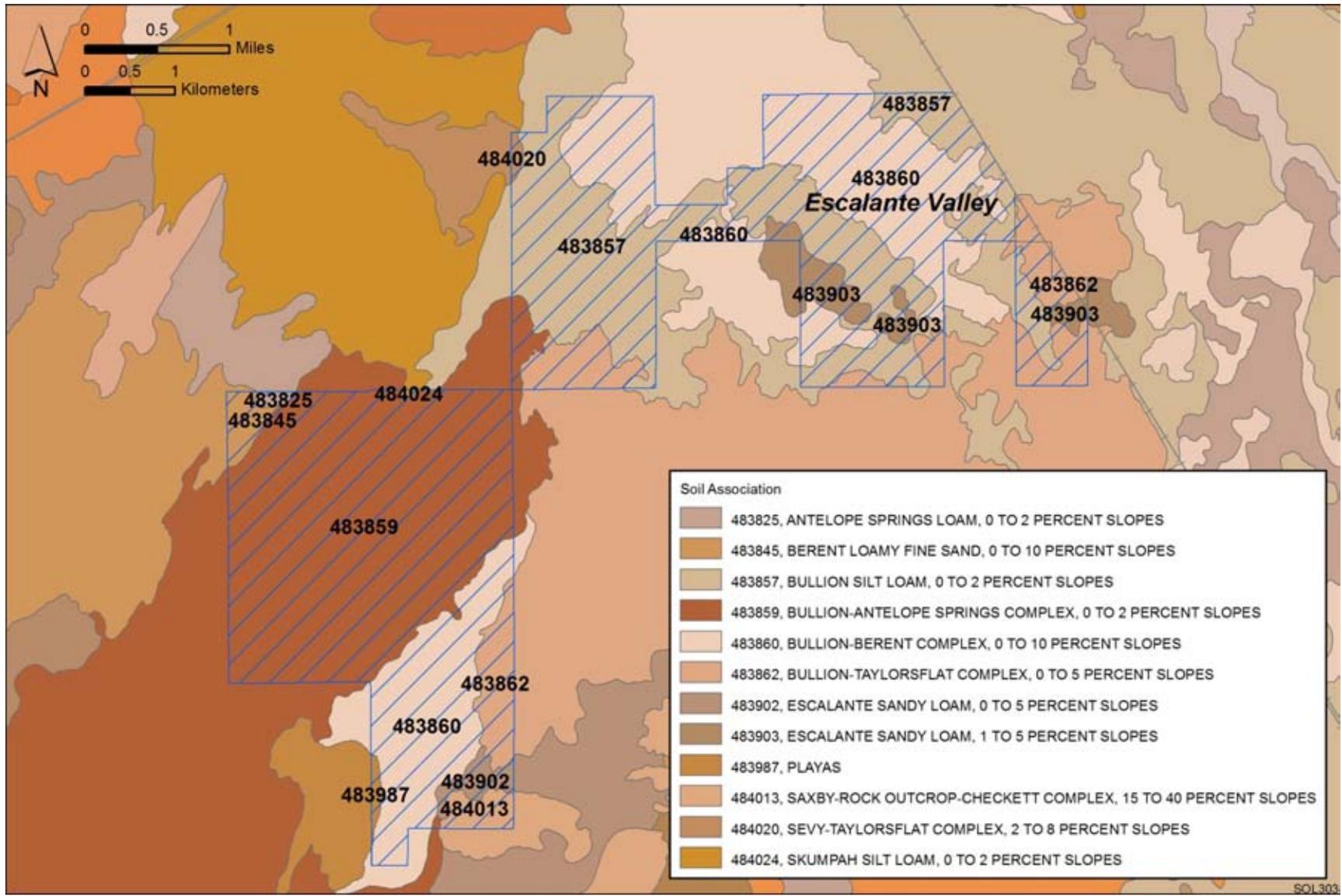


FIGURE 13.1.7.1-5 Soil Map for the Proposed Escalante Valley SEZ (Source: NRCS 2008)

TABLE 13.1.7.1-1 Summary of Soil Map Units within the Proposed Escalante Valley SEZ

Map Unit Symbol	Map Unit Name	Water Erosion Potential ^a	Wind Erosion Potential ^b	Description	Area in Acres ^c (% of SEZ)
483859	Bullion-Antelope Springs complex (0 to 2% slopes)	Severe	Moderate (WEG 4) ^d	Level to nearly level soils (silt loams) on alluvial flats, alluvial fans, and fan remnants. Parent material consists of alluvium from igneous and sedimentary rocks. Soils are very deep and well drained, with high surface runoff potential (very slow infiltration rate) and moderately high permeability. Moderately to strongly saline. Available water capacity is moderate. Severe rutting hazard. Used for rangeland, irrigated pastureland, and urban development (Bullion).	2,191 (33)
483860	Bullion-Berent complex (0 to 10% slopes)	Severe	Moderate (WEG 4)	Level to gently sloping soils (silt loams) on alluvial flats, alluvial fans, and dunes. Parent material consists of alluvium from igneous and sedimentary rocks. Soils are very deep and well drained, with high surface runoff potential (very slow infiltration rate) and moderately high permeability. Moderately to strongly saline. Available water capacity is moderate. Severe rutting hazard. Used for rangeland and wildlife habitat.	1,814 (28)
483857	Bullion silt loam (0 to 2% slopes)	Severe	Moderate (WEG 4)	Level to nearly level soils on alluvial flats and alluvial fans. Parent material consists of alluvium from igneous and sedimentary rocks. Soils are deep and well drained, with high surface runoff potential (very slow infiltration rate) and moderately high permeability. Moderately to strongly saline. Available water capacity is moderate. Severe rutting hazard. Used for rangeland and urban development.	1,597 (24)
483862	Bullion-Taylor's flat complex (0 to 5% slopes)	Severe	Moderate (WEG 4)	Nearly level soils (silt loams) on alluvial flats, alluvial fans, and fan remnants. Parent material consists of alluvium from igneous and sedimentary rocks and/or lacustrine deposits. Soils are very deep and well drained, with high surface runoff potential (very slow infiltration rate) and moderately high permeability. Moderately to strongly saline. Available water capacity is moderate. Severe rutting hazard. Used for rangeland, irrigated cropland, wildlife habitat, and urban development (Bullion).	554 (8)

TABLE 13.1.7.1-1 (Cont.)

Map Unit Symbol	Map Unit Name	Water Erosion Potential ^a	Wind Erosion Potential ^b	Description	Area in Acres ^c (% of SEZ)
483903	Escalante sandy loam (1 to 5% slopes)	Moderate	Moderate (WEG 3)	Nearly level soils on alluvial flats and alluvial fan remnants. Parent material consists of alluvium from igneous and sedimentary rocks. Soils are very deep and well drained, with moderate surface runoff potential and high permeability. Available water capacity is moderate. Farmland of statewide importance. ^e Severe rutting hazard. Used for livestock grazing and cultivation.	166 (3)
484013	Saxby-rock outcrop-Checkett complex (15 to 40% slopes)	Slight	Moderate (WEG 6)	Sloping soils (very stony loams) on mountain slopes and alluvial fan remnants. Parent material consists of colluvium from basalt or residuum weathered from basalt. Soils are shallow and well drained, with a high surface runoff potential (very slow infiltration rate) and moderately high permeability. Available water capacity is very low. Moderate rutting hazard. Used mainly for rangeland.	74 (1)
483845	Berent loamy fine sand (0 to 10% slopes)	Moderate	High (WEG 2)	Undulating soils on dunes. Parent material consists of eolian deposits from igneous and sedimentary rocks. Soils are very deep and somewhat excessively drained, with low surface runoff potential (high infiltration rate) and high permeability. Available water capacity is low. Severe rutting hazard. Used for rangeland and wildlife habitat.	69 (1)
483902	Escalante sandy loam (0 to 5% slopes)	Moderate	Moderate (WEG 3)	Nearly level soils on alluvial flats and alluvial fan remnants. Parent material consists of alluvium from igneous and sedimentary rocks. Soils are very deep and well drained, with moderate surface runoff potential and high permeability. Available water capacity is moderate. Farmland of statewide importance. ^e Severe rutting hazard. Used for livestock grazing and cultivation.	68 (1)
483987	Playas	Not rated	Not rated	Level soils in playa depressions. Consist of stratified silty clay loam to silt loam to very fine sand. Soils are very poorly drained with a high surface runoff potential (very slow infiltration rate). Moderately to strongly saline. Severe rutting hazard.	19 (<1)

TABLE 13.1.7.1-1 (Cont.)

Map Unit Symbol	Map Unit Name	Water Erosion Potential ^a	Wind Erosion Potential ^b	Description	Area in Acres ^c (% of SEZ)
483825	Antelope Springs loam (0 to 2% slopes)	Moderate	Moderate (WEG 6)	Level to nearly level soils on alluvial flats and alluvial fan remnants. Parent material consists of alluvium from igneous and sedimentary rocks. Soils are very deep and well drained, with high surface runoff potential (slow infiltration rate) and high permeability. Available water capacity is moderate. Severe rutting hazard. Used mainly for rangeland.	16 (<1)
484020	Sevy-Taylorflat complex (2 to 8% slopes)	Moderate	Moderate (WEG 6)	Nearly level to gently sloping soils (loams) on stream terraces, alluvial flats, and alluvial fan remnants. Parent material consists of alluvium from igneous and sedimentary rock. Soils are very deep and well drained, with moderate surface runoff potential and moderately high permeability. Available water capacity is moderate. Severe rutting hazard. Used for rangeland, irrigated cropland, and wildlife habitat.	14 (<1)
484024	Skumpah silt loam (0 to 2% slopes)	Severe	Moderate (WEG 4)	Level to nearly level soils on alluvial flats. Parent material consists of alluvium from igneous and sedimentary rocks. Soils are very deep and well drained, with high surface runoff potential (very low infiltration rate) and moderately high permeability. Severe rutting hazard. Used for rangeland, irrigated cropland, and pasture.	5 (<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 (whole soil; doesn't account for the presence of rock fragments) 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 "severe" indicates that erosion is expected; loss of soil productivity and damage are likely and erosion control measures may be costly or 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.

Footnotes continued on next page.

TABLE 13.1.7.1-1 (Cont.)

- ^d WEG = wind erodibility group. WEGs are based on soil texture, content of organic matter, effervescence of carbonates, content of rock fragments, and mineralogy, and take into account soil moisture, surface cover, soil surface roughness, wind velocity and direction, and the length of unsheltered distance (USDA 2004). Groups range in value from 1 (most susceptible to wind erosion) to 8 (least susceptible to wind erosion). The NRCS provides a wind erodibility index, expressed as an erosion rate in tons per acre per year, for each of the wind erodibility groups: WEG 2, 134 tons per acre per year; WEGs 3 and 4, 86 tons per acre per year; and WEG 6, 48 tons per acre 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. Farmland of statewide importance includes soils in NRCS's land capability Class II and III that do not meet the criteria for Prime farmland, but may produce high yields of crops when treated and managed according to acceptable farming methods.

Source: NRCS (2010).

1 **13.1.7.2 Impacts**
2

3 Impacts on soil resources would occur mainly as a result of ground-disturbing activities
4 (e.g., grading, excavating, and drilling), especially during the construction phase of a solar
5 project. These include soil compaction, soil horizon mixing, soil erosion and deposition by wind,
6 soil erosion by water and surface runoff, sedimentation, and soil contamination. Such impacts are
7 common to all utility-scale solar energy developments in varying degrees and are described in
8 more detail for the four phases of development in Section 5.7 .1.
9

10 Because impacts on soil resources result from ground-disturbing activities in the project
11 area, soil impacts would be roughly proportional to the size of a given solar facility, with larger
12 areas of disturbed soil having a greater potential for impacts than smaller areas (Section 5.7.2).
13 The magnitude of impacts would also depend on the types of components built for a given
14 facility, since some components would involve greater disturbance and would take place over a
15 longer timeframe.
16

17
18 **13.1.7.3 SEZ-Specific Design Features and Design Feature Effectiveness**
19

20 No SEZ-specific design features were identified for soil resources at the proposed
21 Escalante Valley SEZ. Implementing the programmatic design features described under both
22 Soils and Air Quality in Appendix A, Section A.2.2., as required under BLM’s Solar Energy
23 Program, would reduce the potential for soil impacts during all project phases.
24

1 **13.1.8 Minerals (Fluids, Solids, and Geothermal Resources)**
2
3

4 **13.1.8.1 Affected Environment**
5

6 There are no locatable mining claims within the proposed Escalante Valley SEZ (BLM
7 and USFS 2010a). The land of the SEZ was closed to locatable mineral entry in June 2009,
8 pending the outcome of this solar energy PEIS. There are four active oil and gas leases that cover
9 most of the SEZ, but they are classified as nonproducing (BLM and USFS 2010b). The area
10 remains open for discretionary mineral leasing for oil and gas and other leasable minerals and for
11 disposal of salable minerals. There are several areas within about 6 mi (10 km) north and west of
12 the SEZ that were previously leased for geothermal resources but have now been closed
13 (BLM and USFS 2010b). No geothermal development has occurred within or adjacent to the
14 Escalante Valley SEZ.
15

16
17 **13.1.8.2 Impacts**
18

19 The oil and gas leases within the Escalante Valley SEZ are prior existing rights and
20 represent a potential conflict with future solar development. As long as these leases remain
21 in effect, solar development would require the agreement of the oil and gas lessees. Such
22 cooperation might be possible, since oil and gas development generally requires fewer than
23 5 acres (0.02 km²) per well, but it would depend on accommodating the oil and gas lease
24 holders' need for continued access to develop, maintain, and service wells.
25

26 If the area is identified as a solar energy development zone, it would continue to be
27 closed to all incompatible forms of mineral development. It is assumed that future development
28 of oil and gas resources would continue to be possible, since such development could occur on
29 the existing leases or from directional drilling outside the lease area. Since the SEZ does not
30 contain existing mining claims, it was also assumed that there would be no future loss of
31 locatable mineral production. The production of common minerals, such as sand and gravel and
32 mineral materials used for road construction, might take place in areas not directly developed for
33 solar energy production.
34

35 The SEZ has had no history of development of geothermal resources or of leasing
36 interest. For that reason, it is not anticipated that solar development would adversely affect
37 development of geothermal resources.
38

39
40 **13.1.8.3 SEZ-Specific Design Features and Design Feature Effectiveness**
41

42 No SEZ-specific design features would be necessary to protect mineral resources.
43 Implementing the programmatic design features described in Appendix A, Section A.2.2, as
44 required under BLM's Solar Energy Program would provide adequate mitigation for locatable
45 minerals, and oil and gas resources and geothermal resources.
46

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1 **13.1.9 Water Resources**

2
3
4 **13.1.9.1 Affected Environment**

5
6 The proposed Escalante Valley SEZ is within the Escalante Desert–Sevier Lake
7 subregion of the Great Basin hydrologic region (USGS 2010a). The proposed Escalante Valley
8 SEZ is located in the Beryl-Enterprise area in the southern Escalante Desert Valley. The basin
9 floor of the Beryl-Enterprise area covers an area of approximately 570,000 acres (2,300 km²).
10 The Escalante Desert Valley is within the Basin and Range physiographic province, which is
11 characterized by intermittent mountain ranges and desert valleys (Robson and Banta 1995). The
12 region consists of semiarid desert valleys where surface waters are typically limited to ephemeral
13 washes and dry lakebeds, and the primary water resource is groundwater. The proposed SEZ is
14 located in the north-central portion of the Beryl-Enterprise area, which is surrounded by a series
15 of low hills to the east and west, the Bull Valley Mountains and the Antelope Range to the south,
16 and the Indian Peak Range and the Wah Wah Mountains to the north (Figure 13.1.9.1-1). The
17 valley opens to the northeast into the Milford area of the Escalante Desert Valley. Surface
18 elevations within the proposed Escalante Valley SEZ range from 5,094 ft (1,553 m) along the
19 northern border of the site to 5,213 ft (1,589 m) at the southeast corner of its lower portion. The
20 highest point in the area is Table Butte, just to the southeast, with a maximum elevation of
21 5,845 ft (1,782 m). Precipitation in the higher elevations ranges from 8 in./yr to more than
22 25 in./yr (20 to 64 cm/yr), whereas the average precipitation in the valley is estimated to be
23 8 in./yr (20 cm/yr) (USDA 2007; WRCC 2010a). The average annual pan evaporation rate is
24 estimated to be 71 in./yr (180 cm/yr) (Cowherd et al. 1988; WRCC 2010b).

25
26
27 **13.1.9.1.1 Surface Waters (Including Drainages, Floodplains, and Wetlands)**

28
29 The proposed Escalante Valley SEZ is located within Utah’s Cedar/Beaver River Basin
30 planning area (UBWR 1995). The surface water features near the proposed Escalante Valley
31 SEZ are limited to ephemeral washes and a dry lakebed west of Table Butte in the southwestern
32 portion of the SEZ (Figure 13.1.9.1-1). The Dick Palmer Wash is a named ephemeral wash that
33 flows north from the Antelope Range and through the southeastern portion of the SEZ. Fourmile
34 Wash is an ephemeral wash that drains the Wah Wah Mountains toward the south near the
35 proposed SEZ. Mud Spring Wash drains the Black Mountains, located 9 mi (14 km) east of the
36 SEZ. The only perennial and intermittent streams in the vicinity of the SEZ drain the mountain
37 ranges in the southern part of the basin, near the cities of Enterprise and Newcastle (Mower and
38 Sandberg 1982).

39
40 The proposed Escalante Valley SEZ is located in an area that has not been examined for
41 flood risk (Zone D) by FEMA (FEMA 2009). Flooding caused by large rainfall events would be
42 limited to localized ponding and erosion, since there are no permanent surface water features
43 near the proposed SEZ. High-intensity rainstorms in the area have been observed to cause
44 significant flooding and damage in populated areas within the basin (UBWR 1995). According to
45 the NWI, no wetlands have been identified within or near the proposed SEZ (USFWS 2009).

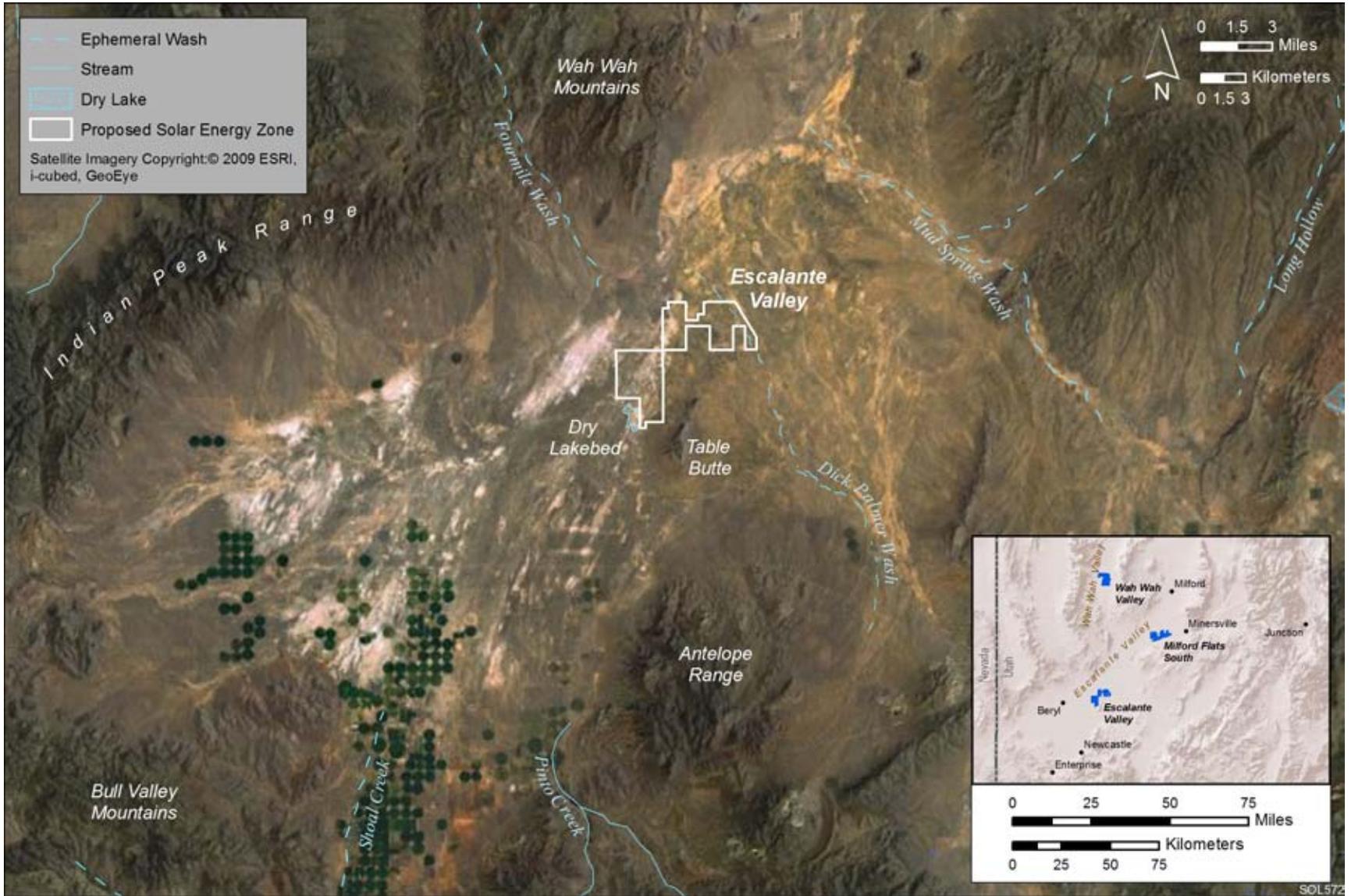


FIGURE 13.1.9.1-1 Surface Water Features near the Proposed Escalante Valley SEZ

1 There are many springs in the mountains surrounding the SEZ; however, the springs are
2 thought to be fed by precipitation that creates localized perched water tables and not by the
3 basin-fill groundwater reservoir beneath the SEZ (Mower and Sandberg 1982).
4

6 **13.1.9.1.2 Groundwater**

7
8 The proposed Escalante Valley SEZ is within the Beryl-Enterprise groundwater basin in
9 the southern Escalante Valley. The basin-fill aquifer in the Beryl-Enterprise basin consists of
10 unconfined Quaternary-age alluvium and lacustrine deposits, primarily of silts and clays, with
11 gravel and sand composing less than 25% of the aquifer material. The mountains surrounding
12 the basin-fill aquifer are composed of consolidated sedimentary and volcanic rocks (Mower and
13 Sandberg 1982). Reported transmissivity values of the basin fill aquifer range between 200 and
14 120,000 ft²/day (19 and 11,000 m²/day) for the basin-fill aquifer, which is approximately
15 1,000 ft (305 m) thick at the valley center (Mower and Sandberg 1982). Transmissivity values
16 in the vicinity of the proposed SEZ are estimated to be between 10,000 and 25,000 ft²/day
17 (930 and 8,600 m²/day). The natural groundwater flow direction is from the southwest to the
18 northeast, with subsurface discharge of an estimated 1,000 ac-ft/yr (1.2 million m³) occurring
19 through the pass between the Wah Wah Mountains and the Black Mountains (Figure 13.1.7.1-4).
20 Approximately 300 ac-ft/yr (370,000 m³) is estimated to enter the Beryl-Enterprise basin from
21 the adjacent Cedar Valley basin to the east (Mower and Sandberg 1982). Recharge in the basin
22 takes place primarily at basin margins, where infiltration of precipitation and runoff occurs
23 through coarse sediments. The base of Table Butte, located just south of the SEZ
24 (Figure 13.1.9.1-1), is also considered an important recharge area within the basin (Thomas and
25 Lowe 2007).
26

27 Several studies examining the groundwater resources in the Beryl-Enterprise basin
28 (Klauk and Gourley 1983; Thomas and Lowe 2007; Greer 2008) have used information
29 regarding groundwater processes given by Mower and Sandberg (1982) that examined the
30 groundwater conditions in 1977 by using observations and groundwater simulations. Total
31 groundwater storage in 1977 was estimated to be 72,000,000 ac-ft (89,000 million m³). In
32 1977, the majority of the groundwater recharge was estimated to be in the form of surface
33 runoff from higher elevations that occurred along the periphery of the valley, at a total of
34 31,000 ac-ft (38 million m³), precipitation on the valley floor was estimated to provide
35 500 ac-ft (620,000 m³), subsurface inflow from adjacent basins was estimated to be 320 ac-ft
36 (390,000 m³), and irrigation return flow was estimated to be 16,300 ac-ft (20 million m³). In
37 the same study, the majority of the groundwater discharge was through groundwater withdrawals
38 for agriculture, at 81,000 ac-ft (100 million m³), evapotranspiration accounted for 6,000 ac-ft
39 (7.4 million m³), and subsurface outflow to the adjacent Milford area groundwater basin was
40 estimated to be 1,000 ac-ft (1.2 million m³). Based on the work by Mower and Sandberg (1982)
41 and a water balance method, Greer (2008) estimated the annual recharge in the groundwater
42 basin to be 34,000 ac-ft/yr (42 million m³/yr), including return flow to the aquifer from
43 irrigation. It should be noted that groundwater pumping has exceeded groundwater recharge
44 in the basin every year since 1950 (UBWR 1995).
45

1 Groundwater levels dropped as much as 150 ft (46 m) in the Beryl-Enterprise basin
2 between 1948 and 2009 because of excessive groundwater withdrawals in the southwestern
3 portion of the basin (Burden et al. 2009). Two active USGS monitoring wells that are located
4 within 1 mi (1.6 km) of the SEZ indicate a current depth to groundwater of 20 to 25 ft (6 to 8 m)
5 (USGS 2009; well numbers 375245113290001 and 375754113274501). Between 1975 and
6 2009, groundwater levels in the vicinity of the SEZ were observed to decline 15 ft (4.6 m)
7 (Burden et al. 2009). The depth to groundwater records in these wells and others within the
8 Beryl-Enterprise basin have shown groundwater levels falling at a rate of 0.2 to 1.5 ft/yr
9 (0.06 to 0.5 m/yr) (Burden et al. 2009). Land subsidence in the Beryl-Enterprise basin has
10 resulted in earth fissures and is likely caused by compaction of the unconsolidated aquifer due
11 to dewatering from groundwater withdrawals (Thomas and Lowe 2007). The highest rates of
12 ground subsidence in the Beryl-Enterprise basin have been measured at between 1.2 and
13 1.6 in./yr (3 and 4 cm/yr) between 1941 and 1998, in an agricultural area located approximately
14 11 mi (18 km) southwest of the proposed Escalante Valley SEZ (Forster 2006).

15
16 The groundwater quality within the proposed Escalante Valley SEZ is generally
17 good, with total dissolved solids (TDS) concentrations ranging between 375 and 750 mg/L
18 (Thomas and Lowe 2007). Over the Beryl-Enterprise basin as a whole, groundwater
19 quality varies, with some wells exceeding the primary maximum contaminant level (MCL)
20 for arsenic (>10 parts per billion [ppb]) and the secondary MCL for sulfate (>250 mg/L)
21 (Burden et al. 2009).

22 23 24 **13.1.9.1.3 Water Use and Water Rights Management**

25
26 In 2005, water withdrawals from surface waters and groundwater in Iron County were
27 308,200 ac-ft/yr (380 million m³), of which 60% came from surface waters and 40% came from
28 groundwater (Kenny et al. 2009). The largest water use category was for agricultural irrigation,
29 at 294,900 ac-ft/yr (364 million m³). The remainder was used for domestic (3%) and industrial
30 purposes (<1%) (Kenny et al. 2009). The majority of the agricultural water use within the
31 county occurs in the Beryl-Enterprise region in the southwestern portion of the southern
32 Escalante Desert Valley. In 2008, groundwater withdrawals were approximately 93,000 ac-ft
33 (115 million m³) within the Beryl-Enterprise basin, and the average groundwater withdrawals
34 between 1997 and 2007 were 85,000 ac-ft/yr (105 million m³) (Burden et al. 2009).

35
36 In Utah, the appropriation doctrine is the basis of water appropriation, which implies that
37 water rights are allocated on a temporal basis (BLM 2001). All waters are the property of the
38 public in the State of Utah and subject to the laws described in *Utah Code*, Title 73, Water and
39 Irrigation (available at <http://www.le.state.ut.us/~code/TITLE73/TITLE73.htm>). A water right
40 establishes an entity's legal ability to divert surface water or groundwater for beneficial use and
41 contains five key elements: a definition of the beneficial use, a priority date, a defined flow or
42 quantity of water to be diverted, a location of the diversion, and location of the beneficial use.
43 Water rights are administered by the Office of the State Engineer, which was renamed the Utah
44 Division of Water Rights (Utah DWR) in 1963 (Utah DWR 2005).

1 The Utah DWR manages both surface water and groundwater appropriations (new
2 appropriations and transfer of existing water rights). In many regions of the state, both surface
3 water and groundwater resources are fully appropriated, so new water diversions can only be
4 made through the transfer of existing water rights. The application process for obtaining a water
5 right is the same for surface water and groundwater; however, the criteria used to evaluate new
6 surface water and groundwater diversions are different and can vary by region in the state.
7 Groundwater diversions can also be subject to groundwater management plans that have been
8 established to protect existing water rights and to limit overuse and degradation of water quality
9 in sensitive areas. The Utah DWR assesses a water right application based on its potential for
10 beneficial use and its potential to affect existing water rights or impair water quality
11 (BLM 2001). For water right transfer applications in regions where water resources are limited,
12 the seniority of a transferred water right will determine its ability to not affect more senior water
13 rights in the region and whether it can meet project demands (Utah DWR 2005).

14
15 The Beryl-Enterprise basin falls under the jurisdiction of the southwestern regional
16 office of the Utah DWR and is located in Policy Area 71 (Escalante Valley). Surface waters in
17 this Policy Area are fully appropriated, so any new surface water diversions must be transferred
18 from existing surface water rights (transfers between surface water and groundwater diversions
19 are typically not allowed). The proposed Escalante Valley SEZ is located in the Nada-Lund
20 groundwater administration district. No new groundwater diversions are allowed because of
21 declining groundwater elevations, and groundwater right transfers from the adjacent Milford
22 or Beryl–New Castle administration districts are reviewed on a case-by-case basis (Utah
23 DWR 2004).

24
25 In 2007, the falling groundwater levels in the basin-fill aquifers throughout the southern
26 Escalante Desert Valley prompted the State Engineer to begin the process of developing a
27 groundwater management plan for the Beryl-Enterprise basin, which includes the area of the
28 proposed SEZ. Statute 73-5-15 of Utah state law describes the initiation and regulation of a
29 groundwater management plan, which in this case was proposed to limit water rights in the
30 region in order to establish a safe yield³ for the basin. However, in 2008, the Utah State
31 Legislature halted the funding for the development of the groundwater management plan for the
32 Beryl-Enterprise region (Utah DWR 2009). The Utah Legislature passed a bill (S.B. 20) in May
33 2010 that allows the creation of local districts to develop groundwater management plans under
34 Statute 73-5-15 (Utah State Legislature 2010).

35 36 37 **13.1.9.2 Impacts**

38
39 Potential impacts on water resources related to utility-scale solar energy development
40 include direct and indirect impacts on surface waters and groundwater. Direct impacts occur at
41 the place of origin and at the time of the proposed activity, while indirect impacts occur away
42 from the place of origin or later in time. Impacts on water resources considered in this analysis

³ Safe yield is the amount of groundwater that can be withdrawn from a groundwater basin over a period of time without exceeding the long-term recharge of the basin or unreasonably affecting the basin's physical and chemical integrity.

1 are the result of land disturbance activities (construction, final developed site plan, as well as
2 off-site activities such as road and transmission line construction) and water use requirements for
3 solar energy technologies that take place during the four project phases: site characterization,
4 construction, operations, and decommissioning/reclamation. Both land disturbance and
5 consumptive water use activities can affect groundwater and surface water flows, cause
6 drawdown of groundwater surface elevations, modify natural drainage pathways, obstruct
7 natural recharge zones, and alter surface water–wetland–groundwater connectivity. Water
8 quality can also be degraded through the generation of wastewater, chemical spills, increased
9 erosion and sedimentation, and increased salinity (e.g., by the excessive withdrawal from
10 aquifers).

13 ***13.1.9.2.1 Land Disturbance Impacts on Water Resources***

14
15 Impacts related to land disturbance activities are common to all utility-scale solar energy
16 developments, which Section 5.9.1 describes in more detail for the four phases of development;
17 these impacts will be minimized through the implementation of programmatic design features
18 described in Appendix A, Section A.2.2. Land disturbance impacts in the vicinity of the
19 proposed Escalante Valley SEZ could potentially affect natural drainage patterns and natural
20 groundwater recharge and discharge properties. The alteration of natural drainage pathways
21 during construction can lead to impacts related to flooding. Land-disturbance activities should
22 be avoided to the extent possible in the vicinity of the ephemeral stream washes and the dry
23 lake present on the site. Alterations to these systems could enhance erosion processes, disrupt
24 groundwater recharge, and negatively affect plant and animal habitats associated with the
25 ephemeral channels.

26 27 28 ***13.1.9.2.2 Water Use Requirements for Solar Energy Technologies***

29 30 31 **Analysis Assumptions**

32
33 A detailed description of the water use assumptions for the four utility-scale solar energy
34 technologies (parabolic trough, power tower, dish engine, and PV systems) is presented in
35 Appendix M. Assumptions regarding water use calculations specific to the proposed Escalante
36 Valley SEZ include the following:

- 37
- 38 • On the basis of a total area less than 10,000 (40 km²), it is assumed that
- 39 one solar project could be constructed during the peak construction year;
- 40
- 41 • Water needed for making concrete would come from an off-site source;
- 42
- 43 • The maximum land disturbance for an individual solar facility during the peak
- 44 construction year is 3,000 acres (12 km²);
- 45

- Assumptions on individual facility size and land requirements (Appendix M), along with the assumed number of projects and maximum allowable land disturbance, result in the potential to disturb approximately 45% of the total SEZ area during peak construction year; and
- Water use requirements for hybrid cooling systems are assumed to be on the same order of magnitude as those using dry cooling (see Section 5.9.2.1).

Site Characterization

During site characterization, water would be used mainly for controlling fugitive dust and providing the workforce potable water supply. Impacts on water resources during this phase of development are expected to be negligible since activities would be limited in area, extent, and duration; water needs could be met by trucking water in from an off-site source.

Construction

During construction, water would be used mainly for controlling fugitive dust and for providing the workforce potable water supply. Because there are no significant surface water bodies on the proposed Escalante Valley SEZ, the water requirements for construction activities could be met by either trucking water to the sites or by using on-site groundwater resources. Water requirements for dust suppression and potable water supply during construction are shown in Table 13.1.9.2-1 and could be as high as 1,264 ac-ft (1.5 million m³). The assumptions

TABLE 13.1.9.2-1 Estimated Water Requirements during the Peak Construction Year for the Proposed Escalante Valley SEZ^a

Activity	Parabolic Trough	Power Tower	Dish Engine	PV
Water use requirements ^a				
Fugitive dust control (ac-ft) ^{b,c}	811	1,216	1,216	1,216
Potable supply for workforce (ac-ft)	74	45	19	9
Total water use requirements (ac-ft)	885	1,261	1,235	1,226
Wastewater generated				
Sanitary wastewater (ac-ft)	74	45	19	9

^a Assumptions of water use for fugitive dust control, potable supply for workforce, and wastewater generation are presented in Table M.9-1 (Appendix M).

^b Fugitive dust control estimation assumes a local pan evaporation of 71 in/yr (180 cm/yr) (Cowherd et al. 1988; WRCC 2010a).

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

1 underlying these estimates for each solar energy technology are described in Appendix M.
2 Groundwater wells would have to yield up to an estimated 765 gal/min (2,900 L/min) to meet
3 the estimated construction water requirements. These yields are similar to average well yields
4 of small- to medium-sized irrigated farms in Utah (USDA 2009b). The availability of
5 groundwater and the impacts of groundwater withdrawal would need to be assessed during the
6 site characterization phase of a solar development project. In addition, up to 74 ac-ft (91,000 m³)
7 of sanitary wastewater would be generated and need to be either treated on-site or sent to an off-
8 site facility. If the groundwater supply used for a project does not meet drinking water quality
9 standards, potable water would need to be brought in from off-site.

10 11 12 **Operations**

13
14 Water would be required for mirror/panel washing, the workforce potable water supply,
15 and cooling during operations. Cooling water is required only for the parabolic trough and power
16 tower technologies. Water needs for cooling are a function of the type of cooling used (dry, wet,
17 hybrid). Further refinements to water requirements for cooling would result from the percentage
18 of time that the option was employed (30 to 60% range assumed) and the power of the system.
19 The differences between the water requirements reported in Table 13.1.9.2-2 for the parabolic
20 trough and power tower technologies are attributable to the assumptions of acreage per
21 megawatt. As a result, the water usage for the more energy-dense parabolic trough technology
22 is estimated to be almost twice as large as that for the power tower technology.

23
24 The water use requirements among the solar energy technologies are a factor of the full
25 build-out capacity, as well as assumptions on water use and technology operations discussed
26 in Appendix M. Assuming that 80% of the SEZ's area would be used for solar energy
27 production, the full build-out capacity would generate 588 to 1,058 MW for the proposed
28 Escalante Valley SEZ. The estimated total water use requirements during operations range
29 from 30 to 301 ac-ft/yr (37,000 to 370,000 m³/yr) for the PV and dish engine technologies
30 (no cooling required) and from 418 to 15,888 ac-ft/yr (0.5 million to 20 million m³/yr) for the
31 parabolic trough and power tower technologies (cooling required). Table 13.1.9.2-2 lists the
32 amounts of water needed for mirror/panel washing, potable water supply, and cooling activities
33 for each solar energy technology. Operations would generate up to 15 ac-ft/yr (18,500 m³/yr) of
34 sanitary wastewater; in addition, for wet-cooled technologies, 167 to 301 ac-ft/yr (210,000 to
35 370,000 m³/yr) of cooling system blowdown water would need to be either treated on-site or sent
36 to an off-site facility. Any on-site treatment of wastewater would have to ensure that treatment
37 ponds are effectively lined in order to prevent any groundwater contamination.

38
39 Water demands during operations would most likely be met by withdrawing groundwater
40 from wells constructed on-site. The parabolic trough and power tower technologies would
41 require an estimated well yield of 259 to 993 gal/min (980 to 3,760 L/min) for dry cooling and
42 1,830 to 9,850 gal/min (6,910 to 37,300 L/min) for wet cooling. The required well yields for
43 dry cooling are similar to average well yields of small irrigated farms in Utah, while the
44 required well yields for wet cooling range from similar well yields of medium-sized irrigated
45 farms to over three times greater than the average well yields of large irrigated farms in Utah
46 (USDA 2009b). For non-cooled technologies (dish engine and PV), wells would have to yield an

TABLE 13.1.9.2-2 Estimated Water Requirements during Operations at the Proposed Escalante Valley SEZ

Activity	Solar Energy Technology			
	Parabolic Trough	Power Tower	Dish Engine	PV
Full build-out capacity (MW) ^{a,b}	1,058	588	588	588
Water use requirements				
Mirror/panel washing (ac-ft/yr) ^{c, d}	529	294	294	29
Potable supply for workforce (ac-ft/yr)	15	7	7	0.7
Dry cooling (ac-ft/yr) ^e	212–1,058	118–588	NA ^f	NA
Wet cooling (ac-ft/yr) ^e	4,762–15,344	2,646–8,525	NA	NA
Total water use				
Non-cooled technologies (ac-ft/yr)	NA	NA	301	30
Dry-cooled (ac-ft/yr)	756–1,602	418–888	NA	NA
Wet-cooled (ac-ft/yr)	5,306–15,888	2,946–8,825	NA	NA
Wastewater generated				
Blowdown (ac-ft/yr) ^g	301	167	NA	NA
Sanitary wastewater (ac-ft/yr)	15	7	7	0.7

- ^a Land area for the parabolic trough technology was estimated at 5 acres/MW (0.02 km²/MW), and the land area for the power tower, dish engine, and PV technologies was estimated at 9 acres/MW (0.04 km²/MW).
- ^b Water requirements are linearly related to power. Water requirements for any other size project can be estimated by using the multipliers provided in Table M.9-2 (Appendix M).
- ^c To convert ac-ft to m³, multiply by 1,234.
- ^d Value assumes a usage rate of 0.5 ac-ft/yr/MW for mirror washing for the parabolic trough, power tower, and dish engine technologies and a rate of 0.05 ac-ft/yr/MW for panel washing for the PV technologies.
- ^e Dry-cooling value assumes 0.2 to 1.0 ac-ft/yr per MW and wet-cooling value assumes 4.5 to 14.5 ac-ft/yr per MW; these ranges correspond to an assumed 30% and 60% operating time (DOE 2009).
- ^f NA = not applicable.
- ^g Value scaled from the 250-MW Beacon Solar project with an annual discharge of 44 gal/min (167 L/min) (AECOM 2009). Blowdown is relevant to wet cooling only.

1
2
3 estimated 19 to 187 gal/min (70 to 710 L/min), which is on the order of 2 to 25 times less than
4 the average well yields of small irrigated farms in Utah (USDA 2009b).
5

6 The water demands for technologies that require wet cooling are significant in
7 comparison to the overall water balance in the basin-fill aquifer. For the proposed Escalante
8 Valley SEZ, estimated water requirements for wet cooling are equivalent to 3 to 17% of the total
9 groundwater withdrawals for the Beryl-Enterprise basin in 2009 (Burden et al. 2009). Annual
10 recharge in the basin has been estimated to be 34,000 ac-ft/yr (42 million m³) (Greer 2008). The

1 estimated water requirements for wet cooling are equivalent to 9 to 47% of the estimated annual
2 recharge for the Beryl-Enterprise basin. The water use for wet cooling could exacerbate existing
3 conditions of groundwater overdraft in the Beryl-Enterprise basin. In addition, obtaining water
4 rights within the Beryl-Enterprise basin would be difficult and water rights would have to be
5 transferred from existing uses. Based on the information presented here, wet cooling for the full
6 build-out scenario is not deemed feasible for the Escalante Valley SEZ. To the extent possible,
7 facilities using dry cooling should implement water conservation practices to limit water needs.
8

9 The availability of water rights and the impacts associated with groundwater withdrawals
10 would need to be assessed during the site characterization phase of a proposed solar project.
11 Less water would be needed for any of the four solar technologies if the full build-out capacity
12 was reduced. The analysis of water use for the various solar technologies assumed a single
13 technology for full build-out. Water use requirements for development scenarios that assume a
14 mixture of solar technologies can be estimated using water use factors described in Appendix M,
15 Section M.9.
16

17 The effects of groundwater withdrawal rates on potential drawdown of groundwater
18 elevations would need to be assessed during the site characterization phase and during the
19 development of constructed wells. For the proposed Escalante Valley SEZ, groundwater
20 elevations are currently declining at a rate of 0.3 to 2.5 ft/yr (0.06 to 0.8 m/yr) in the Beryl-
21 Enterprise basin (Burden et al. 2009). The declining groundwater levels have been linked with
22 land subsidence and surface fissures near the Beryl-Enterprise area, approximately 15 mi
23 (24 km) to the southwest of the proposed Escalante Valley SEZ (USDA 2007). With these
24 existing conditions, further groundwater withdrawals for solar energy development at the
25 proposed SEZ could potentially cause further drawdown of groundwater elevations and land
26 subsidence both on-site and more regionally in the Escalante Desert. These indirect impacts can
27 disturb regional groundwater flow patterns and recharge patterns, which have implications for
28 ecological habitats (discussed in Section 13.1.10).
29
30

31 **Decommissioning/Reclamation**

32

33 All surface structures associated with the solar energy development would be dismantled,
34 and the site would be reclaimed to its preconstruction state during decommissioning. Land
35 disturbance and water use activities would be similar to those during the construction phase
36 (see Table 13.1.9.2-1) and may also include water to establish vegetation in some areas.
37 However, the total volume of water needed is expected to be less. Because quantities of water
38 needed during the decommissioning/reclamation phase would be less than those for construction,
39 impacts on surface and groundwater resources also would be less.
40
41

42 ***13.1.9.2.3 Off-Site Impacts: Roads and Transmission Lines***

43

44 The proposed Escalante Valley SEZ is located 15 mi (24 km) north of State Route 56 and
45 approximately 3 mi (5 km) from existing transmission lines, as described in Section 13.1.1.2.
46 Impacts associated with the construction of roads and transmission lines primarily deal with

1 water use demands for construction, water quality concerns relating to potential chemical spills,
2 and land disturbance effects on the natural hydrology. Water needed for road modification and
3 transmission line construction activities (e.g., for soil compaction, dust suppression, and potable
4 supply for workers) could be trucked to the construction area from an off-site source. As a result,
5 water use impacts would be negligible. Impacts on surface water and groundwater quality
6 resulting from spills would be minimized by implementing the programmatic design features
7 described in Appendix A, Section A.2.2 (e.g., cleaning up spills as soon as they occur). Ground-
8 disturbing activities that have the potential to increase sediment and dissolved solid loads in
9 downstream waters would be conducted following the programmatic design features to minimize
10 impacts associated with alterations to natural drainage pathways and hydrologic processes.
11
12

13 ***13.1.9.2.4 Summary of Impacts on Water Resources***

14

15 The impacts on water resources associated with developing solar energy in the proposed
16 Escalante Valley SEZ are associated with land disturbance effects on natural hydrology, water
17 use requirements for the various solar energy technologies, and water quality concerns. Impacts
18 relating to water use requirements vary depending on the type of solar technology built and, for
19 technologies using cooling systems, the type of cooling (wet, dry, or hybrid) employed. Water
20 requirements would be greatest for wet-cooled parabolic trough and power tower facilities. Dry
21 cooling reduces water use requirements by approximately a factor of 10 compared with wet
22 cooling. PV requires the least amount of water among the solar energy technologies.
23

24 The alteration of natural drainage pathways during construction can lead to impacts
25 related to flooding. Land-disturbance activities should be avoided to the extent possible in the
26 vicinity of the ephemeral stream washes and the dry lake present on the site. Alterations to these
27 systems could enhance erosion processes, disrupt groundwater recharge, and negatively affect
28 plant and animal habitats associated with the ephemeral channels.
29

30 Water in the southern end of Escalante Valley is currently over-appropriated and is
31 closed to new surface water and groundwater appropriations (Utah DWR 2004, 2009). In order
32 to obtain water for solar energy projects in the area, water rights would have to be transferred
33 from existing water rights, most of which are currently used for agriculture (Utah DWR 2004;
34 Kenny et al. 2009).
35

36 The groundwater levels in the Escalante Valley have been declining steadily since
37 1950 (Burden et al. 2009). The average groundwater withdrawals of 85,000 ac-ft/yr
38 (105 million m³/yr) between 1998 and 2007 are two and a half times larger than the
39 previously estimated basin safe yield of 34,000 ac-ft/yr (42 million m³/yr) (Burden et al. 2009;
40 Greer 2008). As of 2008, the appropriated water rights were approximately 110,000 ac-ft/yr
41 (136 million m³/yr), which is over three times the estimated basin safe yield (Utah State
42 Engineer 2008). The large withdrawal-to-recharge ratio has led to significant groundwater level
43 declines in Escalante Valley; in addition, subsidence and land fissures have been linked to
44 declining groundwater levels (Burden et al. 2009; USDA 2007; Utah State Engineer 2008;
45 Forster 2006). Given the information presented here, wet cooling for the full build-out scenario

1 is not deemed feasible for the Escalante Valley SEZ. To the extent possible, facilities using dry
2 cooling should implement water conservation practices to limit water needs.
3
4

5 **13.1.9.3 SEZ-Specific Design Features and Design Feature Effectiveness**

6

7 Implementing the programmatic design features described in Appendix A, Section A.2.2,
8 as required under BLM's Solar Energy Program, will mitigate some impacts on water resources.
9 Programmatic design features would focus on coordination with federal, state, and local agencies
10 that regulate the use of water resources to meet the requirements of permits and approvals
11 needed to obtain water for development, and on hydrological studies to characterize the aquifer
12 from which groundwater would be obtained (including drawdown effects, if a new point of
13 diversion is created). The greatest consideration for mitigating water impacts would be in the
14 selection of solar technologies. The mitigation of impacts would be best achieved by selecting
15 technologies with low water demands.
16

17 Proposed design features specific to the Escalante Valley SEZ are as follows:
18

- 19 • Wet-cooling options would not be feasible; other technologies should
20 incorporate water conservation measures;
21
- 22 • During site characterization, hydrologic investigations would need to identify
23 100-year floodplains and potential jurisdictional water bodies subject to Clean
24 Water Act Section 404 permitting. Siting of solar facilities and construction
25 activities should avoid areas identified as being within a 100-year floodplain;
26
- 27 • Land disturbance and operations activities should prevent erosion and
28 sedimentation in the vicinity of the ephemeral washes and dry lake present on
29 the site;
30
- 31 • Groundwater rights must be obtained from the Utah Division of Water Rights
32 (Utah DWR 2005);
33
- 34 • Groundwater monitoring and production wells should be constructed in
35 accordance with Utah standards (Utah DWR 2008); and
36
- 37 • Stormwater management plans and BMPs should comply with standards
38 developed by the Utah Division of Water Quality (UDWQ 2008); and
39
- 40 • Water for potable uses would have to meet or be treated to meet Utah drinking
41 water standards as defined by Utah Administrative Code Rule R309-200.
42

1 **13.1.10 Vegetation**
2

3 This section addresses vegetation that could occur or is known to occur within the
4 potentially affected area of the proposed Escalante Valley SEZ. The affected area considered in
5 this assessment included the areas of direct and indirect effects. The area of direct effects is
6 defined as the area that would be physically modified during project development (i.e., where
7 ground-disturbing activities would occur) and included the SEZ, a 250-ft (76-m) wide portion
8 of an assumed transmission line corridor, and a 60-ft (18-m) wide portion of an assumed access
9 road corridor. The area of indirect effects was defined as the area within 5 mi (8 km) of the SEZ
10 boundary, within the 1-mi (1.6-km) wide assumed transmission line corridor, and within the 1-mi
11 (1.6-km) wide assumed access road corridor where ground-disturbing activities would not occur
12 but that could be indirectly affected by activities in the area of direct effect.
13

14 Indirect effects considered in the assessment include effects from surface runoff, dust,
15 and accidental spills from the SEZ, but do not include ground-disturbing activities. The potential
16 degree of indirect effects would decrease with increasing distance away from the SEZ. This area
17 of indirect effects was identified on the basis of professional judgment and was considered
18 sufficiently large to bound the area that would potentially be subject to indirect effects. The
19 affected area is the area bounded by the areas of direct and indirect effects. These areas are
20 defined and the impact assessment approach is described in Appendix M.
21

22
23 **13.1.10.1 Affected Environment**
24

25 Much of the proposed Escalante Valley SEZ is located within the Shadscale-dominated
26 Saline Basins Level IV ecoregion, which primarily supports a sparse saltbush-greasewood shrub
27 community (Woods et al. 2001). This ecoregion includes nearly flat to gently sloping valley
28 bottoms and lower hill slopes. Soils have a high salt and alkali content, and plants are salt and
29 drought tolerant. The dominant shrub species in this ecoregion are shadscale (*Atriplex*
30 *confertifolia*), winterfat (*Krascheninnikovia lanata*), greasewood (*Sarcobatus vermiculatus*),
31 and bud sagebrush (*Picrothamnus desertorum*). Perennial grasses are also typically present and
32 include bottlebrush squirreltail (*Elymus elymoides*), indian ricegrass (*Achnatherum hymenoides*),
33 and galleta (*Pleuraphis jamesii*). Much of the western portion of the SEZ lies within the Salt
34 Deserts Level IV ecoregion. This ecoregion is mostly barren and contains playas, salt flats, mud
35 flats, low terraces, and saline lakes. Playas and salt flats are ponded during wet periods and
36 subject to wind erosion when they are dry. Soils are poorly drained, have a high salt and alkali
37 content, and are often salt-crusted. Plants in this ecoregion are generally sparse and widely
38 scattered, if present at all, and include extremely salt-tolerant species such as salicornia
39 (*Salicornia* sp.), saltgrass (*Distichlis spicata*), alkali sacaton (*Sporobolus airoides*), iodine bush
40 (*Allenrolfea occidentalis*), and greasewood. Annual precipitation in the vicinity of the SEZ is
41 low, averaging 10 in. (25.4 cm) at Enterprise Beryl Junction (see Section 13.1.13).
42

43 The region surrounding the SEZ consists of a mosaic of these ecoregions, as well as
44 the Sagebrush Basins and Slopes Level IV ecoregion, which supports a Great Basin sagebrush
45 community dominated by Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*)
46 and includes perennial bunchgrasses. This ecoregion includes valleys, alluvial fans, bajadas,

1 mountain flanks, and stream terraces. Also present is the Woodland- and Shrub-covered Low
2 Mountains Level IV ecoregion. This ecoregion includes pinyon-juniper woodlands and
3 sagebrush communities, along with mountain brush communities at higher elevations. These
4 ecoregions are all located within the Central Basin and Range Level III ecoregion, which is
5 described in Appendix I.

6
7 Land cover types, described and mapped under the Southwest Regional Gap Analysis
8 Project (SWReGAP) (USGS 2005c), were used to evaluate plant communities in and near the
9 SEZ. Each cover type includes a range of similar plant communities. Land cover types occurring
10 within the potentially affected area of the proposed Escalante Valley SEZ are shown in
11 Figure 13.1.10.1-1. Table 13.1.10.1-1 provides the surface area of each cover type within the
12 potentially affected area.

13
14 Lands within the proposed Escalante Valley SEZ are classified primarily as Inter-
15 Mountain Basins Mixed Salt Desert Scrub and Inter-Mountain Basins Active and Stabilized
16 Dune, the latter occurring especially in the western portion of the SEZ. Additional cover types
17 within the SEZ are given in Table 13.1.10.1-1. Greasewood and sagebrush were observed to
18 be the dominant species in the low scrub communities observed over much of the SEZ in
19 September 2009, with sagebrush generally the more abundant. Sensitive habitats on the SEZ
20 include sand dune, dry wash, and playa habitats.

21
22 The indirect impact area, including the area surrounding the SEZ within 5 mi (8 km),
23 along with the access road and transmission line corridors, includes 18 cover types, which are
24 listed in Table 13.1.10.1-1. The predominant cover types are Inter-Mountain Basins Mixed Salt
25 Desert Scrub and Inter-Mountain Basins Big Sagebrush Shrubland.

26
27 There are no National Wetland Inventory (NWI) data for the region that includes the
28 proposed Escalante Valley SEZ (USFWS 2009). Dry washes occur within the SEZ, access road
29 corridor, and transmission line corridor. A dry lakebed intersects the southwestern boundary of
30 the SEZ and an extensive area of playa habitat, including Lund Flats, occurs to the north of the
31 SEZ. Intermittently flooded areas were observed in the SEZ. These dry washes, lakebeds, and
32 intermittently flooded areas typically contain water for short periods during or following
33 precipitation events. One occurrence of Open Water (mostly surrounded by Inter-Mountain
34 Basins Semi-Desert Shrub Steppe) is located in the southwest portion of the SEZ, and two
35 locations of Open Water occur in the eastern portion. These locations are likely small earthen
36 livestock watering areas that have been constructed by building up berms to hold runoff or water
37 pumped into the areas for short periods of time.

38
39 Table 13.1.10.1-2 lists the designated noxious weeds of Utah that are recorded as
40 occurring in Iron County (UDA 2008; USDA 2010), which includes the proposed Escalante
41 Valley SEZ, and additional noxious weed species declared by Iron County (UDA 2009). UDA
42 (2008) provides a list of all Utah State designated noxious weeds. Cheatgrass (*Bromus tectorum*)
43 and halogeton (*Halogeton glomeratus*), invasive species known to occur within the SEZ, are not
44 included in Table 13.1.10.1-2.

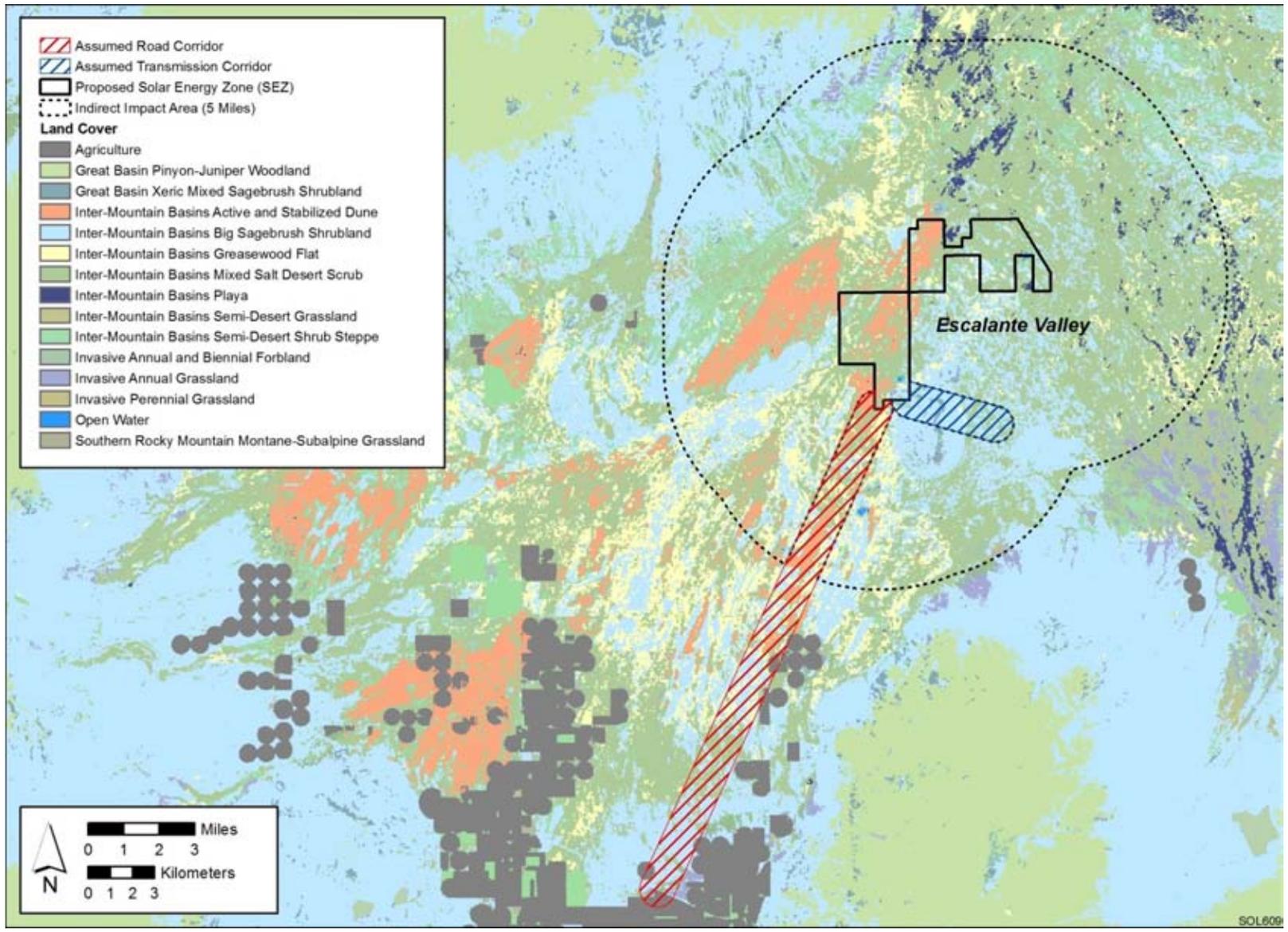


FIGURE 13.1.10.1-1 Land Cover Types within the Proposed Escalante Valley SEZ (Source: USGS 2004)

TABLE 13.1.10.1-1 Land Cover Types within the Potentially Affected Area of the Proposed Escalante Valley SEZ and Potential Impacts

Land Cover Type ^a	Area of Cover Type Affected (acres) ^b				Overall Impact Magnitude ^g
	Within SEZ (Direct Effects) ^c	Assumed Access Road (Direct Effects) ^d	Assumed Transmission Line (Direct Effects) ^e	Corridors and Outside SEZ (Indirect Effects) ^f	
S065 Inter-Mountain Basins Mixed Salt Desert Scrub: Generally consists of open shrublands which include at least one species of <i>Atriplex</i> along with other shrubs. Perennial grasses dominate a sparse to moderately dense herbaceous layer.	3,717 acres ^h (1.3%, 2.7%)	33 acres (<0.1%)	23 acres (<0.1%)	48,493 acres (16.8%)	Moderate
S012 Inter-Mountain Basins Active and Stabilized Dune: Includes Dune and sand sheet areas that are unvegetated or sparsely vegetated, with up to 30% plant cover, but generally less than 10%. Plant communities consist of patchy or open grassland, shrubland, or shrub steppe, with species often adapted to the shifting sandy substrate.	1,278 acres (6.5%, 20.4%)	11 acres (0.1 %)	0 acres	4,824 acres (24.4%)	Moderate
S054 Inter-Mountain Basins Big Sagebrush Shrubland: Dominated by basin big sagebrush (<i>Artemisia tridentata tridentata</i>), Wyoming big sagebrush (<i>Artemisia tridentata wyomingensis</i>), or both. Other shrubs may be present. Perennial herbaceous plants are present but not abundant.	781 acres (0.1%, 0.1%)	40 acres (<0.1%)	64 acres (<0.1%)	32,172 acres (3.0%)	Small
S079 Inter-Mountain Basins Semi-Desert Shrub Steppe: Generally consists of perennial grasses with an open shrub and dwarf shrub layer.	339 acres (0.1%, 0.2%)	2 acres (<0.1%)	1 acre (<0.1%)	9,182 acres (3.4%)	Small

TABLE 13.1.10.1-1 (Cont.)

Land Cover Type ^a	Area of Cover Type Affected (acres) ^b				Overall Impact Magnitude ^g
	Within SEZ (Direct Effects) ^c	Assumed Access Road (Direct Effects) ^d	Assumed Transmission Line (Direct Effects) ^e	Corridors and Outside SEZ (Indirect Effects) ^f	
S096 Inter-Mountain Basins Greasewood Flat: Dominated or co-dominated by greasewood (<i>Sarcobatus vermiculatus</i>) and generally occurring in areas with saline soils, a shallow water table, and intermittent flooding, although remaining dry for most growing seasons. This community type generally occurs near drainages or around playas. These areas may include, or may be co-dominated by, other shrubs, and may include a graminoid herbaceous layer.	318 acres (0.5%, 1.5%)	19 acres (<0.1%)	1.6 acres (<0.1%)	11,637 acres (16.7%)	Small
S090 Inter-Mountain Basins Semi-Desert Grassland: Consists of perennial bunchgrasses as dominants or co-dominants. Scattered shrubs or dwarf shrubs may also be present.	60 acres (0.2%, 0.6%)	1 acre (<0.1%)	<1 acre (<0.1%)	647 acres (1.7%)	Small
D09 Invasive Annual and Biennial Forbland: Areas dominated by annual and biennial non-native forb species.	59 acres (0.3%, 0.7%)	<1 acre (<0.1%)	<1 acre (<0.1%)	2,427 acres (11.4%)	Small
N11 Open Water: Plant or soil cover is generally less than 25%.	22 acres (0.3%, 2.8%)	<1 acre (<0.1%)	0 acres	45 acres (0.6%)	Small
S015 Inter-Mountain Basins Playa: Playa habitats are intermittently flooded and generally barren or sparsely vegetated. Depressions may contain small patches of grass and sparse shrubs may occur around playa margins.	15 acres (0.1%, 0.3%)	<1 acre (<0.1%)	0 acres	2,379 acres (23.7%)	Small

TABLE 13.1.10.1-1 (Cont.)

Land Cover Type ^a	Area of Cover Type Affected (acres) ^b				Overall Impact Magnitude ^g
	Within SEZ (Direct Effects) ^c	Assumed Access Road (Direct Effects) ^d	Assumed Transmission Line (Direct Effects) ^e	Corridors and Outside SEZ (Indirect Effects) ^f	
<p>S000 Great Basin Xeric Mixed Sagebrush Shrubland: Generally occurs on level plains, slopes, and ridges. The dominant shrub species are black sagebrush (<i>Artemisia nova</i>) or, at higher elevations, little sagebrush (<i>Artemisia arbuscula</i>), and co-dominants may be Wyoming big sagebrush (<i>Artemisia tridentata</i> ssp. <i>wyomingensis</i>) or yellow rabbitbrush (<i>Chrysothamnus viscidiflorus</i>). Other shrub species may also be present as well as sparse perennial bunchgrasses.</p>	15 acres (<0.1%, <0.1%)	<1 acre (<0.1%)	4 acres (<0.1%)	479 acres (0.3%)	Small
<p>D08 Invasive Annual Grassland: Dominated by non-native annual grass species.</p>	4 acres (<0.1%, <0.1%)	<1 acre (<0.1%)	<1 acre (<0.1%)	863 acres (3.0%)	Small
<p>D06 Invasive Perennial Grassland: Dominated by non-native perennial grasses.</p>	3 acres (<0.1%, 0.1%)	1 acre (<0.1%)	0 acres	311 acres (3.0%)	Small
<p>S024 Rocky Mountain Bigtooth Maple Ravine Woodland: Occurs in ravines, on toeslopes, and benches associated with riparian areas. It may also occur on steep north slopes at higher elevations. The dominant species is bigtooth maple (<i>Acer grandidentatum</i>), but gambel oak (<i>Quercus gambelii</i>) may be co-dominant in some areas. Other broadleaf trees or conifers may be present.</p>	0 acres	<1 acre (<0.1%)	0 acres	1 acre (1.2 %)	Small
<p>S046 Rocky Mountain Gambel Oak-Mixed Montane Shrubland: Occurs on dry foothills and lower mountain slopes. Gambel oak (<i>Quercus gambelii</i>) may be the only dominant species or share dominance with other shrubs.</p>	0 acres	<1 acre (<0.1%)	0 acres	5 acres (<0.1%)	Small

TABLE 13.1.10.1-1 (Cont.)

Land Cover Type ^a	Area of Cover Type Affected (acres) ^b				Overall Impact Magnitude ^g
	Within SEZ (Direct Effects) ^c	Assumed Access Road (Direct Effects) ^d	Assumed Transmission Line (Direct Effects) ^e	Corridors and Outside SEZ (Indirect Effects) ^f	
S040 Great Basin Pinyon-Juniper Woodland: Occurs on low elevation slopes and ridges. Singleleaf pinyon (<i>Pinus monophylla</i>), Utah juniper (<i>Juniperus osteosperma</i>), or both, are the dominant species, generally associating with curl-leaf mountain mahogany (<i>Cercocarpus ledifolius</i>). Understory species include shrubs and grasses.	0 acres	<1 acre (<0.1%)	<1 acre (<0.1%)	170 acres (<0.1%)	Small
N21 Developed, Open Space—Low Intensity: Includes housing, parks, golf courses, and other areas planted in developed settings. Impervious surfaces comprise up to 49% of the total land cover.	0 acres	<1 acre (<0.1%)	0 acres	6 acres (<0.1%)	Small
N80 Agriculture: Areas where pasture/hay or cultivated crops account for more than 20% of total vegetation cover.	0 acres	4 acres (<0.1%)	0 acres	345 acres (0.2%)	Small
S085 Southern Rocky Mountain Montane-Subalpine Grassland: Typically occurs as a mosaic of two or three plant associations on well-drained soils. The dominant species is usually a bunchgrass.	0 acres	0 acres	0 acres	9 acres (0.1%)	Small

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

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

^c Includes the area of the cover type within the SEZ, the percentage that area represents of all occurrences of that cover type within the SEZ region (i.e., a 50-mi [80-km] radius from the center of the SEZ), and the percentage that area represents of all occurrences of that cover type on BLM lands within the SEZ region.

Footnotes continued on next page.

TABLE 13.1.10.1-1 (Cont.)

- ^d For access road development, direct effects were estimated within a 15-mi (24-km) long, 60-ft (18-m) wide road ROW from the SEZ to the nearest state highway. Direct impacts within this area were determined from the proportion of the cover type within the 1-mi (1.6-km) wide road corridor. Impacts are for the area of the cover type within the assumed ROW, and the percentage that area represents of all occurrences of that cover type within the SEZ region.
- ^e For transmission development, direct effects were estimated within a 3-mi (5-km), 250-ft (76-m) wide transmission ROW from the SEZ to the nearest existing line. Direct impacts within this area were determined from the proportion of the cover type within the 1-mi (1.6-km) wide transmission corridor. Impacts are for the area of the cover type within the assumed ROW, and the percentage that area represents of all occurrences of that cover type within the SEZ region.
- ^f 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 portions of the 1-mi (1.6-km) wide road and transmission corridors where ground-disturbing activities would not occur. Indirect effects include effects from surface runoff, dust, and other factors from project developments. The potential degree of indirect effects would decrease with increasing distance away from the SEZ. Includes the area of the cover type within the indirect effects area and the percentage that area represents of all occurrences of that cover type within the SEZ region.
- ^g Overall impact magnitude categories were based on professional judgment and are (1) *small*: a relatively small proportion of the cover type ($\leq 1\%$) within the SEZ region would be lost; (2) *moderate*: an intermediate proportion of a cover type (>1 but $\leq 10\%$) would be lost; and (3) *large*: $>10\%$ of a cover type would be lost.
- ^h To convert acres to km^2 , multiply by 0.004047.

**TABLE 13.1.10.1-2 Utah State-
Designated Noxious Weeds Known to
Occur in Iron County**

Common Name	Scientific Name
Bull thistle	<i>Cirsium vulgare</i>
Canada thistle	<i>Cirsium arvense</i>
Field bindweed	<i>Convolvulus arvensis</i>
Hoary cress	<i>Cardaria</i> spp.
Musk thistle	<i>Carduus nutans</i>
Perennial pepperweed	<i>Lepidium latifolium</i>
Puncturevine	<i>Tribulus terrestris</i>
Whorled milkweed	<i>Asclepias verticillata</i>

Sources: UDA (2008, 2009).

13.1.10.2 Impacts

The construction of solar energy facilities within the proposed Escalante Valley SEZ would result in direct impacts on plant communities due to the removal of vegetation within the facility footprint during land-clearing and land-grading operations. Approximately 80% of the SEZ (5,291 acres [21.4 km²]) would be expected to be cleared with full development of the SEZ. The plant communities affected would depend on facility locations and could include any of the communities that occur on the SEZ. Therefore, for the purposes of this analysis, all the area of each cover type within the SEZ is considered to be directly affected by removal with full development of the SEZ.

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

Possible impacts from solar energy facilities on vegetation that is encountered within the SEZ described in more detail in Section 5.10.1. Any such impacts will be minimized through the implementation of required programmatic design features described in Appendix A, Section A.2.2 and from any additional mitigations applied. Section 13.1.10.2.3, below, identifies design features of particular relevance to the proposed Escalante Valley SEZ.

1 *13.1.10.2.1 Impacts on Native Species*

2
3 The impacts of construction, operation, and decommissioning were considered small if
4 the impact affected a relatively small proportion (<1%) of the cover type in the SEZ region
5 (within 50 mi [80 km] of the center of the SEZ); a moderate impact (>1 but <10%) could affect
6 an intermediate proportion of cover type; a large impact could affect greater than 10% of a
7 cover type.
8

9 Solar facility construction and operation would primarily affect communities of the
10 Inter-Mountain Basins Mixed Salt Desert Scrub and Inter-Mountain Basins Active and Stabilized
11 Dune cover types. Additional cover types within the SEZ that would be affected include
12 Inter-Mountain Basins Big Sagebrush Shrubland, Inter-Mountain Basins Semi-Desert Shrub
13 Steppe, Inter-Mountain Basins Greasewood Flat, Inter-Mountain Basins Semi-Desert Grassland,
14 Invasive Annual and Biennial Forbland, Open Water, Inter-Mountain Basins Playa, Great Basin
15 Xeric Mixed Sagebrush Shrubland, Invasive Annual Grassland, and Invasive Perennial
16 Grassland. The open water areas are likely artificial impoundments, while Invasive Annual and
17 Biennial Forbland, Invasive Annual Grassland, Invasive Perennial Grassland, and the developed
18 areas likely support few native plant communities. The potential impacts on land cover types
19 resulting from solar energy facilities in the proposed Escalante Valley SEZ are summarized in
20 Table 13.1.10.1-1. Many of these cover types are relatively common in the SEZ region; however,
21 several are relatively uncommon, representing less than 1% of the land area within the SEZ
22 region: Inter-Mountain Basins Semi-Desert Grassland (0.7%), Invasive Annual Grassland
23 (0.6%), Inter-Mountain Basins Active and Stabilized Dune (0.4%), Inter-Mountain Basins Playa
24 (0.2%), Open Water (0.2%), Invasive Perennial Grassland (0.2%), and Invasive Annual and
25 Biennial Forbland (0.4%). In addition, Rocky Mountain Bigtooth Maple Ravine Woodland
26 (<0.1%), and Developed Open Space-Low Intensity (0.6%), would potentially be impacted by
27 the access road ROW. Sand dune, playa, and dry wash communities are important sensitive
28 habitats in the region.
29

30 The construction, operation, and decommissioning of solar projects within the SEZ
31 would result in moderate impacts on Inter-Mountain Basins Mixed Salt Desert Scrub and Inter-
32 Mountain Basins Active and Stabilized Dune. Solar project development within the SEZ would
33 result in small impacts on the remaining cover types in the affected area.
34

35 Disturbance of vegetation in dune communities within the SEZ or access road corridor,
36 such as from heavy equipment operation, could result in the loss of substrate stabilization.
37 Re-establishment of dune species could be difficult due to the arid conditions and unstable
38 substrates. Re-establishment of shrub communities in temporarily disturbed areas would likely
39 be very difficult because of the arid conditions and might require extended periods of time. In
40 addition, noxious weeds could become established in disturbed areas and colonize adjacent
41 undisturbed habitats, thus reducing restoration success and potentially resulting in widespread
42 habitat degradation. Cryptogamic soil crusts occur in many of the shrubland communities in the
43 region. Damage to these crusts, as by the operation of heavy equipment or other vehicles, can
44 alter important soil characteristics, such as nutrient cycling and availability, and affect plant
45 community characteristics (Lovich and Bainbridge 1999).
46

1 The deposition of fugitive dust from disturbed soil areas in habitats outside a solar project
2 area could result in reduced productivity or changes in plant community composition. Fugitive
3 dust deposition could affect plant communities of each of the cover types occurring within the
4 indirect impact area identified in Table 13.1.10.1-1.

5
6 Communities associated with playa habitats, greasewood flats communities, or other
7 intermittently flooded areas downgradient from solar projects, access road, and transmission line
8 ROWs could be affected by ground-disturbing activities. Site clearing and grading could disrupt
9 surface water, resulting in changes in the frequency, duration, depth, or extent of inundation or
10 soil saturation, and could potentially alter playa or greasewood flats plant communities and affect
11 community function. Increases in surface runoff from a solar energy project site, access road, or
12 transmission line ROW could also affect the hydrologic characteristics of these communities.
13 The introduction of contaminants into these habitats could result from spills of fuels or other
14 materials used on a project site. Soil disturbance could result in sedimentation in these areas,
15 which could degrade or eliminate sensitive plant communities. Grading could also affect dry
16 washes within the SEZ, access road corridor, and transmission line corridor. Alteration of
17 surface drainage patterns or hydrology could adversely affect downstream dry wash or dry lake
18 communities. Vegetation within these communities could be lost to erosion or desiccation. See
19 Section 13.1.9 for further discussion of impacts on washes and dry lakes.

20
21 The construction of access roads or transmission lines in ROWs outside of the SEZ
22 could potentially result in direct impacts on wetlands that may occur in or near the ROWs if
23 fill material is placed within wetland areas, or in indirect impacts as described above.

24 25 26 ***13.1.10.2.2 Impacts from Noxious Weeds and Invasive Plant Species***

27
28 Executive Order (E.O.) 13112, "Invasive Species," directs federal agencies to prevent
29 the introduction of invasive species and provide for their control and to minimize the economic,
30 ecological, and human health impacts of invasive species (*Federal Register*, Vol. 64, page
31 61836, Feb. 8, 1999). Potential impacts of noxious weeds and invasive plant species resulting
32 from solar energy facilities are described in Section 5.10.1. Invasive species could be
33 inadvertently brought to a project site by equipment previously used in infested areas, or they
34 may be present on or near a project site. Despite required programmatic design features to
35 prevent the spread of noxious weeds, project disturbance could potentially increase the
36 prevalence of noxious weeds and invasive species in the affected area of the proposed Escalante
37 Valley SEZ and increase the probability that weeds could be transported into areas that were
38 previously relatively weed-free. This could result in reduced restoration success and possible
39 widespread habitat degradation.

40
41 Noxious weeds, including cheat grass and halogeton, occur on the SEZ. Additional
42 species designated as noxious weeds for Utah, and those known to occur in Iron County are
43 given in Table 13.1.10.1-2. Past or present land uses, such as grazing or OHV use, may affect the
44 susceptibility of plant communities to the establishment of noxious weeds and invasive species.
45 Small areas of Invasive Annual and Biennial Forbland totaling 59 acres (0.2 km²) occur within
46 the SEZ, and approximately 2,427 acres (9.8 km²) occur within 5 mi (8 km) of the SEZ and in

1 the access road and transmission line corridors; 4 acres (0.02 km²) of Invasive Annual Grassland
2 occur within the SEZ, and approximately 532 acres (2.2 km²) occur within 5 mi (8 km) of the
3 SEZ and in the access road corridor; 3 acres (0.01 km²) of Invasive Perennial Grassland occur
4 within the SEZ, and approximately 312 acres (1.3 km²) occur within 5 mi (8 km) of the SEZ and
5 in the access road corridor. About 9 acres (0.04 km²) of Developed, Open Space—Low Intensity
6 occur within the access road corridor. Because disturbance may promote the establishment and
7 spread of invasive species, developed areas may provide sources of such species. Disturbance
8 associated with existing roads, transmission lines, and rail lines within the SEZ area of potential
9 impacts also likely contributes to the susceptibility of plant communities to the establishment and
10 spread of noxious weeds and invasive species.

13 13.1.10.3 SEZ-Specific Design Features and Design Feature Effectiveness

14
15 In addition to programmatic design features, SEZ-specific design features would reduce
16 the potential for impacts on plant communities. While the specifics of some of these practices are
17 best established when considering specific project details, some measures can be identified at
18 this time, as follows:

- 19
20 • An Integrated Vegetation Management Plan addressing invasive species
21 control and an Ecological Resources Mitigation and Monitoring Plan
22 addressing habitat restoration should be approved and implemented to
23 increase the potential for successful restoration of affected habitats and
24 minimize the potential for the spread of invasive species, such as those
25 occurring in Iron County, that could be introduced as a result of solar energy
26 project activities (see Section 13.1.10.2.2). Invasive species control should
27 focus on biological and mechanical methods where possible to reduce the use
28 of herbicides.
- 29
30 • All playa, sand dune and sand transport areas, and dry wash habitats, shall be
31 avoided to the extent practicable, and any impacts minimized and mitigated.
32 A buffer area shall be maintained around playas and dry washes to reduce the
33 potential for impacts on these habitats on or near the SEZ.
- 34
35 • Appropriate engineering controls should be used to minimize impacts on dry
36 wash, playa, greasewood flat, and dry lake habitats, including downstream
37 occurrences, that result from surface water runoff, erosion, sedimentation,
38 altered hydrology, accidental spills, or fugitive dust deposition to these
39 habitats. Appropriate buffers, best management practices, and engineering
40 controls would be determined through agency consultation.

41
42 If these SEZ-specific design features are implemented in addition to programmatic design
43 features, and assuming they are successful, it is anticipated that a high potential for impacts from
44 invasive species and impacts on dry washes, playas, flats, and dry lakes and springs would be
45 reduced to a minimal potential for impact.

13.1.11 Wildlife and Aquatic Biota

This section addresses wildlife (amphibians, reptiles, birds, and mammals) and aquatic biota that could occur within the potentially affected area of the proposed Escalante Valley SEZ. Wildlife known to occur within 50 mi (80 km) of the SEZ (i.e., the SEZ region) were determined from the Utah Conservation Data Center (UDWR 2009a). Land cover types suitable for each species were determined from SWReGAP (USGS 2004, 2005c, 2007). The amount of aquatic habitat within the SEZ region was determined by estimating the length of linear perennial stream and canal features and the area of standing water body features (i.e., ponds, lakes, and reservoirs) within 50 mi (80 km) of the SEZ using available GIS surface water datasets.

The affected area considered in this assessment included the areas of direct and indirect effects. The area of direct effects was defined as the area that would be physically modified during project development (i.e., where ground-disturbing activities would occur) and included the SEZ, a 250-ft (76-m) wide portion of an assumed 3-mi (5-km) long transmission line corridor, and a 60-ft (18-m) wide portion of an assumed 15-mi (24-km) long access road corridor.

The area of indirect effects was defined as the area within 5 mi (8 km) of the SEZ boundary and within the 1.0-mi (1.6-km) wide assumed transmission and access road corridors where ground-disturbing activities would not occur, but that could be indirectly affected by activities in the areas of direct effect (e.g., surface runoff, dust, noise, lighting, and accidental spills in the SEZ or in the transmission line or road construction areas). Since the assumed transmission line location is within the 5-mi (8-km) area of indirect effect for the SEZ, no additional area of indirect effect was considered for the transmission corridor. An additional area of indirect effect was considered for 10 mi (16 km) of the access road corridor that would extend beyond the 5-mi (8-km) area of indirect effect for the SEZ. The potential degree of indirect effects would decrease with increasing distance away from the SEZ. The area of indirect effect was identified on the basis of professional judgment and was considered sufficiently large to bound the area that would potentially be subject to indirect effects. These areas of direct and indirect effect are defined and the impact assessment approach is described in Appendix M.

Dominant land cover habitat in the affected area is intermountain scrub-shrub, and the primary vegetation community types within the affected area are mixed salt desert scrub and sagebrush (*Artemisia* spp.) (see Section 13.1.10). Ephemeral washes and a dry lakebed in the southwestern portion of the SEZ (Section 13.1.9.1.1). Fourmile Wash occurs in the area of indirect effects as near as 3 mi (5 km) northwest of the SEZ. There are also dry lake playa habitats throughout the area of indirect effects.

13.1.11.1 Amphibians and Reptiles

13.1.11.1.1 Affected Environment

This section addresses amphibian and reptile species that are known to occur, or for which potentially suitable habitat occurs, on or within the potentially affected area of the

1 proposed Escalante Valley SEZ. The list of amphibian and reptile species potentially present
2 in the SEZ area was determined from range maps and habitat information available from the
3 Utah Conservation Data Center (UDWR 2009a). Land cover types suitable for each species
4 were determined from SWReGAP (USGS 2004, 2005c, 2007). See Appendix M for additional
5 information on the approach used.

6
7 Eight amphibian species are known to occur in Iron County, within which the proposed
8 Escalante Valley SEZ is located (UDWR 2009a). Based on species distributions within this
9 area and habitat preferences of the amphibian species, only the Great Basin spadefoot (*Spea*
10 *intermontana*) and the Great Plains toad (*Bufo cognatus*) would be expected to occur within the
11 SEZ (UDWR 2009a; Stebbins 2003).

12
13 Thirty reptile species are known to occur within Iron County (UDWR 2009a). About
14 half of these species could occur within the proposed Escalante Valley SEZ (UDWR 2009a;
15 Stebbins 2003). Species expected to be fairly common to abundant within the SEZ include
16 the common sagebrush lizard (*Sceloporus graciosus*), desert horned lizard (*Phrynosoma*
17 *platyrhinos*), eastern fence lizard (*S. undulatus*), gophersnake (*Pituophis catenifer*), greater
18 short-horned lizard (*Phrynosoma hernandesi*), long-nosed leopard lizard (*Gambelia wislizenii*),
19 nightsnake (*Hypsiglena torquata*), tiger whiptail (*Aspidoscelis tigris*), and wandering
20 gartersnake (*Thamnophis elegans vagrans*, a subspecies of terrestrial gartersnake).

21
22 Table 13.1.11.1-1 provides habitat information for representative amphibian and reptile
23 species that could occur within the proposed Escalante Valley SEZ.

24 25 26 **13.1.11.1.2 Impacts**

27
28 The types of impacts that amphibians and reptiles could incur from construction,
29 operation, and decommissioning of utility-scale solar energy facilities are discussed in
30 Section 5.10.2.1. Any such impacts would be minimized through the implementation of
31 required programmatic design features described in Appendix A, Section A.2.2, and through
32 any additional mitigation applied. Section 13.1.11.1.3, below, identifies SEZ-specific design
33 features of particular relevance to the proposed Escalante Valley SEZ.

34
35 The assessment of impacts on amphibian and reptile species is based on available
36 information on the presence of species in the affected area as presented in Section 13.1.11.1.1
37 following the analysis approach described in Appendix M. Additional NEPA assessments and
38 coordination with state natural resource agencies may be needed to address project-specific
39 impacts more thoroughly. These assessments and consultations could result in additional
40 required actions to avoid or mitigate impacts on amphibians and reptiles
41 (see Section 13.1.11.1.3).

42
43 In general, impacts on amphibians and reptiles would result from habitat disturbance
44 (i.e., habitat reduction, fragmentation, and alteration) and from disturbance, injury, or mortality
45 to individual amphibians and reptiles. On the basis of the magnitude of impacts on amphibians

TABLE 13.1.11.1-1 Habitats, Potential Impacts, and Potential Mitigation for Representative Amphibian and Reptile Species That Could Occur on or in the Affected Area of the Proposed Escalante Valley SEZ

Common Name (Scientific Name)	Habitat ^a	Maximum Area of Potential Habitat Affected ^b				Overall Impact Magnitude ^g and Species-Specific Mitigation ^h
		Within SEZ (Direct Effects) ^c	Outside SEZ (Indirect Effects) ^d	Within Road Corridor (Indirect and Direct Effects) ^e	Within Transmission Corridor (Indirect and Direct Effects) ^f	
Amphibians						
Great Basin spadefoot (<i>Spea intermontana</i>)	Sagebrush flats, semidesert shrublands, pinyon-juniper woodlands, and spruce-fir forests. Breeds in temporary and permanent waters including rain pools, pools in intermittent streams, and flooded areas along streams. About 3,757,000 acres ¹ of potentially suitable habitat occurs within the SEZ region.	4,513 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat) during construction and operations	86,504 acres of potentially suitable habitat (2.3% of available potentially suitable habitat)	91 acres of potentially suitable habitat lost 0.002% of available potentially suitable habitat) and 7,897 acres in area of indirect effect	92 acres of potentially suitable habitat lost (0.002% of available potentially suitable habitat) and 1,840 acres in area of indirect effect	Small overall impact. Avoidance of ephemeral washes and the dry lakebed.
Great Plains toad (<i>Bufo cognatus</i>)	Prefers desert, grassland, and agricultural habitats. Breeds in shallow temporary pools, quiet areas of streams, marshes, irrigation ditches, and flooded fields. In cold winter months, it burrows underground and becomes inactive. About 481,800 acres of potentially suitable habitat occurs within the SEZ region.	739 acres of potentially suitable habitat lost (0.2% of available potentially suitable habitat) during construction and operations	23,457 acres of potentially suitable habitat (4.9% of available potentially suitable habitat)	33 acres of potentially suitable habitat lost (0.007% of available potentially suitable habitat) and 2,862 acres in area of indirect effect	2 acres of potentially suitable habitat lost (<0.001% of available potentially suitable habitat) and 44 acres in area of indirect effect	Small overall impact. Avoidance of ephemeral washes and the dry lakebed.

TABLE 13.1.11.1-1 (Cont.)

Common Name (Scientific Name)	Habitat ^a	Maximum Area of Potential Habitat Affected ^b				Overall Impact Magnitude ^g and Species-Specific Mitigation ^h
		Within SEZ (Direct Effects) ^c	Outside SEZ (Indirect Effects) ^d	Within Road Corridor (Indirect and Direct Effects) ^e	Within Transmission Corridor (Indirect and Direct Effects) ^f	
Lizards						
Common sagebrush lizard (<i>Sceloporus graciosus</i>)	Open ground with scattered low bushes. Usually found in sagebrush habitat, but it also occurs in many other types of habitat, including pinyon-juniper areas and open forests. Sometimes abundant in prairie dog colonies. It becomes inactive during the cold winter months, often using stone piles, shrubs, or rodent burrows for cover. About 4,283,300 acres of potentially suitable habitat occurs within the SEZ region.	4,867 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat) during construction and operations	98,352 acres of potentially suitable habitat (2.3% of available potentially suitable habitat)	95 acres of potentially suitable habitat lost (0.002% of available potentially suitable habitat) and 8,248 acres in area of indirect effect	92 acres of potentially suitable habitat lost (0.002% of available potentially suitable habitat) and 1,852 acres in area of indirect effect	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.
Desert horned lizard (<i>Phrynosoma platyrhinos</i>)	Deserts dominated by sagebrush, creosotebush, greasewood, or cactus. Occurs on sandy flats, alluvial fans, washes, and edges of dunes. Burrows in soil during periods of inactivity. About 2,009,000 acres of potentially suitable habitat occurs in the SEZ region.	5,291 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	117,692 acres of potentially suitable habitat (5.9% of available potentially suitable habitat)	142 acres of potentially suitable habitat lost (0.007% of available potentially suitable habitat) and 12,347 acres in area of indirect effect	93 acres of potentially suitable habitat lost (0.005% of available potentially suitable habitat) and 1,878 acres in area of indirect effect	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.

TABLE 13.1.11.1-1 (Cont.)

Common Name (Scientific Name)	Habitat ^a	Maximum Area of Potential Habitat Affected ^b				Overall Impact Magnitude ^g and Species-Specific Mitigation ^h
		Within SEZ (Direct Effects) ^c	Outside SEZ (Indirect Effects) ^d	Within Road Corridor (Indirect and Direct Effects) ^e	Within Transmission Corridor (Indirect and Direct Effects) ^f	
Lizards (Cont.)						
Eastern fence lizard (<i>Sceloporus undulatus</i>)	Sunny, rocky habitats of cliffs, talus, old lava flows and cones, canyons, and outcrops. Various vegetation adjacent to or among rocks, including montane forests, woodlands, semidesert shrubland, and various forbs and grasses. About 2,611,600 acres of potentially suitable habitat occurs in the SEZ region.	2,013 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat) during construction and operations	32,607 acres of potentially suitable habitat (1.2% of available potentially suitable habitat)	54 acres of potentially suitable habitat lost (0.002% of available potentially suitable habitat) and 4,688 acres in area of indirect effect	2 acres of potentially suitable habitat lost (<0.001% of available potentially suitable habitat) and 50 acres in area of indirect effect	Small overall impact.
Greater short-horned lizard (<i>Phrynosoma hernandesi</i>)	Short-grass prairies, sagebrush, semidesert shrublands, shale barrens, pinyon-juniper and pine-oak woodlands, oak-grass associations, and open conifer forests in mountainous areas. About 3,482,500 acres of potentially suitable habitat occurs in the SEZ region.	841 acres of potentially suitable habitat lost (0.02% of available potentially suitable habitat) during construction and operations	35,324 acres of potentially suitable habitat (1.0% of available potentially suitable habitat)	46 acres of potentially suitable habitat lost (0.001% of available potentially suitable habitat) and 3,986 acres in area of indirect effect	64 acres of potentially suitable habitat lost (0.002% of available potentially suitable habitat) and 1,297 acres in area of indirect effect	Small overall impact.

TABLE 13.1.11.1-1 (Cont.)

Common Name (Scientific Name)	Habitat ^a	Maximum Area of Potential Habitat Affected ^b				Overall Impact Magnitude ^g and Species-Specific Mitigation ^h
		Within SEZ (Direct Effects) ^c	Outside SEZ (Indirect Effects) ^d	Within Road Corridor (Indirect and Direct Effects) ^e	Within Transmission Corridor (Indirect and Direct Effects) ^f	
Lizards (Cont.)						
Long-nosed leopard lizard (<i>Gambelia wislizenii</i>)	Desert and semidesert areas with scattered shrubs). Prefers sandy or gravelly flats and plains. Also prefers areas with abundant rodent burrows that they occupy when inactive. About 1,602,400 acres of potentially suitable habitat occurs in the SEZ region.	4,513 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	86,322 acres of potentially suitable habitat (5.4% of available potentially suitable habitat)	91 acres of potentially suitable habitat lost (0.006% of available potentially suitable habitat) and 7,891 acres in area of indirect effect	91 acres of potentially suitable habitat lost (0.006% of available potentially suitable habitat) and 1,835 acres in area of indirect effect	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.
Tiger whiptail (<i>Aspidoscelis tigris</i>)	Primarily occurs in sparsely vegetated desert and shrubland habitats. During cold winter months, it often occupies underground burrows created by rodents or other lizards. About 2,936,000 acres of potentially suitable habitat occurs within the SEZ region.	4,449 acres of potentially suitable habitat lost (0.2% of available potentially suitable habitat) during construction and operations	75,553 acres of potentially suitable habitat (2.6% of available potentially suitable habitat)	79 acres of potentially suitable habitat lost (0.003% of available potentially suitable habitat) and 6,902 acres in area of indirect effect	30 acres of potentially suitable habitat lost (0.001% of available potentially suitable habitat) and 594 acres in area of indirect effect	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.

TABLE 13.1.11.1-1 (Cont.)

Common Name (Scientific Name)	Habitat ^a	Maximum Area of Potential Habitat Affected ^b				Overall Impact Magnitude ^g and Species-Specific Mitigation ^h
		Within SEZ (Direct Effects) ^c	Outside SEZ (Indirect Effects) ^d	Within Road Corridor (Indirect and Direct Effects) ^e	Within Transmission Corridor (Indirect and Direct Effects) ^f	
Snakes						
Gophersnake (<i>Pituophis catenifer</i>)	Plains grasslands, sandhills, riparian areas, marshes, edges of ponds and lakes, rocky canyons, semidesert and mountain shrublands, montane woodlands, rural and suburban areas, and agricultural areas. Likely inhabits pocket gopher burrows in winter. About 3,802,600 acres of potentially suitable habitat occurs in the SEZ region.	871 acres of potentially suitable habitat lost (0.02% of available potentially suitable habitat) during construction and operations	38,625 acres of potentially suitable habitat (1.0% of available potentially suitable habitat)	50 acres of potentially suitable habitat lost (0.001% of available potentially suitable habitat) and 4,345 acres in area of indirect effect	69 acres of potentially suitable habitat lost (0.002% of available potentially suitable habitat) and 1,386 acres in area of indirect effect	Small overall impact.
Nightsnake (<i>Hypsiglena torquata</i>)	Arid and semiarid desert flats, plains, and woodlands; areas with rocky and sandy soils are preferred. During cold periods of the year, it seeks refuge underground, in crevices, or under rocks. About 2,737,500 acres of potentially suitable habitat occurs within the SEZ region.	5,291 acres of potentially suitable habitat lost (0.2% of available potentially suitable habitat) during construction and operations	70,537 acres of potentially suitable habitat (2.6% of available potentially suitable habitat)	72 acres of potentially suitable habitat lost (0.003% of available potentially suitable habitat) and 6,239 acres in area of indirect effect	24 acres of potentially suitable habitat lost (<0.001% of available potentially suitable habitat) and 473 acres in area of indirect effect	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.

TABLE 13.1.11.1-1 (Cont.)

Common Name (Scientific Name)	Habitat ^a	Maximum Area of Potential Habitat Affected ^b				Overall Impact Magnitude ^g and Species-Specific Mitigation ^h
		Within SEZ (Direct Effects) ^c	Outside SEZ (Indirect Effects) ^d	Within Road Corridor (Indirect and Direct Effects) ^e	Within Transmission Corridor (Indirect and Direct Effects) ^f	
Snakes (Cont.)						
Wandering gartersnake (<i>Thamnophis elegans vagrans</i>)	Most terrestrial or wetland habitats in the vicinity of any lotic or lentic body of water. However, it also occurs many miles from surface waters. About 1,779,500 acres of potentially suitable habitat occurs within the SEZ region.	2,413 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat) during construction and operations	52,528 acres of potentially suitable habitat (3.0% of available potentially suitable habitat)	68 acres of potentially suitable habitat lost (0.004% of available potentially suitable habitat) and 5,923 acres in area of indirect effect	65 acres of potentially suitable habitat lost (0.004% of available potentially suitable 1,301 acres in area of indirect effect	Small overall impact.

- ^a Potentially suitable habitat was determined by using SWReGAP habitat suitability and land cover models. Area of potentially suitable habitat for each species is presented for the SEZ region, which is defined as the area within 50 mi (80 km) of the SEZ center.
- ^b Maximum area of potentially suitable habitat that could be affected relative to availability within the SEZ region. Habitat availability for each species within the region was determined by using SWReGAP habitat suitability and land cover models. This approach probably overestimates the amount of suitable habitat in the project area.
- ^c Direct effects within the SEZ would consist of the ground-disturbing activities associated with construction and the maintenance of an altered environment associated with operations. A maximum of 5,291 acres would be developed in the SEZ.
- ^d Area of indirect effects was assumed to be the area adjacent to the SEZ within 5 mi (8 km) of the SEZ boundary and within the 1-mi (1.6-km) wide road corridor (less the assumed area of direct effects) that extends beyond the 5-mi (8-km) area adjacent to the SEZ boundary. Indirect effects include effects from surface runoff, dust, noise, lighting, and so on from the SEZ, but do not include ground-disturbing activities. The potential degree of indirect effects would decrease with increasing distance away from the SEZ.
- ^e For access road development, direct effects were estimated within a 15-mi (24-km) long, 60-ft (18-m) wide ROW for an assumed new access road from the SEZ to the nearest state highway. Indirect effects were estimated within a 1-mi (1.6-km) wide road corridor to the state highway, less the assumed area of direct effects.

Footnotes continued on next page.

TABLE 13.1.11.1-1 (Cont.)

- ^f For transmission development, direct effects were estimated within a 3-mi (5-km) long, 250-ft (76-m) wide ROW for an assumed new transmission line connecting to the nearest existing line. Indirect effects were estimated within a 1-mi (1.6-km) wide transmission corridor to the existing transmission line, less the assumed area of direct effects.
- ^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; (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.

Sources: NatureServe (2010); UDWR (2009a); USGS (2004, 2005c, 2007).

1 and reptiles summarized in Table 13.1.11.1-1, direct impacts on amphibian and reptile species
2 would be small, as 0.3% or less of potentially suitable habitats identified for the species in the
3 SEZ region would be lost. Larger areas of potentially suitable habitats for most amphibian and
4 reptile species occur within the area of potential indirect effects (e.g., up to 5.9% of available
5 habitat for the desert horned lizard). Other impacts on amphibians and reptiles could result from
6 surface water and sediment runoff from disturbed areas, fugitive dust generated by project
7 activities, accidental spills, collection, and harassment. These indirect impacts are expected to be
8 negligible with implementation of programmatic design features.
9

10 Decommissioning after operations cease could result in short-term negative impacts on
11 individuals and habitats within and adjacent to the SEZ. The negative impacts of
12 decommissioning would be reduced or eliminated as reclamation proceeds. Potentially long-term
13 benefits could accrue as habitats are restored in previously disturbed areas. Section 5.10.2.1.4
14 provides an overview of the impacts of decommissioning and reclamation on wildlife. Of
15 particular importance for amphibian and reptile species would be the restoration of original
16 ground surface contours, soils, and native plant communities associated with semiarid
17 shrublands.
18
19

20 ***13.1.11.1.3 SEZ-Specific Design Features and Design Feature Effectiveness***

21

22 The implementation of required programmatic design features described in Appendix A,
23 Section A.2.2, would reduce the potential for effects on amphibians and reptiles, especially for
24 those species that depend on habitat types that can be avoided (e.g., ephemeral washes and the
25 dry lakebed). Indirect impacts could be reduced to negligible levels by implementing design
26 features, especially those engineering controls that would reduce runoff, sedimentation, spills,
27 and fugitive dust. While SEZ-specific design features are best established when considering
28 specific project details, the following is one design features that can be identified at this time:
29

- 30 • Avoid the ephemeral washes and dry lakebed in the southwestern portion of
31 the SEZ.
32

33 If this SEZ-specific design feature is implemented in addition to other programmatic
34 design features, impacts on amphibian and reptile species could be reduced. However, as
35 potentially suitable habitats for a number of the amphibian and reptile species occur throughout
36 much of the SEZ, additional species-specific mitigation of direct effects for those species would
37 be difficult or infeasible.
38
39

40 **13.1.11.2 Birds**

41
42

43 ***13.1.11.2.1 Affected Environment***

44

45 This section addresses bird species that are known to occur, or for which potentially
46 suitable habitat occurs, on or within the potentially affected area of the proposed Escalante

1 Valley SEZ. The list of bird species potentially present in the SEZ area was determined
2 from range maps and habitat information available from the Utah Conservation Data Center
3 (UDWR 2009a). Land cover types suitable for each species were determined from SWReGAP
4 (USGS 2004, 2005c, 2007). See Appendix M for additional information on the approach used.
5

6 Nearly 270 species of birds are reported from Iron County (Utah Ornithological
7 Society 2007). However, based on habitat preferences for these species, only about 10% of the
8 species would be expected to regularly occur within the proposed Escalante Valley SEZ.
9

10 **Waterfowl, Wading Birds, and Shorebirds**

11
12
13 As discussed in Section 4.10.2.2.2, waterfowl (ducks, geese, and swans), wading birds
14 (herons and cranes), and shorebirds (avocets, gulls, plovers, rails, sandpipers, stilts, and terns) are
15 among the most abundant groups of birds in the six-state solar study area. Around 80 waterfowl,
16 wading bird, and shorebird species have been reported from Iron County (Utah Ornithological
17 Society 2007). However, within the proposed Escalante Valley SEZ, waterfowl, wading birds,
18 and shorebird species would be mostly absent to uncommon. The perennial streams, canals,
19 lakes, and reservoirs within 50 mi (80 km) of the SEZ would provide more viable habitats for
20 this group of birds.
21

22 **Neotropical Migrants**

23
24
25 As discussed in Section 4.10.2.2.3, neotropical migrants represent the most diverse
26 category of birds within the six-state solar energy study area. Those species that are common or
27 abundant within Iron County and would be expected to occur within the proposed Escalante
28 Valley SEZ include Bewick's wren (*Thryomanes bewickii*), Brewer's sparrow (*Spizella breweri*),
29 common raven (*Corvus corax*), gray flycatcher (*Empidonax wrightii*), greater roadrunner
30 (*Geococcyx californianus*), horned lark (*Eremophila alpestris*), Le Conte's thrasher (*Toxostoma*
31 *leconteii*), loggerhead shrike (*Lanius ludovicianus*), rock wren (*Salpinctes obsoletus*), sage
32 sparrow (*Amphispiza belli*), sage thrasher (*Oreoscoptes montanus*), vesper sparrow (*Pooecetes*
33 *gramineus*), and western kingbird (*Tyrannus verticalis*) (UDWR 2009a).
34
35

36 **Birds of Prey**

37
38 Section 4.10.2.2.4 provided an overview of the birds of prey (raptors, owls, and vultures)
39 within the six-state solar study area. Twenty-seven bird of prey species have been reported from
40 Iron County (Utah Ornithological Society 2007). Raptor species that could occur within the
41 proposed Escalante Valley SEZ include the American kestrel (*Falco sparverius*), golden eagle
42 (*Aquila chrysaetos*), red-tailed hawk (*Buteo jamaicensis*), rough-legged hawk (*Buteo lagopus*,
43 only during winter), Swainson's hawk (*Buteo swainsoni*), and turkey vulture (*Cathartes aura*)
44 (UDWR 2009a).
45
46
47

1 **Upland Game Birds**
2

3 Section 4.10.2.2.5 provided an overview of the upland game birds (primarily pheasants,
4 grouse, quail, and doves) that occur within the six-state solar study area. Upland game species
5 that could occur within the proposed Escalante Valley SEZ include the chukar (*Alectoris*
6 *chukar*), mourning dove (*Zenaida macroura*), and wild turkey (*Meleagris gallopavo*)
7 (UDWR 2009a).
8

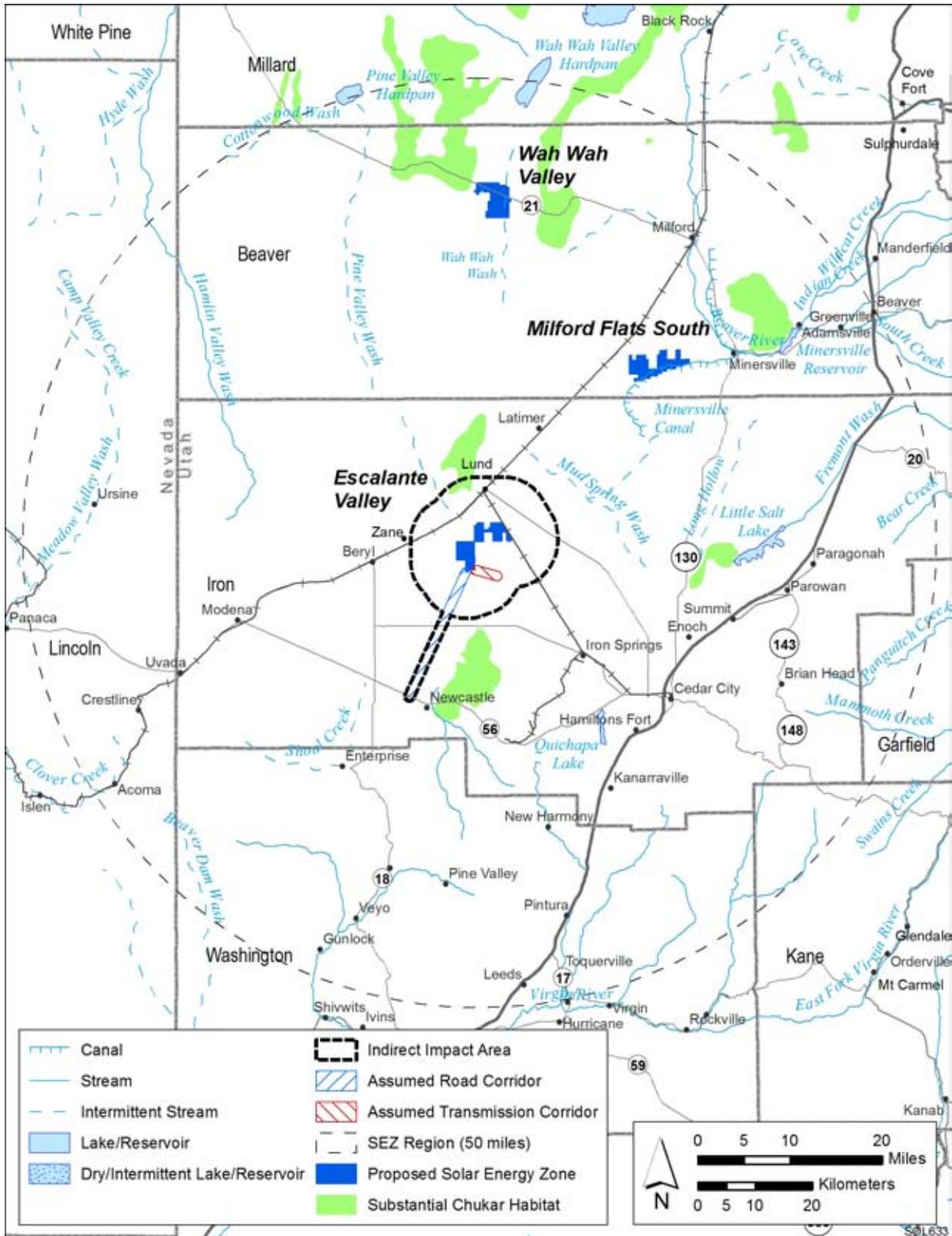
9 The chukar is an introduced upland game bird. A management plan for the chukar in
10 Utah has been developed (UDWR 2003). Preferred habitat for the chukar is steep, semiarid
11 slopes with rocky outcrops and shrubs with a grass and forb understory. Sources of water are
12 required during hot, dry periods, with most birds found within 0.25 mi (0.4 km) of water during
13 the brooding period (UDWR 2003, 2009a). Grasses and seeds of forbs are the main foods with
14 insects important to young chicks (UDWR 2003). Urbanization and elimination of sagebrush are
15 among the major factors that adversely affect chukar habitat. Population declines periodically
16 occur due to severe winters or droughts (UDWR 2003). The chukar is distributed throughout
17 Utah, with over 20,400,000 acres (82,556 km²) of potential high and substantial value habitats⁴
18 occurring in the state (UDWR 2003). Figure 13.1.11.2-1 shows the location of the proposed
19 Escalante Valley SEZ relative to substantial chukar habitat. No areas of this habitat type occur
20 within the SEZ. The shortest distance from the SEZ to substantial chukar habitat is 4 mi (6 km).
21

22 Two subspecies of wild turkey occur in Utah, the Rio Grande wild turkey (*Meleagris*
23 *gallopavo intermedia*) and Merriam’s wild turkey (*M. g. merriami*). Only the Rio Grande wild
24 turkey has established populations within Iron County (UDWR 2009a). It prefers cottonwood
25 riparian areas of rivers associated with oak-pine and pinyon-juniper forests (UDWR 2009a).
26 Areas of brushy cover are used for nesting. Food items include pine nuts, acorns, grasses, weed
27 seeds, and green vegetation. Insects are also important in the diet of young poults
28 (UDWR 2009a). The shortest distance from the SEZ to crucial wild turkey habitat⁵ is 15 mi
29 (25 km). Nearly 1,138,700 acres (4,608 km²) of crucial wild turkey habitat occurs within the
30 SEZ region.
31

32 Table 13.1.11.2-1 provides habitat information for representative bird species that could
33 occur within the proposed Escalante Valley SEZ. Special status bird species are discussed in
34 Section 13.1.12.
35
36

4 High value habitat is an area that provides for intensive use by a wildlife species. Substantial value habitat is an area used by a wildlife species but is not crucial for population survival. Degradation or unavailability of substantial value habitat will not lead to significant declines in carrying capacity and/or numbers of the wildlife species in question.

5 Crucial value habitat is essential to the life history requirements of the wildlife species. Degradation or unavailability of crucial habitat will lead to significant declines in carrying capacity and/or numbers of the wildlife species in question.



1
 2 **FIGURE 13.1.11.2-1 Location of the Proposed Escalante Valley SEZ Relative to Substantial**
 3 **Chukar Habitat (Source: UDRW 2006)**

TABLE 13.1.11.2-1 Habitats, Potential Impacts, and Potential Mitigation for Representative Bird Species That Could Occur on or in the Affected Area of the Proposed Escalante Valley SEZ

Common Name (Scientific Name)	Habitat ^a	Maximum Area of Potential Habitat Affected ^b				Overall Impact Magnitude ^g and Species-Specific Mitigation ^h
		Within SEZ (Direct Effects) ^c	Outside SEZ (Indirect Effects) ^d	Within Road Corridor (Indirect and Direct Effects) ^e	Within Transmission Corridor (Indirect and Direct Effects) ^f	
Neotropical Migrants						
Bewick's wren (<i>Thryomanes bewickii</i>)	Generally associated with dense, brushy habitats. Permanent resident of lowland deserts and pinyon-juniper forests of southern Utah. Breeding occurs in brushy areas of open woodlands and other open habitats. Cavity nester with nests constructed in small enclosed areas such as tree cavities, nesting boxes, rock crevices, or the center of a brush pile. About 4,297,900 acres ⁱ of potentially suitable habitat occurs within the SEZ region.	1,468 acres of potentially suitable habitat lost (0.03% of available potentially suitable habitat) during construction and operations	60,481 acres of potentially suitable habitat (1.4% of available potentially suitable habitat)	80 acres of potentially suitable habitat lost (0.002% of available potentially suitable habitat) and 6,940 acres in area of indirect effect	71 acres of potentially suitable habitat lost (0.002% of available potentially suitable habitat) and 1,428 acres in area of indirect effect	Small overall impact. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.
Brewer's sparrow (<i>Spizella breweri</i>)	Considered a shrubsteppe obligate. Occupies open desert scrub and cropland habitats. However, may also occur in high desert scrub (greasewood) habitats, particularly where adjacent to shrubsteppe habitats. Nests are usually located in patches of sagebrush that are taller and denser, with more bare	4,912 acres of potentially suitable habitat lost (0.2% of available potentially suitable habitat) during construction and operations	96,568 acres of potentially suitable habitat (4.4% of available potentially suitable habitat)	94 acres of potentially suitable habitat lost (0.004% of available potentially suitable habitat) and 8,375 acres in area of indirect effect	92 acres of potentially suitable habitat lost (0.004% of available potentially suitable habitat) and 1,847 acres in area of indirect effect	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect. Some measure of mitigation provided

TABLE 13.1.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat ^a	Maximum Area of Potential Habitat Affected ^b				Overall Impact Magnitude ^g and Species-Specific Mitigation ^h
		Within SEZ (Direct Effects) ^c	Outside SEZ (Indirect Effects) ^d	Within Road Corridor (Indirect and Direct Effects) ^e	Within Transmission Corridor (Indirect and Direct Effects) ^f	
Neotropical Migrants (Cont.)						
Brewer's sparrow (<i>Spizella breweri</i>) (Cont.)	ground and less herbaceous cover, than the surrounding habitat. Also breeds in large sagebrush openings in pinyon-juniper or coniferous forest habitats. About 2,199,600 acres of potentially suitable habitat occurs in the SEZ region.					by the requirements of the Migratory Bird Treaty Act.
Common raven (<i>Corvus corax</i>)	Occurs in most habitats. Trees and cliffs provide cover. Roosts primarily in trees. Nests on cliffs, bluffs, tall trees, or human-made structures. Forages in sparse, open terrain. About 4,894,500 acres of potentially suitable habitat occurs in the SEZ region.	5,237 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat) during construction and operations	111,466 acres of potentially suitable habitat (2.3% of available potentially suitable habitat)	130 acres of potentially suitable habitat lost (0.003% of available potentially suitable habitat) and 11,281 acres in area of indirect effect	94 acres of potentially suitable habitat lost (0.002% of available potentially suitable habitat) and 1,900 acres in area of indirect effect	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.

TABLE 13.1.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat ^a	Maximum Area of Potential Habitat Affected ^b				Overall Impact Magnitude ^g and Species-Specific Mitigation ^h
		Within SEZ (Direct Effects) ^c	Outside SEZ (Indirect Effects) ^d	Within Road Corridor (Indirect and Direct Effects) ^e	Within Transmission Corridor (Indirect and Direct Effects) ^f	
Neotropical Migrants (Cont.)						
Gray flycatcher (<i>Empidonax wrightii</i>)	Inhabits woodlands and shrublands occurring predominately in pinyon-juniper, sagebrush, and desert shrublands. Nests are located low in shrubs or small trees, usually 2 to 5 ft (0.6 to 1.5 m) above ground. About 3,790,500 acres of potentially suitable habitat occurs within the SEZ region.	1,135 acres of potentially suitable habitat lost (0.03% of available potentially suitable habitat) during construction and operations	44,583 acres of potentially suitable habitat (1.2% of available potentially suitable habitat)	48 acres of potentially suitable habitat lost (0.001% of available potentially suitable habitat) and 4,209 acres in area of indirect effect	69 acres of potentially suitable habitat lost (0.002% of available potentially suitable habitat) and 1,397 acres in area of indirect effect	Small overall impact. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.
Greater roadrunner (<i>Geococcyx californianus</i>)	Desert scrub, chaparral, edges of cultivated lands, and arid open areas with scattered brush. Requires thickets, large bushes, or small trees for shade, refuge, and roosting. Usually nests low in trees, shrubs, or clumps of cactus. Rarely nests on ground. About 3,959,300 acres of potentially suitable habitat occurs in the SEZ region.	4,513 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat) during construction and operations	86,855 acres of potentially suitable habitat (2.2% of available potentially suitable habitat)	95 acres of potentially suitable habitat lost (0.002% of available potentially suitable habitat) and 8,247 acres in area of indirect effect	91 acres of potentially suitable habitat lost (0.002% of available potentially suitable habitat) and 1,841 acres in area of indirect effect	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.

TABLE 13.1.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat ^a	Maximum Area of Potential Habitat Affected ^b				Overall Impact Magnitude ^g and Species-Specific Mitigation ^h
		Within SEZ (Direct Effects) ^c	Outside SEZ (Indirect Effects) ^d	Within Road Corridor (Indirect and Direct Effects) ^e	Within Transmission Corridor (Indirect and Direct Effects) ^f	
Neotropical Migrants (Cont.)						
Horned lark (<i>Eremophila alpestris</i>)	Common to abundant resident in a variety of open habitats. Breeds in grasslands, sagebrush, semidesert shrublands, and alpine tundra. During migration and winter, inhabits the same habitats, other than tundra, and occurs in agricultural areas. Usually occurs where plant density is low and there are exposed soils. About 2,294,500 acres of potentially suitable habitat occurs in the SEZ region.	5,245 acres of potentially suitable habitat lost (0.2% of available potentially suitable habitat) during construction and operations	112,459 acres of potentially suitable habitat (4.9% of available potentially suitable habitat)	128 acres of potentially suitable habitat lost (0.006% of available potentially suitable habitat) and 11,098 acres in area of indirect effect	93 acres of potentially suitable habitat lost (0.004% of available potentially suitable habitat) and 1,879 acres in area of indirect effect	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.
Le Conte's thrasher (<i>Toxostoma leconteii</i>)	Open desert wash, alkali desert scrub, and desert succulent shrub habitats. Prefers to nest and forage in arroyos and washes lined with dense stands of creosotebush and salt bush. About 352,600 acres of potentially suitable habitat occurs in the SEZ region.	3,717 acres of potentially suitable habitat lost (1.1% of available potentially suitable habitat) during construction and operations	51,387 acres of potentially suitable habitat (14.6% of available potentially suitable habitat)	46 acres of potentially suitable habitat lost (0.01% of available potentially suitable habitat) and 4,036 acres in area of indirect effect	23 acres of potentially suitable habitat lost (0.006% of available potentially suitable habitat) and 455 acres in area of indirect effect	Moderate overall impact. Avoid ephemeral washes. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.

TABLE 13.1.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat ^a	Maximum Area of Potential Habitat Affected ^b				Overall Impact Magnitude ^g and Species-Specific Mitigation ^h
		Within SEZ (Direct Effects) ^c	Outside SEZ (Indirect Effects) ^d	Within Road Corridor (Indirect and Direct Effects) ^e	Within Transmission Corridor (Indirect and Direct Effects) ^f	
Neotropical Migrants (Cont.)						
Loggerhead shrike (<i>Lanius ludovicianus</i>)	Open country with scattered trees and shrubs, savanna, desert scrub, desert riparian, Joshua tree, and occasionally open woodland habitats. Perches on poles, wires, or fence posts (suitable hunting perches are important aspect of habitat). Nests in shrubs and small trees. About 4,507,700 acres of potentially suitable habitat occurs in the SEZ region.	5,230 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat) during construction and operations	110,273 acres of potentially suitable habitat (2.4% of available potentially suitable habitat)	128 acres of potentially suitable habitat lost (0.003% of available potentially suitable habitat) and 11,106 acres in area of indirect effect	94 acres of potentially suitable habitat lost (0.002% of available potentially suitable habitat) and 1,884 acres in area of indirect effect	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.
Rock wren (<i>Salpinctes obsoletus</i>)	Arid and semiarid habitats. Breeds in areas with talus slopes, scrublands, or dry washes. Nests, constructed of plant materials, are located in rock crevices and the nest entrance is paved with small rocks and stones. About 4,681,500 acres of potentially suitable habitat occurs within the SEZ region.	5,245 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat) during construction and operations	112,304 acres of potentially suitable habitat (2.4% of available potentially suitable habitat)	124 acres of potentially suitable habitat lost (0.003% of available potentially suitable habitat) and 10,767 acres in area of indirect effect	94 acres of potentially suitable habitat lost (0.002% of available potentially suitable habitat) and 1,884 acres in area of indirect effect	Small overall impact. Avoid ephemeral washes. No other species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.

TABLE 13.1.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat ^a	Maximum Area of Potential Habitat Affected ^b				Overall Impact Magnitude ^g and Species-Specific Mitigation ^h
		Within SEZ (Direct Effects) ^c	Outside SEZ (Indirect Effects) ^d	Within Road Corridor (Indirect and Direct Effects) ^e	Within Transmission Corridor (Indirect and Direct Effects) ^f	
<i>Neotropical Migrants (Cont.)</i>						
Sage sparrow (<i>Amphispiza belli</i>)	Prefers shrubland, grassland, and desert habitats. The nest, constructed of twigs and grasses, is located either low in a shrub or on the ground. About 4,319,500 acres of potentially suitable habitat occurs within the SEZ region.	5,291 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat) during construction and operations	116,263 acres of potentially suitable habitat (2.7% of available potentially suitable habitat)	143 acres of potentially suitable habitat lost (0.003% of available potentially suitable habitat) and 12,479 acres in area of indirect effect	94 acres of potentially suitable habitat lost (0.002% of available potentially suitable habitat) and 1,884 acres in area of indirect effect	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.

TABLE 13.1.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat ^a	Maximum Area of Potential Habitat Affected ^b			Overall Impact Magnitude ^g and Species-Specific Mitigation ^h	
		Within SEZ (Direct Effects) ^c	Outside SEZ (Indirect Effects) ^d	Within Road Corridor (Indirect and Direct Effects) ^e		Within Transmission Corridor (Indirect and Direct Effects) ^f
<i>Neotropical Migrants (Cont.)</i>						
Sage thrasher (<i>Oreoscoptes montanus</i>)	It breeds in sagebrush shrublands, other shrublands, and cholla grasslands in the western United States and winters in the southwestern United States and northern Mexico. In Utah, the species nests in greasewood and sagebrush habitats in low-elevation deserts where it constructs a bulky nest in a concealed location, usually in sagebrush or on the ground, using twigs and grasses. About 2,582,000 acres of potentially suitable habitat occurs within the SEZ region.	5,230 acres of potentially suitable habitat lost (0.2% of available potentially suitable habitat) during construction and operations	109,737 acres of potentially suitable habitat (4.3% of available potentially suitable habitat)	124 acres of potentially suitable habitat lost (0.005% of available potentially suitable habitat) and 10,755 acres in area of indirect effect	93 acres of potentially suitable habitat lost (0.004% of available potentially suitable habitat) and 1,879 acres in area of indirect effect	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.

TABLE 13.1.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat ^a	Maximum Area of Potential Habitat Affected ^b				Overall Impact Magnitude ^g and Species-Specific Mitigation ^h
		Within SEZ (Direct Effects) ^c	Outside SEZ (Indirect Effects) ^d	Within Road Corridor (Indirect and Direct Effects) ^e	Within Transmission Corridor (Indirect and Direct Effects) ^f	
Vesper sparrow (<i>Pooecetes gramineus</i>)	Breeds in grasslands, open shrublands mixed with grasslands, and open pinyon-juniper woodlands. Occurs in open riparian and agricultural areas during migration. About 2,087,000 acres of potentially suitable habitat occurs in the SEZ region.	1,261 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat) during construction and operations	49,163 acres of potentially suitable habitat (2.4% of available potentially suitable habitat)	56 acres of potentially suitable habitat lost (0.003% of available potentially suitable habitat) and 4,879 acres in area of indirect effect	70 acres of potentially suitable habitat lost (0.003% of available potentially suitable habitat) and 1,408 acres in area of indirect effect	Small overall impact. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.
Western kingbird (<i>Tyrannus verticalis</i>)	Occurs in a variety of habitats including riparian forests and woodlands, savannahs, shrublands, agricultural lands, deserts, and urban areas. Nesting occurs in trees, bushes, and other raised areas, such as buildings. It migrates to Central America or the southeastern United States for the winter. About 2,736,200 acres of potentially suitable habitat occurs within the SEZ region.	4,852 acres of potentially suitable habitat lost (0.2% of available potentially suitable habitat) during construction and operations	95,797 acres of potentially suitable habitat (3.5% of available potentially suitable habitat)	95 acres of potentially suitable habitat lost (0.003% of available potentially suitable habitat) and 8,249 acres in area of indirect effect	92 acres of potentially suitable habitat lost (0.003% of available potentially suitable habitat) and 1,846 acres in area of indirect effect	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.

TABLE 13.1.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat ^a	Maximum Area of Potential Habitat Affected ^b				Overall Impact Magnitude ^g and Species-Specific Mitigation ^h
		Within SEZ (Direct Effects) ^c	Outside SEZ (Indirect Effects) ^d	Within Road Corridor (Indirect and Direct Effects) ^e	Within Transmission Corridor (Indirect and Direct Effects) ^f	
Birds of Prey						
American kestrel (<i>Falco sparverius</i>)	Occurs in most open habitats, in various shrub and early successional forest habitats, forest openings, and various ecotones. Perches on trees, snags, rocks, utility poles and wires, and fence posts. Uses cavities in trees, snags, rock areas, banks, and buildings for nesting and cover. About 4,609,200 acres of potentially suitable habitat occurs in the SEZ region.	5,230 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat) during construction and operations	110,274 acres of potentially suitable habitat (2.4% of available potentially suitable habitat)	128 acres of potentially suitable habitat lost (0.003% of available potentially suitable habitat) and 11,107 acres in area of indirect effect	94 acres of potentially suitable habitat lost (0.002% of available potentially suitable habitat) and 1,884 acres in area of indirect effect	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.
Golden eagle (<i>Aquila chrysaetos</i>)	Grasslands, shrublands, pinyon-juniper woodlands, and ponderosa pine forests. Occasionally in most other habitats, especially during migration and winter. Nests on cliffs and sometimes trees in rugged areas, with breeding birds ranging widely over surrounding areas. About 4,828,500 acres of potentially suitable habitat occurs in the SEZ region.	5,230 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat) during construction and operations	110,267 acres of potentially suitable habitat (2.3% of available potentially suitable habitat)	128 acres of potentially suitable habitat lost (0.003% of available potentially suitable habitat) and 11,100 acres in area of indirect effect	94 acres of potentially suitable habitat lost (0.002% of available potentially suitable habitat) and 1,884 acres in area of indirect effect	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect. Some measure of mitigation provided by the requirements of the Bald and Golden Eagle Protection Act.

TABLE 13.1.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat ^a	Maximum Area of Potential Habitat Affected ^b				Overall Impact Magnitude ^g and Species-Specific Mitigation ^h
		Within SEZ (Direct Effects) ^c	Outside SEZ (Indirect Effects) ^d	Within Road Corridor (Indirect and Direct Effects) ^e	Within Transmission Corridor (Indirect and Direct Effects) ^f	
Birds of Prey (Cont.)						
Red-tailed hawk (<i>Buteo jamaicensis</i>)	Wide variety of habitats from deserts, mountains, and populated valleys. Open areas with scattered, elevated perch sites such as scrub desert, plains and montane grassland, agricultural fields, pastures, urban parklands, broken coniferous forests, and deciduous woodland. Nests on cliff ledges or in tall trees. About 2,144,600 acres of potentially suitable habitat occurs in the SEZ region.	4,897 acres of potentially suitable habitat lost (0.2% of available potentially suitable habitat) during construction and operations	96,333 acres of potentially suitable habitat (4.5% of available potentially suitable habitat)	100 acres of potentially suitable habitat lost (0.005% of available potentially suitable habitat) and 8,712 acres in area of indirect effect	87 acres of potentially suitable habitat lost (0.004% of available potentially suitable habitat) and 1,758 acres in area of indirect effect	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.
Rough-legged hawk (<i>Buteo lagopus</i>)	A winter resident in Utah, where it is usually found in grasslands, fields, marshes, sagebrush flats, and other open habitats. About 1,830,800 acres of potentially suitable habitat occurs within the SEZ region.	1,195 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat) during construction and operations	45,529 acres of potentially suitable habitat (2.5% of available potentially suitable habitat)	54 acres of potentially suitable habitat lost (0.003% of available potentially suitable habitat) and 4,687 acres in area of indirect effect	69 acres of potentially suitable habitat lost (0.004% of available potentially suitable habitat) and 1,392 acres in area of indirect effect	Small overall impact.

TABLE 13.1.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat ^a	Maximum Area of Potential Habitat Affected ^b				Overall Impact Magnitude ^g and Species-Specific Mitigation ^h
		Within SEZ (Direct Effects) ^c	Outside SEZ (Indirect Effects) ^d	Within Road Corridor (Indirect and Direct Effects) ^e	Within Transmission Corridor (Indirect and Direct Effects) ^f	
Birds of Prey (Cont.)						
Swainson's hawk <i>(Buteo swainsoni)</i>	Grasslands, agricultural areas, shrublands, and riparian forests. Nests in trees in or near open areas. Migrants often occur in treeless areas. Large flocks often occur in agricultural areas during locust infestations. About 2,444,000 acres of potentially suitable habitat occurs in the SEZ region.	399 acres of potentially suitable habitat lost (0.02% of available potentially suitable habitat) during construction and operations	10,761 acres of potentially suitable habitat (0.4% of available potentially suitable habitat)	9 acres of potentially suitable habitat lost (<0.001% of available potentially suitable habitat) and 822 acres in area of indirect effect	1 acre of potentially suitable habitat lost (<0.001% of available potentially suitable habitat) and 18 acres in area of indirect effect	Small overall impact.
Turkey vulture <i>(Cathartes aura)</i>	Occurs in open stages of most habitats that provide adequate cliffs or large trees for nesting, roosting, and resting. Migrates and forages over most open habitats. Will roost communally in trees, exposed boulders, and occasionally transmission line support towers. About 2,456,600 acres of potentially suitable habitat occurs in the SEZ region.	3,717 acres of potentially suitable habitat lost (0.2% of available potentially suitable habitat) during construction and operations	51,909 acres of potentially suitable habitat (2.1% of available potentially suitable habitat)	50 acres of potentially suitable habitat lost (0.002% of available potentially suitable habitat) and 4,381 acres in area of indirect effect	23 acres of potentially suitable habitat lost (0.001% of available potentially suitable habitat) and 461 acres in area of indirect effect	Small overall impact.

TABLE 13.1.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat ^a	Maximum Area of Potential Habitat Affected ^b				Overall Impact Magnitude ^g and Species-Specific Mitigation ^h
		Within SEZ (Direct Effects) ^c	Outside SEZ (Indirect Effects) ^d	Within Road Corridor (Indirect and Direct Effects) ^e	Within Transmission Corridor (Indirect and Direct Effects) ^f	
Upland Game Birds						
Chukar (<i>Alectoris chukar</i>)	Steep, semiarid slopes with rocky outcrops and shrubs with a grass and forb understory. Distribution often follows that of cheatgrass. Sources of water are required during hot, dry periods, with most birds found within 0.25 mi (0.4 km) of water during the brooding period. About 4,283,400 acres of potentially suitable habitat occurs in the SEZ region.	4,916 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat) during construction and operations	97,624 acres of potentially suitable habitat (2.3% of available potentially suitable habitat)	97 acres of potentially suitable habitat lost (0.002% of available potentially suitable habitat) and 8,447 acres in area of indirect effect	93 acres of potentially suitable habitat lost (0.002% of available potentially suitable habitat) and 1,868 acres in area of indirect effect	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.
Mourning dove (<i>Zenaida macroura</i>)	Habitat generalist, occurring in grasslands, shrublands, croplands, lowland and foothill riparian forests, ponderosa pine forests, deserts, and urban and suburban areas. Rarely in aspen and other forests, coniferous woodlands, and alpine tundra. Nests on ground or in trees. Winters mostly in lowland riparian forests adjacent to cropland. About 4,440,300 acres of potentially suitable habitat occurs in the SEZ region.	5,234 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat) during construction and operations	112,950 acres of potentially suitable habitat (2.5% of available potentially suitable habitat)	128 acres of potentially suitable habitat lost (0.003% of available potentially suitable habitat) and 11,178 acres in area of indirect effect	90 acres of potentially suitable habitat lost (0.002% of available potentially suitable habitat) and 1,810 acres in area of indirect effect	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.

TABLE 13.1.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat ^a	Maximum Area of Potential Habitat Affected ^b				Overall Impact Magnitude ^g and Species-Specific Mitigation ^h
		Within SEZ (Direct Effects) ^c	Outside SEZ (Indirect Effects) ^d	Within Road Corridor (Indirect and Direct Effects) ^e	Within Transmission Corridor (Indirect and Direct Effects) ^f	
Upland Game Birds (Cont.)						
Wild turkey (<i>Meleagris gallopavo</i>)	The Rio Grande wild turkey prefers cottonwood riparian areas of rivers associated with oak-pine and pinyon-juniper forests, while the Merriam's wild turkey inhabits open stands of ponderosa pine interspersed with aspen, grass meadows, and oaks grading into pinyon pine and juniper. Areas of brushy cover are used for nesting. About 4,193,600 acres of potentially suitable habitat occurs within the SEZ region.	1,210 acres of potentially suitable habitat lost (0.03% of available potentially suitable habitat) during construction and operations	47,749 acres of potentially suitable habitat (1.1% of available potentially suitable habitat)	50 acres of potentially suitable habitat lost (0.001% of available potentially suitable habitat) and 4,342 acres in area of indirect effect	69 acres of potentially suitable habitat lost (0.002% of available potentially suitable habitat) and 1,398 acres in area of indirect effect	Small overall impact.

^a Potentially suitable habitat was determined by using SWReGAP habitat suitability and land cover models. Area of potentially suitable habitat for each species is presented for the SEZ region, which is defined as the area within 50 mi (80 km) of the SEZ center.

^b Maximum area of potentially suitable habitat that could be affected relative to availability within the SEZ region. Habitat availability for each species within the region was determined by using SWReGAP habitat suitability and land cover models. This approach probably overestimates the amount of suitable habitat in the project area.

^c Direct effects within the SEZ would consist of the ground-disturbing activities associated with construction and the maintenance of an altered environment associated with operations. A maximum of 5,291 acres of direct effect within the SEZ was assumed.

^d Area of indirect effects was assumed to be the area adjacent to the SEZ within 5 mi (8 km) of the SEZ boundary and within the 1-mi (1.6-km) wide road corridor (less the assumed area of direct effects) that extends beyond the 5-mi (8-km) area adjacent to the SEZ boundary. Indirect effects include effects from surface runoff, dust, noise, lighting, and so on from the SEZ, but do not include ground-disturbing activities. The potential degree of indirect effects would decrease with increasing distance away from the SEZ.

Footnotes continued on next page.

TABLE 13.1.11.2-1 (Cont.)

- ^e For access road development, direct effects were estimated within a 15-mi (24-km) long, 60-ft (18-m) wide ROW for an assumed new access road from the SEZ to the nearest state highway. Indirect effects were estimated within a 1-mi (1.6-km) wide road corridor to the state highway, less the assumed area of direct effects.
- ^f For transmission development, direct effects were estimated within a 3-mi (5-km) long, 250-ft (76-m) wide ROW for an assumed new transmission line connecting to the nearest existing line. Indirect effects were estimated within a 1-mi (1.6-km) wide transmission corridor to the existing transmission line, less the assumed area of direct effects.
- ^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; (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.

Sources: NatureServe (2010); UDWR (2009a); USGS (2004, 2005c, 2007).

1 **13.1.11.2.2 Impacts**
2

3 The types of impacts that birds could incur from construction, operation, and
4 decommissioning of utility-scale solar energy facilities are discussed in Section 5.10.2.1.
5 Any such impacts would be minimized through the implementation of required programmatic
6 design features described in Appendix A, Section A.2.2, and through any additional mitigation
7 applied.. Section 13.1.11.2.3, below, identifies design features of particular relevance to the
8 proposed Escalante Valley SEZ.
9

10 The assessment of impacts on bird species is based on available information on the
11 presence of species in the affected area, as presented in Section 13.1.11.2.1 following the
12 analysis approach described in Appendix M. Additional NEPA assessments and coordination
13 with federal or state natural resource agencies may be needed to address project-specific impacts
14 more thoroughly. These assessments and consultations could result in additional required actions
15 to avoid or mitigate impacts on birds (see Section 13.1.11.2.3).
16

17 In general, impacts on birds would result from habitat disturbance (i.e., habitat reduction,
18 fragmentation, and alteration) and from disturbance, injury, or mortality to individual birds.
19 Table 13.1.11.2-1 summarizes the magnitude of potential impacts on representative bird species
20 resulting from solar energy development in the proposed Escalante Valley SEZ. Direct impacts
21 on bird species would be small for all but one species (Le Conte’s thrasher), as only 0.2% or less
22 of potentially suitable habitats for the bird species would be lost (Table 13.1.11.2-1). Impacts on
23 the Le Conte’s thrasher would be moderate, because solar energy development within the SEZ
24 would directly impact 1.1% of potentially suitable habitat for this species (Table 13.1.11.2-1).
25 Larger areas of potentially suitable habitat for bird species occur within the area of potential
26 indirect effects (e.g., up to 14.6% of potentially suitable habitat for the Le Conte’s thrasher).
27 Other impacts on birds could result from collision with vehicles and buildings, surface water
28 and sediment runoff from disturbed areas, fugitive dust generated by project activities, noise,
29 lighting, spread of invasive species, accidental spills, and harassment. Indirect impacts on areas
30 outside the SEZ (for example, impacts caused by dust generation, erosion, and sedimentation)
31 are expected to be negligible with implementation of programmatic design features.
32

33 Decommissioning after operations cease could result in short-term negative impacts on
34 individuals and habitats within and adjacent to the SEZ. The negative impacts of
35 decommissioning would be reduced or eliminated as reclamation proceeds. Potentially long-term
36 benefits could accrue as habitats are restored in previously disturbed areas. Section 5.10.2.1.4
37 provides an overview of the impacts of decommissioning and reclamation on wildlife. Of
38 particular importance for bird species would be the restoration of original ground surface
39 contours, soils, and native plant communities associated with semiarid shrublands.
40
41

42 **13.1.11.2.3 SEZ-Specific Design Features and Design Feature Effectiveness**
43

44 The successful implementation of programmatic design features presented in
45 Appendix A, Section A.2.2, would reduce the potential for effects on birds, especially for those
46 species that depend on habitat types that can be avoided (e.g., ephemeral washes and the dry

1 lakebed). Indirect impacts could be reduced to negligible levels by implementing programmatic
2 design features, especially those engineering controls that would reduce runoff, sedimentation,
3 spills, and fugitive dust. While SEZ-specific design features important for reducing impacts on
4 birds are best established when specific project details are considered, the following design
5 features can be identified at this time:

- 6
- 7 • For solar energy developments within the SEZ, the requirements contained
8 within the 2010 Memorandum of Understanding between the BLM and
9 USFWS to promote the conservation of migratory birds will be followed.
- 10
- 11 • Take of golden eagles and other raptors should be avoided. Mitigation
12 regarding the golden eagle should be developed in consultation with the
13 USFWS and UDWR. A permit may be required under the Bald and Golden
14 Eagle Protection Act.
- 15
- 16 • The steps outlined in the *Utah Field Office Guidelines for Raptor Protection*
17 *from Human and Land Use Disturbances* (Romin and Muck 1999) should be
18 followed.
- 19
- 20 • Ephemeral washes and the dry lakebed in the southwestern portion of the SEZ
21 should be avoided.
- 22

23 If these SEZ-specific design features are implemented in addition to programmatic design
24 features, impacts on bird species could be reduced. However, as potentially suitable habitats for a
25 number of the bird species occur throughout much of the SEZ, additional species-specific
26 mitigation of direct effects for those species would be difficult or infeasible.

27

28

29 **13.1.11.3 Mammals**

30

31

32 ***13.1.11.3.1 Affected Environment***

33

34 This section addresses mammal species that are known to occur, or for which potentially
35 suitable habitat occurs, on or within the potentially affected area of the proposed Escalante
36 Valley SEZ. The list of mammal species potentially present in the SEZ area was determined
37 from range maps and habitat information available from the Utah Conservation Data Center
38 (UDWR 2009a). Land cover types suitable for each species were determined from SWReGAP
39 (USGS 2004, 2005c, 2007). See Appendix M for additional information on the approach used.
40 Nearly 80 species of mammals are known to occur within Iron County (UDWR 2009a). Based
41 on species distributions and habitat preferences, fewer than 30 mammal species could occur
42 within the proposed Escalante Valley SEZ (UDWR 2009a). Similar to the overview of mammals
43 provided for the six-state solar energy study area (Section 4.6.2.3), the following discussion for
44 the SEZ emphasizes big game and other mammal species that (1) have key habitats within or
45 near the SEZ, (2) are important to humans (e.g., big game, small game, and furbearer species),
46 and/or (3) are representative of other species that share important habitats.

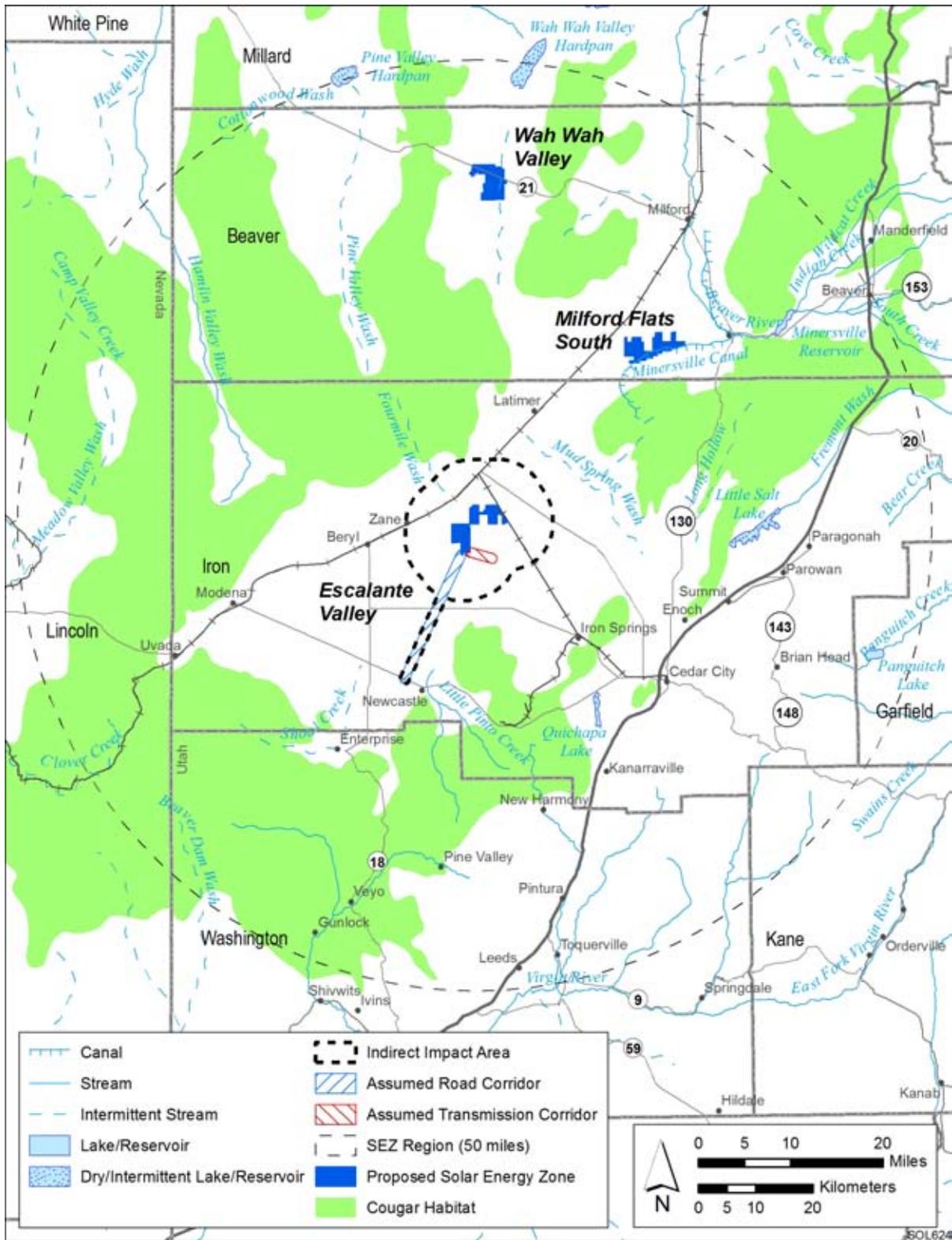
1 **Big Game**
2

3 The big game species that could occur within the area of the proposed Escalante Valley
4 SEZ include American black bear (*Ursus americanus*, fairly common in Utah), cougar (*Puma*
5 *concolor*, fairly common in Utah), elk (*Cervis canadensis*, common in the mountainous regions
6 of Utah), mule deer (*Odocoileus hemionus*, common in Utah), and pronghorn (*Antilocapra*
7 *americana*, common in Utah) (UDWR 2009a).
8
9

10 **American Black Bear.** The American black bear occurs throughout much of Utah, where
11 it primarily inhabits forested areas (UDWR 2009a). However, no areas of substantial or crucial
12 American black bear habitat occur near the SEZ. The shortest distance from the SEZ to
13 substantial American black bear habitat is 17 mi (27 km), whereas the closest distance to crucial
14 American black bear habitat is 19 mi (31 km).
15
16

17 **Cougar.** The cougar is fairly common in Utah (UDWR 2009a). A management plan for
18 the cougar has been developed in Utah (UDWR 2009b). Cougar habitat encompasses about
19 59,325,200 acres (240,080 km²) in Utah with a statewide cougar population estimate somewhere
20 between about 2,500 and 4,000 (UDWR 2009b). Cougars mostly occur in rough, broken foothills
21 and canyon country, often in association with pinyon-juniper and pine-oak brush areas
22 (CDOW 2009; Pederson undated), avoiding areas of sagebrush and low-growing shrubs or other
23 areas without tall cover (Pederson undated). The proposed Escalante Valley SEZ overlaps the
24 cougar's overall range, but the SEZ does not occur within high-value cougar habitat
25 (UDWR 2009a). Figure 13.1.11.3-1 shows the location of the SEZ relative to areas of the
26 woodland and shrub-covered low mountain Level IV ecoregion. These ecoregion areas would
27 potentially provide suitable cougar habitat. The shortest distance from these areas to the
28 proposed Escalante Valley SEZ is 5 mi (87.7 km). About 1,712,640 acres (6,931 km²) of the
29 woodland and shrub-covered low mountain Level IV ecoregion occurs within the SEZ region.
30
31

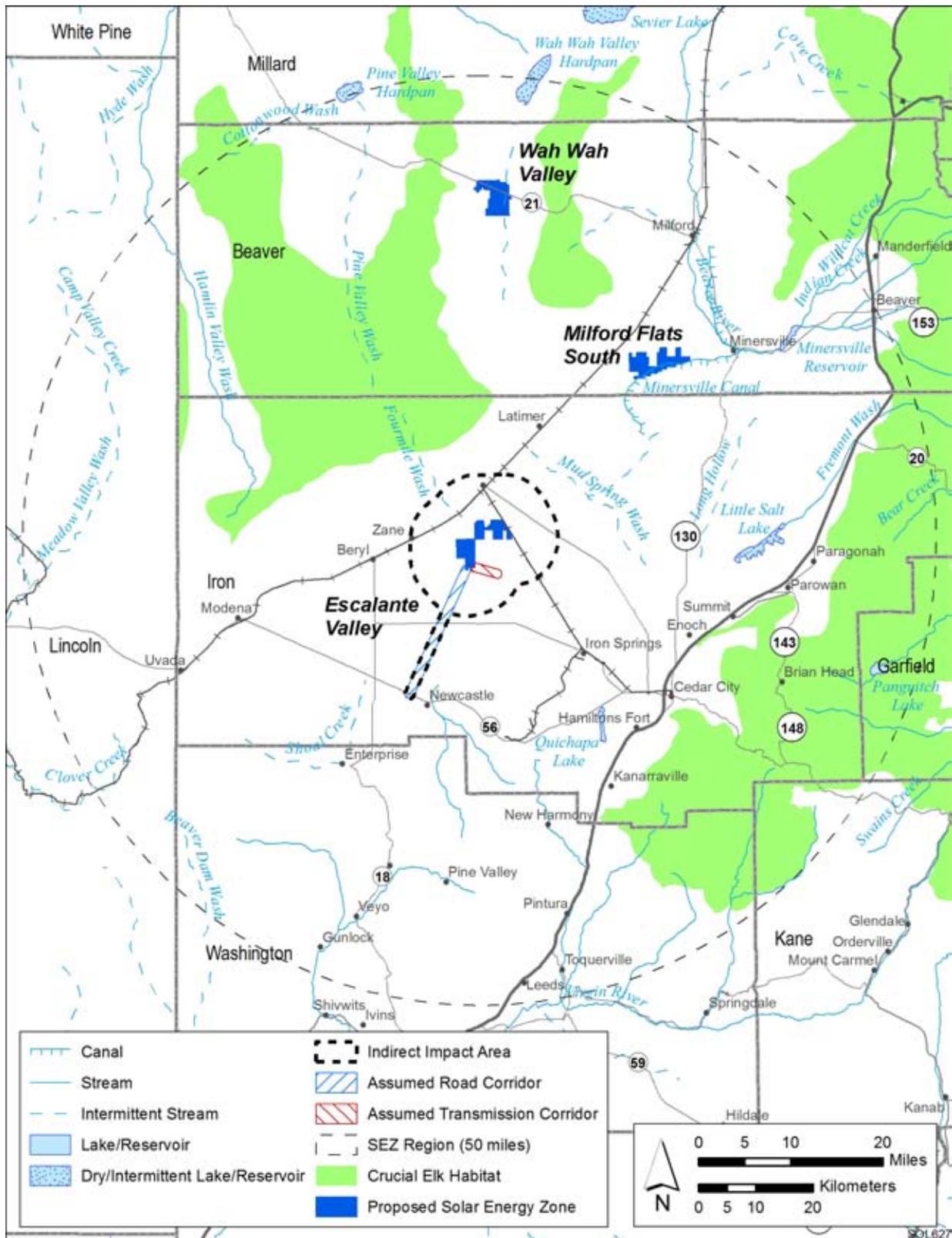
32 **Elk.** Elk are common in most mountainous regions of Utah. They inhabit mountain
33 meadows and forests during the summer and foothills and valley grasslands during the winter
34 (UDWR 2009a). Elk require an available water source on all seasonal ranges and prefer to
35 be within 0.5 mi (0.8 km) of water. Elk also require cover for escape and protection
36 (UDWR 2010a). Crucial elk habitat is continuously being lost and fragmented within Utah.
37 The statewide management plan for the elk has been updated (UDWR 2010a). The management
38 objective is a statewide population of 80,000 elk. The statewide population estimate in 2009
39 was nearly 68,000. Within the Pine Valley Big Game Management Unit, which encompasses
40 the area that includes the proposed Escalante Valley SEZ, the population estimate was 50
41 (UDWR 2010a). Figure 13.1.11.3-2 shows the location of the proposed Escalante Valley SEZ
42 relative to areas of crucial elk habitat. The shortest distance from the SEZ to these areas is 9 mi
43 (14 km). About 1,110,500 acres (4,494 km²) of crucial elk habitat occur within the SEZ region.
44
45



1

2 **FIGURE 13.1.11.3-1 Location of the Proposed Escalante Valley SEZ Relative to Woodland**
 3 **and Shrub-Covered Low Mountains Level IV Ecoregion Areas (Cougar Habitat)**
 4 **(Source: Woods et al. 2001)**

5



1
 2 **FIGURE 13.1.11.3-2 Location of the Proposed Escalante Valley SEZ Relative to Elk Crucial**
 3 **Habitat Areas (Source: UDWR 2006)**
 4

1 **Mule deer.** The mule deer is the most important game species in Utah. It is common
2 throughout the state, being least abundant in desert areas (UDWR 2008). A statewide
3 management plan for mule deer has been developed (UDWR 2008). Crucial mule deer habitat
4 is continuously being lost and fragmented within Utah. The statewide population has been
5 declining for over 30 years. The 2003 post-season statewide population estimate was
6 302,000, much lower than the long-term management objective of 426,000 (UDWR 2008).
7 Figure 13.1.11.3-3 shows the location of the proposed Escalante Valley SEZ relative to areas
8 of crucial mule deer habitat. The shortest distance from the SEZ to these areas is 6 mi (10 km).
9 Over 2,747,600 acres (11,119 km²) of crucial mule deer habitat occurs within the SEZ region.

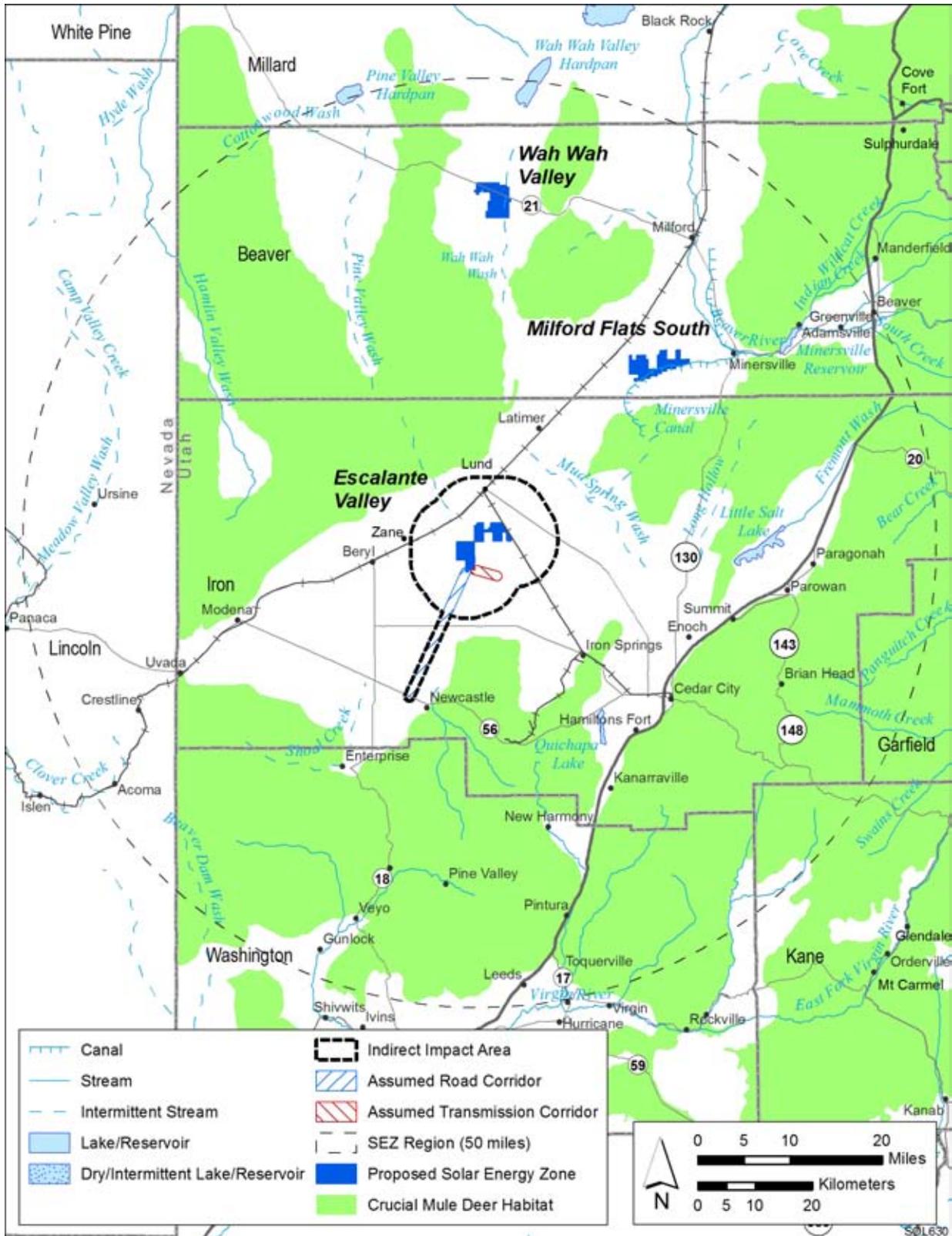
10
11
12 **Pronghorn.** The pronghorn is common in Utah, occurring primarily in shrubsteppe
13 habitat in large expanses of open, low-rolling or flat terrain (UDWR 2009a,c). A statewide
14 management plan for pronghorn has been developed (UDWR 2009c). The statewide population
15 of pronghorn is estimated at 12,000 to 14,000 (UDWR 2009c). Within the Pine Valley Big Game
16 Management Unit, which encompasses the proposed Escalante Valley SEZ, the population
17 estimate is 325 (UDWR 2009c). Figure 13.1.11.3-4 shows that the proposed Escalante Valley
18 SEZ is contained within areas of crucial pronghorn habitat. Over 1,646,560 acres (6,663 km²) of
19 crucial pronghorn habitat occur within the SEZ region.

20 21 22 **Other Mammals**

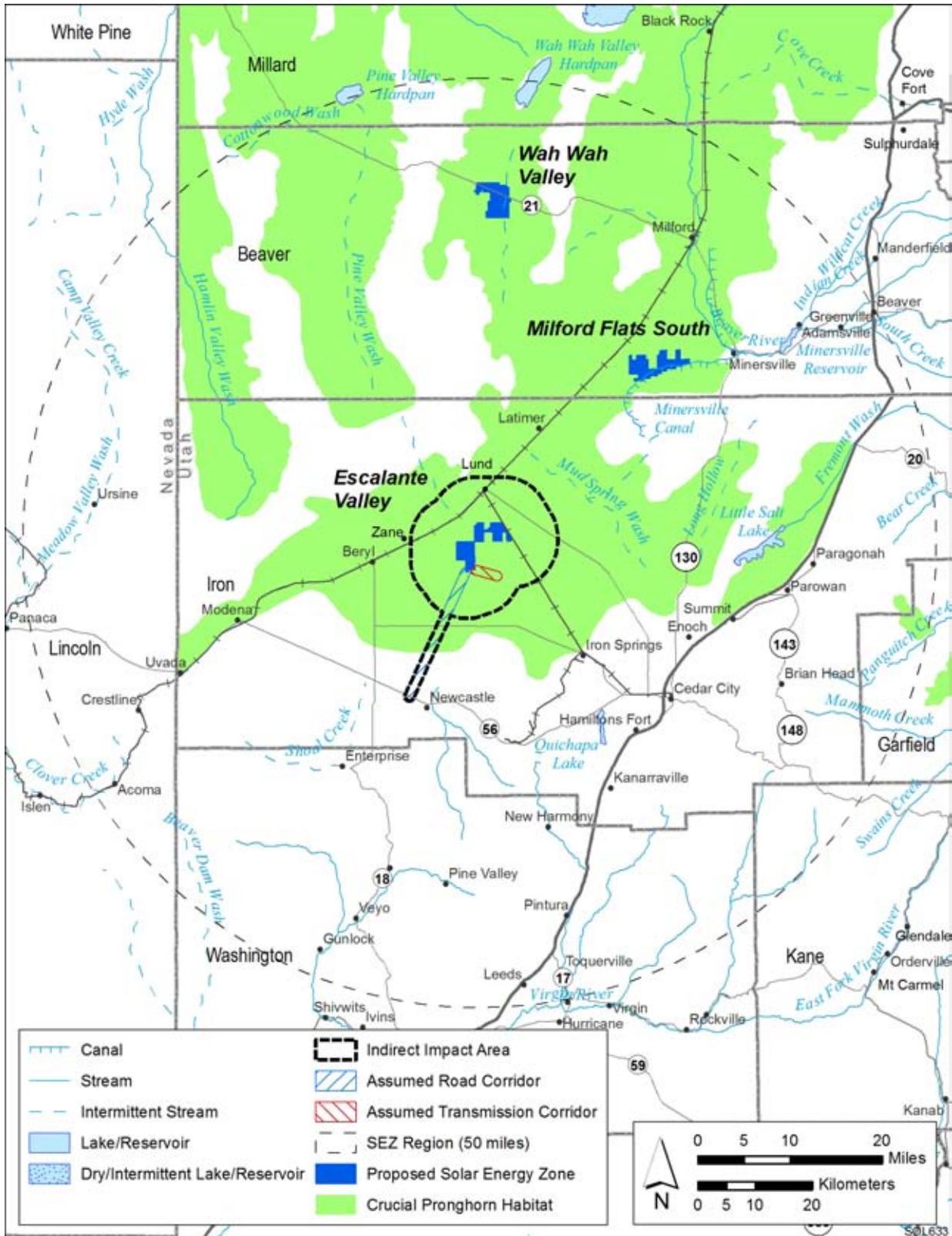
23
24 A number of small game and furbearer species occur within Iron County. Species that
25 could occur within the area of the proposed Escalante Valley SEZ include the American badger
26 (*Taxidea taxus*, common in deserts and grasslands), black-tailed jackrabbit (*Lepus californicus*,
27 most abundant rabbit species in Utah), coyote (*Canis latrans*, common), and desert cottontail
28 (*Sylvilagus audubonii*, widely distributed from desert areas to lower slopes of mountains)
29 (UDWR 2009a).

30
31 The nongame (small) mammal species include bats, mice, voles, moles, and shrews.
32 Species that could occur within the area of the proposed Escalante Valley SEZ include the desert
33 woodrat (*Neotoma lepida*, common in western Utah), Great Basin pocket mouse (*Perognathus*
34 *parvus*, common), least chipmunk (*Neotamias minimus*, wide-ranging in many types of habitats),
35 northern grasshopper mouse (*Onychomys leucogaster*, common), sagebrush vole (*Lemmyscus*
36 *curtatus*, moderately common), and white-tailed antelope squirrel (*Ammospermophilus leucurus*,
37 common) (UDWR 2009a). Bat species that may occur within the area of the SEZ include the
38 Brazilian free-tailed bat (*Tadarida brasiliensis*), little brown myotis (*Myotis lucifugus*), long-
39 legged myotis (*M. volans*), and western pipistrelle (*Parastrellus hesperus*) (UDWR 2009a).
40 However, roost sites for the bat species (e.g., caves, hollow trees, rock crevices, or buildings)
41 would be limited to absent within the SEZ.

42
43 Table 13.1.11.3-1 provides habitat information for representative mammal species that
44 could occur within the proposed Escalante Valley SEZ. Special status mammal species are
45 discussed in Section 13.1.12.



1
 2 **FIGURE 13.1.11.3-3 Location of the Proposed Escalante Valley SEZ Relative to Mule Deer Crucial**
 3 **Habitat Areas (Source: UDR 2006)**



1
 2 **FIGURE 13.1.11.3-4 Location of the Proposed Escalante Valley SEZ Relative to Pronghorn**
 3 **Crucial Habitat Areas (Source: UDWR 2006)**

TABLE 13.1.11.3-1 Habitats, Potential Impacts, and Potential Mitigation for Representative Mammal Species That Could Occur on or in the Affected Area of the Proposed Escalante Valley SEZ

Common Name (Scientific Name)	Habitat ^a	Maximum Area of Potential Habitat Affected ^b				Overall Impact Magnitude ^g and Species-Specific Mitigation ^h
		Within SEZ (Direct Effects) ^c	Outside SEZ (Indirect Effects) ^d	Within Road Corridor (Indirect and Direct Effects) ^e	Within Transmission Corridor (Indirect and Direct Effects) ^f	
Big Game						
American black bear (<i>Ursus americanus</i>)	Montane shrublands and forests, and subalpine forests at moderate elevations. About 3,869,500 acres ⁱ of potentially suitable habitat occurs in the SEZ region.	871 acres of potentially suitable habitat lost (0.02% of available potentially suitable habitat) during construction and operations	38,285 acres of potentially suitable habitat (1.0% of available potentially suitable habitat)	46 acres of potentially suitable habitat lost (0.001% of available potentially suitable habitat) and 3,996 acres in area of indirect effect	69 acres of potentially suitable habitat lost (0.002% of available potentially suitable habitat) and 1,386 acres in area of indirect effect	Small overall impact.
Cougar (<i>Puma concolor</i>)	Most common in rough, broken foothills and canyon country, often in association with montane forests, shrublands, and pinyon-juniper woodlands. About 4,631,600 acres of potentially suitable habitat occurs in the SEZ region.	4,912 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	96,754 acres of potentially suitable habitat (2.1% of available potentially suitable habitat)	96 acres of potentially suitable habitat lost (0.002% of available potentially suitable habitat) and 8,375 acres in area of indirect effect	92 acres of potentially suitable habitat lost (0.002% of available potentially suitable habitat) and 1,853 acres in area of indirect effect	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.

TABLE 13.1.11.3-1 (Cont.)

Common Name (Scientific Name)	Habitat ^a	Maximum Area of Potential Habitat Affected ^b				Overall Impact Magnitude ^g and Species-Specific Mitigation ^h
		Within SEZ (Direct Effects) ^c	Outside SEZ (Indirect Effects) ^d	Within Road Corridor (Indirect and Direct Effects) ^e	Within Transmission Corridor (Indirect and Direct Effects) ^f	
Big Game (Cont.)						
Elk (<i>Cervis canadensis</i>)	Semi-open forest, mountain meadows, foothills, plains, valleys, and alpine tundra. Uses open spaces such as alpine pastures, marshy meadows, river flats, brushy clean cuts, forest edges, and semidesert areas. About 2,333,500 acres of potentially suitable habitat occurs in the SEZ region.	796 acres of potentially suitable habitat lost (0.03% of available potentially suitable habitat) during construction and operations	34,950 acres of potentially suitable habitat (1.5% of available potentially suitable habitat)	44 acres of potentially suitable habitat lost (0.002% of available potentially suitable habitat) and 3,862 acres in area of indirect effect	69 acres of potentially suitable habitat lost (0.003% of available potentially suitable habitat) and 1,379 acres in area of indirect effect	Small overall impact.
Mule deer (<i>Odocoileus hemionus</i>)	Most habitats, including coniferous forests, desert shrub, chaparral, and grasslands with shrubs. Greatest densities in shrublands on rough, broken terrain that provides abundant browse and cover. About 3,256,800 acres of potentially suitable habitat occurs in the SEZ region.	5,230 acres of potentially suitable habitat lost (0.2% of available potentially suitable habitat) during construction and operations	110,097 acres of potentially suitable habitat (3.4% of available potentially suitable habitat)	128 acres of potentially suitable habitat lost (0.004% of available potentially suitable habitat) and 11,106 acres in area of indirect effect	93 acres of potentially suitable habitat lost (0.003% of available potentially suitable habitat) and 1,879 acres in area of indirect effect	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.

TABLE 13.1.11.3-1 (Cont.)

Common Name (Scientific Name)	Habitat ^a	Maximum Area of Potential Habitat Affected ^b				Overall Impact Magnitude ^g and Species-Specific Mitigation ^h
		Within SEZ (Direct Effects) ^c	Outside SEZ (Indirect Effects) ^d	Within Road Corridor (Indirect and Direct Effects) ^e	Within Transmission Corridor (Indirect and Direct Effects) ^f	
Big Game (Cont.)						
Pronghorn (<i>Antilocapra americana</i>)	Grasslands and semidesert shrublands on rolling topography that affords good visibility. Most abundant in shortgrass or midgrass prairies and least common in xeric habitats. About 1,917,800 acres of potentially suitable habitat occurs in the SEZ region.	1,513 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat) during construction and operations	58,698 acres of potentially suitable habitat (3.1% of available potentially suitable habitat)	81 acres of potentially suitable habitat lost (0.004% of available potentially suitable habitat) and 7,059 acres in area of indirect effect	71 acres of potentially suitable habitat lost (0.004% of available potentially suitable habitat) and 1,423 acres in area of indirect effect	Small overall impact.
Small Game and Furbearers						
American badger (<i>Taxidea taxus</i>)	Open grasslands and deserts, meadows in subalpine and montane forests, alpine tundra. Digs burrows in friable soils. Most common in areas with abundant populations of ground squirrels, prairie dogs, and pocket gophers. About 4,423,100 acres of potentially suitable habitat occurs in the SEZ region.	5,245 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat) during construction and operations	112,307 acres of potentially suitable habitat (2.5% of available potentially suitable habitat)	124 acres of potentially suitable habitat lost (0.003% of available potentially suitable habitat) and 10,761 acres in area of indirect effect	94 acres of potentially suitable habitat lost (0.002% of available potentially suitable habitat) and 1,884 acres in area of indirect effect	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.

TABLE 13.1.11.3-1 (Cont.)

Common Name (Scientific Name)	Habitat ^a	Maximum Area of Potential Habitat Affected ^b				Overall Impact Magnitude ^g and Species-Specific Mitigation ^h
		Within SEZ (Direct Effects) ^c	Outside SEZ (Indirect Effects) ^d	Within Road Corridor (Indirect and Direct Effects) ^e	Within Transmission Corridor (Indirect and Direct Effects) ^f	
<i>Small Game and Furbearers (Cont.)</i>						
Black-tailed jackrabbit (<i>Lepus californicus</i>)	Open plains, fields, and deserts with scattered thickets or patches of shrubs. Also open, early stages of forests and chaparral habitats. Rests during the day in shallow depressions, and uses shrubs for cover. About 4,603,900 acres of potentially suitable habitat occurs in the SEZ region.	5,245 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat) during construction and operations	112,656 acres of potentially suitable habitat (2.4% of available potentially suitable habitat)	128 acres of potentially suitable habitat lost (0.003% of available potentially suitable habitat) and 11,110 acres in area of indirect effect	94 acres of potentially suitable habitat lost (0.002% of available potentially suitable habitat) and 1,884 acres in area of indirect effect	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.
Coyote (<i>Canis latrans</i>)	All habitats at all elevations. Least common in dense coniferous forest. Where human control efforts occur, they are restricted to broken, rough country with abundant shrub cover and a good supply of rabbits or rodents. About 5,009,000 acres of potentially suitable habitat occurs in the SEZ region.	5,291 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat) during construction and operations	122,640 acres of potentially suitable habitat (2.4% of available potentially suitable habitat)	150 acres of potentially suitable habitat lost (0.003% of available potentially suitable habitat) and 13,031 acres in area of indirect effect	94 acres of potentially suitable habitat lost (0.002% of available potentially suitable habitat) and 1,901 acres in area of indirect effect	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.

TABLE 13.1.11.3-1 (Cont.)

Common Name (Scientific Name)	Habitat ^a	Maximum Area of Potential Habitat Affected ^b				Overall Impact Magnitude ^g and Species-Specific Mitigation ^h
		Within SEZ (Direct Effects) ^c	Outside SEZ (Indirect Effects) ^d	Within Road Corridor (Indirect and Direct Effects) ^e	Within Transmission Corridor (Indirect and Direct Effects) ^f	
Small Game and Furbearers (Cont.)						
Desert cottontail (<i>Sylvilagus audubonii</i>)	Abundant to common in grasslands, open forests, and desert shrub habitats. Can occur in areas with minimal vegetation as long as adequate cover (e.g., rock piles, fallen logs, fence rows) is present. Thickets and patches of shrubs, vines, and brush also used as cover. About 4,475,000 acres of potentially suitable habitat occurs in the SEZ region.	5,230 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat) during construction and operations	110,264 acres of potentially suitable habitat (2.5% of available potentially suitable habitat)	128 acres of potentially suitable habitat lost (0.003% of available potentially suitable habitat) and 11,106 acres in area of indirect effect	94 acres of potentially suitable habitat lost (0.002% of available potentially suitable habitat) and 1,884 acres in area of indirect effect	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.
Nongame (small) Mammals						
Brazilian free-tailed bat (<i>Tadarida brasiliensis</i>)	Cliffs, deserts, grasslands, old fields, savannas, shrublands, woodlands, and suburban/urban areas. Roosts in buildings, caves, and hollow trees. May roost in rock crevices, bridges, signs, or cliff swallow nests during migration. Large maternity colonies inhabit caves, buildings, culverts, and bridges. About 4,459,900 acres of potentially suitable habitat occurs in the SEZ region.	5,215 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat) during construction and operations	118,404 acres of potentially suitable habitat (2.5% of available potentially suitable habitat)	147 acres of potentially suitable habitat lost (0.003% of available potentially suitable habitat) and 12,828 acres in area of indirect effect	89 acres of potentially suitable habitat lost (0.002% of available potentially suitable habitat) and 1,795 acres in area of indirect effect	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.

TABLE 13.1.11.3-1 (Cont.)

Common Name (Scientific Name)	Habitat ^a	Maximum Area of Potential Habitat Affected ^b			Overall Impact Magnitude ^g and Species-Specific Mitigation ^h	
		Within SEZ (Direct Effects) ^c	Outside SEZ (Indirect Effects) ^d	Within Road Corridor (Indirect and Direct Effects) ^e		Within Transmission Corridor (Indirect and Direct Effects) ^f
<i>Nongame (small) Mammals (Cont.)</i>						
Desert woodrat <i>(Neotoma lepida)</i>	Sagebrush scrub; chaparral; deserts and rocky slopes with scattered cactus, yucca, pine-juniper, or other low vegetation; creosotebush desert; Joshua tree woodlands; scrub oak woodlands, pinyon-juniper woodlands; and riparian zones. Most abundant in rocky areas with Joshua trees. At elevations to 8,500 ft (2,591 m). Dens built of debris on ground, among cacti or yucca, along cliffs, among rocks, or occasionally in trees. About 4,277,900 acres of potentially suitable habitat occurs in the SEZ region.	5,230 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat) during construction and operations	109,910 acres of potentially suitable habitat (2.6% of available potentially suitable habitat)	123 acres of potentially suitable habitat lost (0.003% of available potentially suitable habitat) and 10,752 acres in area of indirect effect	94 acres of potentially suitable habitat lost (0.002% of available potentially suitable habitat) and 1,884 acres in area of indirect effect	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.

TABLE 13.1.11.3-1 (Cont.)

Common Name (Scientific Name)	Habitat ^a	Maximum Area of Potential Habitat Affected ^b				Overall Impact Magnitude ^g and Species-Specific Mitigation ^h
		Within SEZ (Direct Effects) ^c	Outside SEZ (Indirect Effects) ^d	Within Road Corridor (Indirect and Direct Effects) ^e	Within Transmission Corridor (Indirect and Direct Effects) ^f	
<i>Nongame (small)</i>						
<i>Mammals (Cont.)</i>						
Great Basin pocket mouse (<i>Perognathus parvus</i>)	Prefers arid grassland, sagebrush, and pinyon-juniper habitats with sandy soil. About 4,064,900 acres of potentially suitable habitat occurs within the SEZ region.	5,170 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat) during construction and operations	109,135 acres of potentially suitable habitat (2.7% of available potentially suitable habitat)	122 acres of potentially suitable habitat lost (0.003% of available potentially suitable habitat) and 10,622 acres in area of indirect effect	94 acres of potentially suitable habitat lost (0.002% of available potentially suitable habitat) and 1,883 acres in area of indirect effect	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.
Least chipmunk (<i>Neotamias minimus</i>)	Low-elevation semidesert shrublands, montane shrublands and woodlands, forest edges, and alpine tundra. About 4,593,200 acres of potentially suitable habitat occurs in the SEZ region.	5,245 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat) during construction and operations	112,297 acres of potentially suitable habitat (2.4% of available potentially suitable habitat)	124 acres of potentially suitable habitat lost (0.003% of available potentially suitable habitat) and 10,760 acres in area of indirect effect	94 acres of potentially suitable habitat lost (0.002% of available potentially suitable habitat) and 1,884 acres in area of indirect effect	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.

TABLE 13.1.11.3-1 (Cont.)

Common Name (Scientific Name)	Habitat ^a	Maximum Area of Potential Habitat Affected ^b				Overall Impact Magnitude ^g and Species-Specific Mitigation ^h
		Within SEZ (Direct Effects) ^c	Outside SEZ (Indirect Effects) ^d	Within Road Corridor (Indirect and Direct Effects) ^e	Within Transmission Corridor (Indirect and Direct Effects) ^f	
<i>Nongame (small)</i>						
<i>Mammals (Cont.)</i>						
Little brown myotis (<i>Myotis lucifugus</i>)	Various habitats including pinyon-juniper woodlands, montane shrublands, and riparian woodlands. Uses man-made structures for summer roosting, although caves and hollow trees are also utilized. Winter hibernation often occurs in caves or mines. Most foraging activity occurs in woodlands over or near water. About 4,217,600 acres of potentially suitable habitat occurs within the SEZ region.	4,897 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat) during construction and operations	96,515 acres of potentially suitable habitat (2.3% of available potentially suitable habitat)	100 acres of potentially suitable habitat lost (0.002% of available potentially suitable habitat) and 8,718 acres in area of indirect effect	88 acres of potentially suitable habitat lost (0.002% of available potentially suitable habitat) and 1,763 acres in area of indirect effect	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.
Long-legged myotis (<i>Myotis volans</i>)	Prefers pine forest, desert, and riparian habitats. Old buildings, rock crevices, and hollow trees are used for daytime roosting and winter hibernation. It forages in open areas, such as forest clearings. About 3,367,300 acres of potentially suitable habitat occurs within the SEZ region.	4,471 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat) during construction and operations	77,426 acres of potentially suitable habitat (2.3% of available potentially suitable habitat)	79 acres of potentially suitable habitat lost (0.002% of available potentially suitable habitat) and 6,915 acres in area of indirect effect	25 acres of potentially suitable habitat lost (<0.001% of available potentially suitable habitat) and 505 acres in area of indirect effect	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.

TABLE 13.1.11.3-1 (Cont.)

Common Name (Scientific Name)	Habitat ^a	Maximum Area of Potential Habitat Affected ^b				Overall Impact Magnitude ^g and Species-Specific Mitigation ^h
		Within SEZ (Direct Effects) ^c	Outside SEZ (Indirect Effects) ^d	Within Road Corridor (Indirect and Direct Effects) ^e	Within Transmission Corridor (Indirect and Direct Effects) ^f	
<i>Nongame (small)</i>						
<i>Mammals (Cont.)</i>						
Northern grasshopper mouse <i>(Onychomys leucogaster)</i>	Occurs in grasslands, sagebrush deserts, overgrazed pastures, weedy roadside ditches, sand dunes, and other habitats with sandy soil and sparse vegetation. About 3,959,100 acres of potentially suitable habitat occurs within the SEZ region.	2,473 acres of potentially suitable habitat lost (0.06% of available potentially suitable habitat) during construction and operations	51,681 acres of potentially suitable habitat (1.3% of available potentially suitable habitat)	70 acres of potentially suitable habitat lost (0.002% of available potentially suitable habitat) and 6,060 acres in area of indirect effect	69 acres of potentially suitable habitat lost (0.002% of available potentially suitable habitat) and 1,398 acres in area of indirect effect	Small overall impact.
Sagebrush vole <i>(Lemmiscus curtatus)</i>	Typically associated with semiarid sagebrush and grassland areas. Burrows are often constructed near sagebrush. About 1,232,800 acres of potentially suitable habitat occurs within the SEZ region.	781 acres of potentially suitable habitat lost (0.06% of available potentially suitable habitat) during construction and operations	34,357 acres of potentially suitable habitat (2.8% of available potentially suitable habitat)	44 acres of potentially suitable habitat lost (0.004% of available potentially suitable habitat) and 3,850 acres in area of indirect effect	64 acres of potentially suitable habitat lost (0.005% of available potentially suitable habitat) and 1,290 acres in area of indirect effect	Small overall impact.

TABLE 13.1.11.3-1 (Cont.)

Common Name (Scientific Name)	Habitat ^a	Maximum Area of Potential Habitat Affected ^b				Overall Impact Magnitude ^g and Species-Specific Mitigation ^h
		Within SEZ (Direct Effects) ^c	Outside SEZ (Indirect Effects) ^d	Within Road Corridor (Indirect and Direct Effects) ^e	Within Transmission Corridor (Indirect and Direct Effects) ^f	
<i>Nongame (small)</i>						
<i>Mammals (Cont.)</i>						
Western pipistrelle (<i>Parastrellus esperus</i>)	Deserts and lowlands, desert mountain ranges, desert scrub flats, and rocky canyons. Roosts mostly in rock crevices, sometimes mines and caves, and rarely in buildings. Suitable roosts occur in rocky canyons and cliffs. Most abundant bat in desert regions. About 2,709,700 acres of potentially suitable habitat occurs in the SEZ region.	5,230 acres of potentially suitable habitat lost (0.2% of available potentially suitable habitat) during construction and operations	111,551 acres of potentially suitable habitat (4.1% of available potentially suitable habitat)	124 acres of potentially suitable habitat lost (0.005% of available potentially suitable habitat) and 10,755 acres in area of indirect effect	90 acres of potentially suitable habitat lost (0.003% of available potentially suitable habitat) and 1,788 acres in area of indirect effect	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.
White-tailed antelope squirrel (<i>Ammospermophilus leucurus</i>)	Low deserts, semidesert and montane shrublands, plateaus, and foothills in areas with sparse vegetation and hard gravelly surfaces. Spends its nights and other periods of inactivity in underground burrows. About 1,361,200 acres of potentially suitable habitat occurs within the SEZ region.	4,146 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	64,596 acres of potentially suitable habitat (4.7% of available potentially suitable habitat)	52 acres of potentially suitable habitat lost (0.004% of available potentially suitable habitat) and 4,522 acres in area of indirect effect	28 acres of potentially suitable habitat lost (0.002% of available potentially suitable habitat) and 557 acres in area of indirect effect	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.

Footnotes on next page.

TABLE 13.1.11.3-1 (Cont.)

-
- ^a Potentially suitable habitat was determined by using SWReGAP habitat suitability and land cover models. Area of potentially suitable habitat for each species is presented for the SEZ region, which is defined as the area within 50 mi (80 km) of the SEZ center.
- ^b Maximum area of potentially suitable habitat that could be affected relative to availability within the SEZ region. Habitat availability for each species within the region was determined by using SWReGAP habitat suitability and land cover models. This approach probably overestimates the amount of suitable habitat in the project area. A maximum of 5,291 acres of direct effect within the SEZ was assumed.
- ^c Direct effects within the SEZ would consist of the ground-disturbing activities associated with construction and the maintenance of an altered environment associated with operations.
- ^d Area of indirect effects was assumed to be the area adjacent to the SEZ within 5 mi (8 km) of the SEZ boundary and within the 1-mi (1.6-km) wide road corridor (less the assumed area of direct effects) that extends beyond the 5-mi (8-km) area adjacent to the SEZ boundary. Indirect effects include effects from surface runoff, dust, noise, lighting, and so on from the SEZ, but do not include ground-disturbing activities. The potential degree of indirect effects would decrease with increasing distance away from the SEZ.
- ^e For access road development, direct effects were estimated within a 15-mi (24-km) long, 60-ft (18-m) wide ROW for an assumed new access road from the SEZ to the nearest state highway. Indirect effects were estimated within a 1-mi (1.6-km) wide road corridor to the state highway, less the assumed area of direct effects.
- ^f For transmission development, direct effects were estimated within a 3-mi (5-km) long, 250-ft (76-m) wide ROW for an assumed new transmission line connecting to the nearest existing line. Indirect effects were estimated within a 1-mi (1.6-km) wide transmission corridor to the existing transmission line, less the assumed area of direct effects.
- ^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; (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.

Sources: NatureServe (2010); UDWR (2009a); USGS (2004, 2005c, 2007).

1 **13.1.11.3.2 Impacts**
2

3 The types of impacts that mammals could incur from construction, operation, and
4 decommissioning of utility-scale solar energy facilities are discussed in Section 5.10.2.1. Any
5 such impacts would be minimized through the implementation of required programmatic design
6 features described in Appendix A, Section A.2.2, and through any additional mitigation applied.
7 Section 13.1.11.3.3, below, identifies design features of particular relevance to mammals for the
8 proposed Escalante Valley SEZ.
9

10 The assessment of impacts on mammal species is based on available information on
11 the presence of species in the affected area, as presented in Section 13.1.11.3.1 following the
12 analysis approach described in Appendix M. Additional NEPA assessments and coordination
13 with state natural resource agencies may be needed to address project-specific impacts more
14 thoroughly. These assessments and consultations could result in additional required actions to
15 avoid or mitigate impacts on mammals (see Section 13.1.11.3.3).
16

17 Table 13.1.11.3-1 summarizes the potential magnitude of impacts on representative
18 mammal species resulting from solar energy development (with the inclusion of design features)
19 in the proposed Escalante Valley SEZ.
20

21 **American Black Bear**
22

23 Based on land cover analyses, about 870 acres (3.5 km²) of potentially suitable American
24 black bear habitat could be directly lost by solar energy development within the proposed
25 Escalante Valley SEZ. This is 0.02% of potentially suitable American black bear habitat within
26 the SEZ region. Based on mapped ranges, the SEZ is 17 mi (27 km) from the closest substantial
27 American black bear habitat and 19 mi (31 km) from the closest crucial American black bear
28 habitat. Thus, solar energy development would not directly impact these American black bear
29 habitats. The access road and transmission line routes would not fragment either category of
30 American black bear habitat. Overall, impacts on American black bear from solar energy
31 development in the SEZ would be small.
32
33

34 **Cougar**
35

36 Based on land cover analyses, about 4,900 acres (19.8 km²) of potentially suitable cougar
37 habitat could be directly lost by solar energy development within the proposed Escalante Valley
38 SEZ. This is 0.3% of potentially suitable cougar habitat within the SEZ region. Based on mapped
39 ranges, the SEZ is 5 mi (8 km) from the closest preferred habitat for the cougar (i.e., areas
40 contained within the woodland and shrub-covered low mountain Level IV ecoregion; Figure
41 13.1.11.3-1). Thus, solar energy development would not directly impact preferred cougar habitat.
42 The access road and transmission line routes for the SEZ would not cross through preferred
43 cougar habitat. Overall, impacts on cougar from solar energy development in the SEZ would be
44 small.
45
46
47

1 **Elk**

2
3 Based on land cover analyses, about 800 acres (3.2 km²) of potentially suitable elk
4 habitat could be directly lost by solar energy development within the proposed Escalante Valley
5 SEZ. This is 0.03% of potentially suitable elk habitat within the SEZ region. Based on mapped
6 ranges, the SEZ is 9 mi (14 km) from the closest area of crucial elk habitat (Figure 13.1.11.3-2).
7 Thus, solar energy development would not directly or indirectly impact this habitat. The access
8 road and transmission line routes for the SEZ would not cross through crucial elk habitat.
9 Overall, impacts on elk from solar energy development in the SEZ would be small.

10
11
12 **Mule Deer**

13
14 Based on land cover analyses, about 5,200 acres (21 km²) of potentially suitable mule
15 deer habitat could be directly lost by solar energy development within the proposed Escalante
16 Valley SEZ. This is 0.2% of potentially suitable mule deer habitat within the SEZ region. Based
17 on mapped ranges, the SEZ is 6 mi (10 km) from the closest area of crucial mule deer habitat
18 (Figure 13.1.11.3-3). Thus, solar energy development would not directly or indirectly impact this
19 habitat. The access road and transmission line routes for the SEZ would not cross through crucial
20 mule deer habitat. Overall, impacts on mule deer from solar energy development in the SEZ
21 would be small.

22
23
24 **Pronghorn**

25
26 Based on land cover analyses, about 1,510 acres (6.1 km²) of potentially suitable
27 pronghorn habitat could be directly lost by solar energy development within the proposed
28 Escalante Valley SEZ. This is 0.1% of potentially suitable pronghorn habitat within the SEZ
29 region. Based on mapped ranges, the SEZ and its access road and transmission line routes would
30 be located within crucial pronghorn habitat (Figure 13.1.11.3-4). This could result in the direct
31 reduction of 5,291 acres (21.5 km²) of crucial pronghorn habitat within the SEZ, 91 acres
32 (0.37 km²) for the transmission line, and 109 acres (0.44 km²) for the access road. Fencing,
33 considered a major problem on pronghorn ranges, would present a barrier or hindrance to
34 pronghorn movement (UDWR 2009c). There are over 1,646,560 acres (6,663 km²) of crucial
35 pronghorn habitat within the SEZ region. Therefore, the solar energy development would
36 eliminate about 0.3% of crucial pronghorn habitat that occurs within the SEZ region. Overall,
37 impacts on pronghorn from solar energy development in the SEZ would be small.

38
39
40 **Other Mammals**

41
42 Direct impacts on small game, furbearers, and nongame (small) mammal species would
43 be small, as 0.06 to 0.3% of potential habitats identified for these species would be lost
44 (Table 13.1.11.3-1). Larger areas of potentially suitable habitat for these species occur within
45 the area of potential indirect effects (i.e., ranging from 1.3% for the northern grasshopper
46 mouse to 4.7% for the white-tailed antelope squirrel).

1 **Summary**
2

3 Overall, direct impacts on mammal species would be small for all species, as only 0.3%
4 or less of potentially suitable habitats for the mammal species would be lost (Table 13.1.11.3-1).
5 Larger areas of potentially suitable habitat for mammal species occur within the area of potential
6 indirect effects (e.g., up to 4.7% of potentially suitable habitat for the white-tailed antelope
7 squirrel). Other impacts on mammals could result from collision with vehicles and facilities
8 (e.g., fences), surface water and sediment runoff from disturbed areas, fugitive dust generated
9 by project activities, noise, lighting, spread of invasive species, accidental spills, and harassment.
10 Indirect impacts on areas outside the SEZ (for example, impacts caused by dust generation,
11 erosion, and sedimentation) would be negligible with implementation of programmatic design
12 features.
13

14 Decommissioning after operations cease could result in short-term negative impacts on
15 individuals and habitats within and adjacent to the SEZ. The negative impacts of
16 decommissioning would be reduced or eliminated as reclamation proceeds. Potentially long-term
17 benefits could accrue as habitats are restored in previously disturbed areas. Section 5.10.2.1.4
18 provides an overview of the impacts of decommissioning and reclamation on wildlife. Of
19 particular importance for mammal species would be the restoration of original ground surface
20 contours, soils, and native plant communities associated with semiarid shrublands.
21

22
23 ***13.1.11.3.3 SEZ-Specific Design Features and Design Feature Effectiveness***
24

25 The implementation of required programmatic design features described in Appendix A,
26 Section A.2.2, would reduce the potential for effects on mammals. While SEZ-specific design
27 features are best established when considering specific project details, design features that can
28 be identified at this time include the following:
29

- 30 • The fencing around the solar energy development should not block the free
31 movement of mammals, particularly big game species; and
- 32 • The ephemeral washes and dry lakebed in the southwestern portion of the SEZ
33 should be avoided.
34

35
36 If these SEZ-specific design features are implemented in addition to the programmatic
37 design features, impacts on mammals could be reduced. However, potentially suitable habitats
38 for a number of the mammal species occur throughout much of the SEZ; therefore, species-
39 specific mitigation of direct effects for those species would be difficult or infeasible.
40
41
42

1 **13.1.11.4 Aquatic Biota**

2
3
4 ***13.1.11.4.1 Affected Environment***

5
6 No natural intermittent or perennial streams, water bodies, seeps, or springs are present
7 on the proposed Escalante Valley SEZ or within the area of the presumed new transmission
8 line corridor and access road. Consequently, no aquatic habitat or aquatic communities are
9 present. The proposed Escalante Valley SEZ contains some small earthen livestock watering
10 areas that have been constructed by building up berms to hold runoff or water pumped into the
11 areas for short periods of time. There is little comprehensive information about the distribution
12 of wetlands within the area and no NW data for the region that include the proposed SEZ
13 (USFWS 2009). However, observations made during September 2009 indicated that wetlands
14 would be unlikely or uncommon.

15
16 No perennial streams, water bodies, seeps, or springs have been identified in the area of
17 potential indirect effects. Approximately 3 mi (5 km) of Fourmile Wash is located within the
18 area of indirect effects, which represents approximately 21% of its total 14-mi (23-km) length.
19 Fourmile Wash is an intermittent stream that is usually dry. However, such ephemeral or
20 nonpermanent features, which form during wet periods, may contain invertebrates that are either
21 aquatic opportunists (i.e., species that occupy both temporary and permanent waters) or
22 specialists adapted to living in temporary aquatic environments (Graham 2001). Although most
23 ephemeral pools are populated with widespread species, some can contain species that are
24 endemic to particular geographic regions or even specific pools (Graham 2001). On the basis of
25 information for other ephemeral pools in the American Southwest, ostracods (seed shrimp) and
26 small planktonic crustaceans (e.g., copepods or cladocerans) are expected to be present, and
27 larger branchiopod crustaceans such as fairy shrimp could occur (Graham 2001). Various types
28 of insects that have aquatic larval stages, such as dragonflies and a variety of midges and other
29 flies, may also occur, depending on pool longevity, distance to permanent water features, and the
30 abundance of other invertebrates for prey (Graham 2001). However, site specific surveys would
31 be necessary to characterize aquatic biota, if present.

32
33 Outside of the indirect effects area, but within 50 mi (80 km) of the SEZ, are
34 approximately 340 mi (547 km) of perennial stream, 223 mi (359 km) of intermittent stream,
35 and approximately 32 mi (51 km) of canals. Also present within 50 mi (80 km) of the SEZ are
36 approximately 2,354 acres (9.5 km²) of lake and reservoir habitat. There are approximately
37 5,575 acres (23 km²) of dry lake and 1,069 acres (4.3 km²) of intermittent lake. Pinto Creek,
38 a perennial stream, is located within 2 mi (3 km) of the presumed new access road corridor.

39
40
41 ***13.1.11.4.2 Impacts***

42
43 Because surface water habitats are a unique feature in the arid landscape in the vicinity of
44 the proposed Escalante Valley SEZ, the maintenance and protection of such habitats is important
45 to the survival of aquatic and terrestrial organisms. The types of impacts that aquatic habitats and
46 biota could incur from the development of utility-scale solar energy facilities are described in

1 Section 5.10.2.4 and include (1) direct disturbance, (2) deposition of sediments, (3) changes in
2 water quantity, and (4) degradation of water quality.

3
4 Disturbance of land areas in order to construct solar energy facilities or new transmission
5 line corridors and access roads could increase the transport of soil from the disturbed area via
6 water and air pathways. However, because there are no intermittent or permanent water bodies,
7 streams, or wetlands present within the boundaries of either the proposed Escalante Valley SEZ
8 or the presumed access road and transmission line corridors, there would be no direct impacts
9 on aquatic habitats or aquatic biota. In addition, given that soils in the area are well drained
10 with moderately high permeability (Section 13.1.7.1.2), and that there are no perennial aquatic
11 habitats within 13 mi (21 km) of the SEZ or within approximately 2 mi (3 km) of the access
12 road corridor, it is unlikely that any surface runoff or airborne dust associated with solar energy
13 development would reach aquatic habitats. Consequently, population- or community-level
14 ecological effects on aquatic habitats would be unlikely. Implementing dust control management
15 practices and maintaining undisturbed (i.e., vegetated) areas around the perimeter of the SEZ
16 would further reduce the potential for long-term sediment deposition into surrounding surface
17 water features.

18
19 In arid environments, reductions in the quantity of water in aquatic habitats are of
20 particular concern. Water quantity in aquatic habitats could also be affected if significant
21 amounts of surface water or groundwater are utilized for power plant cooling water, for washing
22 mirrors, or for other needs. The greatest need for water would occur if technologies employing
23 wet cooling, such as parabolic troughs or power towers, were developed at the site; the
24 associated impacts would ultimately depend on the water source used (including groundwater
25 from aquifers at various depths). There are no surface water habitats on the proposed Escalante
26 Valley SEZ that could be used to supply water needs. Water demands during normal operations
27 would most likely be met by withdrawing groundwater from wells constructed on-site, which
28 would potentially affect water levels in surface water features outside of the proposed SEZ and,
29 as a consequence, potentially reduce habitat size and connectivity and create more adverse
30 environmental conditions for aquatic organisms in those habitats. Additional details regarding
31 the volume of water required and the types of organisms present in potentially affected water
32 bodies would be required in order to further evaluate the potential for impacts from water
33 withdrawals.

34
35 As described in Section 5.10.2.4, water quality in aquatic habitats could be affected by
36 the introduction of contaminants such as fuels, lubricants, or pesticides/herbicides during site
37 characterization, construction, operation, or decommissioning/reclamation. However, because of
38 the relatively large distance of any permanent surface water features from solar development
39 activities (a minimum of approximately 2 mi [3 km]), the potential for introducing contaminants
40 into such water bodies would be small.

41 42 43 ***13.1.11.4.3 SEZ-Specific Design Features and Design Feature Effectiveness***

44
45 No SEZ-specific design features are identified at this time. If programmatic project
46 design features described in Appendix A, Section A.2.2, are implemented as needed and if the

1 utilization of water from groundwater or surface water sources is adequately controlled to
2 maintain sufficient water levels in nearby aquatic habitats, the potential impacts on aquatic biota
3 and habitats from solar energy development within the proposed Escalante Valley SEZ would
4 be negligible.
5

1 **13.1.12 Special Status Species (Threatened, Endangered, Sensitive, and Rare Species)**
2

3 This section addresses special status species that are known to occur, or for which
4 suitable habitat occurs, on or within the potentially affected area of the proposed Escalante
5 Valley SEZ. Special status species include the following types of species⁶:
6

- 7 • Species listed as threatened or endangered under the Endangered Species Act
8 (ESA);
9
- 10 • Species that are proposed for listing, under review, or are candidates for
11 listing under the ESA;
12
- 13 • Species that are listed by the BLM as sensitive;
14
- 15 • Species that are listed by the state of Utah⁷; and
16
- 17 • Species that have been ranked as S1 or S2 by the State of Utah or as species of
18 concern by the State of Utah or by the USFWS; hereafter referred to as ‘rare’
19 species.
20

21 Special status species known to occur within 50 mi (80 km) of the Escalante Valley
22 SEZ center (i.e., the SEZ region) were determined from natural heritage records and other
23 data available through NatureServe Explorer (NatureServe 2010), Utah Division of Wildlife
24 Resources (UDWR) Conservation Data Center (UDWR 2009a) and UDWR Vertebrate
25 Information (UDWR 2003), *Utah Rare Plants Guide* (UNPS 2009), and the Southwest Regional
26 Gap Analysis Project (SWReGAP) (USGS 2004, 2005c, 2007). Information reviewed consisted
27 of county-level occurrences as determined from NatureServe, USGS 7.5-minute quad-level
28 occurrences, as well as modeled land cover types and predicted suitable habitats for the species
29 within the 50-mi (80-km) region as determined from SWReGAP. The 50-mi (80-km) SEZ region
30 intersects Beaver, Garfield, Iron, Kane, Millard, and Washington Counties, Utah, and Lincoln
31 County, Nevada. However, the SEZ and affected area occur only in Iron County, Utah. See
32 Appendix M for additional information on the approach used to identify species that could be
33 affected by development within the SEZ.
34
35

36 **13.1.12.1 Affected Environment**
37

38 The affected area considered in the assessment included the areas of direct and indirect
39 effects. The area of direct effects was defined as the area that would be physically modified
40 during project development (i.e., where ground-disturbing activities would occur). For the

⁶ See Section 4.6.4 for definitions of these species categories. Note that some of the categories of species included here do not fit BLM’s definition of special status species as defined in BLM Manual 6840 (BLM 2008). These species are included here to ensure broad consideration of species that may be most vulnerable to impacts.

⁷ According to Utah Administrative Rule R657-48, as described in the *Utah Sensitive Species List* (UDWR 2010), there are no species that receive a separate regulatory designation from the UDWR or the state of Utah.

1 Escalante Valley SEZ, the area of direct effects included the SEZ and the areas within the
2 transmission line and road corridors where ground-disturbing activities are assumed to occur
3 (refer to Section 13.1.1.2 for development assumptions). The area of indirect effects was
4 defined as the area within 5 mi (8 km) of the SEZ boundary and the portion of the 1-mi (1.6-km)
5 wide transmission line and road corridors where ground-disturbing activities would not occur
6 but that could be indirectly affected by activities in the area of direct effects. Indirect effects
7 considered in the assessment included effects from surface runoff, dust, noise, lighting, and
8 accidental spills from the SEZ, but did not include ground-disturbing activities. The potential
9 magnitude of indirect effects would decrease with increasing distance from the SEZ. The area
10 of indirect effects was identified on the basis of professional judgment and was considered
11 sufficiently large to bound the area that would potentially be subject to indirect effects. The
12 affected area includes both the direct and indirect effects areas.
13

14 The primary vegetation community types within the affected area are mixed salt desert
15 scrub and sagebrush (*Artemisia* spp.) (see Section 13.1.10). Potentially unique habitats in the
16 affected area in which special status species may reside include desert dunes, grasslands,
17 woodlands, and playa and wash habitats. The only aquatic or riparian habitats in the affected area
18 occur within and along Fourmile Wash, which occurs in the area of indirect effects as near as
19 3 mi (5 km) northwest of the SEZ. There are also dry lake playa habitats throughout the area of
20 indirect effects. There are no natural intermittent or perennial surface water bodies on the SEZ;
21 however, there are some man-made earthen livestock-watering areas throughout the SEZ
22 (Section 13.1.9; Figure 13.1.12.1-1).
23

24 All special status species that are known to occur within the Escalante Valley SEZ region
25 (i.e., within 50 mi [80 km] of the center of the SEZ) are listed, with their status, nearest recorded
26 occurrence, and habitats in Appendix J. Of these species, 18 could occur in the affected area of
27 the SEZ, based on recorded occurrences or the presence of potentially suitable habitat in the area.
28 These species, their status, and their habitats are presented in Table 13.1.12.1-1. For many of the
29 species listed in the table, their predicted potential occurrence in the affected area is based only
30 on a general correspondence between mapped SWReGAP land cover types and descriptions of
31 species habitat preferences. This overall approach to identifying species in the affected area
32 probably overestimates the number of species that actually occur in the affected area. For many
33 of the species identified as having potentially suitable habitat in the affected area, the nearest
34 known occurrence is more than 20 mi (32 m) from the SEZ.
35

36 Based on information provided by the UDWR, quad-level occurrences for five species
37 intersect the Escalante Valley SEZ affected area (Table 13.1.12.1-1): the ferruginous hawk,
38 greater sage-grouse, western burrowing owl, pygmy rabbit, and Utah prairie dog. There are no
39 groundwater-dependent species in the vicinity of the SEZ based on UDWR records, information
40 provided by the USFWS (Stout 2009), and the evaluation of groundwater resources in the
41 Escalante Valley SEZ region (Section 13.1.9).
42
43

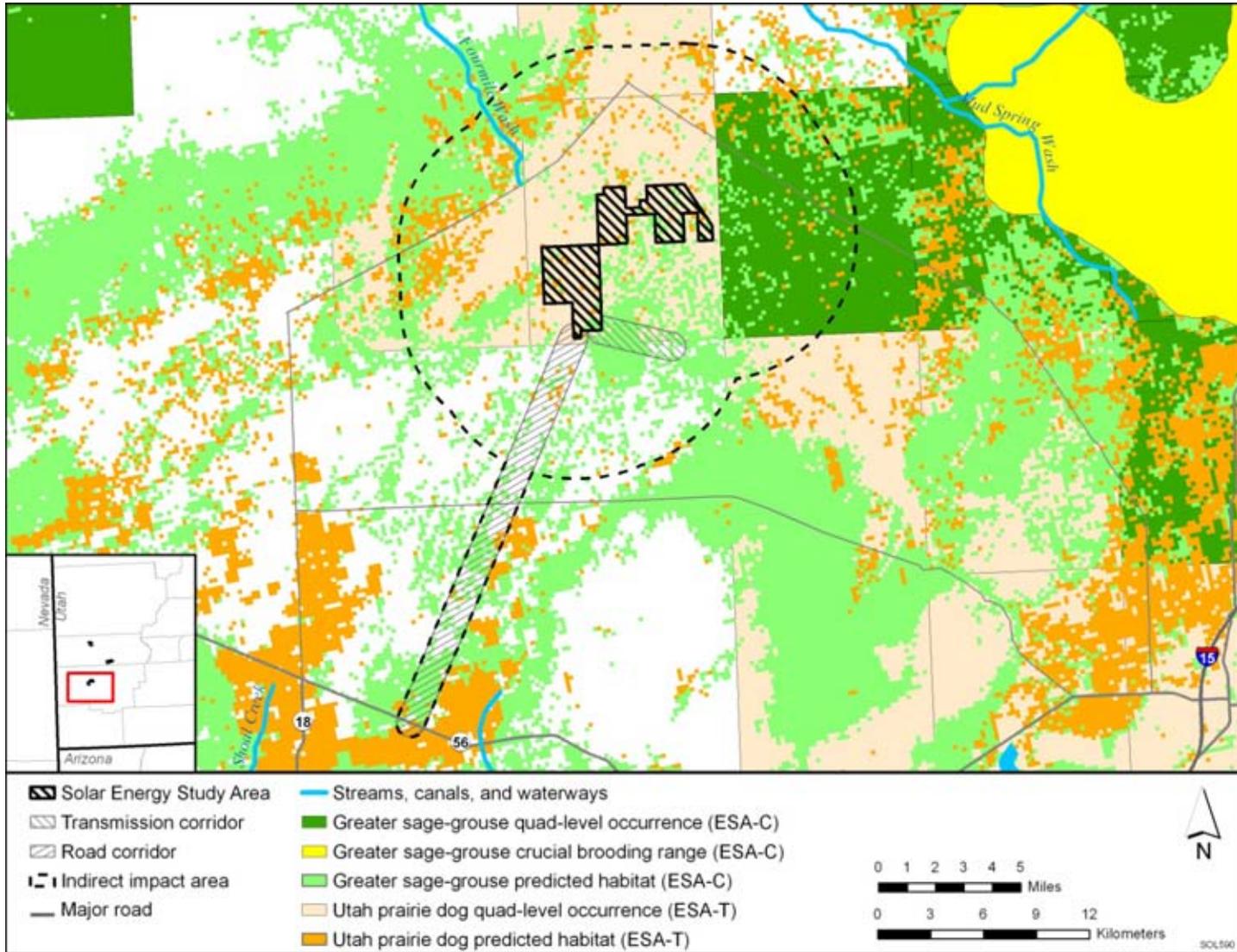


FIGURE 13.1.12.1-1 Known or Potential Occurrences of Species Listed as Endangered, Threatened, or Candidates for Listing under the ESA That May Occur in the Proposed Escalante Valley SEZ Affected Area (Sources: USGS 2007; UDWR 2009a)

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2

3

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TABLE 13.1.12.1-1 Habitats, Potential Impacts, and Potential Mitigation for Special Status Species That Could Occur on or in the Affected Area of the Proposed Escalante Valley SEZ

Common Name	Scientific Name	Listing Status ^a	Habitat ^b	Maximum Area of Potential Habitat Affected ^c				Overall Potential Impact Magnitude ^h and Species-Specific Mitigation ⁱ
				Within SEZ (Direct Effects) ^d	Access Road (Direct Effects) ^e	Transmission Line (Direct Effects) ^f	Outside SEZ (Indirect Effects) ^g	
Plants								
Compact cat's-eye	<i>Cryptantha compacta</i>	BLM-S; FWS-SC; UT-S2	Salt desert shrub and mixed shrub communities at elevations between 5,000 and 8,400 ft. ^j Known from southwestern Millard County and northwestern Beaver County, Utah, and eastern Nevada. Nearest recorded occurrence is 50 mi ^k northwest of the SEZ. About 2,161,906 acres ^l of potentially suitable habitat occurs within the SEZ region.	4,843 acres of potentially suitable habitat lost (0.2% of available potentially suitable habitat)	71 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	88 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	89,274 acres of potentially suitable habitat (4.1% of available potentially suitable habitat)	Small overall impact. Pre-disturbance surveys and avoiding or minimizing disturbance of occupied habitats in the areas of direct effect; translocation of individuals from areas of direct effect; or compensatory mitigation of direct effects on occupied habitats could reduce impacts. Note that these same potential mitigations apply to all special status plants.
Jone's globemallow	<i>Sphaeralcea caespitosa</i>	BLM-S; FWS-SC; UT-S2	Known from at least four occurrences in western Utah and six occurrences in eastern Nevada on federal and state lands on dolomite calcareous soils in association with mixed shrub, pinyon-juniper, and grassland communities at elevations between 5,000 and 6,500 ft. Nearest recorded occurrence is 38 mi north of the SEZ. About 4,150,988 acres of potentially suitable habitat occurs within the SEZ region.	4,909 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat)	73 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	89 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	91,161 acres of potentially suitable habitat (2.2% of available potentially suitable habitat)	Small overall impact. See compact cat's-eye for a list of potential mitigations applicable to all special status plant species.

TABLE 13.1.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status ^a	Habitat ^b	Maximum Area of Potential Habitat Affected ^c				Overall Potential Impact Magnitude ^h and Species-Specific Mitigation ⁱ
				Within SEZ (Direct Effects) ^d	Access Road (Direct Effects) ^e	Transmission Line (Direct Effects) ^f	Outside SEZ (Indirect Effects) ^g	
Plants (Cont.)								
Long-calyx milkvetch	<i>Astragalus oophorus lonchocalyx</i>	BLM-S; FWS-SC; UT-S1	Endemic to the Great Basin in western Utah and eastern Nevada in pinyon-juniper woodlands, sagebrush, and mixed shrub communities at elevations between 5,800 and 7,500 ft. Nearest recorded occurrence are 30 mi west of the SEZ. About 4,065,963 acres of potentially suitable habitat occurs within the SEZ region.	4,843 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat)	71 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	88 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	89,438 acres of potentially suitable habitat (2.2% of available potentially suitable habitat)	Small overall impact. See compact cat's-eye for a list of potential mitigations applicable to all special status plant species.
Money wild buckwheat	<i>Eriogonum nummularre</i>	BLM-S	Western Utah and eastern Nevada on gravelly washes, flats, and slopes in saltbush and sagebrush communities and pinyon-juniper woodlands. Nearest recorded occurrence is 30 mi west of the SEZ. About 3,659,646 acres of potentially suitable habitat occurs within the SEZ region.	4,824 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat)	86 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	89 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	91,721 acres of potentially suitable habitat (2.5% of available potentially suitable habitat)	Small overall impact. See compact cat's-eye for a list of potential mitigations applicable to all special status plant species.
Nevada willowherb	<i>Epilobium nevadense</i>	BLM-S; FWS-SC; UT-S1	Known from western Utah in Iron, Millard, and Washington Counties, as well as Lincoln County, Nevada, in pinyon-juniper woodlands and oak/mountain mahogany communities, on talus slopes and rocky limestone outcrops. Elevation ranges between 5,000 and 8,800 ft. Nearest recorded occurrence is in the Dixie National Forest, approximately 30 mi southwest of the SEZ. About 2,058,301 acres of potentially suitable habitat occurs within the SEZ region.	0 acres	1 acre of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	6 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	175 acres of potentially suitable habitat (<0.1% of available potentially suitable habitat)	Small overall impact. Avoiding or minimizing disturbance of woodland habitat in the area of direct effects could reduce impacts. See compact cat's-eye for a list of potential mitigations applicable to all special status plant species.

TABLE 13.1.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status ^a	Habitat ^b	Maximum Area of Potential Habitat Affected ^c				Overall Potential Impact Magnitude ^h and Species-Specific Mitigation ⁱ
				Within SEZ (Direct Effects) ^d	Access Road (Direct Effects) ^e	Transmission Line (Direct Effects) ^f	Outside SEZ (Indirect Effects) ^g	
<i>Birds</i>								
Bald Eagle	<i>Haliaeetus leucocephalus</i>	BLM-S; UT-SC; UT-S1	Known as a winter resident throughout the SEZ region, most commonly along large bodies of water where fish and waterfowl prey are available. Wintering areas are associated with open water. May occasionally forage in arid shrubland habitats. Nearest recorded occurrences are from Fourmile and Mud Spring Washes 10 mi north and northeast of the SEZ. About 2,830,633 acres of potentially suitable habitat occurs within the SEZ region.	370 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	6 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	5 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	10,565 acres of potentially suitable habitat (0.4% of available potentially suitable habitat)	Small overall impact on foraging habitat only. Avoidance of direct impacts on all foraging habitat is not feasible because suitable foraging habitat is widespread in the area of direct effect.
Ferruginous Hawk ^m	<i>Buteo regalis</i>	BLM-S; UT-SC; UT-S2	Known as a winter resident throughout the SEZ region. Grasslands, shrublands, agricultural lands, and the periphery of pinyon-juniper forests throughout the SEZ region. Quad-level occurrences intersect the affected area. About 1,712,600 acres of potentially suitable habitat occurs within the SEZ region.	2,290 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat)	75 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	67 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	48,774 acres of potentially suitable habitat (2.8% of available potentially suitable habitat)	Small overall impact on foraging habitat only. Avoidance of direct impacts on all foraging habitat is not feasible because suitable foraging habitat is widespread in the area of direct effect.

TABLE 13.1.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status ^a	Habitat ^b	Maximum Area of Potential Habitat Affected ^c				Overall Potential Impact Magnitude ^h and Species-Specific Mitigation ⁱ
				Within SEZ (Direct Effects) ^d	Access Road (Direct Effects) ^e	Transmission Line (Direct Effects) ^f	Outside SEZ (Indirect Effects) ^g	
<i>Birds (Cont.)</i>								
Greater sage-grouse	<i>Centrocercus urophasianus</i>	ESA-C; BLM-S; UT-SC; UT-S2	A year-round resident in the SEZ region. Plains, foothills, and mountain valleys dominated by sagebrush throughout the SEZ region. Lek sites are located in relatively open areas surrounded by sagebrush or in areas where sagebrush density is low. Nesting usually occurs on the ground where sagebrush density is higher. Quad-level occurrences intersect the affected area east of the SEZ. Crucial brooding habitat for the species exists within 10 mi east of the SEZ. About 1,591,858 acres of potentially suitable habitat occurs within the SEZ region.	1,038 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat)	45 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat); 4,123 acres in area of indirect effects	64 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	40,569 acres of potentially suitable habitat (2.5% of available potentially suitable habitat)	Small overall impact. Pre-disturbance surveys and avoiding or minimizing disturbance of occupied habitats, especially leks and nesting sites in the areas of direct effect; or compensatory mitigation of direct effects on occupied habitats could reduce impacts. Mitigation should be developed in consultation with the USFWS and UDWR.
Long-billed curlew	<i>Numenius americanus</i>	BLM-S; UT-SC; UT-S2	Summer resident and migrant throughout the SEZ region in short-grass grasslands near standing water. Species is likely to be transient only in the vicinity of the SEZ. Nearest recorded occurrences are from the Beaver River, approximately 30 mi northeast of the SEZ. About 237,630 acres of potentially suitable habitat occurs within the SEZ region.	739 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat)	12 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	1 acre of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	6,200 acres of potentially suitable habitat (2.6% of available potentially suitable habitat)	Small overall impact. No species-specific mitigation needed. Only transient individuals are expected in the affected area.

TABLE 13.1.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status ^a	Habitat ^b	Maximum Area of Potential Habitat Affected ^c				Overall Potential Impact Magnitude ^h and Species-Specific Mitigation ⁱ
				Within SEZ (Direct Effects) ^d	Access Road (Direct Effects) ^e	Transmission Line (Direct Effects) ^f	Outside SEZ (Indirect Effects) ^g	
Birds (Cont.)								
Northern goshawk	<i>Accipiter gentilis</i>	BLM-S	A year-round resident in the SEZ region. Mature mountain forest and riparian zone habitats throughout the SEZ region. Nests in trees in mature deciduous, coniferous, and mixed forests. Forages in both heavily forested and relatively open shrubland habitats. Nearest recorded occurrences are approximately 25 mi southeast of the SEZ. About 591,239 acres of potentially suitable habitat occurs within the SEZ region.	0 acres	0 acres	10 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	1,109 acres of potentially suitable habitat (0.2% of available potentially suitable habitat)	Small overall impact. Pre-disturbance surveys and avoiding or minimizing disturbance of nesting habitats (woodlands) in the area of direct effects or compensatory mitigation of direct effects on occupied nesting habitats could reduce impacts.
Short-eared owl	<i>Asio flammeus</i>	BLM-S; UT-SC; UT-S2	A winter resident in the SEZ region. Grasslands, shrublands, and other open habitats throughout the SEZ region. Nearest recorded occurrences are within 10 mi northwest of the SEZ. About 3,990,928 acres of potentially suitable habitat occurs within the SEZ region.	4,963 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat)	75 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	83 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	90,439 acres of potentially suitable habitat (2.3% of available potentially suitable habitat)	Small overall impact on foraging habitat only. Avoidance of direct impacts on all foraging habitat is not feasible because suitable foraging habitat is widespread in the area of direct effect.

TABLE 13.1.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status ^a	Habitat ^b	Maximum Area of Potential Habitat Affected ^c				Overall Potential Impact Magnitude ^h and Species-Specific Mitigation ⁱ
				Within SEZ (Direct Effects) ^d	Access Road (Direct Effects) ^e	Transmission Line (Direct Effects) ^f	Outside SEZ (Indirect Effects) ^g	
Birds (Cont.)								
Western burrowing owl	<i>Athene cunicularia hypugaea</i>	BLM-S; FWS-SC; UT-SC	A year-round resident in the SEZ region. Open grasslands and prairies, as well as disturbed sites such as golf courses, cemeteries, and airports throughout the SEZ region. Nests in burrows constructed by mammals (prairie dog, badger, etc.). Nearest recorded occurrences are about 5 mi from the SEZ. About 2,108,869 acres of potentially suitable habitat occurs within the SEZ region.	6,185 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat)	85 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	87 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	97,492 acres of potentially suitable habitat (4.6% of available potentially suitable habitat)	Small overall impact on foraging and nesting habitat. Pre-disturbance surveys and avoiding or minimizing disturbance of occupied burrows and habitats in the area of direct effects or compensatory mitigation of direct effects on occupied habitats could reduce impacts.
Mammals								
Fringed myotis	<i>Myotis thysanodes</i>	BLM-S; FWS-SC; UT-SC	Wide range of habitats including lowland riparian, desert shrub, pinyon-juniper, and sagebrush habitats. Roost sites have been reported in buildings and caves. Nearest recorded occurrences are 30 mi south of the SEZ. About 4,742,697 acres of potentially suitable habitat occurs within the SEZ region.	5,361 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat)	93 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	86 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	102,839 acres of potentially suitable habitat (2.2% of available potentially suitable habitat)	Small overall 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 effect.

TABLE 13.1.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status ^a	Habitat ^b	Maximum Area of Potential Habitat Affected ^c				Overall Potential Impact Magnitude ^h and Species-Specific Mitigation ⁱ
				Within SEZ (Direct Effects) ^d	Access Road (Direct Effects) ^e	Transmission Line (Direct Effects) ^f	Outside SEZ (Indirect Effects) ^g	
Mammals (Cont.)								
Kit fox	<i>Vulpes macrotis</i>	BLM-S; UT-SC	Open prairie, plains, and desert habitats where it inhabits burrows and preys on rodents, rabbits, hares, and small birds. Nearest recorded occurrences are approximately 35 mi northwest of the SEZ. About 1,889,326 acres of potentially suitable habitat occurs within the SEZ region.	4,920 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat)	69 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	87 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	91,505 acres of potentially suitable habitat (4.8% of available potentially suitable habitat)	Small overall impact. Pre-disturbance surveys and avoiding or minimizing disturbance of occupied habitats in the areas of direct effects; translocation of individuals from areas of direct effects; or compensatory mitigation of direct effects on occupied habitats could reduce impacts.
Pygmy rabbit	<i>Brachylagus idahoensis</i>	BLM-S; UT-SC; UT-S2	Sagebrush-shrubland habitats throughout the SEZ region. Prefers loose soils to dig burrows. Nearest recorded occurrences are about 5 mi from the SEZ. About 1,016,858 acres of potentially suitable habitat occurs within the SEZ region.	683 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat)	39 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	54 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	29,577 acres of potentially suitable habitat (2.9% of available potentially suitable habitat)	Small overall impact. Pre-disturbance surveys and avoiding or minimizing disturbance of occupied habitats in the areas of direct effects; translocation of individuals from areas of direct effects; or compensatory mitigation of direct effects on occupied habitats could reduce impacts.

TABLE 13.1.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status ^a	Habitat ^b	Maximum Area of Potential Habitat Affected ^c				Overall Potential Impact Magnitude ^h and Species-Specific Mitigation ⁱ
				Within SEZ (Direct Effects) ^d	Access Road (Direct Effects) ^e	Transmission Line (Direct Effects) ^f	Outside SEZ (Indirect Effects) ^g	
Mammals (Cont.)								
Spotted bat	<i>Euderma maculatum</i>	BLM-S; FWS-SC; UT-SC; UT-S2	Near forests and shrubland habitats throughout the SEZ region. Uses caves and rock crevices for day roosting and winter hibernation. Nearest recorded occurrences are 25 mi southeast of the SEZ. About 3,580,326 acres of potentially suitable habitat occurs within the SEZ region.	4,949 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat)	86 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	86 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	90,695 acres of potentially suitable habitat (2.5% of available potentially suitable habitat)	Small overall 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 effect.
Townsend's big-eared bat	<i>Corynorhinus townsendii</i>	BLM-S; FWS-SC; UT-SC	Near forests and shrubland habitats below 9,000 ft elevation throughout the SEZ region. The species may use caves, mines, and buildings for day roosting and winter hibernation. Nearest recorded occurrences are about 10 mi north of the SEZ. About 3,197,836 acres of potentially suitable habitat occurs within the SEZ region.	5,489 acres of potentially suitable habitat lost (0.2% of available potentially suitable habitat)	46 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	23 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	66,834 acres of potentially suitable habitat (2.1% of available potentially suitable habitat)	Small overall 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 effect.

TABLE 13.1.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status ^a	Habitat ^b	Maximum Area of Potential Habitat Affected ^c				Overall Potential Impact Magnitude ^h and Species-Specific Mitigation ⁱ
				Within SEZ (Direct Effects) ^d	Access Road (Direct Effects) ^e	Transmission Line (Direct Effects) ^f	Outside SEZ (Indirect Effects) ^g	
Mammals (Cont.)								
Utah prairie dog	<i>Cynomys parvidens</i>	ESA-T; UT-S1	Endemic to southwestern Utah in grasslands in level mountain valleys and areas with deep, well-drained soils. Colonies reside in underground burrow systems, which are dynamic in size and location. Nearest recorded occurrences are about 5 mi north of the SEZ. Potentially suitable habitat occurs along Fourmile Wash about 3 mi north of the SEZ. About 573,137 acres of potentially suitable habitat occurs within the SEZ region.	398 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat)	8 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	0 acres	10,750 acres of potentially suitable habitat (1.9% of available potentially suitable habitat)	Small overall impact. Pre-disturbance surveys and avoiding or minimizing disturbance of occupied habitats in the areas of direct effects; translocation of individuals from areas of direct effect; or compensatory mitigation of direct effects on occupied habitats could reduce impacts. Conservation measures should be developed in consultation with the USFWS and the UDWR.

^a BLM-S = listed as a sensitive species by the BLM; ESA-C = candidate for listing under the ESA; ESA-T = listed as threatened under the ESA; ESA-UR = under review for listing under the ESA; FWS-SC = USFWS species of concern; UT-S1 = ranked as S1 in the state of Utah; UT-S2 = ranked as S2 in the state of Utah; UT-SC = Utah species of concern.

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

^c Maximum area of potentially suitable habitat that could be affected relative to availability within the SEZ region. Habitat availability for each species within the region was determined by using SWReGAP habitat suitability and land cover models. This approach probably overestimates the amount of suitable habitat in the project area.

Footnotes continued on next page.

TABLE 13.1.12.1-1 (Cont.)

-
- ^d Direct effects within the SEZ consist of the ground-disturbing activities associated with construction and the maintenance of an altered environment associated with operations.
- ^e For access road development, direct effects were estimated within a 15-mi (24-km) long, 60-ft (18-m) wide road ROW 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 access road corridor.
- ^f For transmission development, direct effects were estimated within a 3-mi (5-km) long, 250-ft (76-m) wide transmission ROW from the SEZ to the nearest existing line. Direct impacts within this area were determined from the proportion of potentially suitable habitat within the 1-mi (1.6-km) wide transmission 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 portions of the access road and transmission corridors 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.
- ^h Overall impact magnitude categories were based on professional judgment and are as follows: (1) *small*: $\leq 1\%$ of the population or its habitat would be lost and the activity would not result in a measurable change in carrying capacity or population size in the affected area; (2) *moderate*: >1 but $\leq 10\%$ of the population or its habitat would be lost and the activity would result in a measurable but moderate (not destabilizing) change in carrying capacity or population size in the affected area; (3) *large*: $>10\%$ of a population or its habitat would be lost and the activity would result in a large, measurable, and destabilizing change in carrying capacity or population size in the affected area. Note that much greater weight was given to the magnitude of direct effects because those effects would be difficult to mitigate. Programmatic design features would reduce most indirect effects to negligible levels.
- 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 ft to m, multiply by 0.3048.
- ^k To convert mi to km, multiply by 1.609.
- ^l To convert acres to km², multiply by 0.004047.
- ^m Species in bold text have been recorded or have designated critical habitat in the affected area.

1 ***13.1.12.1.1 Species Listed under the ESA That Could Occur in the Affected Area***
2

3 In its scoping comments on the proposed Escalante Valley SEZ (Stout 2009), the USFWS
4 expressed concern for impacts of project development on the Utah prairie dog, a species listed as
5 threatened under the ESA. This species has the potential to occur within the SEZ on the basis of
6 observed occurrences near the SEZ and the presence of potentially suitable habitat in the SEZ
7 (Figure 13.1.12.1-1; Table 13.1.12.1-1). Appendix J provides basic information on life history,
8 habitat needs, and threats to populations of this species. No other species that is currently listed
9 under the ESA, proposed for listing, under review for listing, or a candidate for listing is present
10 within the Escalante Valley SEZ affected area.
11

12 The Utah prairie dog occurs in grasslands, level mountain valleys and areas with deep
13 well-drained soils with low growing vegetation that allows for good visibility. It is one of
14 three prairie dog species in the state of Utah and the only prairie dog species to occur in the
15 SEZ region (UDWR 2009a). In its scoping comments on the Escalante Valley SEZ, the
16 USFWS indicated that suitable habitat for the species may occur on the SEZ. Potential habitat
17 for the Utah prairie dog within the SEZ region is described by SWReGAP as year-round known
18 or probable habitat.
19

20 Quad-level occurrences for this species intersect the SEZ and other portions of the
21 affected area. SWReGAP predicts the presence of potentially suitable habitat for the species on
22 the SEZ and throughout the area of indirect effects (Figure 13.1.12.1-1; Table 13.1.12.1-1). Data
23 provided by the Utah prairie dog colony tracking database⁸ also indicates the presence of active
24 Utah prairie dog colonies within the area of indirect effects outside of the SEZ. Critical habitat
25 for this species has not been designated.
26

27
28 ***13.1.12.1.2 Species That Are Candidates for Listing under the ESA***
29

30 The greater sage-grouse is the only species that is a candidate for listing as threatened or
31 endangered under the ESA that may occur in the affected area of the proposed Escalante Valley
32 SEZ. This species is known to occur in plains, foothills, and mountain valleys dominated by
33 sagebrush. In its scoping comments on the SEZ (Stout 2009), the USFWS indicated that suitable
34 sage-grouse habitat occurs throughout the Escalante Valley SEZ region. Potential habitat for the
35 greater sage-grouse within the SEZ region is described by SWReGAP as year-round known or
36 probable habitat. The UDWR has also identified crucial brooding habitat for this species within
37 10 mi (16 km) east of the SEZ (Figure 13.1.12.1-1).
38

39 Quad-level occurrences for this species intersect the SEZ affected area. SWReGAP
40 predicts the presence of potentially suitable habitat for the species on the SEZ and throughout the
41 area of indirect effects (Figure 13.1.12.1-1; Table 13.1.12.1-1).
42
43

⁸ The Utah prairie dog colony tracking database contains sensitive data provided by the UDWR, for official use only. These data were used for the analyses in this PEIS, but the distributions were not displayed on figures in this PEIS.

1 **13.1.12.1.3 BLM-Designated Sensitive Species**
2

3 There are 17 BLM-designated sensitive species that may occur in the affected area of the
4 Escalante Valley SEZ (Table 13.1.12.1-1). These BLM-designated sensitive species include the
5 following: (1) plants—compact cat’s-eye, Jone’s globemallow, long-calyx milkvetch, money
6 wild buckwheat, and Nevada willowherb; (2) birds—bald eagle, ferruginous hawk, greater sage-
7 grouse, long-billed curlew, northern goshawk, short-eared owl, and western burrowing owl; and
8 (3) mammals—fringed myotis, kit fox, pygmy rabbit, spotted bat, and Townsend’s big-eared
9 bat. Quad-level occurrences intersect the SEZ affected area for the following BLM-designated
10 species: ferruginous hawk, western burrowing owl, and pygmy rabbit. Habitats in which these
11 species are found, the amount of potentially suitable habitat in the affected area, and known
12 locations of the species relative to the SEZ are presented in Table 13.1.12.1-1. One species
13 (greater sage-grouse) was discussed in Section 13.1.12.1.1 because of its status under the ESA.
14 All other BLM-designated species as related to the SEZ are described in the remainder of this
15 section. Additional life history information for these species is provided in Appendix J.
16
17

18 **Compact Cat’s-Eye**
19

20 The compact cat’s eye is a perennial herb endemic to southwestern Utah and eastern
21 Nevada. It occurs in scattered locations throughout the Escalante Valley SEZ region. Suitable
22 habitat includes salt desert shrub-scrub. Populations are known to occur about 50 mi (80 km)
23 northwest of the SEZ. Potentially suitable habitat for the species may occur on the SEZ and in
24 other portions of the affected area (Table 13.1.12.1-1).
25
26

27 **Jone’s Globemallow**
28

29 The Jone’s globemallow is a perennial herb endemic to southwestern Utah and eastern
30 Nevada. It inhabits mixed shrublands, pinyon-juniper woodlands, and grassland communities.
31 Populations are known to occur about 38 mi (61 km) north of the SEZ. Potentially suitable
32 habitat may occur on the SEZ and in other portions of the affected area (Table 13.1.12.1-1).
33
34

35 **Long-Calyx Milkvetch**
36

37 The long-calyx milkvetch is a perennial herb endemic to the Great Basin from
38 southwestern Utah and eastern Nevada. It inhabits mixed shrublands, pinyon-juniper woodlands,
39 and grassland communities. Populations are known to occur about 30 mi (48 km) west of the
40 SEZ. Potentially suitable habitat may occur on the SEZ and in other portions of the affected area
41 (Table 13.1.12.1-1).
42
43
44

1 **Money Wild Buckwheat**

2
3 The money wild buckwheat is a perennial shrub from the southwestern United States. It
4 inhabits saltbush, sagebrush, and pinyon-juniper woodland communities on gravelly substrates.
5 Populations are known to occur about 30 mi (48 km) west of the SEZ. Potentially suitable habitat
6 may occur on the SEZ and in other portions of the affected area (Table 13.1.12.1-1).

7
8
9 **Nevada Willowherb**

10
11 The Nevada willowherb is a perennial herb endemic to the Great Basin from
12 southwestern Utah and southeastern Nevada. It inhabits pinyon-juniper and oak-mahogany
13 woodland communities on talus slopes and rocky outcrops. Populations are known to occur
14 within the Dixie National Forest, approximately 30 mi (48 km) southwest of the SEZ. Potentially
15 suitable habitat may occur on the SEZ and in other portions of the affected area
16 (Table 13.1.12.1-1).

17
18
19 **Bald Eagle**

20
21 The bald eagle is known to occur in the SEZ region, primarily associated with larger
22 waterbodies. The species has been recorded in the vicinity of the Fourmile and Mud Spring
23 Washes, approximately 10 mi (16 km) north and northeast of the SEZ. According to the
24 SWReGAP habitat suitability model, only potentially suitable nonbreeding winter habitat
25 occurs in the SEZ affected area. Suitable nesting habitat does not occur in the affected area,
26 but shrubland habitats suitable for foraging may occur on the SEZ and throughout the affected
27 area (Table 13.1.12.1-1).

28
29
30 **Ferruginous Hawk**

31
32 The ferruginous hawk is known to occur in the SEZ region where it forages in shrubland
33 habitats. Quad-level occurrences for this species intersect the Escalante Valley SEZ affected
34 area. According to the SWReGAP habitat suitability model, only potentially suitable
35 nonbreeding winter habitat occurs in the SEZ affected area. Suitable nesting habitat does not
36 occur in the affected area, but shrubland habitats suitable for foraging may occur on the SEZ
37 and throughout the affected area (Table 13.1.12.1-1).

38
39
40 **Long-Billed Curlew**

41
42 The long-billed curlew is known to occur in the SEZ region as a summer resident and
43 migrant in short-grass grasslands near standing water. The species has been recorded near the
44 Beaver River, approximately 30 mi (48 km) northeast of the SEZ. According to the SWReGAP
45 habitat suitability model, only potentially suitable nonbreeding migratory habitat is expected to
46 occur in the SEZ affected area. Suitable nesting habitat does not occur in the affected area, but

1 the species may be observed as a transient in grassland habitats throughout the affected area
2 (Table 13.1.12.1-1).

3 4 5 **Northern Goshawk**

6
7 The northern goshawk is known to occur in the SEZ region where it forages in montane
8 forests and valley shrubland habitats. Populations are known to occur approximately 25 mi
9 (40 km) southeast of the SEZ. According to the SWReGAP habitat suitability model, year-round
10 breeding and nonbreeding potential habitat does not occur on the SEZ or within the access road
11 corridor; however, potentially suitable habitat may occur in the transmission corridor and within
12 the area of indirect effects (Table 13.1.12.1-1). On the basis of an evaluation of SWReGAP land
13 cover types, approximately 6 acres (<0.1 km²) of pinyon-juniper woodland habitat that may be
14 potentially suitable nesting habitat occurs in the transmission corridor. Approximately 164 acres
15 (0.7 km²) of this habitat occurs in the area if indirect effects.

16 17 18 **Short-Eared Owl**

19
20 The short-eared owl is known to occur in the SEZ region where it forages in grasslands,
21 shrublands, and other open habitats. The species has been recorded within 10 mi (16 km)
22 northeast of the SEZ. According to the SWReGAP habitat suitability model, only potentially
23 suitable nonbreeding winter habitat is expected to occur in the affected area. Suitable nesting
24 habitat is not expected to occur in the affected area, but grassland and shrubland habitats suitable
25 for foraging may occur throughout the affected area (Table 13.1.12.1-1).

26 27 28 **Western Burrowing Owl**

29
30 The western burrowing owl is known to occur in the SEZ region where it forages in
31 grasslands, shrublands, and open disturbed areas. This species typically nests in burrows
32 constructed by mammals such as prairie dogs. Quad-level occurrences for this species intersect
33 the Escalante Valley SEZ affected area. According to the SWReGAP habitat suitability model,
34 only potentially suitable summer breeding habitat is expected to occur in the SEZ affected area
35 (Table 13.1.12.1-1). The availability of nest sites (burrows) within the affected area has not been
36 determined, but grassland and shrubland habitat that may be suitable for either foraging or
37 nesting occurs throughout the affected area.

38 39 40 **Fringed Myotis**

41
42 The fringed myotis is known to occur in the SEZ region in a variety of habitats including
43 riparian, shrubland, sagebrush, and pinyon-juniper woodlands. The species roosts in buildings
44 and caves. Populations are known to occur from the Dixie National Forest, approximately 30 mi
45 (48 km) south of the SEZ. According to the SWReGAP habitat suitability model, potentially
46 suitable year-round foraging habitat may be present within the affected area (Table 13.1.12.1-1).

1 On the basis of an evaluation of SWReGAP land cover types, there is no potentially suitable
2 roosting habitat (rocky cliffs and outcrops) in the affected area.
3
4

5 **Kit Fox**

6
7 The kit fox is widely distributed throughout western North America. Within the SEZ
8 region, this species is known to occur in open grassland and shrubland habitats where it inhabits
9 burrows; it has been recorded about 35 mi (56 km) northwest of the SEZ. According to the
10 SWReGAP habitat suitability model, potentially suitable year-round shrubland habitat may occur
11 on the SEZ and in other portions of the affected area (Table 13.1.12.1-1).
12
13

14 **Pygmy Rabbit**

15
16 The pygmy rabbit is widely distributed throughout the Great Basin and intermontane
17 regions of western North America. This species is known to occur in western Utah where it
18 prefers areas with tall dense sagebrush and loose soils. Quad-level occurrences for this species
19 intersect the SEZ and other portions of the affected area. According to the SWReGAP habitat
20 suitability model, potentially suitable year-round sagebrush-shrubland habitat may occur on the
21 SEZ and in other portions of the affected area (Table 13.1.12.1-1).
22
23

24 **Spotted Bat**

25
26 The spotted bat is known to occur in the SEZ region where it inhabits forest and
27 shrubland habitats and roosts in caves and rock crevices. The species has been recorded about
28 25 mi (50 km) southeast of the SEZ. According to the SWReGAP habitat suitability model,
29 potentially suitable year-round foraging habitat may be present within the affected area
30 (Table 13.1.12.1-1). On the basis of an evaluation of SWReGAP land cover types, there is no
31 potentially suitable roosting habitat (rocky cliffs and outcrops) in the area of direct effects.
32
33

34 **Townsend's Big-Eared Bat**

35
36 The Townsend's big-eared bat is known to occur in the SEZ region where it inhabits
37 forest and shrubland habitats and roosts in caves, mines, and buildings. The species has been
38 recorded about 10 mi (16 km) north of the SEZ. According to the SWReGAP habitat suitability
39 model, potentially suitable year-round foraging habitat may be present within the affected area
40 (Table 13.1.12.1-1). On the basis of an evaluation of SWReGAP land cover types, there is no
41 potentially suitable roosting habitat (rocky cliffs and outcrops) in the area of direct effects.
42
43
44

1 **13.1.12.1.4 State-Listed Species**

2
3 According to Utah Administrative Rule R657-48, as described in the *Utah Sensitive*
4 *Species List* (UDWR 2010b), there are no species that receive a separate regulatory designation
5 from the UDWR or the state of Utah.
6

7
8 **13.1.12.1.5 Rare Species**

9
10 There are 16 species that have a state status of S1 or S2 in Utah or that are considered
11 species of concern by the State of Utah or the USFWS may occur in the affected area of the
12 Escalante Valley SEZ (Table 13.1.12.1-1). All these species have been previously discussed as
13 ESA-listed (Section 13.1.12.1.1), ESA candidates (Section 13.1.12.1.2), or BLM-designated
14 sensitive (Section 13.1.12.1.3).
15

16
17 **13.1.12.2 Impacts**

18
19 The potential for impacts on special status species from utility-scale solar energy
20 development within the proposed Escalante Valley SEZ is discussed in this section. The types
21 of impacts that special status species could incur from construction and operation of utility-scale
22 solar energy facilities are discussed in Section 5.10.4.
23

24 The assessment of impacts on special status species is based on available information
25 on the presence of species in the affected area, as presented in Section 13.1.12.1 following the
26 analysis approach described in Appendix M. It is assumed that, prior to development, surveys
27 would be conducted to determine the presence of special status species and their habitats in and
28 near areas where ground-disturbing activities would occur. Additional NEPA assessments, ESA
29 consultations, and coordination with state natural resource agencies may be needed to address
30 project-specific impacts more thoroughly. These assessments and consultations could result in
31 additional required actions to avoid, minimize, or mitigate impacts on special status species
32 (see Section 13.1.12.3).
33

34 Solar energy development within the Escalante Valley SEZ could affect a variety of
35 habitats (see Sections 13.1.9 and 13.1.10). Based on UDWR records, occurrences for the
36 following five special status species intersect the Escalante Valley SEZ affected area:
37 ferruginous hawk, greater sage-grouse, western burrowing owl, pygmy rabbit, and Utah prairie
38 dog. Suitable habitat for each of these species may occur in the affected area. Other special status
39 species may occur on the SEZ or within the affected area based upon the presence of potentially
40 suitable habitat. As discussed in Section 13.1.12.1, this approach to identifying the species that
41 could occur in the affected area probably overestimates the number of species that actually occur
42 in the affected area and may therefore overestimate impacts on some special status species.
43

44 Potential direct and indirect impacts on special status species within the SEZ and in
45 the area of indirect effects outside the SEZ are presented in Table 13.1.12.1-1. In addition, the
46 overall potential magnitude of impacts on each species (assuming programmatic design features

1 are in place) is presented along with any potential species-specific mitigation measures that
2 could further reduce impacts.

3
4 Impacts on special status species could occur during all phases of development
5 (construction, operation, and decommissioning and reclamation) of a utility-scale solar energy
6 project within the SEZ. Construction and operation activities could result in short- or long-term
7 impacts on individuals and their habitats, especially if these activities are sited in areas where
8 special status species are known to or could occur. As presented in Section 13.1.1.2, a 15-mi
9 (24-km) long road corridor and a 3-mi (5-km) long transmission corridor are assumed to be
10 needed to serve solar facilities within this SEZ.

11
12 Direct impacts would result from habitat destruction or modification. It is assumed that
13 direct impacts would occur only within the SEZ and assumed access road and transmission
14 corridors where ground-disturbing activities are expected to occur. Indirect impacts could
15 result from surface water and sediment runoff from disturbed areas, fugitive dust generated by
16 project activities, accidental spills, harassment, and lighting. No ground-disturbing activities
17 associated with project development are anticipated to occur within the area of indirect effects.
18 Decommissioning of facilities and reclamation of disturbed areas after operations cease could
19 result in short-term negative impacts on individuals and habitats adjacent to project areas, but
20 long-term benefits would accrue if original land contours and native plant communities were
21 restored in previously disturbed areas.

22
23 The successful implementation of programmatic design features (discussed in
24 Appendix A) would reduce direct impacts on some special status species, especially those that
25 depend on habitat types that can be easily avoided (e.g., pinyon-juniper woodlands). Indirect
26 impacts on special status species could be reduced to negligible levels by implementing
27 programmatic design features, especially those engineering controls that would reduce runoff,
28 sedimentation, spills, and fugitive dust.

31 ***13.1.12.2.1 Impacts on Species Listed under the ESA***

32
33
34 The Utah prairie dog is the only species listed under the ESA that has the potential to
35 occur in the affected area of the proposed Escalante Valley SEZ and is the only ESA-listed
36 species that the USFWS identified as potentially affected by solar energy development on the
37 SEZ (Stout 2009). Quad-level occurrences for this species intersect the SEZ, and potentially
38 suitable shrubland habitat occurs throughout the affected area (Figure 13.1.12.1-1). Furthermore,
39 information provided by the Utah prairie dog colony tracking database indicates the presence
40 of Utah prairie dog colonies in the area of indirect effects outside of the SEZ. According to
41 SWReGAP, about 398 acres (0.1 km²) of potentially suitable habitat on the SEZ and 8 acres
42 (<0.1 km²) of potentially suitable habitat in the road corridor could be directly affected by
43 construction and operations (Table 13.1.12.1-1). This direct effects area represents about 0.1%
44 of available suitable habitat of the Utah prairie dog in the SEZ region. About 11,440 acres
45 (46 m²) of suitable habitat occurs in the area of potential indirect effects; this area represents
46 about 2.0% of the available suitable habitat in the SEZ region (Table 13.1.12.1-1).

1 The overall impact on the Utah prairie dog from construction, operation, and
2 decommissioning of utility-scale solar energy facilities within the Escalante Valley SEZ is
3 considered small because the amount of potentially suitable habitat in the area of direct effects
4 represents <1% of potentially suitable habitat in the SEZ region.
5

6 The implementation of programmatic design features and complete avoidance of known
7 occupied habitats could reduce impacts to negligible levels. Additional measures may be taken
8 by buffering the locations of known prairie dog colony locations and avoiding or minimizing
9 disturbance to those areas, as recommended by the USFWS (Stout 2009). Formal consultation
10 with the USFWS under Section 7 of the ESA is required for any federal action that may
11 adversely affect an ESA-listed species. Therefore, prior to development, consultation with
12 the USFWS would be necessary to discuss potential impacts on the Utah prairie dog, develop
13 an approved pre-disturbance survey protocol, develop site-specific mitigation, authorize
14 incidental take statements, and develop a Utah prairie dog translocation and monitoring program
15 (if necessary).
16

17 To offset impacts of solar development on the SEZ, compensatory mitigation may be
18 needed to balance the acreage of habitat lost with acquisition of lands that would be improved
19 and protected for Utah prairie dog populations. Compensation can be accomplished by
20 improving the carrying capacity for the Utah prairie dog on the acquired lands. As for other
21 mitigation actions, consultations with the USFWS and the UDWR would be necessary to
22 determine the appropriate mitigation ratio to acquire, enhance, and preserve these lands.
23
24

25 ***13.1.12.2 Impacts on Species That Are Candidates for Listing under the ESA*** 26

27 The greater sage-grouse is the only species that is a candidate for listing under the
28 ESA that could occur in the affected area of the proposed Escalante Valley SEZ. Quad-level
29 occurrences for this species intersect the affected area and potentially suitable sagebrush
30 habitat occurs throughout the affected area (Figure 13.1.12.1-1). In its scoping comments on
31 the SEZ, the USFWS identified a potential impact on greater sage-grouse habitat resulting
32 from solar energy development on the SEZ (Stout 2009). According to SWReGAP, about
33 1,038 acres (4 km²) of potentially suitable habitat on the SEZ, 45 acres (0.2 km²) of
34 potentially suitable habitat in the road corridor, and 64 acres (0.3 km²) of potentially suitable
35 habitat in the transmission corridor could be directly affected by construction and operations
36 (Table 13.1.12.1-1). This direct effects area represents about 0.1% of available suitable habitat
37 for the greater sage-grouse in the SEZ region. About 46,000 acres (186 km²) of suitable habitat
38 occurs in the area of potential indirect effects; this area represents about 2.9% of the available
39 suitable habitat in the SEZ region (Table 13.1.12.1-1).
40

41 The overall impact on the greater sage-grouse from construction, operation, and
42 decommissioning of utility-scale solar energy facilities within the Escalante Valley SEZ is
43 considered small because the amount of potentially suitable habitat for this species in the
44 area of direct effects represents less than 1% of potentially suitable habitat in the SEZ region.
45 The implementation of programmatic design features alone may not be sufficient to reduce

1 impacts to negligible levels because potentially suitable sagebrush habitats are widespread
2 throughout the area of direct effects.
3

4 Efforts to mitigate the impacts of solar energy development in the Escalante Valley SEZ
5 on the greater sage-grouse should be developed in consultation with the USFWS and the UDWR
6 following the *Strategic Plan for Management of Sage Grouse* (UDWR 2009d) and *Guidelines to*
7 *Manage Sage Grouse Populations and Their Habitats* (Connelly et al. 2000). Impacts could be
8 reduced by conducting pre-disturbance surveys and avoiding or minimizing disturbance to
9 occupied habitats in the areas of direct effects, especially leks and nest sites. If avoidance is not a
10 feasible option, a compensatory mitigation plan could be developed and implemented to mitigate
11 direct effects on occupied habitats. Compensation could involve the protection and enhancement
12 of existing occupied or suitable habitats to compensate for habitats lost to development. Any
13 mitigation plans should be developed in coordination with the USFWS and the UDWR.
14

15 ***13.1.12.2.3 Impacts on BLM-Designated Sensitive Species***

16
17
18 Of the 17 BLM-designated sensitive species that could occur in the affected area of
19 the proposed Escalante Valley SEZ, one species, greater sage-grouse, was discussed in
20 Section 13.1.12.2.2 because of its status under the ESA. Impacts on all other BLM-designated
21 sensitive species that have potentially suitable habitat within the SEZ, road corridor, or
22 transmission corridor (i.e., the area of direct effects) are discussed below.
23

24 **Compact Cat's-Eye**

25
26
27 The compact cat's-eye is not known to occur in the affected area of the Escalante Valley
28 SEZ; however, approximately 4,843 acres (20 km²) of potentially suitable habitat on the SEZ,
29 71 acres (<0.1 km²) in the road corridor, and 88 acres (<0.1 km²) in the transmission corridor
30 could be directly affected by construction and operations (Table 13.1.12.1-1). This direct effects
31 area represents about 0.2% of available suitable habitat in the SEZ region. About 97,000 acres
32 (393 km²) of potentially suitable habitat occurs in the area of potential indirect effects; this area
33 represents about 4.5% of the available suitable habitat in the SEZ region (Table 13.1.12.1-1).
34

35 The overall impact on the compact cat's-eye from construction, operation, and
36 decommissioning of utility-scale solar energy facilities within the Escalante Valley SEZ is
37 considered small because the amount of potentially suitable habitat in the area of direct effects
38 represents less than 1% of potentially suitable habitat in the SEZ region. The implementation of
39 programmatic design features may be sufficient to reduce indirect impacts to negligible levels.
40

41 Avoidance of all potentially suitable habitats to mitigate impacts on the compact cat's-
42 eye is not feasible because potentially suitable shrubland habitats are widespread throughout the
43 area of direct effects. For this species and other special status plants, impacts could be reduced
44 by conducting pre-disturbance surveys and avoiding or minimizing disturbance to occupied
45 habitats in the area of direct effects. If avoidance is not a feasible option, plants could be
46 translocated from areas of direct effects to protected areas that would not be affected directly or

1 indirectly by future development. Alternatively or in combination with translocation, a
2 compensatory mitigation plan could be developed and implemented to mitigate direct effects
3 on occupied habitats. Compensation could involve the protection and enhancement of existing
4 occupied or suitable habitats to compensate for habitats lost to development. A comprehensive
5 mitigation strategy that uses one or more of these options could be designed to completely offset
6 the impacts of development.
7
8

9 **Jone's Globemallow**

10
11 The Jone's globemallow is not known to occur in the affected area of the Escalante
12 Valley SEZ; however, approximately 4,909 acres (20 km²) of potentially suitable habitat on
13 the SEZ, 73 acres (<0.1 km²) in the road corridor, and 89 acres (<0.1 km²) in the transmission
14 corridor could be directly affected by construction and operations (Table 13.1.12.1-1). This
15 direct effects area represents about 0.1% of available suitable habitat in the SEZ region. About
16 99,000 acres (400 km²) of potentially suitable habitat occurs in the area of potential indirect
17 effects; this area represents about 2.4% of the available suitable habitat in the SEZ region
18 (Table 13.1.12.1-1).
19

20 The overall impact on the Jone's globemallow from construction, operation, and
21 decommissioning of utility-scale solar energy facilities within the Escalante Valley SEZ is
22 considered small because the amount of potentially suitable habitat in the area of direct effects
23 represents less than 1% of potentially suitable habitat in the SEZ region. The implementation of
24 programmatic design features may be sufficient to reduce indirect impacts to negligible levels.
25

26 Avoidance of all potentially suitable habitats to mitigate impacts on the Jone's
27 globemallow is not feasible because these habitats (shrublands) are widespread throughout the
28 area of direct effects. However, impacts could be reduced to negligible levels with the
29 implementation of programmatic design features and the mitigation options described previously
30 for the compact cat's-eye. The need for mitigation should first be determined by conducting
31 preconstruction surveys for the species and its habitat in the area of direct effects.
32
33

34 **Long-Calyx Milkvetch**

35
36 The long-calyx milkvetch is not known to occur in the affected area of the Escalante
37 Valley SEZ; however, approximately 4,843 acres (20 km²) of potentially suitable habitat on
38 the SEZ, 71 acres (<0.1 km²) in the road corridor, and 88 acres (<0.1 km²) in the transmission
39 corridor could be directly affected by construction and operations (Table 13.1.12.1-1). This
40 direct effects area represents about 0.1% of available suitable habitat in the SEZ region. About
41 97,000 acres (393 km²) of potentially suitable habitat occurs in the area of potential indirect
42 effects; this area represents about 2.4% of the available suitable habitat in the SEZ region
43 (Table 13.1.12.1-1).
44

45 The overall impact on the long-calyx milkvetch from construction, operation, and
46 decommissioning of utility-scale solar energy facilities within the Escalante Valley SEZ is

1 considered small because the amount of potentially suitable habitat in the area of direct effects
2 represents less than 1% of potentially suitable habitat in the SEZ region. The implementation of
3 programmatic design features may be sufficient to reduce indirect impacts to negligible levels.
4

5 Avoidance of all potentially suitable habitats to mitigate impacts on the long-calyx
6 milkvetch is not feasible because these habitats (sagebrush and shrublands) are widespread
7 throughout the area of direct effects. However, impacts could be reduced to negligible levels
8 with the implementation of programmatic design features and the mitigation options described
9 previously for the compact cat's-eye. The need for mitigation should first be determined by
10 conducting preconstruction surveys for the species and its habitat in the area of direct effects.
11

12

13 **Money Wild Buckwheat**

14

15 The money wild buckwheat is not known to occur in the affected area of the Escalante
16 Valley SEZ; however, approximately 4,824 acres (20 km²) of potentially suitable habitat on
17 the SEZ, 86 acres (<0.1 km²) in the road corridor, and 89 acres (<0.1 km²) in the transmission
18 corridor could be directly affected by construction and operations (Table 13.1.12.1-1). This
19 direct effects area represents about 0.1% of available suitable habitat in the SEZ region. About
20 101,000 acres (409 km²) of potentially suitable habitat occurs in the area of potential indirect
21 effects; this area represents about 2.8% of the available suitable habitat in the SEZ region
22 (Table 13.1.12.1-1).
23

24 The overall impact on the money wild buckwheat from construction, operation, and
25 decommissioning of utility-scale solar energy facilities within the Escalante Valley SEZ is
26 considered small because the amount of potentially suitable habitat for this species in the area of
27 direct effects represents less than 1% of potentially suitable habitat in the SEZ region. The
28 implementation of programmatic design features may be sufficient to reduce indirect impacts to
29 negligible levels.
30

31 Avoidance of all potentially suitable habitats to mitigate impacts on the money wild
32 buckwheat is not feasible because these habitats (sagebrush and shrublands) are widespread
33 throughout the area of direct effects. However, impacts could be reduced to negligible levels
34 with the implementation of programmatic design features and the mitigation options described
35 previously for the compact cat's-eye. The need for mitigation should first be determined by
36 conducting preconstruction surveys for the species and its habitat in the area of direct effects.
37

38

39 **Nevada Willowherb**

40

41 The Nevada willowherb is not known to occur in the affected area of the Escalante
42 Valley SEZ, and potentially suitable pinyon-juniper and oak/mahogany forest habitats do not
43 occur on the SEZ. However, approximately 1 acre (<0.1 km²) of potentially suitable habitat in
44 the road corridor and 6 acres (<0.1 km²) in the transmission corridor could be directly affected
45 by construction and operations (Table 13.1.12.1-1). This direct effects area represents <0.1%
46 of available suitable habitat in the SEZ region. About 175 acres (1 km²) of potentially suitable

1 habitat occurs in the area of potential indirect effects; this area represents <0.1% of the available
2 suitable habitat in the SEZ region (Table 13.1.12.1-1).

3
4 The overall impact on the Nevada willowherb from construction, operation, and
5 decommissioning of utility-scale solar energy facilities within the Escalante Valley SEZ is
6 considered small because the amount of potentially suitable habitat in the area of direct effects
7 represents less than 1% of potentially suitable habitat in the SEZ region. The implementation of
8 programmatic design features may be sufficient to reduce indirect impacts to negligible levels.

9
10 Nevada willowherb habitat (pinyon-juniper and oak/mahogany forests) occupies a limited
11 portion of the area of direct effects and could be completely avoided during solar development
12 and protected from indirect effects. In conjunction with the implementation of programmatic
13 design features, avoiding or minimizing disturbance to occupied habitats and forested areas, and
14 the mitigation measures described previously for the compact cat's-eye could further reduce
15 impacts on this species. The need for mitigation should first be determined by conducting
16 pre-disturbance surveys for the species and its habitat in the area of direct effects.

17 18 19 **Bald Eagle**

20
21 The bald eagle is a winter resident within the proposed Escalante Valley SEZ region.
22 Approximately 370 acres (2 km²) of potentially suitable foraging habitat on the SEZ, 6 acres
23 (<0.1 km²) in the road corridor, and 5 acres (<0.1 km²) in the transmission corridor could be
24 directly affected by construction and operations (Table 13.1.12.1-1). This direct effects area
25 represents about <0.1% of available suitable habitat in the SEZ region. About 11,200 acres
26 (45 km²) of potentially suitable foraging habitat occurs in the area of potential indirect effects;
27 this area represents about 0.4% of the available suitable habitat in the SEZ region
28 (Table 13.1.12.1-1).

29
30 The overall impact on the bald eagle from construction, operation, and decommissioning
31 of utility-scale solar energy facilities within the Escalante Valley SEZ is considered small
32 because direct effects would only occur on potentially suitable foraging habitat, and the amount
33 of this habitat in the area of direct effects represents less than 1% of potentially suitable habitat
34 in the SEZ region. The implementation of programmatic design features are expected to reduce
35 indirect impacts to negligible levels. Avoidance of direct impacts on all potentially suitable
36 foraging habitat is not a feasible way to mitigate impacts on the bald eagle because potentially
37 suitable shrubland is widespread throughout the area of direct effects and readily available in
38 other portions of the affected area.

39 40 41 **Ferruginous Hawk**

42
43 The ferruginous hawk is a winter resident within the proposed Escalante Valley SEZ
44 region. Approximately 2,290 acres (9 km²) of potentially suitable foraging habitat on the SEZ,
45 75 acres (0.3 km²) in the road corridor, and 67 acres (0.3 km²) in the transmission corridor could
46 be directly affected by construction and operations (Table 13.1.12.1-1). This direct effects area

1 represents about 0.1% of available suitable habitat in the SEZ region. About 57,000 acres
2 (231 km²) of potentially suitable foraging habitat occurs in the area of potential indirect
3 effects; this area represents about 3.3% of the available suitable habitat in the SEZ region
4 (Table 13.1.12.1-1).

5
6 The overall impact on the ferruginous hawk from construction, operation, and
7 decommissioning of utility-scale solar energy facilities within the Escalante Valley SEZ is
8 considered small because direct effects would only occur on potentially suitable foraging habitat,
9 and the amount of this habitat in the area of direct effects represents less than 1% of potentially
10 suitable habitat in the SEZ region. The implementation of programmatic design features are
11 expected to reduce indirect impacts to negligible levels. Avoidance of direct impacts on all
12 potentially suitable foraging habitat is not a feasible way to mitigate impacts on the ferruginous
13 hawk because potentially suitable shrubland is widespread throughout the area of direct effects
14 and readily available in other portions of the affected area.

15 16 17 **Long-Billed Curlew**

18
19 The long-billed curlew is a summer resident and migrant within the proposed Escalante
20 Valley SEZ region. Individuals may occur as migratory transients in grassland and wetland
21 habitats (playas) in the affected area. Approximately 739 acres (3 km²) of potentially suitable
22 foraging habitat on the SEZ, 12 acres (<0.1 km²) in the road corridor, and 1 acre (<0.1 km²)
23 in the transmission corridor could be directly affected by construction and operations
24 (Table 13.1.12.1-1). This direct effects area represents about 0.3% of available suitable habitat
25 in the SEZ region. About 7,300 acres (30 km²) of potentially suitable foraging habitat occurs in
26 the area of potential indirect effects; this area represents about 3.1% of the available suitable
27 habitat in the SEZ region (Table 13.1.12.1-1).

28
29 The overall impact on the long-billed curlew from construction, operation, and
30 decommissioning of utility-scale solar energy facilities within the Escalante Valley SEZ is
31 considered small because the amount of potentially suitable habitat in the area of direct effects
32 represents less than 1% of potentially suitable habitat in the SEZ region. The implementation of
33 programmatic design features may be sufficient to reduce indirect impacts on this species to
34 negligible levels; however, no species-specific mitigation of direct effects is warranted because
35 the species occurs only as a transient in the affected area and the affected area represents a very
36 small proportion of potentially suitable foraging habitat in the SEZ region.

37 38 39 **Northern Goshawk**

40
41 The northern goshawk is considered to be a year-round resident within the proposed
42 Escalante Valley SEZ region in montane forests and shrubland habitats. According to the
43 SWReGAP habitat suitability model, potentially suitable habitat does not exist on the SEZ or
44 within the road corridor. However, approximately 10 acres (<0.1 km²) of potentially suitable
45 habitat in the transmission corridor could be directly affected (Table 13.1.12.1-1). This
46 direct effects area represents about <0.1% of available suitable habitat in the SEZ region.

1 About 1,300 acres (5 km²) of potentially suitable habitat occurs in the area of potential indirect
2 effects; this area represents about 0.2% of the available suitable habitat in the SEZ region
3 (Table 13.1.12.1-1). Most of this area could serve as foraging habitat (i.e., shrublands); however
4 mature forest habitats suitable for nesting may also occur in the transmission corridor and in
5 portions of the area of indirect effects. On the basis of an evaluation of SWReGAP land cover
6 types, approximately 6 acres (<0.1 km²) of pinyon-juniper woodland habitat that may be
7 potentially suitable nesting habitat occurs in the transmission corridor. Approximately 164 acres
8 (0.7 km²) of this habitat occurs in the area if indirect effects.

9
10 The overall impact on the northern goshawk from construction, operation, and
11 decommissioning of utility-scale solar energy facilities within the Escalante Valley SEZ is
12 considered small because the amount of potentially suitable habitat for this species in the
13 area of direct effects represents less than 1% of potentially suitable habitat in the SEZ region.
14 The implementation of programmatic design features is expected to be sufficient to reduce
15 indirect impacts on this species to negligible levels.

16
17 Avoidance of direct impacts on all foraging habitat (shrublands) is not feasible because
18 suitable foraging habitat (shrublands) is widespread in the area of direct effect and may be
19 readily available in other portions of the affected area. However, avoiding or minimizing
20 disturbance of all potential nesting habitat (woodlands) or occupied nests within the transmission
21 corridor is feasible, and could reduce impacts. If avoiding or minimizing disturbance of all
22 suitable nesting habitat or occupied habitat is not feasible, a compensatory mitigation plan could
23 be developed and implemented to mitigate direct effects. Compensation could involve the
24 protection and enhancement of existing occupied or suitable habitats to compensate for habitats
25 lost to development. A comprehensive mitigation strategy that used one or both of these options
26 could be designed to completely offset the impacts of development. The need for mitigation,
27 other than programmatic design features, should be determined by conducting pre-disturbance
28 surveys for the species and its habitat within the area of direct effects.

30 31 **Short-Eared Owl**

32
33 The short-eared owl is considered to be a winter resident within the proposed Escalante
34 Valley SEZ region in open grasslands and shrublands. Approximately 4,963 acres (20 km²) of
35 potentially suitable foraging habitat on the SEZ, 75 acres (0.3 km²) in the road corridor, and
36 83 acres (0.3 km²) in the transmission corridor could be directly affected by construction and
37 operations (Table 13.1.12.1-1). This direct effects area represents about 0.1% of available
38 suitable habitat in the SEZ region. About 99,000 acres (400 km²) of potentially suitable foraging
39 habitat occurs in the area of potential indirect effects; this area represents about 2.5% of the
40 available suitable habitat in the SEZ region (Table 13.1.12.1-1).

41
42 The overall impact on the short-eared owl from construction, operation, and
43 decommissioning of utility-scale solar energy facilities within the Escalante Valley SEZ is
44 considered small because direct effects would only occur on potentially suitable foraging habitat,
45 and the amount of this habitat in the area of direct effects represents less than 1% of potentially
46 suitable habitat in the SEZ region. The implementation of programmatic design features are

1 expected to reduce indirect impacts to negligible levels. Avoidance of direct impacts on all
2 potentially suitable foraging habitat is not a feasible way to mitigate impacts on the short-eared
3 owl because potentially suitable shrubland is widespread throughout the area of direct effects
4 and readily available in other portions of the affected area.
5
6

7 **Western Burrowing Owl**

8

9 The western burrowing owl is considered to be a summer resident within the proposed
10 Escalante Valley SEZ region where it is known to forage in grasslands and shrublands. Within
11 the SEZ region, the species nests in burrows constructed by mammals such as prairie dogs.
12 Approximately 6,185 acres (25 km²) of potentially suitable habitat on the SEZ, 85 acres
13 (0.3 km²) in the road corridor, and 87 acres (0.4 km²) in the transmission corridor could be
14 directly affected by construction and operations (Table 13.1.12.1-1). This direct effects area
15 represents about 0.3% of available suitable habitat in the SEZ region. About 107,000 acres
16 (433 km²) of potentially suitable habitat occurs in the area of potential indirect effects; this area
17 represents about 5.1% of the available suitable habitat in the SEZ region (Table 13.1.12.1-1).
18 Most of this area could serve as foraging and nesting habitat (shrublands). The abundance of
19 burrows suitable for nesting on the SEZ and in the area of indirect effects has not been
20 determined.
21

22 The overall impact on the western burrowing owl from construction, operation, and
23 decommissioning of utility-scale solar energy facilities within the Escalante Valley SEZ is
24 considered small because the amount of potentially suitable habitat in the area of direct effects
25 represents less than 1% of potentially suitable habitat in the SEZ region. The implementation
26 of programmatic design features is expected to be sufficient to reduce indirect impacts on this
27 species to negligible levels.
28

29 Avoidance of all potentially suitable habitats is not feasible to mitigate impacts on
30 the western burrowing owl because potentially suitable shrubland habitats are widespread
31 throughout the area of direct effect and may be readily available in other portions of the SEZ
32 region. However, impacts on the western burrowing owl could be reduced by avoiding or
33 minimizing disturbance to occupied burrows and habitat in the area of direct effects. If avoiding
34 or minimizing disturbance of all occupied habitat are not feasible options, a compensatory
35 mitigation plan could be developed and implemented to mitigate direct effects. Compensation
36 could involve the protection and enhancement of existing occupied or suitable habitats to
37 compensate for habitats lost to development. A comprehensive mitigation strategy that used
38 one or both of these options could be designed to completely offset the impacts of development.
39 The need for mitigation, other than programmatic design features, should be determined by
40 conducting pre-disturbance surveys for the species and its habitat within the area of direct
41 effects.
42
43
44

1 **Fringed Myotis**

2
3 The fringed myotis is considered to be a year-round resident within the proposed
4 Escalante Valley SEZ region where it is known to forage in riparian, shrubland, and forested
5 habitats. Approximately 5,361 acres (22 km²) of potentially suitable foraging habitat on the
6 SEZ, 93 acres (0.4 km²) in the road corridor, and 86 acres (0.3 km²) in the transmission corridor
7 could be directly affected by construction and operations (Table 13.1.12.1-1). This direct effects
8 area represents about 0.1% of available suitable foraging habitat in the SEZ region. About
9 113,000 acres (457 km²) of potentially suitable foraging habitat occurs in the area of potential
10 indirect effects; this area represents about 2.4% of the available suitable foraging habitat in the
11 SEZ region (Table 13.1.12.1-1). On the basis of an evaluation of SWReGAP land cover types,
12 there is no potentially suitable roosting habitat (rocky cliffs and outcrops) in the affected area.
13

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

23
24 **Kit Fox**

25
26 The kit fox is considered to be a year-round resident within the proposed Escalante
27 Valley SEZ region in grassland and shrubland habitats. Approximately 4,920 acres (20 km²)
28 of potentially suitable habitat on the SEZ, 69 acres (0.3 km²) in the road corridor, and 87 acres
29 (0.4 km²) in the transmission corridor could be directly affected by construction and operations
30 (Table 13.1.12.1-1). This direct effects area represents about 0.3% of available suitable habitat
31 in the SEZ region. About 99,000 acres (400 km²) of potentially suitable habitat occurs in the
32 area of potential indirect effects; this area represents about 5.3% of the available suitable habitat
33 in the SEZ region (Table 13.1.12.1-1).
34

35 The overall impact on the kit fox from construction, operation, and decommissioning of
36 utility-scale solar energy facilities within the Escalante Valley SEZ is considered small because
37 the amount of potentially suitable habitat in the area of direct effects represents less than 1% of
38 potentially suitable habitat in the SEZ region.
39

40 The avoidance of all potentially suitable habitats is not feasible to mitigate impacts on
41 the kit fox because potentially suitable shrubland habitats are widespread throughout the area
42 of direct effects. In conjunction with the implementation of programmatic design features,
43 pre-disturbance surveys and avoiding or minimizing disturbance of occupied habitats in the area
44 of direct effects could reduce impacts. If avoidance or minimization is not a feasible option, a
45 translocation and compensatory mitigation plan could be developed and implemented to mitigate
46 direct effects on occupied habitats. Consultation with the appropriate federal and state agencies

1 should be required for the development of any translocation and compensatory mitigation plans.
2 Compensation could involve the protection and enhancement of existing occupied or suitable
3 habitats to compensate for habitats lost to development. A comprehensive mitigation strategy
4 that uses one or both of these options could be designed to completely offset the impacts of
5 development.
6
7

8 **Pygmy Rabbit** 9

10 The pygmy rabbit is considered to be a year-round resident within the proposed
11 Escalante Valley SEZ region in sagebrush habitats. Approximately 683 acres (3 km²) of
12 potentially suitable habitat on the SEZ, 39 acres (0.2 km²) in the road corridor, and 54 acres
13 (0.2 km²) in the transmission corridor could be directly affected by construction and operations
14 (Table 13.1.12.1-1). This direct effects area represents about 0.1% of available suitable habitat in
15 the SEZ region. About 34,000 acres (138 km²) of potentially suitable habitat occurs in the area
16 of potential indirect effects; this area represents about 3.4% of the available suitable habitat in
17 the SEZ region (Table 13.1.12.1-1).
18

19 The overall impact on the pygmy rabbit from construction, operation, and
20 decommissioning of utility-scale solar energy facilities within the Escalante Valley SEZ is
21 considered small because the amount of potentially suitable habitat in the area of direct effects
22 represents less than 1% of potentially suitable habitat in the SEZ region.
23

24 The avoidance of all potentially suitable habitats is not feasible to mitigate impacts on
25 the pygmy rabbit because potentially suitable sagebrush habitats are widespread throughout the
26 area of direct effects. In conjunction with the implementation of programmatic design features,
27 pre-disturbance surveys and avoiding or minimizing disturbance of occupied habitats in the area
28 of direct effects could reduce impacts. If avoidance or minimization is not a feasible option, a
29 translocation and compensatory mitigation plan could be developed and implemented to mitigate
30 direct effects on occupied habitats. Consultation with the appropriate federal and state agencies
31 should be required for the development of any translocation and compensatory mitigation plans.
32 Compensation could involve the protection and enhancement of existing occupied or suitable
33 habitats to compensate for habitats lost to development. A comprehensive mitigation strategy
34 that uses one or both of these options could be designed to completely offset the impacts
35 of development.
36
37

38 **Spotted Bat** 39

40 The spotted bat is considered to be a year-round resident within the proposed
41 Escalante Valley SEZ region where it is known to forage in shrubland and forested habitats.
42 Approximately 4,949 acres (20 km²) of potentially suitable foraging habitat on the SEZ,
43 86 acres (0.3 km²) in the road corridor, and 86 acres (0.3 km²) in the transmission corridor
44 could be directly affected by construction and operations (Table 13.1.12.1-1). This direct effects
45 area represents about 0.1% of available suitable foraging habitat in the SEZ region. About
46 100,000 acres (405 km²) of potentially suitable foraging habitat occurs in the area of potential

1 indirect effects; this area represents about 2.8% of the available suitable foraging habitat in the
2 SEZ region (Table 13.1.12.1-1). On the basis of an evaluation of SWReGAP land cover types,
3 there is no potentially suitable roosting habitat (rocky cliffs and outcrops) in the affected area.
4

5 The overall impact on the spotted bat from construction, operation, and decommissioning
6 of utility-scale solar energy facilities within the Escalante Valley SEZ is considered small
7 because the amount of potentially suitable habitat in the area of direct effects represents less than
8 1% of potentially suitable habitat in the SEZ region. The implementation of programmatic design
9 features is expected to be sufficient to reduce indirect impacts on this species to negligible levels.
10 Avoidance of all potentially suitable foraging habitats is not feasible because potentially suitable
11 habitat is widespread throughout the area of direct effect and readily available in other portions
12 of the SEZ region.
13
14

15 **Townsend's Big-Eared Bat**

16
17 The Townsend's big-eared bat is considered to be a year-round resident within the
18 proposed Escalante Valley SEZ region where it is known to forage in shrubland and forested
19 habitats. Approximately 5,489 acres (22 km²) of potentially suitable foraging habitat on the
20 SEZ, 46 acres (0.2 km²) in the road corridor, and 23 acres (0.1 km²) in the transmission corridor
21 could be directly affected by construction and operations (Table 13.1.12.1-1). This direct effects
22 area represents about 0.2% of available suitable foraging habitat in the SEZ region. About
23 71,500 acres (289 km²) of potentially suitable foraging habitat occurs in the area of potential
24 indirect effects; this area represents about 2.2% of the available suitable foraging habitat in the
25 SEZ region (Table 13.1.12.1-1). On the basis of an evaluation of SWReGAP land cover types,
26 there is no potentially suitable roosting habitat (rocky cliffs and outcrops) in the affected area.
27

28 The overall impact on the Townsend's big-eared bat from construction, operation, and
29 decommissioning of utility-scale solar energy facilities within the Escalante Valley SEZ is
30 considered small because the amount of potentially suitable habitat in the area of direct effects
31 represents less than 1% of potentially suitable habitat in the SEZ region. The implementation
32 of programmatic design features is expected to be sufficient to reduce indirect impacts on this
33 species to negligible levels. Avoidance of all potentially suitable foraging habitats is not feasible
34 because potentially suitable habitat is widespread throughout the area of direct effect and readily
35 available in other portions of the SEZ region.
36
37

38 ***13.1.12.2.4 Impacts on State-Listed Species***

39
40 According to Utah Administrative Rule R657-48, as described in the *Utah Sensitive*
41 *Species List* (UDWR 2010b), there are no species that receive a separate regulatory designation
42 from the UDWR or the State of Utah.
43
44
45

1 **13.1.12.2.5 Impacts on Rare Species**
2

3 There are 16 species with a state status of S1 or S2 in Utah or species of concern by the
4 State of Utah or the USFWS that may occur in the affected area of the Escalante Valley
5 SEZ. Impacts have been previously discussed for all of these species, which are also ESA-listed
6 (Section 13.1.12.2.1), ESA candidates (Section 13.1.12.2.2), or BLM-designated sensitive
7 (Section 13.1.12.2.3).
8
9

10 **13.1.12.3 SEZ-Specific Design Features and Design Feature Effectiveness**
11

12 The implementation of required programmatic design features described in Appendix A
13 would greatly reduce or eliminate the potential for effects of utility-scale solar energy
14 development on special status species. While some SEZ-specific design features are best
15 established when specific project details are being considered, some design features can be
16 identified at this time, including the following:
17

- 18 • Pre-disturbance surveys should be conducted within the SEZ to determine
19 the presence and abundance of all special status species, including those
20 identified in Table 13.1.12.1-1; disturbance to occupied habitats for these
21 species should be avoided or impacts on occupied habitats should be
22 minimized to the extent practicable. If avoiding or minimizing impacts on
23 occupied habitats is not possible, translocation of individuals from areas of
24 direct effect, or compensatory mitigation of direct effects on occupied habitats
25 could reduce impacts. A comprehensive mitigation strategy for special status
26 species that used one or more of these options to offset the impacts of
27 development should be developed in coordination with the appropriate federal
28 and state agencies.
29
- 30 • Avoiding or minimizing disturbance of pinyon-juniper and oak/mahogany
31 woodlands in the area of direct effects could reduce impacts on the Nevada
32 willowherb and nesting habitat of the northern goshawk.
33
- 34 • Consultation with the USFWS and the UDWR should be conducted to address
35 the potential for impacts on the Utah prairie dog a species listed as threatened
36 under the ESA. Consultation would identify an appropriate survey protocol,
37 avoidance measures, and, if appropriate, reasonable and prudent alternatives,
38 reasonable and prudent measures, and terms and conditions for incidental take
39 statements.
40
- 41 • Coordination with the USFWS and the UDWR should be conducted to
42 address the potential for impacts on the greater sage-grouse, a candidate
43 species for listing under the ESA. Coordination would identify an appropriate
44 pre-disturbance survey protocol, avoidance measures, and any potential
45 compensatory mitigation actions.
46

- 1 • Harassment or disturbance of special status species and their habitats in the
2 affected area should be mitigated. This can be accomplished by identifying
3 any additional sensitive areas and implementing necessary protection
4 measures based upon consultation with the USFWS and the UDWR.
5

6 If these SEZ-specific design features are implemented in addition to required
7 programmatic design features, impacts on the special status and rare species would be reduced.
8 Depending on the effectiveness of an overall mitigation strategy, residual impacts on some
9 species could be minor because of the relative abundance of suitable habitats in the SEZ region.
10

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1 **13.1.13 Air Quality and Climate**

2
3
4 **13.1.13.1 Affected Environment**

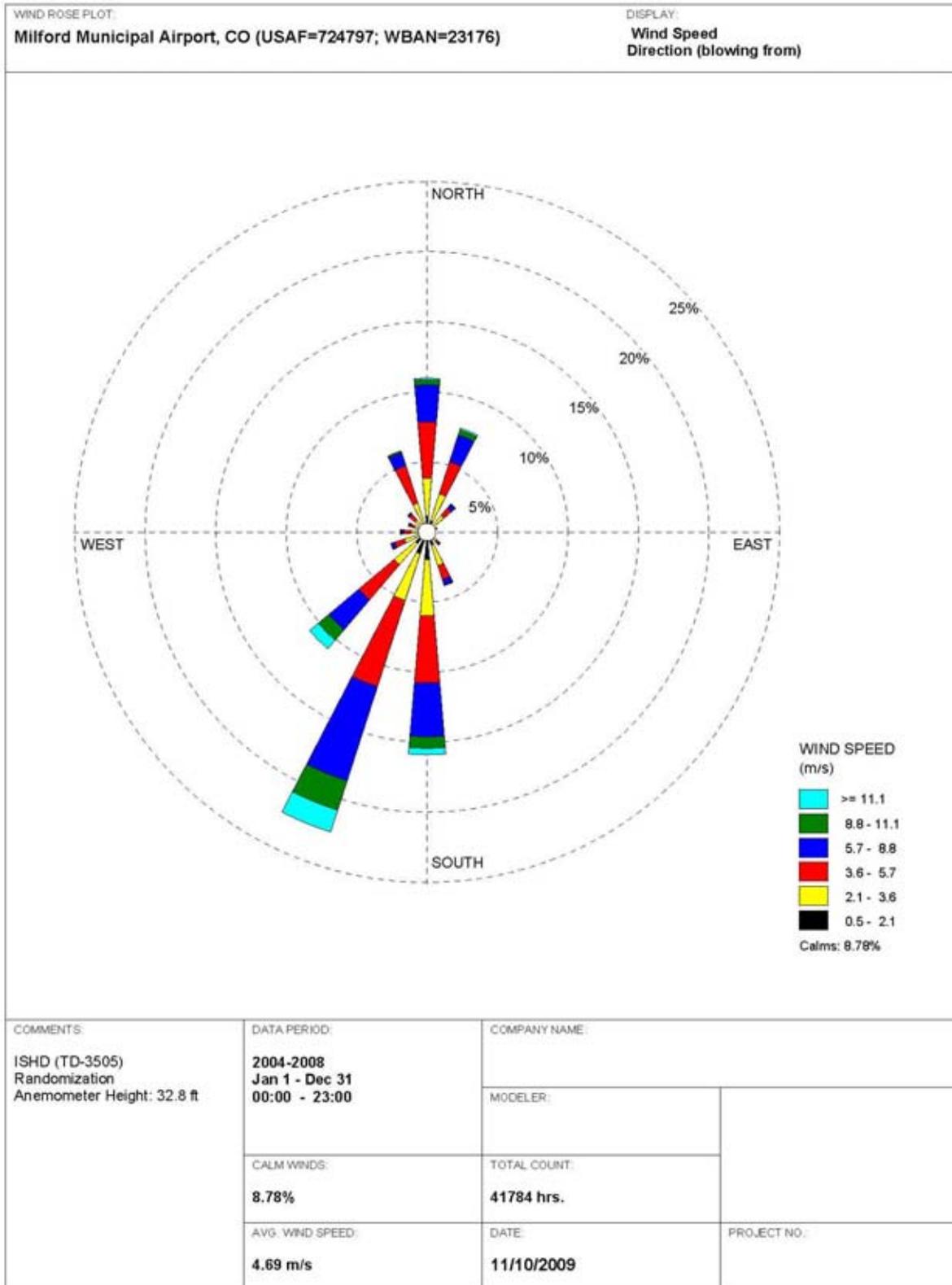
5
6
7 **13.1.13.1.1 Climate**

8
9 The proposed Escalante Valley SEZ is located in southwestern Utah, near the central
10 portion of Iron County. The SEZ is at an elevation of about 5,110 ft (1,558 m) and thus
11 experiences lower air temperatures than lower elevations of comparable latitude. Pacific storms
12 along with prevailing westerly winds lose moisture as they ascend the Cascade and Sierra
13 Nevada Ranges. Therefore, air masses reaching Utah are relatively dry, resulting in light
14 precipitation over the state (NCDC 2009a). Subzero temperatures and prolonged cold spells
15 during the winter months are rare over most parts of the state, because mountain ranges to the
16 east and north block Arctic air masses. Utah experiences relatively strong insolation (solar
17 radiation) during the day and rapid nocturnal cooling because of its relatively thin atmosphere,
18 resulting in wide ranges in daily temperature. In general, the climate around the proposed SEZ is
19 temperate and dry (NCDC 1989). Meteorological data collected at the Milford Municipal Airport
20 and Enterprise Beryl Junction, which are located about 38 mi (61 km) northeast of and about
21 12 mi (19 km) southwest of the Escalante Valley SEZ, respectively, are summarized below.

22
23 A wind rose from the Milford Municipal Airport in Milford⁹ for the 5-year period 2004
24 to 2008 and taken at a level of 33 ft (10 m) is presented in Figure 13.1.13.1-1 (NCDC 2009b).
25 During this period, the annual average wind speed at the airport was about 10.5 mph (4.7 m/s),
26 with a prevailing wind direction from the south–southwest (about 22.4% of the time) and
27 secondarily from the south (about 15.9% of the time), parallel to nearby mountain ranges. About
28 half of the time winds blew from these directions, ranging from south to southwest inclusive.
29 Winds blew predominantly from the south–southwest every month throughout the year, except in
30 March from the north. Wind speeds categorized as calm (less than 1.1 mph [0.5 m/s]) occurred
31 frequently (almost 9% of the time). Average wind speeds were relatively uniform by season with
32 the highest in fall at 11.1 mph (5.0 m/s); lower in spring and winter at 10.4 mph (4.6 m/s); and
33 lowest in summer at 10.1 mph (4.5 m/s).

34
35 For the 1940 to 2008 period, the annual average temperature at Enterprise Beryl Junction
36 was 47.9°F (8.8°C) (WRCC 2009). January was the coldest month, with an average minimum
37 temperature of 12.8°F (–10.7°C), and July was the warmest month, with an average maximum of
38 90.7°F (32.6°C). In summer, daytime maximum temperatures were frequently above 90°F

⁹ Surface wind data from the Milford Municipal Airport were selected as representative of the proposed Escalante Valley SEZ, although the Cedar City Municipal Airport is closer to the Escalante Valley SEZ (about 22 mi [35 km]) than the Milford Municipal Airport (about 38 mi [61 km]). The Escalante Valley SEZ and the Milford Municipal Airport are situated in the valley floor, but the Cedar City Municipal Airport is situated in the foothills of the mountains and surrounded by nearby hills and mountains. The general wind pattern at the Cedar City Municipal Airport is similar to that at the Milford Municipal Airport but more affected by nearby topographic features, with lower wind speeds (6.7 mph [3.0 m/s]) and higher calm winds of almost 25%.



1 WRPLOT View - Lakes Environmental Software

2 **FIGURE 13.1.13.1-1 Wind Rose at 33-ft (10-m) Height at Milford Municipal Airport,**
3 **Milford, Utah, 2004 to 2008 (Source: NCDC 2009b)**

1 (32.2°F) and minimums were in the 40s. On most days of colder months (November through
2 March), the minimum temperatures recorded were below freezing ($\leq 32^{\circ}\text{F}$ [0°C]); subzero
3 temperatures also occurred about 5 and 3 days in January and December, respectively. During
4 the same period, the highest temperature, 104°F (40.0°C), was reached in July 1960, and the
5 lowest, -34°F (-36.7°C), in December 1990. Each year, about 43 days had a maximum
6 temperature of $\geq 90^{\circ}\text{F}$ (32.2°C), while about 204 days had minimum temperatures at or
7 below freezing.

8
9 For the 1940 to 2008 period, annual precipitation at Enterprise Beryl Junction averaged
10 about 10.0 in. (25.4 cm) (WRCC 2009). There is an average of 57 days annually with measurable
11 precipitation (0.01 in. [0.025 cm] or higher). Precipitation is rather evenly distributed by season.
12 During the summer months, low-pressure storm systems in the area are rare, and precipitation
13 during this period occurs as showers and thundershowers in widely varying amounts
14 (NCDC 1989). Snow is usually light and powdery with below-average moisture content, starting
15 as early as September and continuing as late as May. Most of the snow falls from November
16 through March. The annual average snowfall at Enterprise Beryl Junction is about 28.4 in.
17 (72.1 cm) (WRCC 2009).

18
19 Because the area surrounding the proposed SEZ is so far from major water bodies
20 (e.g., about 390 mi [630 km] to the Pacific Ocean) and because surrounding mountain ranges
21 block air masses, severe weather events, such as thunderstorms and tornadoes, are rare.

22
23 Cities situated in the foothills of mountain ranges along I-15 in eastern Iron County
24 occasionally experienced flash floods from summer thunderstorms, some of which caused
25 property and crop damage. Since 1994, 21 floods (mostly flash floods) with peaks in July and
26 August were reported in Iron County (NCDC 2010); these did cause some property and crop
27 damage.

28
29 In Iron County, 12 hail events that caused minor property damage have been reported
30 since 1970. Hail measuring 1.75 in. (4.4 cm) in diameter was reported in 1981. In Iron County,
31 one high-wind event was reported in 1994 (NCDC 2010). Since 1963, 12 thunderstorm wind
32 events up to a maximum wind speed of 75 mph (33 m/s) occurred, mostly during the summer
33 months, but caused minimal damage (NCDC 2010).

34
35 During a fall 2009 site visit, windblown dusts were observed in Iron County. However,
36 no dust storms were reported in Iron County (NCDC 2010). The ground surface of the SEZ is
37 covered predominantly with silt loams, which have relatively moderate dust storm potential.
38 Occasional dust storms can deteriorate air quality and visibility and have adverse respiratory
39 health effects. High winds in combination with dry soil conditions result in blowing dust in Utah
40 (UDEQ 2009), typically during the spring through fall months.

41
42 Complex terrain typically disrupts the mesocyclones associated with tornado-producing
43 thunderstorms, and thus tornadoes in Iron County, which encompasses the proposed Escalante
44 Valley SEZ, occur infrequently. In the period from 1950 to July 2010, a total of four tornadoes
45 (0.1 per year each) were reported in Iron County (NCDC 2010). However, all tornadoes

1 occurring in Iron County were relatively weak (i.e., one was F [uncategorized¹⁰], two were F0,
 2 and one was F1 on the Fujita tornado scale). None of these tornadoes caused deaths, injuries, or
 3 property damage or occurred in the area near the Escalante Valley SEZ.

4
 5
 6 **13.1.13.1.2 Existing Air Emissions**

7
 8 Iron County, which encompasses the proposed Escalante
 9 Valley SEZ, has only a few industrial emission sources, and the
 10 amount of their emissions is relatively low. Mobile source
 11 emissions, primarily from I-15, account for substantial portions
 12 of total NO_x and CO emissions in Iron County. Data for 2002
 13 on annual emissions of criteria pollutants and VOCs in Iron
 14 County are presented in Table 13.1.13.1-1 (WRAP 2009).
 15 Emission data are classified into six source categories: point,
 16 area (including fugitive dust), onroad mobile, nonroad mobile,
 17 biogenic, and fire (e.g., wildfires, prescribed fires, agricultural
 18 fires, structural fires). In Iron County, area sources were the
 19 major contributors to SO₂, PM₁₀, and PM_{2.5}—about 66%,
 20 75%, and 38%, respectively, of total county emissions. Onroad
 21 sources were major contributors to NO_x and CO emissions
 22 (56% and 67%, respectively). Biogenic sources (e.g., naturally
 23 occurring emissions from vegetation, including trees, plants,
 24 and crops) accounted for most of the VOC emissions (about
 25 95%) and were a secondary contributor to CO emissions (about
 26 19%). Nonroad sources were secondary contributors to SO₂ and
 27 NO_x (about 22% and 31%, respectively, of total county
 28 emissions), while point sources were minor sources of criteria
 29 pollutants and VOCs. Fire emissions were secondary
 30 contributors to PM₁₀ and PM_{2.5} emissions (about 14% and
 31 38%, respectively), but their PM_{2.5} contributions were
 32 comparable to primary contributors (area sources) in Iron
 33 County.

34
 35 Information on GHG emissions was not available at
 36 the county level in Utah. In 2005, the state of Utah produced
 37 about 69 MMT of *gross*¹¹ carbon dioxide equivalent (CO₂e)
 38 emissions¹² (Roe et al. 2007). Gross GHG emissions in Utah

TABLE 13.1.13.1-1 Annual Emissions of Criteria Pollutants and VOCs in Iron County, Utah, Encompassing the Proposed Escalante Valley SEZ, 2002^a

Pollutant ^b	Emissions (tons/yr)
SO ₂	592
NO _x	4,791
CO	38,810
VOCs	61,890
PM ₁₀	1,690
PM _{2.5}	539

^a Includes point, area (including fugitive dust), onroad and nonroad mobile, biogenic, and fire emissions.

^b Notation: CO = carbon monoxide; NO_x = nitrogen oxides; PM_{2.5} = particulate matter with a diameter of ≤2.5 μm; PM₁₀ = particulate matter with a diameter of ≤10 μm; SO₂ = sulfur dioxide; and VOCs = volatile organic compounds.

Source: WRAP (2009).

¹⁰ Not categorized by the Fujita tornado scale because damage level was not reported.

¹¹ Excluding GHG emissions removed as a result of forestry and other land uses and excluding GHG emissions associated with exported electricity.

¹² A measure used to compare the emissions from various GHGs on the basis of their global warming potential, defined as the cumulative radiative forcing effects of a gas over a specified time horizon resulting from the emission of a unit mass of gas relative to a reference gas, CO₂. The CO₂e for a gas is derived by multiplying the mass of the gas by the associated global warming potential.

1 increased by about 40% from 1990 to 2005, which was more than twice as fast as the national
2 rate (about 16%). In 2005, electricity production (37.2%) was the primary contributor to gross
3 GHG emission sources in Utah, followed by transportation (24.6%). Fossil fuel use (in the
4 residential, commercial, and nonfossil industrial sectors) accounted for about 17.7% of total state
5 emissions, while fossil fuel production and agriculture accounted for about 6% each. Utah's *net*
6 CO₂e emissions were about 31 MMt, considering carbon sinks from forestry activities and
7 agricultural soils throughout the state. The EPA (2009a) also estimated that in 2005, CO₂
8 emissions from fossil fuel combustion were 66 MMt, which is comparable to the state's estimate.
9 The electric power generation (53%) and transportation (25%) sectors accounted for more than
10 three-fourths of the CO₂ emission total, and the residential, commercial, and industrial (RCI)
11 sectors accounted for the remainder.

14 ***13.1.13.1.3 Air Quality***

15
16 The State of Utah has adopted National Ambient Air Quality Standards (NAAQS) for
17 six criteria pollutants: SO₂, NO₂, CO, O₃, particulate matter (PM₁₀ and PM_{2.5}), and Pb
18 (EPA 2010; Prey 2009). The NAAQS for criteria pollutants are presented in Table 13.1.13.1-2.
19

20 Iron County, which encompasses the proposed Escalante Valley SEZ, is located
21 administratively within the Four Corners Interstate Air Quality Control Region (AQCR)
22 (Title 40, Part 81, Section 121 of the *Code of Federal Regulations* [40 CFR 81.121]), along
23 with southwestern Colorado, northwestern New Mexico, and southern and east central Utah.
24 Currently, Iron County is designated as being in unclassifiable/attainment for all criteria
25 pollutants (40 CFR 81.345).
26

27 Because of low population density, little industrial activity (except for agricultural
28 and hog production activities), and low traffic volumes (except on I-15) in Iron County,
29 anthropogenic emissions are small, and thus ambient air quality is relatively good. The primary
30 air quality concern for the lower elevations in Iron County (e.g., around the Escalante Valley
31 SEZ) is soil erosion (NRCS 2005). High winds, coupled with soils that are susceptible to wind
32 erosion, cause dust storms that can damage human health, livestock, and crops and degrade the
33 environmental stability of the area. Many farming and ranching operations have to deepen wells
34 and increase pump capacities to obtain access to available well waters. Larger engines and
35 motors to drive the higher capacity pumps have increased energy consumption and associated
36 air emissions.
37

38 No measurement data are available for criteria pollutants in Iron County (EPA 2009b).
39 Background concentrations of SO₂, NO₂, CO, PM₁₀, and PM_{2.5} representative of Iron County
40 have been developed by the Utah Division of Air Quality for air-quality-modeling purposes and
41 are presented in Table 13.1.13.1-2 (Prey 2009). Ambient air quality in Iron County is relatively
42 good, considering that background levels representative of Iron County were lower than their
43 respective standards (up to 55%), except O₃. The background O₃ concentration presented in the
44 table, taken at Zion National Park (NP) from 2004 to 2008, exceeds the NAAQS. Albeit in a
45 remote area, both local and distant point and mobile emission sources, including power plants,
46 refineries, and lime kilns, would affect air quality at Zion NP.

TABLE 13.1.13.1-2 NAAQS and Background Concentration Levels Representative of the Proposed Escalante Valley SEZ

Pollutant ^a	Averaging Time	NAAQS ^b	Background Concentration Level ^{c,d}	
			Concentration	Measurement Location, Year
SO ₂	1-hour	0.075 ppm ^e	NA ^f	NA
	3-hour	0.5 ppm	0.008 ppm (1.6%)	Estimate
	24-hour	0.14 ppm	0.004 ppm (2.9%)	Estimate
	Annual	0.03 ppm	0.002 ppm (6.7%)	Estimate
NO ₂	1-hour	0.100 ppm ^g	NA	NA
	Annual	0.053 ppm	0.005 ppm (9.4%)	Estimate
CO	1-hour	35 ppm	1 ppm (2.9%)	Estimate
	8-hour	9 ppm	1 ppm (11%)	Estimate
O ₃	1-hour	0.12 ppm ^h	NA	NA
	8-hour	0.075 ppm	0.091 ppm (121%)	Zion National Park, Washington County, 2005; highest of fourth-highest daily maximum during 2004 to 2008
PM ₁₀	24-hour	150 µg/m ³	83 µg/m ³ (55%)	Graymont Lime Kiln, about 17 mi north-northeast of Black Rock in Millard County
	Annual	50 µg/m ³ ⁱ	21.8 µg/m ³ (44%)	
PM _{2.5}	24-hour	35 µg/m ³	18 µg/m ³ (51%)	St. George, Washington County, 2005
	Annual	15.0 µg/m ³	8 µg/m ³ (53%)	Estimate, 2006
Pb	Calendar quarter	1.5 µg/m ³	0.08 µg/m ³ (5.3%)	Magna, Salt Lake County, 2005
	Rolling 3-month	0.15 µg/m ³ ^j	NA	NA

^a Notation: CO = carbon monoxide; NO₂ = nitrogen dioxide; O₃ = ozone; Pb = lead; PM_{2.5} = particulate matter with a diameter of ≤ 2.5 µm; PM₁₀ = particulate matter with a diameter of ≤ 10 µm; and SO₂ = sulfur dioxide.

^b The State of Utah has adopted NAAQS for all criteria pollutants.

^c Background concentrations for SO₂, NO₂, CO, PM₁₀, and PM_{2.5} are developed for the Iron County by Utah Division of Air Quality for NAAQS and/or PSD modeling purposes.

^d Values in parentheses are background concentration levels as a percentage of NAAQS. Calculation of 1-hour SO₂, 1-hour NO₂, and rolling 3-month Pb to NAAQS was not made because no measurement data based on new NAAQS are available. Although not representative of Iron County, the highest monitored value of Pb in Utah is presented to show that Pb is not an issue in the state of Utah.

^e Effective August 23, 2010.

^f NA = not applicable or not available.

^g Effective April 12, 2010.

Footnotes continued on next page.

TABLE 13.1.13.1-2 (Cont.)

- ^h The EPA revoked the 1-hour O₃ standard in all areas, although some areas have continuing obligations under that standard (“anti-backsliding”).
- ⁱ Effective December 18, 2006, the EPA revoked the annual PM₁₀ standard of 50 µg/m³, but annual PM₁₀ concentrations are presented for comparison purposes.
- ^j Effective January 12, 2009.

Sources: EPA (2009b, 2010); Prey (2009).

1
2
3 The Prevention of Significant Deterioration (PSD) regulations (see 40 CFR 52.21),
4 which are designed to limit the growth of air pollution in clean areas, apply to a major new
5 source or modification of an existing major source within an attainment or unclassified area
6 (see Section 4.11.2.3). As a matter of policy, the EPA recommends that the permitting authority
7 notify the Federal Land Managers when a proposed PSD source would locate within 62 mi
8 (100 km) of a sensitive Class I area. There are several Class I areas around the proposed
9 Escalante Valley SEZ, only one of which is situated within 62 mi (100 km), Zion NP
10 (40 CFR 81.430), about 30 mi (48 km) south–southeast of the SEZ. This Class I area is not
11 located directly downwind of prevailing winds at the SEZ (Figure 13.1.13.1-1). The next
12 nearest Class I areas are located beyond 62 mi (100 km): Bryce Canyon NP, about 66 mi
13 (106 km) east–southeast of the Escalante Valley SEZ; Grand Canyon NP in Arizona, 105 mi
14 (169 km) south; and Capital Reef NP, 112 mi (180 km) east.

15
16
17 **13.1.13.2 Impacts**
18

19 Potential impacts on ambient air quality associated with a solar project would be of
20 most concern during the construction phase. Impacts on ambient air quality from fugitive dust
21 emissions resulting from soil disturbances are anticipated, but they would be of short duration.
22 During the operations phase, only a few sources with generally low-level emissions would exist
23 for any of the four types of solar technologies evaluated. A solar facility would either not burn
24 fossil fuels or burn only small amounts during operation. (For facilities using heat transfer fluids
25 [HTFs], fuel could be used to maintain the temperature of the HTFs for more efficient daily
26 start-up.) Conversely, solar facilities would displace air emissions that would otherwise be
27 released from fossil fuel–fired power plants.
28

29 Air quality impacts shared by all solar technologies are discussed in detail in
30 Section 5.11.1, and technology-specific impacts are discussed in Section 5.11.2. Impacts
31 specific to the proposed Escalante Valley SEZ are presented in the following sections. Any such
32 impacts would be minimized through the implementation of required programmatic design
33 features described in Appendix A, Section A.2.2, and through any additional mitigation applied.
34 Section 13.1.13.3 below identifies SEZ-specific design features of particular relevance to the
35 Escalante Valley SEZ.
36
37

1 **13.1.13.2.1 Construction**

2
3 The Escalante Valley SEZ has a relatively flat terrain; thus only a minimum number of
4 site preparation activities, perhaps with no large-scale earthmoving operations, would be
5 required. However, fugitive dust emissions from soil disturbances during the entire construction
6 phase would be a major concern because of the large areas that would be disturbed in a region
7 that experiences windblown dust problems. Fugitive dusts, which are released near ground level,
8 typically have more localized impacts than similar emissions from an elevated stack, which has
9 additional plume rise induced by buoyancy and momentum effects.

10
11
12 **Methods and Assumptions**

13
14 Air quality modeling for PM₁₀ and PM_{2.5} emissions associated with construction
15 activities was performed using the EPA-recommended AERMOD model (EPA 2009c). Details
16 for emissions estimation, the description of AERMOD, input data processing procedures, and
17 modeling assumption are described in Section M.13 of Appendix M. Estimated air
18 concentrations were compared with the applicable NAAQS levels at the site boundaries and
19 nearby communities and with Prevention of Significant Deterioration (PSD) increment levels at
20 nearby Class I areas.^{13,14} For the Escalante Valley SEZ, the modeling was conducted based on
21 the following assumptions and input:

- 22
- 23 • Emissions were uniformly distributed over the 3,000 acres (12.1 km²) and in
24 the western portion of the SEZ, close to the nearest residence and nearby
25 communities;
 - 26
 - 27 • Surface hourly meteorological data came from the Milford Municipal Airport,
28 and upper air sounding data came from Salt Lake City for the 2004 to 2008
29 period;
 - 30
 - 31 • A receptor grid was regularly spaced over a modeling domain of 62 mi
32 × 62 mi (100 km × 100 km) centered on the proposed SEZ; and
 - 33
 - 34 • There were additional discrete receptors at the SEZ boundaries and at the
35 nearest Class I area—Zion NP—about 30 mi (48 km) south-southeast of the
36 SEZ.
- 37

¹³ To provide a quantitative assessment, the modeled air impacts of construction were compared to the NAAQS levels and the PSD Class I increment levels. Although the Clean Air Act exempts construction activities from PSD requirements, a comparison with the Class I increment levels was used to quantify potential impacts. Only monitored data can be used to determine the attainment status. Modeled data are used to assess potential problems and as a consideration in the permitting process.

¹⁴ In Utah, construction lasting less than 180 days might be considered temporary and not require modeling (Maung 2009). For a longer development time, modeling would be required if PM₁₀ emissions exceeded 5 tons/yr. However, for a staged development in which different areas were being developed at different times, the decision to require modeling would depend upon the details of the development plan. In all situations, the state must be informed of development plans and must be presented with a written fugitive dust control plan.

1 **Results**

2

3 The modeling results for both PM₁₀ and PM_{2.5} concentration increments and total

4 concentrations (modeled plus background concentrations) that would result from construction-

5 related fugitive emissions are summarized in Table 13.1.13.2-1. Maximum 24-hour PM₁₀

6 concentration increment modeled to occur at the site boundaries would be an estimated

7 622 µg/m³, which far exceeds the relevant standard level of 150 µg/m³. The total 24-hour PM₁₀

8 concentration (increment plus background) of 705 µg/m³ would further exceed this standard

9 level at the SEZ boundary. However, high PM₁₀ concentrations would be limited to the

10 immediate area surrounding the SEZ boundary and would decrease quickly with distance.

11 Predicted maximum 24-hour PM₁₀ concentration increments would be about 114 µg/m³ at the

12 nearest residence (about 1.1 mi [1.8 km] northwest of the SEZ), about 85 µg/m³ at Lund, about

13 10 µg/m³ at Newcastle, about 6 µg/m³ at Beryl, and less than 5 µg/m³ at more distant

14 communities. Annual modeled PM₁₀ concentration increment and total concentration at the

15 SEZ boundary are 113 µg/m³ and 135 µg/m³, respectively. The total concentration is higher than

16 the standard level of 50 µg/m³, which was revoked by EPA in 2006. Annual PM₁₀ increments

17 would be much lower at the mentioned towns, about 7 µg/m³ at the nearest residence, about

18 4.5 µg/m³ at Lund, and less than 0.5 µg/m³ at other communities. Total 24-hour PM_{2.5}

19 concentrations would be about 60 µg/m³ at the SEZ boundary, which is higher than the standard

20

21

TABLE 13.1.13.2-1 Maximum Air Quality Impacts from Emissions Associated with Construction Activities for the Proposed Escalante Valley SEZ

Pollutant ^a	Averaging Time	Rank ^b	Concentration (µg/m ³)				Percentage of NAAQS	
			Maximum Increment ^b	Background ^c	Total	NAAQS	Increment	Total
PM ₁₀	24 hour	H6H	622	83	705	150	414	470
	Annual ^d	NA ^e	113	21.8	135	50	226	269
PM _{2.5}	24 hour	H8H	42.4	18	60.4	35	121	172
	Annual	NA ^e	11.3	8	19.3	15.0	75	129

^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 See Table 13.1.13.1-2 (Source: Prey [2009]).

^d Effective December 18, 2006, the EPA revoked the annual PM₁₀ standard of 50 µg/m³, but annual PM₁₀ concentrations are presented for comparison purposes.

^e NA = not applicable.

1 level of 35 $\mu\text{g}/\text{m}^3$; modeled concentrations are more than twice the background concentrations in
2 this total. The total annual average $\text{PM}_{2.5}$ concentration would be 19.3 $\mu\text{g}/\text{m}^3$, which is above the
3 standard level of 15.0 $\mu\text{g}/\text{m}^3$. At the nearest residence, predicted maximum 24-hour and annual
4 $\text{PM}_{2.5}$ concentration increments would be about 5.4 and 0.7 $\mu\text{g}/\text{m}^3$, respectively.
5

6 Predicted 24-hour and annual PM_{10} concentration increments at the nearest Class I Area,
7 Zion NP, would be about 5.3 and 0.1 $\mu\text{g}/\text{m}^3$, or 67% and 2.6% of the allowable PSD increments
8 for Class I area, respectively.
9

10 In conclusion, predicted 24-hour and annual PM_{10} and $\text{PM}_{2.5}$ concentration levels could
11 exceed the standard levels at the SEZ boundaries and in the immediate surrounding areas during
12 the construction of solar facilities. To reduce potential impacts on ambient air quality and in
13 compliance with programmatic design features, aggressive dust control measures would be used.
14 Potential air quality impacts on nearby residences and cities would be lower. Modeling indicates
15 that emissions from construction activities are not anticipated to exceed Class I PSD PM_{10}
16 increments at the nearest federal Class I area (Zion NP). Construction activities are not subject
17 to the PSD program, and the comparison provides only a screen to gauge the size of the impact.
18 Accordingly, it is anticipated that impacts of construction activities on ambient air quality
19 would be moderate and temporary.
20

21 Construction emissions from the engine exhaust from heavy equipment and vehicles
22 could cause impacts on air quality related values (AQRVs) (e.g., visibility and acid deposition)
23 at the nearest federal Class I area, Zion NP, which is not located directly downwind of
24 prevailing winds. SO_x emissions from engine exhaust would be very low, because programmatic
25 design features would require that ultra-low-sulfur fuel with a sulfur content of 15 ppm be used.
26 NO_x emissions from engine exhaust would be primary contributors to potential impacts on
27 AQRVs. Construction-related emissions are temporary in nature and thus would cause some
28 unavoidable but short-term impacts.
29

30 Transmission lines within a designated ROW would be constructed to connect to the
31 nearest regional grid. A regional 138-kV transmission line is located about 3 mi (5 km) south
32 of the Escalante Valley SEZ; thus construction of a transmission line over this relatively short
33 distance would be needed if that line were used to connect to the regional grid. Also, it is likely
34 that the 138-kV line would need to be upgraded to handle the output of a full-size solar project.
35 Activities would result in fugitive dust emissions from soil disturbance and engine exhaust
36 emissions from heavy equipment and vehicles as at other construction sites. Because of the short
37 distance of 3 mi (5 km) to the regional grid, transmission line construction from the Escalante
38 Valley SEZ could be performed in a short time period (a few months, at most). The construction
39 site along the transmission line ROW would move continuously; thus no particular area would
40 be exposed to air emissions for a prolonged period, and potential air quality impacts on nearby
41 residences, if any, would be minor and temporary in nature.
42
43
44

1 **13.1.13.2.2 Operations**
 2

3 Emission sources associated with the operation of a solar facility would include auxiliary
 4 boilers; vehicle (commuter, visitor, support, and delivery) traffic; maintenance (e.g., mirror
 5 cleaning and repair and replacement of damaged mirrors); and drift from cooling towers for the
 6 parabolic trough or power tower technology if wet cooling were implemented (drift comprises
 7 low-level PM emissions).
 8

9 The type of emission sources caused by and offset by operation of a solar facility are
 10 discussed in Section M.13.4 of Appendix M.
 11

12 Estimates of potential air emissions displaced by the solar project development at the
 13 Escalante Valley SEZ are presented in Table 13.1.13.2-2. Total power generation capacity
 14 ranging from 588 to 1,058 MW is estimated for the Escalante Valley SEZ for various solar
 15
 16

TABLE 13.1.13.2-2 Annual Emissions from Combustion-Related Power Generation Displaced by Full Solar Development of the Proposed Escalante Valley SEZ

Area Size (acres)	Capacity (MW) ^a	Power Generation (GWh/yr) ^b	Emission Rates (tons/yr; 10 ³ tons/yr for CO ₂) ^c			
			SO ₂	NO _x	Hg	CO ₂
6,614	588–1,058	1,030–1,854	1,025–1,845	1,960–3,528	0.004–0.007	1,111–2,000
Percentage of total emissions from electric power systems in Utah ^d			2.8–5.0%	2.8–5.0%	2.8–5.0%	2.8–5.0%
Percentage of total emissions from all source categories in Utah ^e			1.9–3.4%	0.80–1.5%	NA ^f	1.5–2.8%
Percentage of total emissions from electric power systems in the six-state study area ^d			0.41–0.74%	0.53–0.95%	0.14–0.25%	0.42–0.76%
Percentage of total emissions from all source categories in the six-state study area ^e			0.22–0.39%	0.07–0.13%	NA	0.13–0.24%

^a It is assumed that the SEZ would eventually have development on 80% of the lands and that 5 acres (0.020 km²) per MW (for parabolic trough technology) to 9 acres (0.04 km²) per MW (power tower, dish engine, and PV technologies) of land would be required.

^b A capacity factor of 20% is assumed.

^c Composite combustion-related emission factors for SO₂, NO_x, Hg, and CO₂ of 1.99, 3.81, 7.8 × 10⁻⁶, and 2,158 lb/MWh, respectively, were used for the state of Utah.

^d Emission data for all air pollutants are for 2005.

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

^f NA = not estimated.

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

1 technologies (see Section 13.1.1.2). The estimated amount of emissions avoided for the solar
2 technologies evaluated depends only on the megawatts of conventional fossil fuel-generated
3 power displaced, because a composite emission factor per megawatt-hour of power by
4 conventional technologies is assumed (EPA 2009d). If the Escalante Valley SEZ were fully
5 developed, it is expected that emissions avoided would be substantial. Development of solar
6 power in the SEZ would result in avoided air emissions ranging from 2.8% to 5.0% of total
7 emissions of SO₂, NO_x, Hg, and CO₂ from electric power systems in the state of Utah
8 (EPA 2009d). Avoided emissions would be up to 1.0% of total emissions from electric power
9 systems in the six-state study area. When compared with all source categories, power production
10 from the same solar facilities would displace up to 3.4% of SO₂, 1.5% of NO_x, and 2.8% of CO₂
11 emissions in the state of Utah (EPA 2009a; WRAP 2009). These emissions would be up to 0.4%
12 of total emissions from all source categories in the six-state study area. Power generation from
13 fossil fuel-fired power plants accounts for about 97.5% of the total electric power generation in
14 Utah, most of which is from coal combustion (more than 94%). Thus, solar facilities to be built
15 in the Escalante Valley SEZ could displace relatively more fossil fuel emissions than those built
16 in other states that rely less on fossil fuel-generated power.

17
18 As discussed in Section 5.11.1.5, the operation of associated transmission lines would
19 generate some air pollutants from activities such as periodic site inspections and maintenance.
20 However, these activities would occur infrequently, and the amount of emissions would be small.
21 In addition, transmission lines could produce minute amounts of O₃ and its precursor NO_x
22 associated with corona discharge (i.e., the breakdown of air near high-voltage conductors), which
23 is most noticeable for higher voltage lines during rain or very humid conditions. Since the
24 proposed SEZ in Utah is located in an arid desert environment, these emissions would be small,
25 and potential impacts on ambient air quality associated with transmission lines would be
26 negligible, considering the infrequent occurrences and small amount of emissions from
27 corona discharges.

30 ***13.1.13.2.3 Decommissioning/Reclamation***

31
32 As discussed in Section 5.11.1.4, decommissioning/reclamation activities are similar to
33 construction activities but are on a more limited scale and of shorter duration. Potential impacts
34 on ambient air quality would be correspondingly less than those from construction activities.
35 Decommissioning activities would last for a short period, and their potential impacts would be
36 moderate and temporary. The same mitigation measures adopted during the construction phase
37 also would be implemented during the decommissioning phase (Section 5.11.3).

40 **13.1.13.3 SEZ-Specific Design Features and Design Feature Effectiveness**

41
42 No SEZ-specific design features are required. Limiting dust generation during
43 construction and operations at the proposed Escalante Valley SEZ (such as increased watering
44 frequency or road paving or treatment) is a required design feature under BLM's Solar Energy
45 Program. These extensive fugitive dust control measures would keep off-site PM levels as low
46 as possible during construction.

1 **13.1.14 Visual Resources**

2
3
4 **13.1.14.1 Affected Environment**

5
6 The proposed Escalante Valley SEZ in Utah is located within the Basin and Range
7 ecoregion (Woods et al. 2001). Regional topography is characterized by linear, generally north
8 and south trending, semiarid desert valleys at approximately 5,000-ft (1,524-m) elevation and
9 intermittent mountain ranges up to approximately 10,000 ft (3,048 m) in elevation. No large
10 water bodies or large urban areas are located near the SEZ, and few major roads cross the area.
11 The region is sparsely inhabited, remote, and rural in character. As shown in Figure 13.1.14.1-1,
12 the proposed Escalante Valley SEZ (6,614 acres [27 km²]) is located in the south-central portion
13 of the Escalante Desert, a large, southwest–northeast trending valley. The site is approximately
14 5 mi (8 km) southeast of the Wah Wah Mountains and 7 mi (11 km) north of the Antelope
15 Range. Within the SEZ, elevation ranges from about 5,093 ft (1,552 m) along the central
16 northern boundary to 5,184 ft (1,580 m) in the southeast corner of the western portion of
17 the SEZ.

18
19 The SEZ is within a flat treeless plain, with the strong horizon line being the dominant
20 visual feature. Vegetation is primarily low shrubs (generally less than 3 ft [0.9 m] high, but in
21 some parts of the SEZ generally less than 1 ft [0.3 m] high), with some areas of bare, generally
22 tan soil and gravel. An area of low dunes is located in the far southwestern portion of the SEZ,
23 with slightly more relief and large expanses of sand, and with sparse shrubs and grasses on low
24 ridges. During a September 2009 site visit, the vegetation within the SEZ presented a range of
25 greens, light browns, blue-grays, and gray bare wood, with banding and other variation sufficient
26 to add slight visual interest. Bands or patches of light tan bare soil are interspersed with the
27 vegetation in some areas. Some or all of the vegetation might be snow-covered in winter, which
28 might significantly affect the visual qualities of the area by changing the color contrasts
29 associated with the vegetation. This, in turn, could change the contrasts associated with the
30 introduction of solar facilities into the landscape. No permanent water features are present
31 within the SEZ. This landscape type is common within the region. Panoramic views of the
32 SEZ are shown in Figures 13.1.14.1-2, 13.1.14.1-3, and 13.1.14.1-4.

33
34 No paved roads pass through or near the SEZ, but a number of unpaved roads cross
35 the SEZ. No electric transmission lines are located within the SEZ. Other than normally dry
36 livestock ponds, cattle trails, and wire fences, there is little evidence of cultural modifications
37 that affect the scenic quality of the SEZ. In general, the SEZ is natural appearing.

38
39 Off-site views include distant mountains to the north, east, and west. The Shauntie Hills,
40 approximately 4 mi (6.4 km) northwest of the SEZ, add somewhat to the scenic quality of views
41 from the SEZ. However, to the east and west, the other mountains are at a sufficient distance
42 that they do not substantially add to the scenic quality of the SEZ. Table Butte is located about
43 0.5 mi (0.8 km) from the southeast corner of the southernmost portion of the SEZ. Table Butte
44 dominates views in that direction from the southern portion of the SEZ, adding significantly to
45 the scenic quality of nearby portions of the SEZ. In addition, the southeastern portion of the SEZ
46

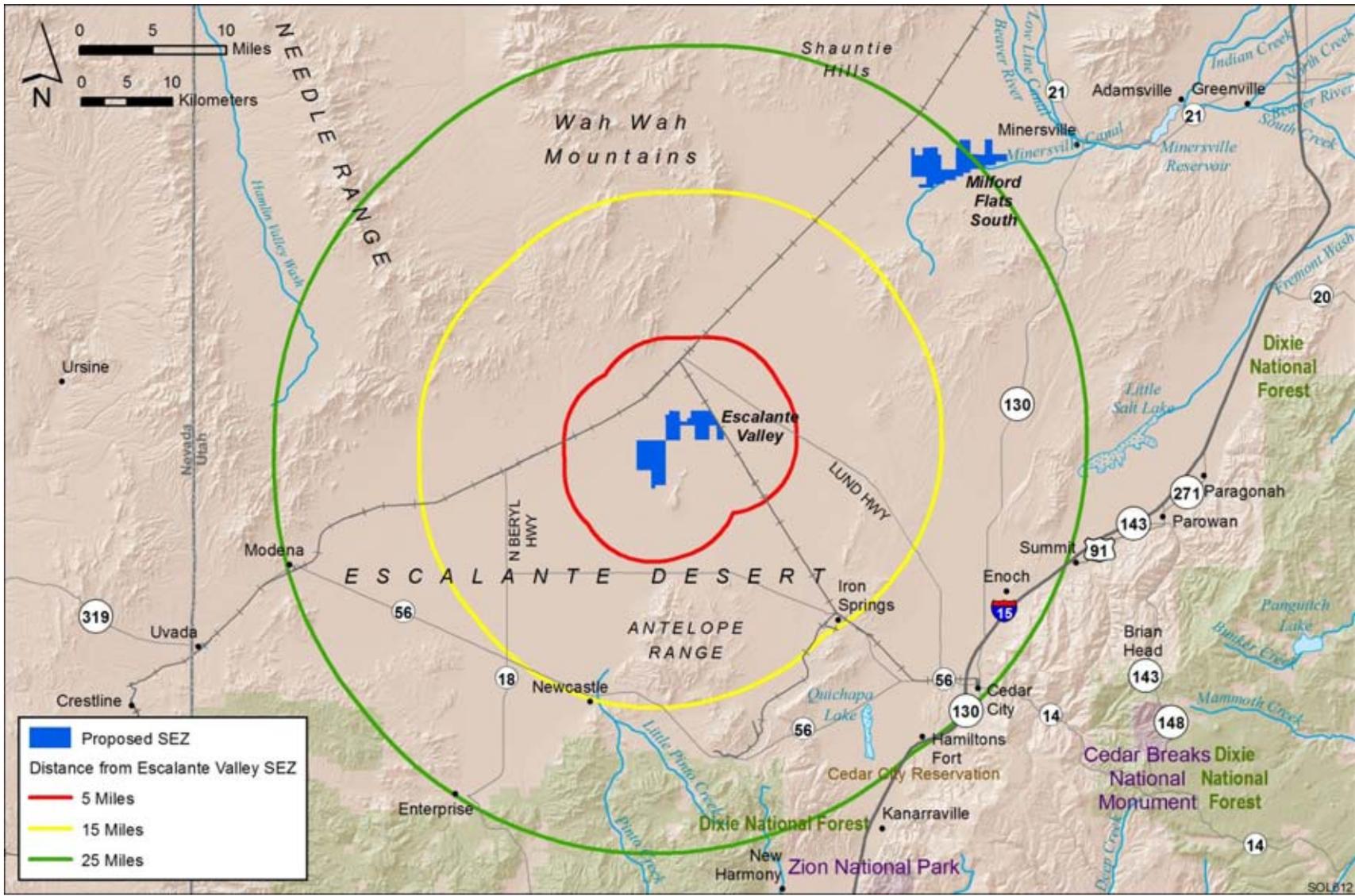


FIGURE 13.1.14.1-1 Proposed Escalante Valley SEZ and Surrounding Lands

1
2
3

1



2 **FIGURE 13.1.14.1-2 Approximately 180° Panoramic View of the Proposed Escalante Valley SEZ, Including Table Butte at Far Left**
3 **(southwest) and Black Mountains at Right (northeast)**

4

5

6



7 **FIGURE 13.1.14.1-3 Approximately 90° Panoramic View of the Proposed Escalante Valley SEZ, Looking South from Central Portion of**
8 **the Proposed SEZ, with Table Butte at Center**

9

10

11



12 **FIGURE 13.1.14.1-4 Approximately 120° Panoramic View of the Proposed Escalante Valley SEZ, North from Southern Boundary of the**
13 **Proposed SEZ**

1 also has greater visual interest because of the relief and color variety from the dune landscape.
2 As a result, the far southeastern portion of the SEZ has the highest relative scenic value within
3 the SEZ.
4

5 Few off-site cultural disturbances are visible from the SEZ; however, the Union Pacific
6 (UP) Railroad is visible about 2 mi (3.2 km) northwest of the SEZ, and a spur from that line
7 passes just northeast of the far northeastern corner of the SEZ on a slightly raised embankment,
8 making it visible from nearby locations. Transmission lines and a few low structures are visible
9 in the far distance from the eastern portion of the SEZ. The nearest transmission line is 3 mi
10 (4.8 km) away.
11

12 Access to the Escalante Valley SEZ is on dirt roads, from Lund Highway northeast of the
13 SEZ, or Beryl Milford Road northwest of the SEZ. The nearest major road is State Route 56,
14 located about 15 mi (24 km) south of the SEZ.
15

16 Current land uses within the SEZ include grazing, general outdoor recreation,
17 backcountry and OHV driving, and hunting for both small and big game. The land is used
18 primarily by local residents, but at low usage levels. Because the SEZ location is remote with
19 few people living nearby, few visitors, and poor road access, the number of viewers is
20 relatively low.
21

22 The BLM conducted a visual resource inventory (VRI) for the SEZ and surrounding
23 lands in 2009 to 2010 (BLM 2010a). The VRI evaluates BLM-administered lands based on
24 *scenic quality*; *sensitivity level*, in terms of public concern for preservation of scenic values in
25 the evaluated lands; and *distance* from travel routes or key observation points. Based on these
26 three factors, BLM-administered lands are placed into one of four Visual Resource Inventory
27 Classes, which represent the relative value of the visual resources. Class I and II are the most
28 valued; Class III represents a moderate value; and Class IV represents the least value. Class I is
29 reserved for specially designated areas, such as national wildernesses and other congressionally
30 and administratively designated areas where decisions have been made to preserve a natural
31 landscape. Class II is the highest rating for lands without special designation. More information
32 about VRI methodology is available in Section 5.7 and in *Visual Resource Inventory*, BLM
33 Manual Handbook 8410-1 (BLM 1986a).
34

35 The VRI values for the SEZ and most of its immediate surroundings are VRI Class IV,
36 indicating low relative visual values. A very small portion of the SEZ and the area immediately
37 east of the southernmost section of the SEZ, which includes Table Butte, is VRI Class III,
38 indicating moderate relative visual values. The Table Butte VRI Class III determination was
39 due primarily to its prominence as a local landmark, and its interesting form.
40

41 The inventory indicates generally low scenic quality for the SEZ and its immediate
42 surroundings, excluding Table Butte, based primarily on the lack of topographic relief and water
43 features, the presence of cultural disturbances, and the relative commonness of the landscape
44 type within the region. The SEZ also received relatively low scores for variety in vegetation
45 types and color. A positive visual attribute noted in the inventory was the attractive off-site

1 views; however, this positive attribute was insufficient to raise the scenic quality to the
2 “moderate” level. The VRI noted relatively low levels of use and public interest. middleground
3

4 Lands within the 25-mi (40-km), 650-ft (198-m) viewshed of the SEZ contain
5 38,155 acres (154.41 km²) of VRI Class II areas, primarily east and southeast of the SEZ in the
6 Antelope Range and Three Peaks areas in lands near the Old Spanish National Historic Trail, but
7 also north and northwest of the SEZ; 58,988 acres (237.03 km²) of Class III areas, primarily
8 south and east of the SEZ in lands near the Old Spanish National Historic Trail, but also west of
9 the SEZ; and 682,898 acres (2763.59 km²) of VRI Class IV areas, concentrated primarily in the
10 Escalante Desert and nearby mountain ranges north of the SEZ. The VRI map for the SEZ and
11 surrounding lands is shown in Figure 13.1.14.1-5.
12

13 The Cedar Beaver Garfield Antimony Final Resource Management Plan/Final
14 Environmental Impact Statement (BLM 1984b) indicates that the entire SEZ is managed as
15 visual resource management (VRM) Class IV, which permits major modification of the existing
16 character of the landscape. The VRM map for the Escalante Valley SEZ and surrounding lands is
17 shown in Figure 13.1.14.1-6. More information about the BLM VRM program is available in
18 Section 5.7 and in *Visual Resource Management*, BLM Manual Handbook 8400 (BLM 1984a).
19
20

21 **13.1.14.2 Impacts** 22

23 The potential for impacts from utility-scale solar energy development on visual resources
24 within the proposed Escalante Valley SEZ and surrounding lands, as well as the impacts of
25 related developments (e.g., access roads and transmission lines) outside of the SEZ, is presented
26 in this section, as are potential SEZ-specific design features.
27

28 Site-specific impact assessment is needed to systematically and thoroughly assess visual
29 impact levels for a particular project. Without precise information about the location of a project,
30 a relatively complete and accurate description of its major components, and their layout, it is not
31 possible to assess precisely the visual impacts associated with the facility. However, if the
32 general nature and location of a facility are known, a more generalized assessment of potential
33 visual impacts can be made by describing the range of expected visual changes and discussing
34 contrasts typically associated with these changes. In addition, a general analysis can identify
35 sensitive resources that may be at risk if a future project is sited in a particular area. Detailed
36 information about the methodology employed for the visual impact assessment used in this PEIS,
37 including assumptions and limitations, is presented in Appendix M.
38
39

40 *Potential Glint and Glare Impacts.* Similarly, the nature and magnitude of potential glint-
41 and glare-related visual impacts for a given solar facility is highly dependent on viewer position,
42 sun angle, the nature of the reflective surface and its orientation relative to the sun and the
43 viewer, atmospheric conditions, and other variables. The determination of potential impacts from
44 glint and glare from solar facilities within a given proposed SEZ would require precise
45 knowledge of these variables, and is not possible given the scope of the PEIS. Therefore, the
46 following analysis does not describe or suggest potential contrast levels arising from glint and

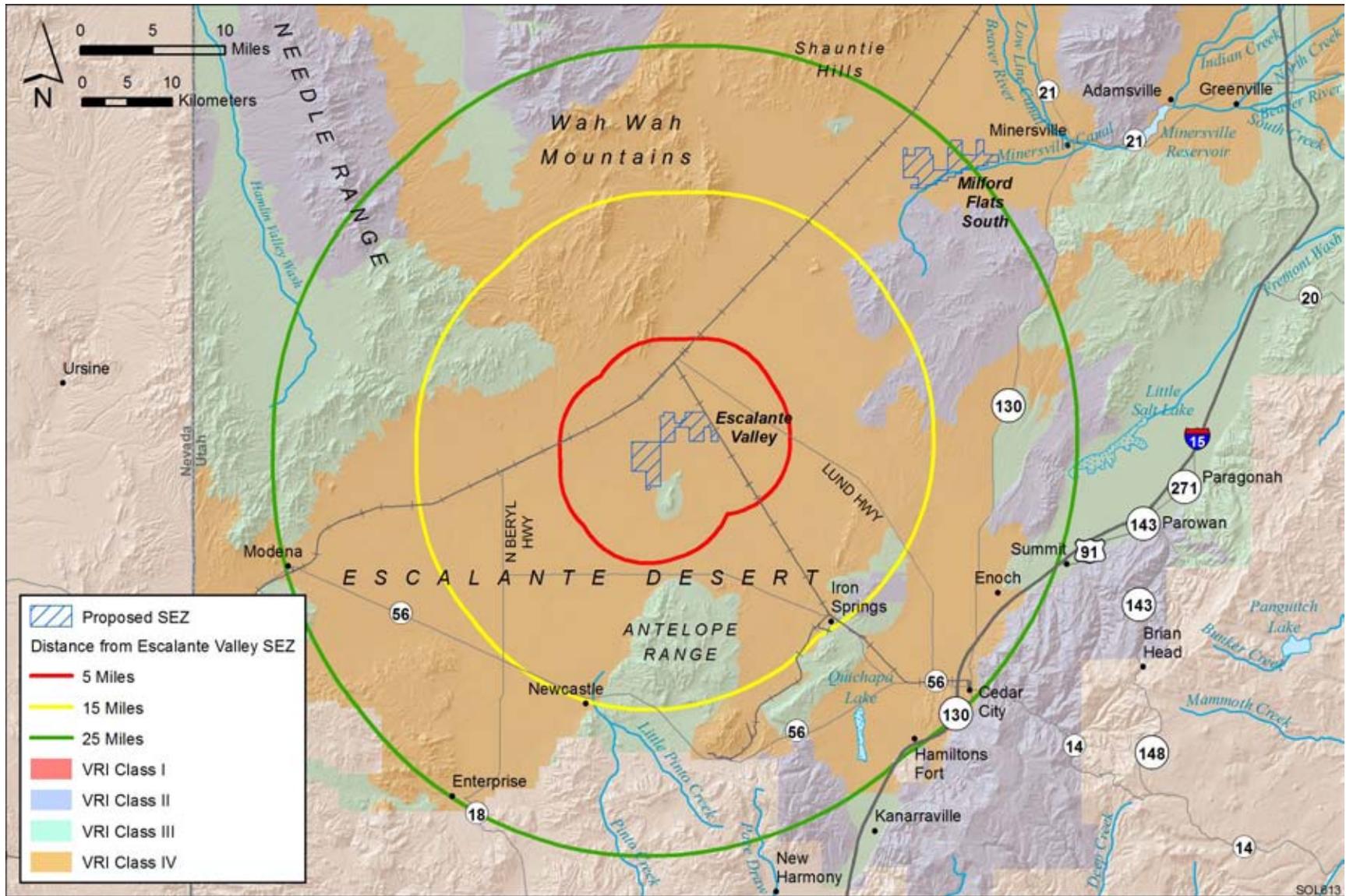


FIGURE 13.1.14.1-5 Visual Resource Inventory Values for the Proposed Escalante Valley SEZ and Surrounding Lands

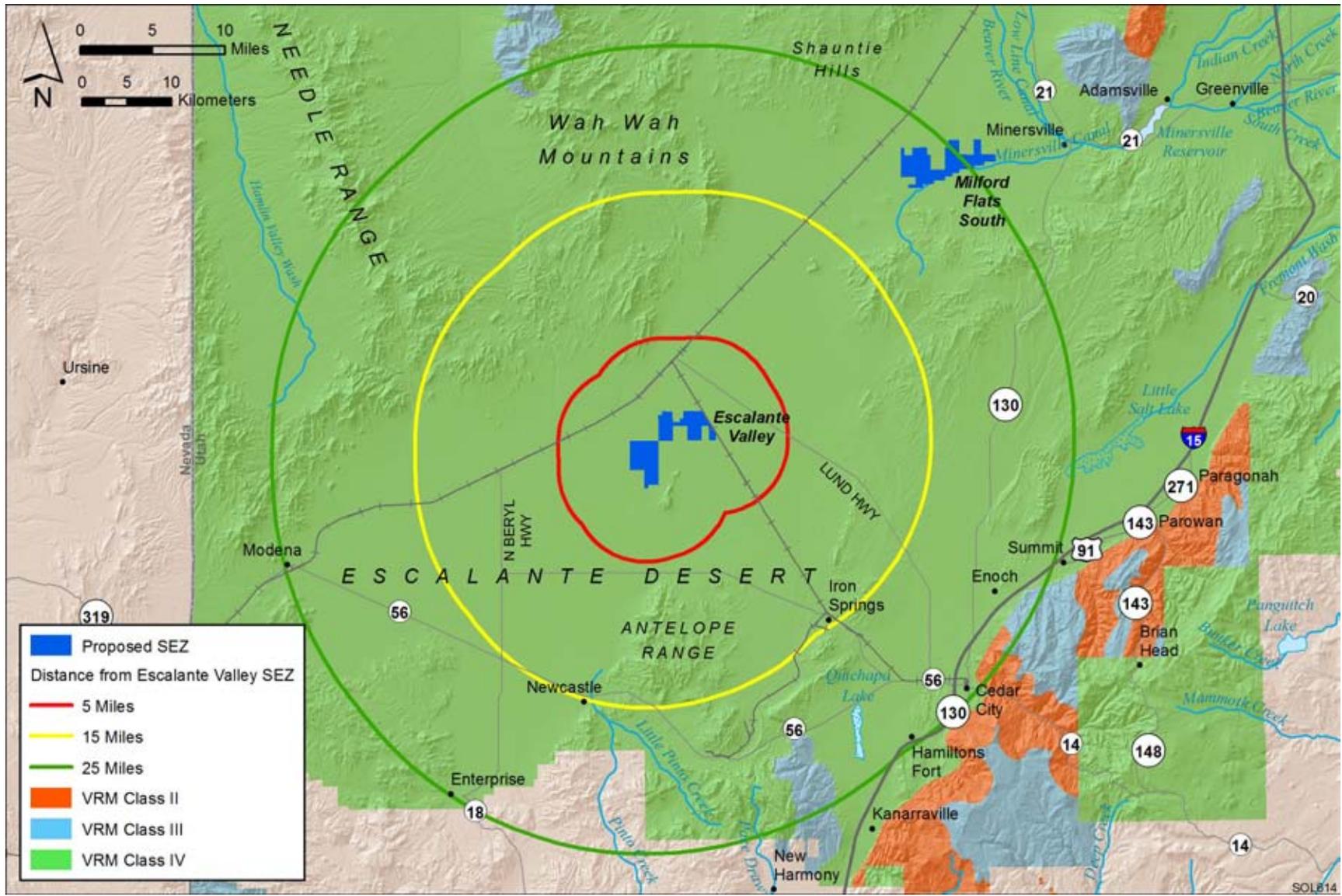


FIGURE 13.1.14.1-6 Visual Resource Management Classes for the Proposed Escalante Valley SEZ and Surrounding Lands

1 glare for facilities that might be developed within the SEZ; however, it should be assumed that
2 glint and glare are possible visual impacts from *any* utility-scale solar facility, regardless of size,
3 landscape setting, or technology type. The occurrence of glint and glare at solar facilities could
4 potentially cause large, but temporary, increases in brightness and visibility of the facilities. The
5 visual contrast levels projected for sensitive visual resource areas discussed in the following
6 analysis do not account for potential glint and glare effects; however, these effects would be
7 incorporated into a future site- and project-specific assessment that would be conducted for
8 specific proposed utility-scale solar energy projects. For more information about potential glint
9 and glare impacts associated with utility-scale solar energy facilities, see Section 5.12 of this
10 PEIS.

11 12 13 ***13.1.14.2.1 Impacts on the Proposed Escalante Valley SEZ*** 14

15 Some or all of the SEZ could be developed for one or more utility-scale solar energy
16 projects, utilizing one or more of the solar energy technologies described in Appendix F.
17 Because of the industrial nature and large size of utility-scale solar energy facilities, large visual
18 impacts on the SEZ would occur as a result of the construction, operation, and decommissioning
19 of solar energy projects. In addition, large impacts could occur at solar facilities utilizing highly
20 reflective surfaces or major light-emitting components (solar dish, parabolic trough, and power
21 tower technologies), with lesser impacts associated with reflective surfaces expected from PV
22 facilities. These impacts would be expected to involve major modifications of the existing
23 character of the landscape and would likely dominate the nearby views. Additional, and
24 potentially large, impacts would occur as a result of the construction, operation, and
25 decommissioning of related facilities, such as access roads and electric transmission lines. While
26 the primary visual impacts associated with solar energy development within the SEZ would
27 occur during daylight hours, lighting required for utility-scale solar energy facilities would be a
28 potential source of visual impacts at night, both within the SEZ and on surrounding lands.
29

30 Common and technology-specific visual impacts from utility-scale solar energy
31 development, as well as impacts associated with electric transmission lines, are discussed in
32 Section 5.12 of this PEIS. Impacts would last throughout construction, operation, and
33 decommissioning, and some impacts could continue after project decommissioning. Visual
34 impacts resulting from solar energy development in the SEZ would be in addition to impacts
35 from solar energy development and other development that may occur on other public or private
36 lands within the SEZ viewshed, and are subject to cumulative effects. For discussion of
37 cumulative impacts, see Section 6.5 of the PEIS.
38

39 The changes described above would be expected to be consistent with BLM VRM
40 objectives for VRM Class IV, as seen from nearby KOPs. More information about impact
41 determination using the BLM VRM program is available in Section 5.12 and in *Visual Resource*
42 *Contrast Rating*, BLM Manual Handbook 8431-1 (BLM 1986b).
43

44 Implementation of the programmatic design features intended to reduce visual impacts
45 (described in Appendix A, Section A.2.2) would be expected to reduce visual impacts associated
46 with utility-scale solar energy development within the SEZ; however, the degree of effectiveness

1 of these design features could be assessed only at the site- and project-specific level. Given the
2 large scale, reflective surfaces, and strong regular geometry of utility-scale solar energy facilities
3 and the lack of screening vegetation and landforms within the SEZ viewshed, siting the facilities
4 away from sensitive visual resource areas and other sensitive viewing areas would be the primary
5 means of mitigating visual impacts. The effectiveness of other visual impact mitigation measures
6 would generally be limited.

9 ***13.1.14.2.2 Impacts on Lands Surrounding the Proposed Escalante Valley SEZ***

11 **Impacts on Selected Sensitive Visual Resource Areas**

13
14 Because of the large size of utility-scale solar energy facilities and the generally flat,
15 open nature of the proposed SEZ, lands outside the SEZ would be subjected to visual impacts
16 related to construction, operation, and decommissioning of utility-scale solar energy facilities.
17 The affected areas and extent of impacts would depend on a number of visibility factors and
18 viewer distance (for a detailed discussion of visibility and related factors, see Section 5.12).
19 A key component in determining impact levels is the intervisibility between the project and
20 potentially affected lands; if topography, vegetation, or structures screen the project from
21 viewer locations, there is no impact.

22
23 Preliminary viewshed analyses were conducted to identify which lands surrounding
24 the proposed SEZ could have views of solar facilities in at least some portion of the SEZ
25 (see Appendix M for information on assumptions and limitations of the methods used). Four
26 viewshed analyses were conducted, each for different heights representative of project elements
27 associated with potential solar energy technologies: PV and parabolic trough arrays (24.6 ft
28 [7.5 m]), solar dishes and power blocks for CSP technologies (38 ft [11.6 m]), transmission
29 towers and short solar power towers (150 ft [45.7 m]), and tall solar power towers (650 ft
30 [198.1 m]). Viewshed maps for the SEZ for all four solar technology heights are available in
31 Appendix N.

32
33 Figure 13.1.14.2-1 shows the combined results of the viewshed analyses for all four solar
34 technologies. The colored segments indicate areas with clear lines of sight to one or more areas
35 within the SEZ and from which solar facilities within these areas of the SEZ would be expected
36 to be visible, assuming the absence of screening vegetation or structures and the occurrence of
37 adequate lighting and other atmospheric conditions. The light brown areas are locations from
38 which PV and parabolic trough arrays located in the SEZ could be visible. Solar dishes and
39 power blocks for CSP technologies would be visible from the areas shaded in light brown and
40 the additional areas shaded in light purple. Transmission towers and short solar power towers
41 would be visible from the areas shaded light brown, light purple, and the additional areas shaded
42 in dark purple. Power tower facilities located in the SEZ could be visible from areas shaded light
43 brown, light purple, and dark purple, and at least the upper portions of power tower receivers
44 could be visible from the additional areas shaded in medium brown.

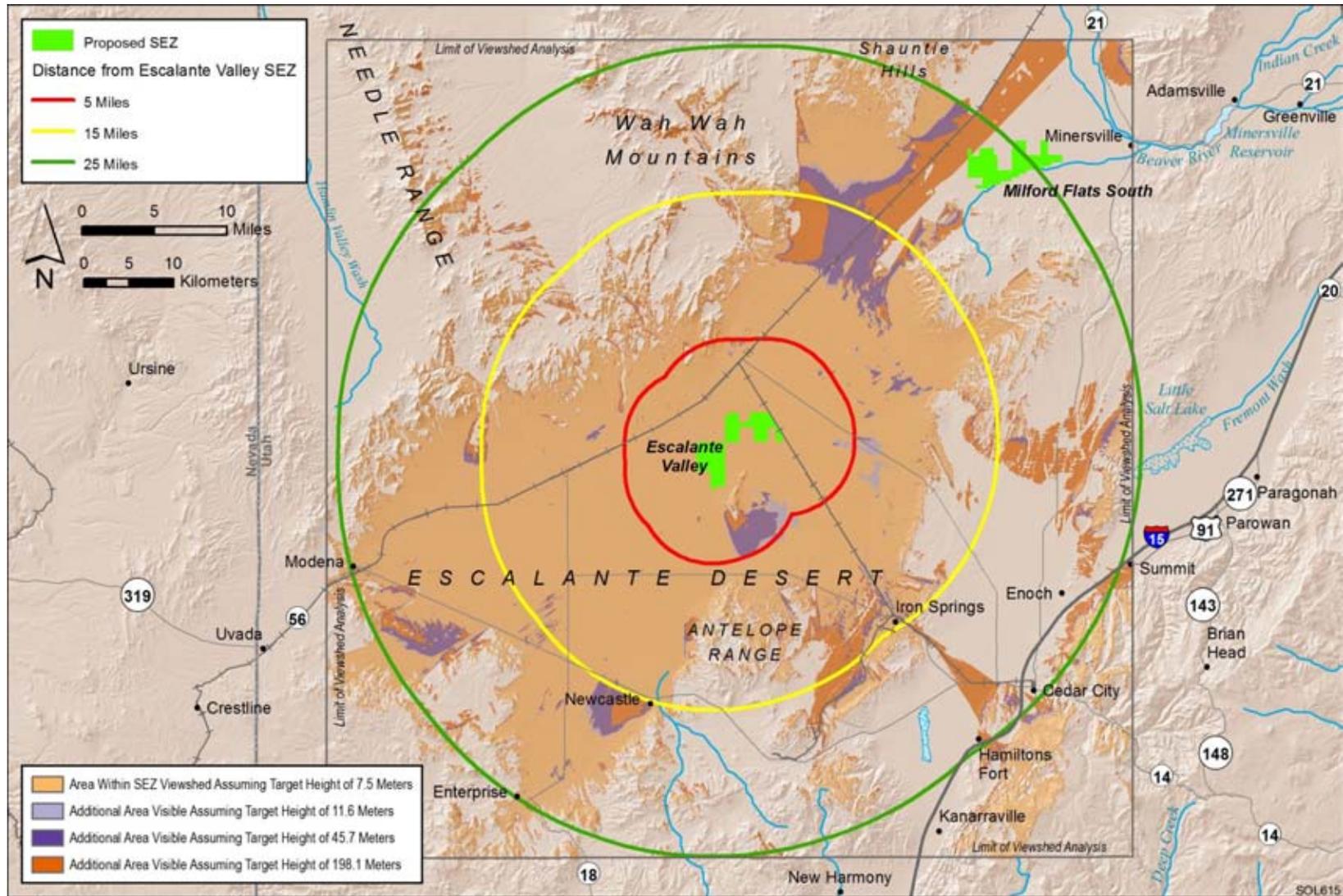


FIGURE 13.1.14.2-1 Viewshed Analyses for the Proposed Escalante Valley SEZ and Surrounding Lands, Assuming Solar Technology Heights of 24.6 ft (7.5 m), 38 ft (11.6 m), 150 ft (45.7 m), and 650 ft (198.1 m) (shaded areas indicate lands from which solar development within the SEZ could be visible)

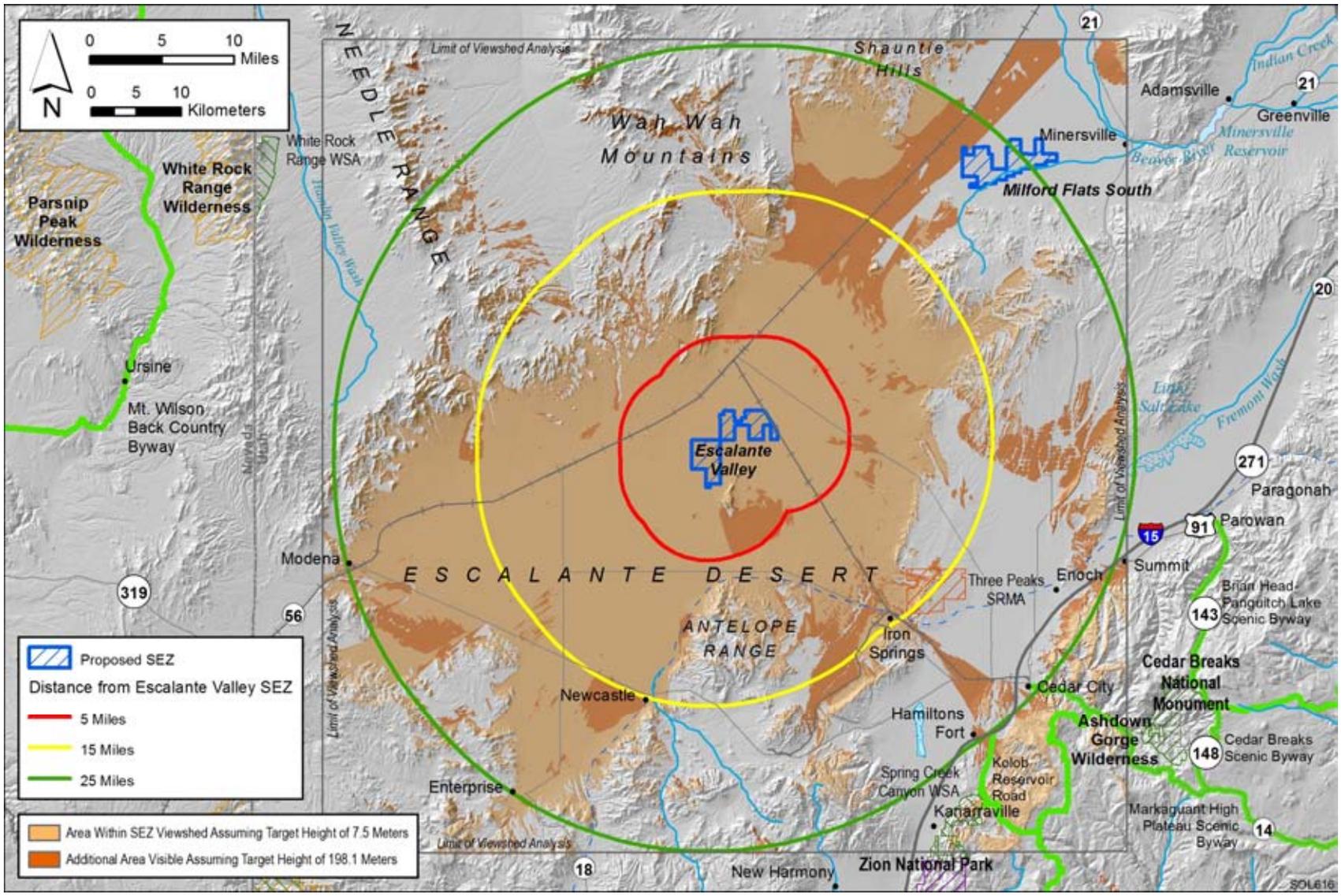
1 For the following visual impact discussion, the tall solar power tower (650 ft [198.1 m])
2 and PV and parabolic trough array (24.6 ft [7.5 m]) viewsheds are shown in the figures and
3 discussed in the text. These heights represent the maximum and minimum landscape visibility
4 for solar energy technologies analyzed in this PEIS. Viewsheds for solar dish and CSP
5 technology power blocks (38 ft [11.6 m]), and transmission towers and short solar power towers
6 (150 ft [45.7 m]) are presented in Appendix N. The visibility of these facilities would fall
7 between that for tall power towers and PV and parabolic trough arrays.
8
9

10 **Impacts on Selected Federal-, State-, and BLM-Designated Sensitive Visual** 11 **Resource Areas** 12

13 Figure 13.1.14.2-2 shows the results of a GIS analysis that overlays selected federal,
14 state, and BLM-designated sensitive visual resource areas onto the combined tall solar power
15 tower (650 ft [198.1 m]) and PV and parabolic trough array (24.6 ft [7.5 m]) viewsheds. The
16 figure illustrates which of these sensitive visual resource areas could have views of solar
17 facilities within the SEZ and therefore potentially would be subject to visual impacts from those
18 facilities. Distance zones that correspond with BLM's VRM system-specified foreground-
19 middleground distance (5 mi [8 km]), background distance (15 mi [24 km]), and a 25-mi
20 (40-km) distance zone are shown as well, in order to indicate the effect of distance from the SEZ
21 on impact levels, which are highly dependent on distance.
22

23 The scenic resources included in the analyses were as follows:
24

- 25 • National Parks, National Monuments, National Recreation Areas, National
26 Preserves, National Wildlife Refuges, National Reserves, National
27 Conservation Areas, National Historic Sites;
- 28
- 29 • Congressionally authorized Wilderness Areas;
- 30
- 31 • Wilderness Study Areas;
- 32
- 33 • National Wild and Scenic Rivers;
- 34
- 35 • Congressionally authorized Wild and Scenic Study Rivers;
- 36
- 37 • National Scenic Trails and National Historic Trails;
- 38
- 39 • National Historic Landmarks and National Natural Landmarks;
- 40
- 41 • All-American Roads, National Scenic Byways, State Scenic Highways; and
42 BLM- and USFS-designated scenic highways/byways;
- 43
- 44 • BLM-designated Special Recreation Management Areas; and
45
- 46 • ACECs designated because of outstanding scenic qualities.



1
2 **FIGURE 13.1.14.2-2 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 Escalante Valley SEZ**

Potential impacts on specific sensitive resource areas visible from and within 25 mi (40 km) of the proposed Escalante Valley SEZ are discussed below. The results of this analysis are also summarized in Table 13.1.14.2-1. Further discussion of impacts on these areas is provided in Sections 13.1.3 (Specially Designated Areas and Lands with Wilderness Characteristics) and 13.1.17 (Cultural Resources).

The following visual impact analysis describes *visual contrast levels* rather than *visual impact levels*. *Visual contrasts* are changes in the seen landscape, including changes in the forms, lines, colors, and textures of objects seen in the landscape. A measure of *visual impact* includes potential human reactions to the visual contrasts arising from a development activity, based on viewer characteristics, including attitudes and values, expectations, and other characteristics that are viewer- and situation-specific. Accurate assessment of visual impacts requires knowledge of the potential types and numbers of viewers for a given development and their characteristics and expectations, specific locations from which the project might be viewed, and other variables that were not available or not feasible to incorporate in the PEIS analysis. These variables would be incorporated into a future site- and project-specific assessment that would be conducted for specific proposed utility-scale solar energy projects. For more discussion of visual contrasts and impacts, see Section 5.12.

National Historic Trail

- *Old Spanish*—The Old Spanish National Historic Trail is a congressionally designated, multistate historic trail that passes within 6.4 mi (10.3 km) of the SEZ at the point of closest approach on the south side of the SEZ. Approximately 30 mi (48 km) of the trail are within the 650-ft (198.1-m) viewshed of the SEZ.

TABLE 13.1.14.2-1 Selected Potentially Affected Sensitive Visual Resources within a 25-mi (40-km) Viewshed of the Proposed Escalante Valley SEZ, Assuming a Viewshed Analysis Target Height of 650 ft (198.1 m)

Feature Type	Feature Name and Total Acreage	Feature Area or Linear Distance ^a		
		Visible within 5 mi	Visible between	
			5 and 15 mi	15 and 25 mi
National Historic Trail	Old Spanish	0	22 mi	8 mi
SRMA	Three Peaks (6,631 acres)	0	1,672 acres (25%) ^b	164 acres (3%) ^b

^a To convert acres to km², multiply by 0.004047; to convert mi to km, multiply by 1.609.

^b Percentage of total feature area for areal features.

1 As shown in Figure 13.1.14.2-2, within 25 mi (40 km) of the SEZ, following
2 the trail from the east, the trail extends southwest and enters the viewshed just
3 east of Iron Springs, where the trail turns northwest to pass north of the
4 Antelope Range, drawing closer to the SEZ. At the 6.6-mi (10.6-km) point of
5 closest approach, the trail then turns to the southwest toward Newcastle and
6 passes out of the 25-mi (40-km) viewshed as it descends into Mountain
7 Meadow.
8

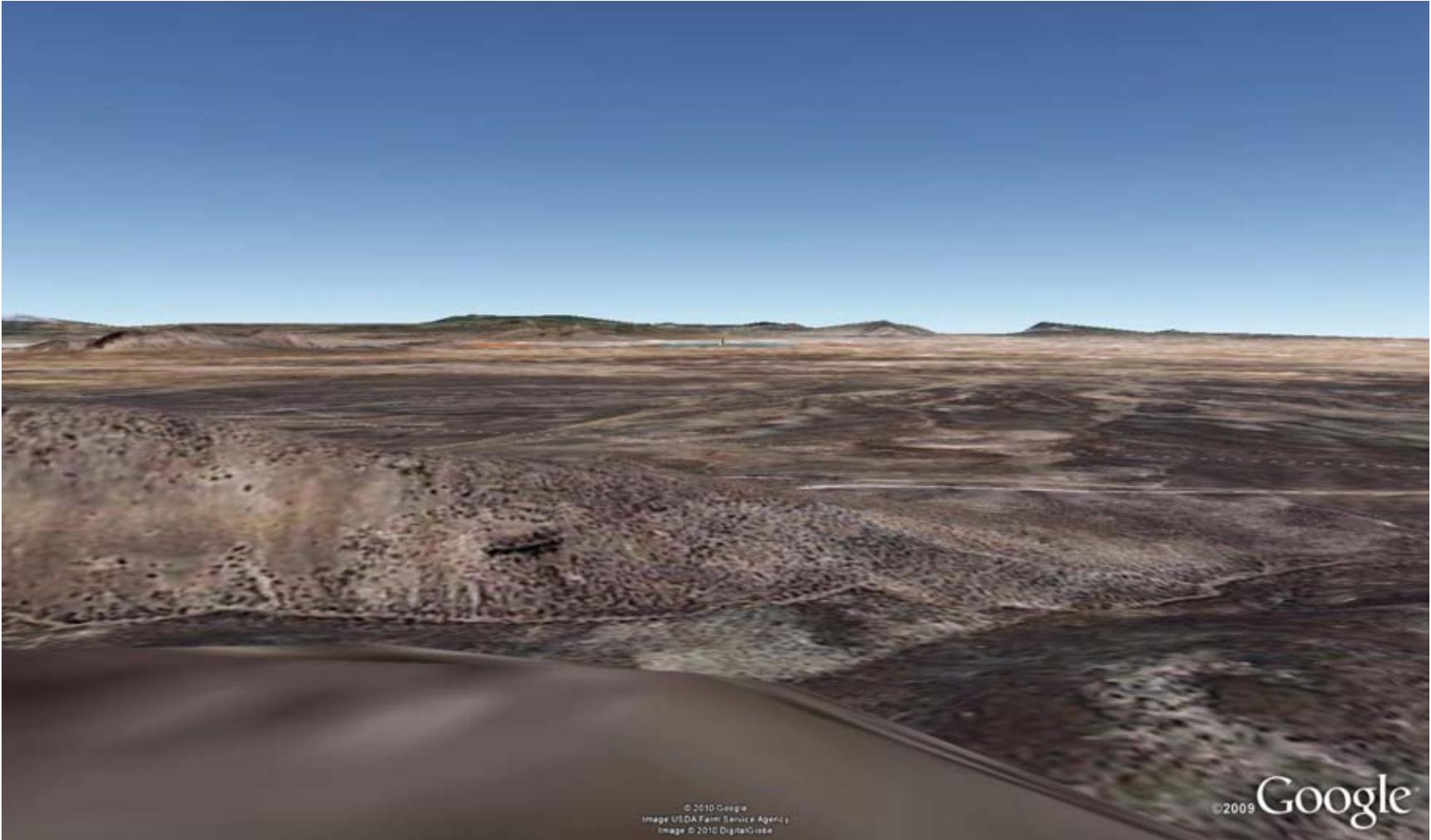
9 For trail users traveling westward, the upper portions of sufficiently tall power
10 towers might become visible in the vicinity of Iron Springs, assuming no
11 screening by nearby vegetation or structures. The trail is elevated
12 approximately 200 ft (61 m) above the SEZ, and at a distance of
13 approximately 14 mi (23 km), the angle of view would be very low. If power
14 towers were visible within the SEZ, they would appear as points of light on
15 the northwest horizon, and if they were sufficiently tall to require hazard
16 navigation lighting, they could potentially be visible at night as well. Views of
17 some of the southwestern portion of the SEZ would be blocked by Table
18 Butte.
19

20 Figure 13.1.14.2-3 is a Google Earth visualization that depicts a view of the
21 Escalante Valley SEZ (highlighted in orange) as seen from a point on the Old
22 Spanish Trail in the Three Peaks area at the north end of the Antelope Range,
23 about 10 mi (16 km) from the closest visible portion of the SEZ and about
24 700 ft (213 m) higher in elevation than the southern portion of the SEZ. The
25 visualization includes simplified wireframe models of a hypothetical solar
26 power tower facility. The models were placed within the SEZ as a visual aid
27 for assessing the approximate size and viewing angle of utility-scale solar
28 facilities. The receiver towers depicted in the visualization are properly scaled
29
30

GOOGLE EARTH™ VISUALIZATIONS

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

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



1

2 **FIGURE 13.1.14.2-3 Google Earth Visualization of the Proposed Escalante Valley SEZ (shown in orange tint) and Surrounding Lands,**
3 **with Power Tower Wireframe Models, as Seen from Viewpoint on Old Spanish Trail at North End of Antelope Range**
4

1 models of a 459-ft (139.9-m) power tower with an 867-acre (3.5-km²) field of
2 12-ft (3.7-m) heliostats, each representing approximately 100 MW of electric
3 generating capacity. Two models were placed in the SEZ for this and other
4 visualizations shown in this section of the PEIS. In the visualization, the SEZ
5 area is depicted in orange, the heliostat fields in blue.
6

7 The visualization suggests that a substantial portion of the SEZ would be
8 screened from view by Table Butte, but the visible portion of the SEZ would
9 occupy a small portion of the field of view from this point on the Old Spanish
10 Trail, essentially appearing as a thin horizontal band in the distance.
11

12 Solar arrays within the visible portion of the SEZ would be seen edge-on,
13 which would reduce their apparent size, conceal their strong regular geometry,
14 and cause them to appear to repeat the strong line of the horizon, which would
15 tend to reduce visual contrast. Taller solar facility components, such as
16 transmission towers, could be visible, depending on lighting, but might not be
17 noticed by casual observers.
18

19 Operating power towers within the SEZ could be visible as points of light on
20 the northeast horizon, against the backdrop of the Escalante Desert floor or the
21 Wah Wah Mountains north of the SEZ. If sufficiently tall, the power towers
22 could have red or white flashing hazard navigation lights that would likely be
23 visible from this viewpoint at night, given the dark night skies in the vicinity
24 of the SEZ. Other lighting associated with solar facilities in the SEZ could
25 potentially be visible as well, at least for facilities in the closest portions of
26 the SEZ.
27

28 Visual contrasts associated with solar energy development within the SEZ
29 would depend solar facility type, size, and location within the SEZ, and other
30 visibility factors. Under the 80% development scenario analyzed in this PEIS,
31 weak levels of visual contrast would be expected.
32

33 Figure 13.1.14.2-4 is a Google Earth view of the Escalante Valley SEZ as
34 seen from a location on the Old Spanish Trail near the point of closest
35 approach of the trail to the SEZ (6.4 mi [10.3 km]), about 300 ft (91 m) higher
36 in elevation than the southern boundary of the SEZ. West-bound trail users
37 would see the SEZ to the right as they traveled down the trail.
38

39 From this viewpoint, much of the SEZ is screened from view by Table Butte,
40 but portions of the SEZ are visible both east and west of Table Butte.
41 Although closer than the viewpoint in Figure 13.1.14.2-3, this viewpoint is
42 lower in elevation, so the overall appearance of the SEZ is similar, although
43 more of the SEZ is visible. The SEZ and solar arrays within the SEZ would
44 appear as a thin band at the base of the Wah Wah Mountains. Solar arrays
45 within the visible portion of the SEZ would be seen edge-on, reducing their
46 apparent size, concealing their strong regular geometry, and causing them to

1 appear to repeat the line of the horizon, which would tend to reduce
2 visual contrast.

3
4 Plumes (if present) and taller ancillary facilities, such as buildings,
5 transmission structures, and cooling towers, would likely be visible projecting
6 above the collector/reflector arrays, and their structural details could be
7 evident at least for nearby facilities. The ancillary facilities could create form
8 and line contrasts with the strongly horizontal, regular, and repeating forms
9 and lines of the collector/reflector arrays. Color and texture contrasts would
10 also be possible, but their extent would depend on the materials and surface
11 treatments utilized in the facilities.

12
13 Operating power towers within the SEZ could be visible as bright points of
14 light on the northeast horizon against the backdrop of the Escalante Desert
15 floor or the Wah Wah Mountains north of the SEZ. If sufficiently tall, the
16 power towers could have red or white flashing hazard navigation lights that
17 would likely be visible from this viewpoint at night, and could be
18 conspicuous, given the dark night skies in the vicinity of the SEZ. Other
19 lighting associated with solar facilities in the SEZ could be visible as well.
20 Visual contrasts associated with solar energy development within the SEZ
21 would depend on solar facility type, size, and location within the SEZ, and
22 other visibility factors. Under the 80% development scenario analyzed in the
23 PEIS, weak levels of visual contrast would be expected.

24
25 As westbound trail users passed the point of closest approach, the trail would
26 already be turning away from the SEZ toward the southwest, and as trail users
27 continued westward on the trail, the SEZ would be behind them, with impacts
28 diminishing from the levels described above as the users continued westward.

29
30 East-bound trail users would enter the 25-mi (40-km) viewshed just north of
31 Mountain Meadow in Holt Canyon and about 1,000 ft (300 m) higher in
32 elevation than the SEZ. However, at 25 mi (40 km), while operating, power
33 tower receivers within the SEZ could be visible as distant points of light on
34 the northeastern horizon, the SEZ would occupy a very small portion of the
35 field of view, and most solar facilities would be unlikely to be distinguishable
36 from the background. Almost immediately, the trail drops in elevation
37 substantially, to about 400 ft (120 m) above the SEZ, lowering the angle of
38 view and, except for a few small areas, eliminating visibility of the SEZ for
39 the next few miles.

40
41 At about 21 mi (34 km) from the SEZ, the trail re-enters the SEZ viewshed.
42 At this far distance and low viewing angle, solar collector/reflector arrays
43 would be seen edge-on, if at all. Operating power towers within the SEZ
44 might be visible as distant points of light on the northern horizon, but visual
45 contrasts from solar facilities within the SEZ would be weak. As east-bound
46 trail users traveled farther northeast on the trail, contrast levels would increase

1 gradually but only slightly, because even as distance to the SEZ decreased, the
2 angle of view would decrease, as the trail eventually drops to only about
3 200 ft (60 m) in elevation above the SEZ. The SEZ and solar arrays within the
4 SEZ would be visible down the trail, but at a very low viewing angle and
5 occupying a very small portion of the field of view, in part because Table
6 Butte would screen portions of the SEZ.
7

8 In general, at no point would visual contrasts from solar facilities within the
9 SEZ be expected to create more than weak visual contrasts as viewed from the
10 trail, although near the point of closest approach power tower receivers within
11 the SEZ might appear as bright points of light low in the field of view.
12
13

14 ***Special Recreation Management Areas***

- 15
16 • *Three Peaks*—The Three Peaks Special Recreation Management Area is a
17 BLM-designated SRMA 13 mi (21 km) southeast of the SEZ at the point of
18 closest approach. The SRMA was designated to manage diverse recreational
19 uses and to protect natural resources from being damaged from recreational
20 use (BLM 2005). The SRMA provides front-country experiences. Activities
21 occurring in the SRMA include horseback riding, OHV riding, mountain
22 biking, camping, and radio-controlled model airplane flying (BLM 2006).
23

24 The Escalante Valley SEZ is visible from higher elevations in the SRMA,
25 particularly the northwest slopes of the Three Peaks. The area of the SRMA
26 within the 650-ft (198.1-m) viewshed of the SEZ includes 1,836 acres
27 (7.4 km²), or 28% of the total SRMA acreage. The area of the SRMA within
28 the 24.6-ft (7.5 m) viewshed of the SEZ includes 1,199 acres (4.9 km²), or
29 18% of the total SRMA acreage. As shown in Figure 13.1.14.2-2, the visible
30 area extends from the point of closest approach to almost 2 mi (3 km) into the
31 SRMA, about (15 mi [24 km] from the SEZ).
32

33 Figure 13.1.14.2-5 is a Google Earth visualization of the SEZ as seen from the
34 southwestern-most peak of the Three Peaks in the southwestern portion of the
35 SRMA, approximately 16 mi (26 km) from the far southeastern portion of the
36 SEZ. Because of the long distance to the SEZ, the angle of view is very low.
37 The SEZ and solar arrays within the SEZ would appear as a thin band at the
38 base of the distant Wah Wah Mountains, with Table Butte screening the
39 farthest southwest portions of the SEZ. Solar arrays within the SEZ that were
40 visible from the SRMA would be seen edge-on, reducing their apparent size,
41 concealing their strong regular geometry, and causing them to appear to repeat
42 the line of the horizon, which would tend to reduce visual contrast. Operating
43 power towers within the SEZ could be visible as distant points of light on the
44 northwest horizon, against the backdrop of the Escalante Desert valley floor.
45 If sufficiently tall, the power towers could have red or white flashing hazard
46 navigation lights that would likely be visible from this viewpoint at night,
47 given the dark night skies in the vicinity of the SEZ.

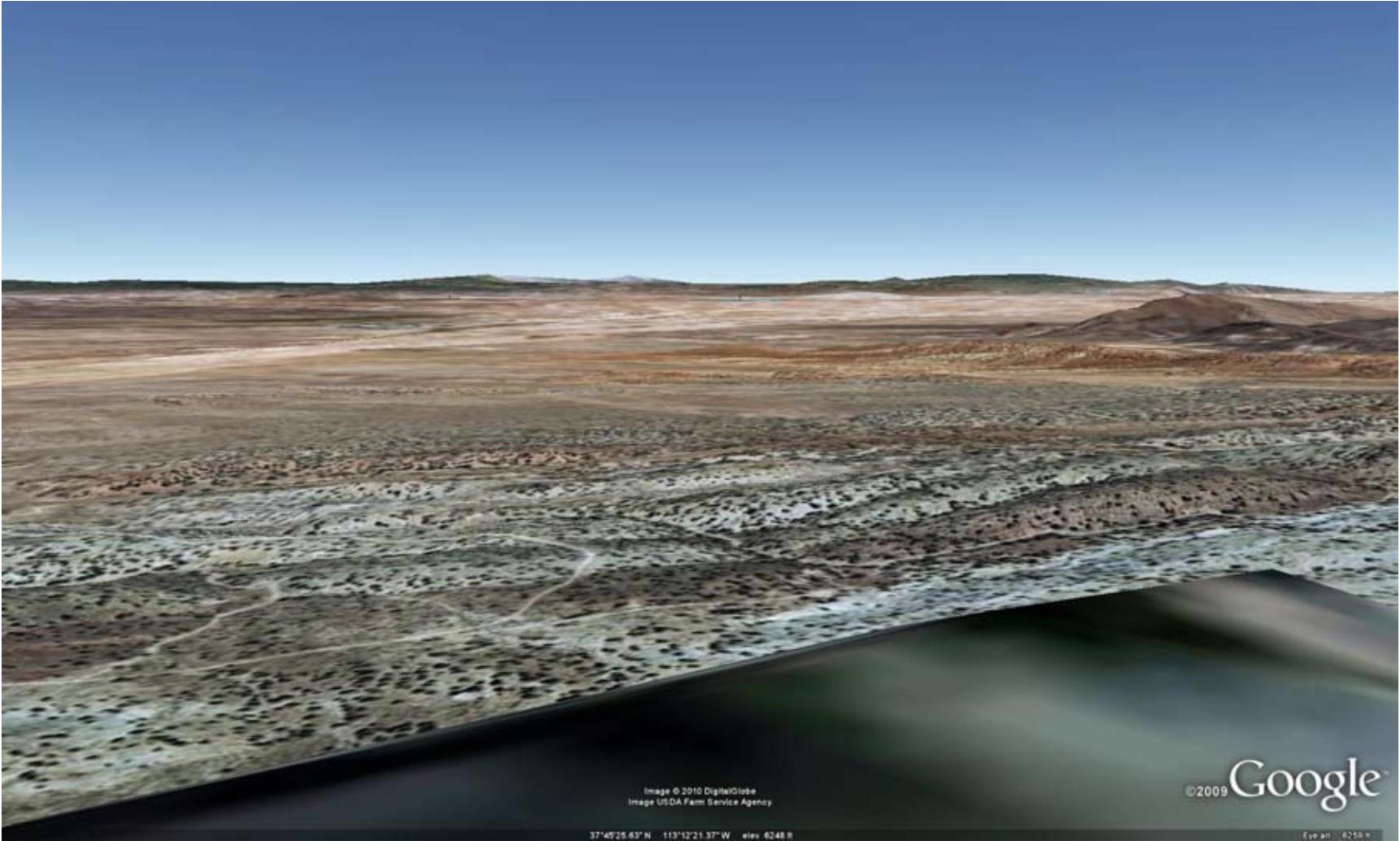


FIGURE 13.1.14.2-5 Google Earth Visualization of the Proposed Escalante Valley SEZ (shown in orange tint) and Surrounding Lands, with Power Tower Wireframe Models, as Seen from Viewpoint in Three Peaks SRMA

1 Visual contrasts associated with solar energy development within the SEZ
2 would depend on viewer location within the SRMA; solar facility type, size,
3 and location within the SEZ; and other visibility factors. Under the 80%
4 development scenario analyzed in this PEIS, weak levels of visual contrast
5 would be expected. The highest contrast levels would be expected for the
6 peaks and northwest slopes of the Three Peaks, with lower contrasts expected
7 for lower elevations.
8

9 Additional scenic resources exist at the national, state, and local levels, and impacts may
10 occur on both federal and nonfederal lands, including sensitive traditional cultural properties
11 important to Tribes. Note that in addition to the resource types and specific resources analyzed
12 in this PEIS, future site-specific NEPA analyses would include state and local parks, recreation
13 areas, other nonfederal sensitive visual resources, as well as communities close enough to the
14 proposed project to be affected by visual impacts. Selected nonfederal lands and resources are
15 included in the discussion below.
16

17 In addition to impacts associated with the solar energy facilities themselves, sensitive
18 visual resources could be affected by facilities that would be built and operated in conjunction
19 with the solar facilities. With respect to visual impacts, the most important associated facilities
20 would be access roads and transmission lines, the precise locations of which cannot be
21 determined until a specific solar energy project is proposed. Currently, there are no suitable
22 transmission lines within the proposed SEZ; thus construction and operation of a transmission
23 line both inside and outside the proposed SEZ would be required. Depending on project- and
24 site-specific conditions, visual impacts associated with access roads and (particularly)
25 transmission lines could be large. Detailed information about visual impacts associated with
26 transmission lines is presented in Section 5.12.1.5. A detailed site-specific NEPA analysis based
27 on more precise knowledge of facility location and characteristics would be required to
28 determine visibility and associated impacts precisely for any future solar projects.
29
30

31 **Impacts on Selected Other Lands and Resources** 32 33

34 ***Communities of Modena, Enterprise, and Newcastle.*** The viewshed analyses indicate
35 visibility of the SEZ from the communities of Modena (about 25 mi [40 km] west-southwest
36 of the SEZ), Enterprise (about 25 mi [40 km] south-southwest), and Newcastle (about 15 mi
37 [24 km] south). All three communities are between 200 and 350 ft (60 to 110 m) higher in
38 elevation than the closest boundary of the SEZ.
39

40 Screening by small undulations in topography, vegetation, buildings, or other structures
41 would likely restrict or eliminate visibility of the SEZ and associated solar facilities within these
42 communities, but a detailed future site-specific NEPA analysis would be required to determine
43 visibility precisely.
44

45 Because of the very long distance from both Modena and Enterprise to the SEZ, and the
46 very low elevation difference between these communities and the SEZ, the angle of view to the

1 SEZ is quite low, and where screening from nearby vegetation or structures was absent, the SEZ
2 would occupy a very small portion of the field of view from these communities. Power tower
3 receivers within the SEZ might be visible as faint lights on the horizon, and at night, if power
4 towers were tall enough to require hazard navigation lighting, that towers could have flashing red
5 or white lights that could potentially be visible from these communities. Other solar facilities are
6 unlikely to be visible at all. Thus, visual impacts on these communities from solar development
7 within the SEZ would be expected to be minimal.

8
9 The SEZ would occupy a slightly larger portion of the field of view from Newcastle, at
10 15 mi (24 km) from the SEZ; however, Table Butte would screen the far eastern portion of the
11 SEZ from view. The angle of view is so low that any solar collector/reflector arrays and other
12 low-height facilities within the SEZ either would be seen on edge, which would reduce their
13 visibility and visual contrast, or might not be visible at all. Power tower receivers within the SEZ
14 might be visible as lights on the horizon. Visual impacts on Newcastle from solar development
15 within the SEZ would be expected to be minimal.

16
17 In addition to the impacts described above, visitors to the area may experience visual
18 impacts from solar energy facilities located within the SEZ (as well as any associated access
19 roads and transmission lines) as they travel area roads, including Lund Highway, which would be
20 subject to major visual contrast from solar development within the SEZ, Beryl Road, and
21 Antelope Road.

22 23 24 ***13.1.14.2.3 Summary of Visual Resource Impacts for the Proposed*** 25 ***Escalante Valley SEZ*** 26

27 Under the 80% development scenario analyzed in this PEIS, there could be multiple solar
28 facilities within the Escalante Valley SEZ, a variety of technologies employed, and a range of
29 supporting facilities that would contribute to visual impacts, such as transmission towers and
30 lines, substations, power block components, and roads. The resulting visually complex landscape
31 would be essentially industrial in appearance and would contrast strongly with the surrounding
32 mostly natural-appearing landscape. Large visual impacts on the SEZ and surrounding lands
33 within the SEZ viewshed would result from solar energy development under the 80%
34 development scenario analyzed in this PEIS, because of major modification of the character of
35 the existing landscape. Additional impacts would result from construction and operation of
36 transmission lines and access roads within the SEZ.

37
38 The SEZ is in an area of low scenic quality. Residents, workers, and visitors to the area
39 may experience visual impacts from solar energy facilities located within the SEZ (as well as
40 any associated access roads and transmission lines) as they travel area roads.

41
42 Utility-scale solar energy development within the proposed Escalante Valley SEZ is
43 unlikely to cause even moderate visual impacts on highly sensitive visual resource areas, the
44 closest of which is more than 6 mi (10 km) from the SEZ. The closest community (Newcastle) is
45 about 15 mi (24 km) from the SEZ and is likely to experience minimal visual impacts from solar
46 development within the SEZ. The communities of Modena and Enterprise are also located within

1 the 25-mi (40-km) viewshed of the SEZ. Visual impacts on these communities would be
2 expected to be minimal.
3

4 5 **13.1.14.3 SEZ-Specific Design Features and Design Feature Effectiveness** 6

7 No SEZ-specific design features have been identified to protect visual resources for the
8 proposed Escalante Valley SEZ. As noted in Section 5.12, the presence and operation of large-
9 scale solar energy facilities and equipment would introduce major visual changes into non-
10 industrialized landscapes and could create strong visual contrasts in line, form, color, and texture
11 that could not easily be mitigated substantially. Implementation of the programmatic design
12 features that are presented in Appendix A, Section A.2.2, would be expected to reduce visual
13 impacts associated with utility-scale solar energy development within the SEZ; however, the
14 degree of effectiveness of these design features could be assessed only at the site- and project-
15 specific level. Given the large scale, reflective surfaces, and strong regular geometry of utility-
16 scale solar energy facilities and the typical lack of screening vegetation and landforms within the
17 SEZ viewshed, siting the facilities away from sensitive visual resource areas and other sensitive
18 viewing areas is the primary means of mitigating visual impacts. The effectiveness of other
19 visual impact mitigation measures would generally be limited.
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1 **13.1.15 Acoustic Environment**

2
3
4 **13.1.15.1 Affected Environment**

5
6 The proposed Escalante Valley SEZ is located in southwestern Utah, around the central
7 portion of Iron County. The State of Utah has no applicable quantitative noise-level regulations,
8 but Iron County, which includes the proposed Escalante Valley SEZ, has quantitative noise
9 limits applicable to solar power plants. No solar power plant should exceed 65 dBA as measured
10 at the property line, or 50 dBA as measured at the nearest neighboring inhabitable building
11 (Iron County 2009).

12
13 The nearest major road in the vicinity of the proposed Escalante Valley SEZ is State
14 Route 56, located about 14 mi (23 km) to the south. Two county roads, Lund Highway and
15 Beryl Milford Road, northeast and northwest, respectively, are located within 2 mi (3 km) of the
16 SEZ. The UP Railroad runs along the Beryl Milford Road, from which a railroad branches out at
17 Lund, passes through eastern edge of the SEZ, and connects to Cedar City. The nearest airport is
18 privately owned Sun Valley Estates Airport, which is about 1.3 mi (2.1 km) northwest of the
19 SEZ, and the next nearest one is Beryl Junction Airport, about 15 mi (24 km) southwest of the
20 SEZ. Nearby regional airports include Cedar City Airport and Milford Airport, which are
21 located about 22 mi (35 km) southeast of and 38 mi (61 km) northeast of the SEZ, respectively.
22 Large-scale irrigated agricultural lands are situated more than 6 mi (10 km) southwest, while
23 hog production facilities are about 9 mi (15 km) north–northeast. No sensitive receptors
24 (e.g., residences, hospitals, schools, or nursing homes) exist around the SEZ. The closest
25 residences to the boundary of the SEZ are about 1.1 mi (1.8 km) to the northwest. Several small
26 communities are nearby: Lund is about 3.5 mi (5.6 km) to the north and Beryl about 9 mi
27 (14.5 km) to the west. No population centers with schools exist within a 15-mi (24-km) radius of
28 the SEZ. Accordingly, noise sources around the SEZ include road traffic, railroad traffic, aircraft
29 flyover, and agricultural activities. Other noise sources are associated with current land use
30 around the SEZ, including grazing, outdoor recreation, back-country and OHV use, and hunting.
31 The proposed Escalante Valley SEZ is in a remote and undeveloped area, the overall character of
32 which is rural. To date, no environmental noise survey has been conducted around the proposed
33 SEZ. On the basis of the population density, the day-night average sound level (L_{dn}) is estimated
34 to be 32 dBA for Iron County, a low-end level typical of a rural area in the range of 33 to
35 47 dBA L_{dn} ¹⁵ (Eldred 1982; Miller 2002).

36
37
38 **13.1.15.2 Impacts**

39
40 Potential noise impacts associated with solar projects in the Escalante Valley SEZ would
41 occur during all phases of the projects. During the construction phase, potential noise impacts
42 associated with operation of heavy equipment and vehicular traffic on the nearest residences

¹⁵ Rural and undeveloped areas have sound levels in the range of 33 to 47 dBA as L_{dn} (Eldred 1982). Typically, the nighttime level is 10 dBA lower than the daytime level, and it can be interpreted as 33 to 47 dBA (mean 40 dBA) during daytime hours and 23 to 37 dBA (mean 30 dBA) during nighttime hours.

1 (within 1.1 mi [1.8 km]) would be anticipated, albeit of short duration. During the operations
2 phase, potential impacts on the nearest residences would be anticipated, depending on the solar
3 technologies employed. Noise impacts shared by all solar technologies are discussed in detail
4 in Section 5.13.1, and technology-specific impacts are presented in Section 5.13.2. Impacts
5 specific to the Escalante Valley SEZ are presented in this section. Any such impacts would be
6 minimized through the implementation of required programmatic design features described in
7 Appendix A, Section A.2.2, and through any additional SEZ-specific design features applied
8 (see Section 13.1.15.3 below). This section primarily addresses potential noise impacts on
9 humans, although potential impacts on wildlife at nearby sensitive areas are discussed.
10 Additional discussion on potential noise impacts on wildlife is presented in Section 5.10.2.
11
12

13 ***13.1.15.2.1 Construction***

14

15 The proposed Escalante Valley SEZ has a relatively flat terrain; thus, minimal site
16 preparation activities would be required, and associated noise levels would be lower than those
17 during general construction (e.g., erecting building structures and installing equipment, piping,
18 and electrical).
19

20 For the parabolic trough and power tower technologies, the highest construction noise
21 levels would occur at the power block area where key components (e.g., steam turbine/generator)
22 needed to generate electricity are located; a maximum of 95 dBA at a distance of 50 ft (15 m) is
23 assumed, if impact equipment such as pile drivers or rock drills is not being used. Typically, the
24 power block area is located in the center of the solar facility, at a distance of more than 0.5 mi
25 (0.8 km) to the facility boundary. Noise levels from construction of the solar array would be
26 lower than 95 dBA. When geometric spreading and ground effects are considered, as explained
27 in Section 4.13.1, noise levels would attenuate to about 50 dBA at a distance of 0.5 mi (0.8 km)
28 from the power block area. This noise level is the same as the Iron County regulation of 50 dBA
29 for a solar facility. In addition, mid- and high-frequency noise from construction activities is
30 significantly attenuated by atmospheric absorption under the low-humidity conditions typical of
31 an arid desert environment and by temperature lapse conditions typical of daytime hours; thus
32 noise attenuation to Iron County regulation levels would occur at distances somewhat shorter
33 than 0.5 mi (0.8 km). If a 10-hour daytime work schedule is considered, the EPA guideline level
34 of 55 dBA L_{dn} for residential areas (EPA 1974) would occur at about 1,200 ft (370 m) from the
35 power block area, which would be well within the facility boundary. For construction activities
36 occurring near the northwestern SEZ boundary, estimated noise levels would be about 42 dBA at
37 the nearest residences, which is below the Iron County regulation of 50 dBA for a solar facility
38 and comparable to the typical daytime mean rural background level of 40 dBA. In addition, an
39 estimated 42 dBA L_{dn} ¹⁶ at these residences is well below the EPA guideline of 55 dBA L_{dn} for
40 residential areas.
41
42

¹⁶ For this analysis, background levels of 40 and 30 dBA for daytime and nighttime hours, respectively, are assumed, which result in a day-night average noise level (L_{dn}) of 40 dBA.

1 There are no specially designated areas within 5 mi (8 km) of the Escalante Valley SEZ,
2 which is the farthest distance at which noise, other than extremely loud noise, would be
3 discernable. Thus, no noise impact analysis at nearby specially designated areas was conducted.
4

5 Depending on the soil conditions, pile driving might be required for installation of
6 solar dish engines. However, the pile drivers used would be relatively small and quiet, such as
7 vibratory or sonic drivers, rather than the impulsive impact pile drivers frequently used at large-
8 scale construction sites. Potential impacts on the nearest residences would be anticipated to be
9 minor, considering the distance to the nearest residences (about 1.1 mi [1.8 km] from the
10 northwestern SEZ boundary).
11

12 It is assumed that most construction activities would occur during the day when noise is
13 better tolerated than at night, because of the masking effects of background noise. In addition,
14 construction activities for a utility-scale facility are temporary (typically a few years).
15 Construction would cause some unavoidable but localized short-term noise impacts on
16 neighboring communities, particularly for activities occurring near the northwestern SEZ
17 boundary, close to the nearest residences.
18

19 Construction activities could result in various degrees of ground vibration, depending
20 on the equipment used and construction methods employed. All construction equipment causes
21 ground vibration to some degree, but activities that typically generate the most severe vibrations
22 are high-explosive detonations and impact pile driving. As is the case for noise, vibration would
23 diminish in strength with distance. For example, vibration levels at receptors beyond 140 ft
24 (43 m) from a large bulldozer (87 VdB at 25 ft [7.6 m]) would diminish below the threshold of
25 perception for humans, which is about 65 VdB (Hanson et al. 2006). During the construction
26 phase, no major construction equipment that can cause ground vibration would be used, and no
27 residences or sensitive structures are located in close proximity. Therefore, no adverse vibration
28 impacts are anticipated from construction activities, including from pile driving for dish engines.
29

30 It is assumed that a transmission line would be constructed to connect to the nearest
31 regional grid. A 138-kV transmission line is located about 3 mi (5 km) south of the Escalante
32 Valley SEZ; thus construction of a transmission line over this relatively short distance would be
33 needed if that line were used to connect to the regional grid. Also, it is likely that the 138-kV line
34 would need to be upgraded to handle the output of a full-size solar project. Such construction
35 could be performed over a short time period (a few months, at most). Construction sites along the
36 transmission line ROWs would move continuously, and thus no particular area would be exposed
37 to noise for a prolonged period. Therefore, potential impacts on nearby residences along the
38 transmission line ROW, if any, would be minor and temporary.
39

40 **13.1.15.2.2 Operations**

41
42
43 Noise sources common to all or most types of solar technologies include equipment
44 motion from solar tracking; maintenance and repair activities (e.g., washing mirrors or replacing
45 broken mirrors) at the solar array area; commuter/visitor/support/delivery traffic within and
46 around the solar facility; and control/administrative buildings, warehouses, and other auxiliary

1 buildings/structures. Diesel-fired emergency power generators and firewater pump engines
2 would be additional sources of noise, but their operations would be limited to several hours
3 per month (for preventive maintenance testing).
4

5 With respect to the main solar energy technologies, noise-generating activities in the
6 PV solar array area would be minimal, related mainly to solar tracking, if used. On the other
7 hand, dish engine technology, which employs collector and converter devices in a single unit,
8 generally has the strongest noise sources.
9

10 For the parabolic trough and power tower technologies, most noise sources during
11 operations would be in the power block area, including the turbine generator (typically in an
12 enclosure), pumps, boilers, and dry- or wet-cooling systems. The power block is typically
13 located in the center of the facility. On the basis of a 250-MW parabolic trough facility with a
14 cooling tower (Beacon Solar, LLC 2008), simple noise modeling indicates that noise levels
15 around the power block would be more than 85 dBA, but about 51 dBA at the facility boundary,
16 about 0.5 mi (0.8 km) from the power block area. For a facility located near the northwestern
17 SEZ boundary, the predicted noise level would be about 40 dBA at the nearest residences about
18 1.1 mi (1.8 km) from the SEZ boundary, which is lower than the Iron County regulation of
19 50 dBA and the same as the typical daytime mean rural background level of 40 dBA. If TES
20 were not used (i.e., if the operation were limited to daytime, 12 hours only¹⁷), the EPA guideline
21 level of 55 dBA (as L_{dn} for residential areas) would occur at about 1,370 ft (420 m) from the
22 power block area and thus would not be exceeded outside of the proposed SEZ boundary. At the
23 nearest residences, about 42 dBA L_{dn} would be estimated, which is well below the EPA
24 guideline of 55 dBA L_{dn} for residential areas. However, day–night average noise levels higher
25 than those estimated above by using the simple noise modeling would be anticipated if TES were
26 used during nighttime hours, as explained below and in Section 4.13.1.
27

28 On a calm, clear night typical of the proposed Escalante Valley SEZ setting, the
29 air temperature would likely increase with height (temperature inversion) because of strong
30 radiative cooling. Such a temperature profile tends to focus noise downward toward the ground.
31 There would be little, if any, shadow zone¹⁸ within 1 or 2 mi (1.6 or 3 km) of the noise source in
32 the presence of a strong temperature inversion (Beranek 1988). In particular, such conditions
33 add to the effect of noise being more discernable during nighttime hours, when the background
34 noise levels are the lowest. To estimate the day–night average sound level (L_{dn}), 6-hour
35 nighttime generation with TES is assumed after 12-hour daytime generation. For nighttime
36 hours under temperature inversion, 10 dB is added to sound levels estimated from the uniform
37 atmosphere (see Section 4.13.1). On the basis of these assumptions, the estimated nighttime
38 noise level at the nearest residences (about 1.1 mi [1.8 km] from the northwestern SEZ
39 boundary) would be 50 dBA, which is equivalent to the Iron County regulation but is much
40 higher than the typical nighttime mean rural background level of 30 dBA. The day-night average
41 noise level is estimated to be about 52 dBA L_{dn} , which is lower than the EPA guideline of
42 55 dBA L_{dn} for residential areas. The assumptions are conservative in terms of operating hours,

¹⁷ Maximum possible operating hours at the summer solstice, but limited to 7 to 8 hours at the winter solstice.

¹⁸ A shadow zone is defined as the region in which direct sound does not penetrate because of upward diffraction.

1 and no credit was given to other attenuation mechanisms, so it is likely that sound levels would
2 be lower than 52 dBA L_{dn} at the nearest residences, even if TES were used at a solar facility. In
3 consequence, operating parabolic trough or power tower facilities using TES and located near
4 the northwestern SEZ boundary could result in adverse noise impacts at the nearest residences,
5 depending on background noise levels and meteorological conditions. In the permitting process,
6 refined noise propagation modeling would be warranted along with measurement of background
7 noise levels.

8
9 The solar dish engine is unique among CSP technologies, because it generates electricity
10 directly and does not require a power block. A single, large solar dish engine has relatively low
11 noise levels, but a solar facility might employ tens of thousands of dish engines, which would
12 cause high noise levels around such a facility. For example, the proposed 750-MW SES Solar
13 Two dish engine facility in California would employ as many as 30,000 dish engines (SES Solar
14 Two, LLC 2008). At the Escalante Valley SEZ, on the basis of the assumption of dish engine
15 facilities of up to 588-MW total capacity (covering 80% of the total area, or 5,291 acres
16 [21.4 km²]), up to 23,515 25-kW dish engines could be employed. Also, for a large dish engine
17 facility, several hundred step-up transformers would be embedded in the dish engine solar field,
18 along with a substation; however, the noise from these sources would be masked by dish
19 engine noise.

20
21 The composite noise level of a single dish engine would be about 88 dBA at a distance
22 of 3 ft (0.9 m) (SES Solar Two, LLC 2008). This noise level would be attenuated to about
23 40 dBA (typical of the mean rural daytime environment) within 330 ft (100 m). However, the
24 combined noise level from tens of thousands of dish engines operating simultaneously would
25 be high in the immediate vicinity of the facility, for example, about 49 dBA at 1.0 mi (1.6 km)
26 and 44 dBA at 2 mi (3 km) from the boundary of the squarely shaped dish engine solar field;
27 both of these are lower than the Iron County regulation of 50 dBA for a solar facility but higher
28 than the typical daytime mean rural background level of 40 dBA. Noise levels would be higher
29 than the Iron County regulation up to 0.8 mi (1.3 km) from a dish engine facility. However, the
30 50-dBA level would occur at a somewhat shorter distance than the aforementioned 0.8-mi
31 (1.3-km) distance, considering noise attenuation by atmospheric absorption and temperature
32 lapse during daytime hours.

33
34 To estimate noise levels at the nearest residences, it was assumed dish engines were
35 placed over 80% of the Escalante Valley SEZ at intervals of 98 ft (30 m). Under this assumption,
36 the estimated noise level at the nearest residences, about 1.1 mi (1.8 km) from the SEZ boundary,
37 would be about 45 dBA, which is lower than the Iron County regulation of 50 dBA for a solar
38 facility but higher than the typical daytime mean rural background level of 40 dBA. On the basis
39 of a 12-hr daytime operation, the estimated 44 dBA L_{dn} at these residences is well below the
40 EPA guideline of 55 dBA L_{dn} for residential areas. However, depending on background noise
41 levels and meteorological conditions, noise from dish engines could have adverse impacts on the
42 nearest residences. Thus, consideration of minimizing noise impacts is very important during the
43 siting of dish engine facilities. Direct mitigation of dish engine noise through noise control
44 engineering could also limit noise impacts.

1 During operations, no major ground-vibrating equipment would be used. In addition,
2 no sensitive structures are located close enough to the Escalante Valley SEZ to experience
3 physical damage. Therefore, during operation of any solar facility potential vibration impacts
4 on surrounding communities and vibration-sensitive structures would be minimal.
5

6 Transformer-generated humming noise and switchyard impulsive noises would be
7 generated during the operation of solar facilities. These noise sources would be located near the
8 power block area, typically near the center of a solar facility. Noise from these sources would
9 generally be limited within the facility boundary and not be heard at the nearest residences,
10 assuming a 1.6-mi (2.6-km) distance (at least 0.5 mi [0.8 km] to the facility boundary and 1.1 mi
11 [1.8 km] to the nearest residences). Accordingly, potential impacts of these noise sources on the
12 nearest residences would be minimal.
13

14 For impacts from transmission line corona discharge noise during rainfall events
15 (discussed in Section 5.13.1.5), the noise level at 50 ft (15 m) and 300 ft (91 m) from the
16 center of a 230-kV transmission line tower would be about 39 and 31 dBA (Lee et al. 1996),
17 respectively, typical of daytime and nighttime mean background noise levels in rural
18 environments. Corona noise includes high-frequency components, considered to be more
19 annoying than low-frequency environmental noise. However, corona noise would not likely
20 cause impacts, unless a residence was located close to it (e.g., within 500 ft [152 m] of a 230-kV
21 transmission line). The proposed Escalante Valley SEZ is located in an arid desert environment,
22 and incidents of corona discharge are infrequent. Therefore, potential impacts on nearby
23 residences from corona noise along transmission lines within the SEZ would be negligible.
24
25

26 ***13.1.15.2.3 Decommissioning/Reclamation*** 27

28 Decommissioning/reclamation requires many of the same procedures and equipment
29 used in traditional construction. Decommissioning/reclamation would include dismantling
30 of solar facilities and support facilities such as buildings/structures and mechanical/
31 electrical installations; disposal of debris; grading; and revegetation as needed. Activities
32 for decommissioning would be similar to those for construction but more limited. Potential
33 noise impacts on surrounding communities would be correspondingly lower than those
34 for construction activities. Decommissioning activities would be of short duration, and
35 their potential impacts would be minor and temporary in nature. The same mitigation
36 measures adopted during the construction phase could also be implemented during the
37 decommissioning phase.
38

39 Similarly, potential vibration impacts on surrounding communities and vibration-
40 sensitive structures during decommissioning of any solar facility would be lower than those
41 during construction and thus minimal.
42
43
44

1 **13.1.15.3 SEZ-Specific Design Features and Design Feature Effectiveness**
2

3 The implementation of required programmatic design features described in Appendix A,
4 Section A.2.2, would greatly reduce or eliminate the potential for noise impacts from
5 development and operation of solar energy facilities. While some SEZ-specific design features
6 are best established when specific project details are being considered, measures that can be
7 identified at this time include the following:
8

- 9 • Noise levels from cooling systems equipped with TES should be managed
10 so that levels at the nearest residences to the northwest of the SEZ are kept
11 within applicable guidelines. This could be accomplished in several ways,
12 for example, through placing the power block approximately 1 to 2 mi (1.6 to
13 3 km) or more from residences, limiting operations to a few hours after sunset,
14 and/or installing fan silencers.
15
- 16 • Dish engine facilities within the Escalante Valley SEZ should be located more
17 than 1 to 2 mi (1.6 to 3 km) from the nearest residences (i.e., the facilities
18 should be located in the eastern or southwestern area of the proposed SEZ).
19 Direct noise control measures applied to individual dish engine systems could
20 also be used to reduce noise impacts at nearby residences.
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1 **13.1.16 Paleontological Resources**

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4 **13.1.16.1 Affected Environment**

5
6 The proposed Escalante Valley SEZ is covered predominantly by Quaternary aged
7 deposits of varying types. The western half is mostly composed of Quaternary landslide
8 deposits (classified as Ql on geological maps). The total acreage of the landslide deposits
9 within the SEZ is 3,549 acres (14.4 km²), or 54% of the SEZ. The eastern half is mostly
10 composed of Quaternary alluvium (classified as Qa). The total acreage of alluvium within the
11 SEZ is 2,447 acres (9.9 km²), or 37% of the SEZ. Peripheral sections of the southwest portion
12 of the SEZ are composed of Quaternary eolian deposits (classified as Qe). The total acreage of
13 eolian deposits within the SEZ is 617 acres (2.5 km²), or 9% of the SEZ. All these Quaternary
14 deposits are classified as Potential Fossil Yield Classification (PFYC) Class 2 on the basis of the
15 PFYC map from the Utah State Office (Murphey and Daitch 2007). Class 2 indicates that the
16 potential for the occurrence of significant fossil material is low (see Section 4.14 for a discussion
17 of the PFYC system).
18

19
20 **13.1.16.2 Impacts**

21
22 Few, if any, impacts on significant paleontological resources are likely to occur in the
23 proposed Escalante Valley SEZ. Vertebrate paleontological resources have been found in ancient
24 lacustrine deposits associated with Lake Bonneville, particularly in caves (Madsen 2000).
25 Therefore, a more detailed look at the geological deposits of the SEZ is needed to determine
26 whether a paleontological survey is warranted. If the geological deposits are determined to be as
27 described above and remain classified as PFYC Class 2, further assessment of paleontological
28 resources is not likely to be necessary. Important resources could exist; if identified, they would
29 need to be managed on a case-by-case basis. Section 5.14 discusses the types of impacts that
30 could occur on any significant paleontological resources found to be present within the Escalante
31 Valley SEZ. Impacts will be minimized through the implementation of required programmatic
32 design features described in Appendix A, Section A.2.2.
33

34 Indirect impacts on paleontological resources, such as looting or vandalism, are not
35 likely for a PFYC Class 2 area. Programmatic design features for controlling water runoff and
36 sedimentation would prevent erosion-related impacts on buried deposits outside of the SEZ.
37

38 The nearest State or U.S. Route is 15 mi (24 km) from the SEZ (State Route 56), so
39 a new road is anticipated to be needed to access the Escalante Valley SEZ, resulting in
40 approximately 109 acres (0.44 km²) of disturbance to PFYC Class 2 deposits. Approximately
41 3 mi (5 km) of transmission line is anticipated be needed to connect to the nearest existing line,
42 resulting in approximately 91 acres (0.37 km²) of disturbance also in areas classified as PFYC
43 Class 2. Few, if any, impacts on paleontological resources are anticipated in areas of PFYC
44 Class 2 deposits related to these additional ROWs. However, similar to the SEZ footprint,
45 important resources could exist, and if identified, they would need to be managed on a case-by-
46 case basis. Impacts on paleontological resources related to the creation of new corridors not

1 assessed in this PEIS would be evaluated at the project-specific level if new road or transmission
2 construction or line upgrades were to occur.
3

4 **13.1.16.3 SEZ-Specific Design Features and Design Feature Effectiveness**

5
6
7 Impacts would be minimized through the implementation of required programmatic
8 design features, as described in Appendix A, Section A.2.2. If the geological deposits are
9 determined to be as described above and remain classified PFYC Class 2, SEZ-specific design
10 features for mitigating impacts on paleontological resources within the proposed Escalante
11 Valley SEZ and associated ROWs are not likely to be necessary.
12

1 **13.1.17 Cultural Resources**

2
3
4 **13.1.17.1 Affected Environment**

5
6
7 **13.1.17.1.1 Prehistory**

8
9 The proposed Escalante Valley SEZ is located in the Escalante Desert of southwest Utah.
10 The earliest known occupation of southwest Utah is from the Paleoindian Era, dating from about
11 12,000 to 9,000 years before present (B.P.). The archaeological data suggest that Paleoindian
12 groups were mobile hunter-gatherers moving seasonally to exploit available natural resources.
13 Although these groups initially hunted large animals (megafauna), such as mammoth and
14 mastodon, they adapted to hunting bison and smaller game animals and continued their reliance
15 on wild plant foods as the megafauna became extinct. Sites dating to the Paleoindian Era are
16 typically represented by isolated surface finds of single projectile points. Very limited amounts
17 of Paleoindian material have been found on BLM-administered lands within the Cedar City Field
18 Office, but much of what has been found comes from the dune areas of the Escalante Valley.
19

20 About 9,000 years ago, the Archaic Era began, as evidenced by changing subsistence
21 patterns and associated tool production. The projectile points associated with Archaic peoples
22 are stemmed or notched varieties rather than the large, lanceolate points of the Paleoindian Era,
23 indicating a reliance on smaller game. Early, Middle, and Late Archaic (9,000 to 2,000 years
24 B.P.) sites have been found in the vicinity of the Escalante Desert. Large and deeply stratified
25 Early Archaic sites (9,000 to 5,500 B.P.) are best known from cave sites near lakes, but small,
26 seasonal sites indicating mobile foraging strategy are common. During the Middle Archaic
27 (5,500 to 3,500 years B.P.), use areas are similar to the Early Archaic, but site frequency
28 increases in upland areas. Relatively few sites dating to the Late Archaic period (3,500 to
29 2,000 years B.P.) have been recorded; what is known, however, indicates increased use of
30 upland areas and abandonment of lowland areas (Backer et al. 2001).
31

32 The period between A.D. 1 and 1300 is known as the Formative Era, when there was
33 a transition toward the use of domesticated crops, such as maize, beans, and squash and
34 widespread use of the bow and arrow (Backer et al. 2001). The Fremont culture is located in
35 most of Utah, north of the Colorado, Escalante, and Virgin Rivers between A.D. 400 and 1300.
36 The Fremont culture is well known for its distinctive rock art using trapezoidal figures. South
37 of the Fremont area pueblo-style cultures (Virgin Anasazi) based on horticulture occur along
38 the Virgin and Muddy Rivers—ceramic parallels with the Kayenta Anasazi suggest dates of
39 A.D. 400 to 1150. By 1300 both the Fremont and Virgin Anasazi cultures disappeared and were
40 replaced by mobile Shoshonean and Paiute groups, who practiced a more Archaic lifestyle until
41 European contact. Reasons for this disappearance are unknown, but the popular theories are
42 climate change, invasion by an outside group, or overuse of the environment resulting in
43 widespread erosion and a lowering of the water table (Hauck 1977; Stegner and Kelly 2008).
44 Several Fremont sites have been recorded northeast of the Escalante Valley SEZ in the higher
45 elevations (Dalley 2009).
46
47

1 **13.1.17.1.2 Ethnohistory**
2

3 Late Prehistoric and Protohistoric sites date from A.D. 1100 to the early 19th century.
4 Inhabitants of the Escalante Valley during this time would primarily include the Numic-speaking
5 Southern Paiute. The Southern Paiute were mobile groups usually based near permanent water
6 sources suitable for floodplain or irrigation horticulture; they moved seasonally to take advantage
7 of a wide variety of plant and animal resources produced by variations in altitude and
8 topography. Small bands, often no larger than a nuclear family, followed a pattern of gathering
9 and hunting resources that were in season (Stoffle and Dobyns 1983). As part of a seasonal
10 round, these groups came together for communal hunts or to gather pine nuts. Winter and
11 farming villages were located near permanent water and included storage features for seeds and
12 roots. Plant resources tended to predominate. Basketry, sickles, seed beaters, nets, and weirs
13 were common food procurement tools along with bows and arrows, clubs, and traps (Kelly and
14 Fowler 1986). Characteristic brownware ceramics in the archaeological record have been
15 suggested as the best indicator of occupation by Numic groups. Other Native American groups
16 that may have visited or passed through the area during this time are the Ute and Shoshone, also
17 Numic speakers. The Ute were known to conduct raids on the Southern Paiute and participate in
18 slave trading. The following text discusses each of these Native American groups.
19
20

21 **Southern Paiute**
22

23 The proposed Escalante Valley SEZ lies within the area recognized by contemporary
24 Southern Paiutes as part of their traditional homeland (Stoffle and Dobyns 1983;
25 Stoffle et al. 1997). The Southern Paiute appear to have moved into southern Nevada and
26 southwestern Utah about A.D. 1150 (Euler 1964). Early ethnographies based on remnant groups
27 that had survived a 75% reduction in population resulting from the spread of European diseases,
28 Ute slave raids, and displacement from high-quality resource areas, reported small, struggling
29 nomadic bands (Kelly and Fowler 1986). More recent evidence suggests that before the arrival of
30 Euro-American colonists, the Southern Paiute may have been organized on a tribal level under
31 the ritual leadership of High Chiefs and bound together by a network of trails used by specialist
32 runners (Stoffle and Dobyns 1983). The Southern Paiute occupied territory that stretched from
33 the high Colorado Plateaus west and southwest following the bend in the Colorado River through
34 canyon country and the Basin and Range geologic province into the Mojave Desert. This
35 territory encompassed several different shifts in vegetation and corresponding differences in
36 subsistence practices. The proposed Escalante Valley SEZ falls within *Yanawant*, the traditional
37 eastern subdivision of the Southern Paiute (Stoffle et al. 1997). Situated in the Escalante Desert,
38 it is located in a little-used no-man's-land surrounded by the Cedar, Beaver, and Panguitch
39 groups (Kelly 1934). When first described by ethnographers, these groups did not maintain any
40 overall tribal organization; territories were self-sufficient economically; and the only known
41 organizations were kin-based bands, often no larger than that of a nuclear family (Kelly and
42 Fowler 1986).
43

44 The Southern Paiute practiced a mixed subsistence economy, gathering wild plant
45 resources, hunting, and fishing. They also maintained some floodplain and irrigated
46 agricultural fields and husbanded wild plants through transplanting, pruning, burning, and

1 irrigation (Stoffle and Dobyns 1983). The diet of the Southern Paiute was varied, but the harsh
2 climate of the area at times made subsistence precarious for these people. They were experts
3 in uses of botanicals, knowledge that was maintained primarily by the women, and this
4 knowledge of seasonal plant exploitation meant that at times the agricultural fields would have
5 been little maintained while groups were away from their base camp gathering resources
6 (Stoffle et al. 1999). The Southern Paiute maintained seasonal housing that corresponded to their
7 seasonal exploitation of resources. In the summer, they lived under trees with brush bedding,
8 using shades and windbreaks occasionally. After the fall harvest, they resided in conical or
9 subconical shaped houses or in caves. It was not until the late nineteenth century that teepees and
10 sweathouses were adopted from the Utes (Kelly and Fowler 1986). The Southern Paiute were a
11 non-warlike group, and consequently they were often the target of raids by their more aggressive
12 neighbors. Despite the Ute aggression, the Southern Paiute were on friendly terms with most of
13 the other groups north of the Colorado River and would visit, trade, hunt, or gather in each
14 other's territory and occasionally intermarry.

15
16 Basketry was one of the most characteristic crafts practiced by the Southern Paiute.
17 Conical burden baskets, fan-shaped trays for winnowing and parching (drying), seed beaters,
18 and water jugs were made from local plants. Pottery, usually unfired, was also made for daily
19 use. The annual cycle of seasonal plant exploitation required great mobility on the part of the
20 Southern Paiute, and consequently they often used the lighter weight baskets for carrying their
21 belongings.

22
23 The arrival of Europeans in the New World had serious consequences for the Southern
24 Paiute. Even before direct contact occurred, the spread of European diseases and the slave trade
25 implemented by Utes and Navajo on horseback for the Spanish colonial markets in New Mexico,
26 Sonora, and California resulted in significant depopulation. The Southern Paiutes retreated from
27 areas where there was an increased presence of Euro-American travelers, such as along the
28 Old Spanish Trail. They were further displaced by Euro-American settlers in Utah and Nevada,
29 who sought the same limited water supplies used by the Southern Paiute. Dependency on wild
30 plant resources likely increased during this time, as the Southern Paiute would have been forced
31 to withdraw into more remote areas away from the intruding Euro-Americans (Kelly and
32 Fowler 1986). As Euro-American settlements grew, the Southern Paiute were drawn into the
33 new economy, often serving as transient wage labor. Settlements or colonies of laborers grew
34 up around settlements, farms, and mines, often including individuals from across the Southern
35 Paiute homeland.

36
37 In 1865, an initial attempt to settle the Southern Paiutes in northeastern Utah with their
38 traditional enemies, the Utes, failed. The Moapa Reservation, established in eastern Nevada in
39 1875, was more successful. In the first decades of the twentieth century, small reservations were
40 created in southern Utah for the Shivwits, Indian Peak, Koosharem, and Kanosh Bands, and in
41 northern Arizona for the Kaibab. Colonies at Las Vegas and Pahrump, Nevada, along with
42 Cedar City, Utah, each acquired a small land base. Where feasible, the Southern Paiute farmed
43 or ranched on these reservations, but mostly they served as wage laborers, travelling great
44 distances. The various bands retained social and ceremonial ties with one another. In 1954, the
45 four Utah reservations were terminated by the Federal Government and their lands distributed
46 among tribal members, resulting in the loss of much of the land. The Southern Paiute

1 successfully filed claims with the Indian Claims Commission in the same decade. In 1980, the
2 Paiute Indian Tribe of Utah was created from the terminated Utah bands and the Cedar City
3 colony and restored to federal trust status (Stoffle and Dobyns 1983; Kelly and Fowler 1986).
4
5

6 **Western Shoshone**

7

8 The Western Shoshone are ethnically similar Central Numic speakers who traditionally
9 occupied the northwestern flank of Southern Paiute territory—stretching from eastern California
10 through central Nevada into northwestern Utah and southern Idaho. Those in western Utah in
11 the Salt Lake and Tooele Valleys are usually termed Goshutes (Thomas et al. 1986). Moving
12 primarily in small groups, depending on the abundance of resources available, they pursued a
13 mobile subsistence strategy following a seasonal round gathering a wide variety of plant
14 resources (Stoffle et al. 1990) supplemented by hunting. Pine nuts, available in the mountains
15 of eastern Nevada and western Utah, were a storable staple. Pronghorn antelope and bighorn
16 sheep were among the large game animals they hunted, but smaller game, including rodents,
17 birds, and, where available, fish, provided more protein. Groups, often identified by their home
18 territory, varied in size and composition with the seasons. The largest groups gathered for the
19 pine nut harvest, which may have included a rabbit or antelope drive as well. Winter villages,
20 consisting of conical structures overlaid with juniper bark, were usually close to stores of pine
21 nuts. Those groups closest to the Utah SEZs were the Snake Valley Shoshone and the Cedar
22 Valley Goshutes. They interacted peacefully with the Southern Paiutes, with whom they were
23 on good terms (Thomas et al. 1986).
24

25 Their first recorded contact with Euro-Americans was the trapper Jedediah Smith in
26 1827. The Western Shoshone were heavily affected by the Mormon migration to the Valley of
27 the Great Salt Lake beginning in 1847 and the onslaught of prospectors seeking gold and other
28 mineral wealth in California and Nevada beginning in 1849. The Shoshone were occasionally
29 hostile to miners and those traveling trails to the west, and attempts were made to negotiate
30 treaties and set up reservations beginning in 1860 (Rusco 1992). Never actually surrendering
31 their lands (the Western Shoshone were not willing to give up their mobile lifestyle), the Treaty
32 of Ruby Valley, in eastern Nevada, and the Treaty of Tooele Valley, in western Utah, were
33 signed in 1863. Reserves or “farms” were set aside for the Western Shoshone beginning in the
34 late 1850s; however, it wasn’t until after 1900 that federal lands were set aside for Western
35 Shoshone “colonies.” Those closest to the Utah SEZs are the Ely, Nevada, Colony and the
36 Goshute Reservation in Ibapah, Utah (Thomas et al. 1986).
37
38

39 **Ute**

40

41 Like the Southern Paiutes, the Utes speak a dialect of Southern Numic. The two groups
42 can understand each other’s speech, and the Beaver and Cedar groups of the Southern Paiute
43 adopted many cultural traits from the Utes to the extent that they were considered Utes by some
44 other Southern Paiute groups. The northeastern neighbors of the Southern Paiute, the Ute ranged
45 from the Oquirrh Mountains in the west to the Front Range in Colorado in the east. The range of

1 the Pahvant Band, centered on Sevier Lake and the Sevier River, overlapped with that of
2 Southern Paiute groups (Callaway et al. 1986).

3
4 Western Ute bands, concentrated along the Wasatch Front, shared many traits with the
5 Southern Paiutes and Western Shoshone, both in subsistence base and dwelling style. Unlike
6 the Eastern Utes, Western Utes lived in conical winter houses and used nets in their jackrabbit
7 drives. They were gatherers of roots, nuts, lilies, berries, and a variety of seed plants and
8 consumed crickets, grasshoppers, and locusts as well as jackrabbits, cottontails, mountain
9 sheep, deer, and fish. Like their Great Basin neighbors, they lived in highly mobile bands
10 whose membership was fluid, and like their western neighbors, as long as they remained
11 without horses they were subject to slaving raids by the Eastern Utes (Callaway et al. 1986).

12
13 Unlike their eastern counterparts, Western Utes did not encounter Euro-Americans in
14 their homelands until the mid-1700s. As with their Southern Paiute neighbors, the Pahvant band
15 suffered from the introduction of European diseases and the influx of Mormon settlers and
16 prospectors. By 1870 their population was decimated. The first Ute reservation was established
17 in 1868 in northeastern Utah. Many Utes were forced to move to the Uintah Reservation, but
18 small groups in the west refused to leave and eventually found a home on the reservations of the
19 Paiute Indian Tribe of Utah (Callaway et al. 1986; Simmons 2000).

20 21 22 ***13.1.17.1.3 History***

23
24 The earliest documented European presence in the Escalante Desert was the Dominguez-
25 Escalante Expedition, which began in July 1776.¹⁹ Two Catholic priests, Fathers Francisco
26 Atanasio Dominguez and Silvestre Velez de Escalante, were looking for a route from the
27 Spanish capital city of Santa Fe to the Spanish settlement of Monterey on the California coast.
28 A specific location of potential interest near the proposed SEZs in Utah is Thermo Hot Springs,
29 where the Dominguez-Escalante group cast lots to determine whether they would continue
30 forward or head back to Santa Fe. They were short on supplies, and it had started snowing, so
31 they decided to return to Santa Fe. The group traveled for more than 6 months on a 2,000-mi
32 (2,320-km) circle through the previously unexplored interior of the Great Basin. Although they
33 did not complete their intended goal, the maps and journals describing their travels and
34 encounters would prove very valuable to later expeditions, such as to Spanish/New Mexican
35 traders and Anglo-American fur trappers traveling the Old Spanish Trail in the 1820s and 1830s
36 (BLM 1976).

37
38 The Old Spanish Trail was an evolving trail system generally established in the early
39 nineteenth century, but tended to follow established paths used by earlier explorers, like
40 Dominguez and Escalante, and Native Americans. The trail is not a direct route due to a desire
41 to avoid hostile Indian Tribes, as well as the Grand Canyon. Several forks and cutoffs were
42 established as more and more travelers made use of the trail system. The 2,700-mi (4,345-km)
43 trail network crosses through six states with various paths between Santa Fe and Los Angeles.

¹⁹ Although it was technically illegal, traders from New Spain (New Mexico) would travel north to acquire Native American slaves for New Mexican settlers from at least the mid-1700s.

1 It was used primarily between 1829 and 1848 by New Mexican traders exchanging textiles for
2 horses. The portion of the trail of interest in the Escalante Desert is the Northern Route, which
3 passes through what today are the Utah towns of Parowan and Iron Springs. The trail cuts
4 through the Escalante Desert and passes relatively close to the proposed Escalante Valley SEZ
5 (NPS 2000).
6

7 With the ratification of the Treaty of Guadalupe Hidalgo in 1848, closing out the
8 Mexican-American War, the area came under American control. In 1847, the first American
9 settlers arrived in the Great Basin, among them Mormon immigrants under the leadership of
10 Brigham Young, who settled in the Valley of the Great Salt Lake. They sought to bring the
11 entire Great Basin under their control, establishing an independent State of Deseret. From its
12 center in Salt Lake City, the church sent out colonizers to establish agricultural communities
13 in surrounding valleys and missions to acquire natural resources such as minerals and timber.
14 Relying on irrigation to support their farms, the Mormons often settled in the same places as the
15 Fremont and Virgin Anasazi centuries before. The result was a scattering of planned agricultural
16 communities from northern Arizona to southern Idaho and parts of Wyoming, Nevada, and
17 southern California. Much of this area was included in the Utah Territory established by
18 Congress in 1850 (Arrington 1958). Utah did not achieve statehood until 1896.
19

20 In 1851, as a result of scouting efforts by Jefferson Hunt, a senior Mormon officer of
21 the Mormon Battalion, several Mormon settlements like Cedar City and Parowan arose in what
22 is today known as Iron County, Utah. Iron County is aptly named for its iron ore deposits.
23 Parowan was a halfway point between the Salt Lake Valley and southern California. Its
24 intended purpose was as an agricultural community to support the Mormon's iron mission. It
25 was in close proximity to Cedar City, where Mormon scouts had found a rich iron ore deposit
26 (200 million tons of 52% iron) near many cedar trees, which were an excellent source of fuel.
27 Committees of iron missionaries laid out the town, constructed a fort, roads, bridges, and canals,
28 and planted crops. Unfortunately, after 10 years of hard labor trying to make the iron mission a
29 success, the "small, volunteer, cooperative industry was simply unable to cope with the problems
30 associated with developing a major resource" (Arrington 1958).
31

32 One of the most important events in Utah (and in U.S.) history during the nineteenth
33 century was the completion of the transcontinental railroad at Promontory Summit, Utah, in
34 1869. The subsequent construction of connecting railroads through most other parts of the
35 territory was equally significant for the development of the region. Union Pacific (UP) was the
36 first railroad company to build in Utah and connect to the Central Pacific line at Promontory in
37 1869. Within 20 years, it became the largest railroad company in the territory. The movement of
38 goods and people became relatively easy through much of the territory. More goods meant more
39 money and more banks. The Church of Jesus Christ of the Latter-day Saints was in favor of the
40 railroad expansion, because it allowed more of its members to travel safely to new Zion at low
41 cost. The railroads were essential to the prosperity of the mining industry, and the mining
42 industry was instrumental in population growth. Between 1890 and 1920, mining companies
43 were heavily recruiting immigrant workers (European, Japanese, Mexican, and Chinese), who
44 were migrating into the United States at that time, to satisfy their labor needs. The railroads
45 changed not only the economy of Utah but also the settlement patterns. Stockyards, lumberyards,
46 and distribution centers were established along the lines. Commercial corridors followed the

1 tracks, and workers lived near where they worked. Social differences were accentuated on the
2 basis of which side of the tracks one lived (University of Utah 2009b). UP Railroad lines pass
3 through or near the proposed Escalante Valley SEZ. One of the station stops for the Los Angeles
4 to Salt Lake City line was located in Lund, Utah, less than 4 mi (6.4 km) from the north
5 boundary of the SEZ. In the early 1920s, a branch line was constructed from Lund to Cedar City
6 to encourage travel to the nearby national parks; this branch line marks the northeast edge of
7 the SEZ.
8
9

10 ***13.1.17.1.4 Traditional Cultural Properties***

11
12 The Southern Paiute see themselves as persisting in a cultural landscape composed of
13 many culturally significant places bound together into the land called *Puaxant Tuvip* (sacred land
14 or power land), created by a supernatural being who established a birthright relationship between
15 them and the land upon which they were created. Significant sites, such as the mountain
16 *Nuvagntu* (Mount Charleston in southwestern Nevada), have meaning for all Southern Paiutes
17 (Stoffle et al. 1997). Traditional cultural properties of significance to the Southern Paiute could
18 be present in the valleys. Government-to-government consultation is ongoing with these Native
19 American Tribes, so that their concerns, including any potential impacts on traditional cultural
20 properties, can be adequately addressed (see also Section 13.1.18 on Native American concerns
21 and Chapter 14 and Appendix K for a summary of government-to-government consultation for
22 this PEIS). Identification of traditional cultural properties may be considered sensitive and
23 therefore may not be fully described or disclosed in this PEIS.
24

25 To date, no traditional cultural properties have been identified within the proposed
26 Escalante Valley SEZ, nor have concerns been raised for traditional cultural properties or
27 sacred areas located in the vicinity of the SEZ. However, in the past the Southern Paiutes
28 have identified mountain springs, clay and rock sources, burial sites, rock art, trails, shrines,
29 ceremonial areas, and former habitation sites as sites of cultural importance (Stoffle and
30 Dobyns 1983) (see also Section 13.1.18).
31
32

33 ***13.1.17.1.5 Cultural Surveys and Known Archaeological and Historic Resources***

34
35 Eight linear archaeological surveys (mostly seismic lines) go through the proposed
36 Escalante Valley SEZ, but they do not cover much area in terms of acreage (Dalley 2009).
37 Two block sample surveys for the Intermountain Power Project were conducted on the western
38 border of the SEZ. Five sites have been recorded as a result of these 10 surveys in the southern
39 and western half of the SEZ; no sites have been recorded in the northern and eastern half
40 (Dalley 2009). Of the five sites, two are minor lithic scatters that are not eligible for the
41 *National Register of Historic Places* (NRHP); two are NRHP-eligible prehistoric sites in dune
42 areas (one contains a base of a Paleoindian point and the other includes some ceramic sherds);
43 and the fifth site is a lithic scatter with no diagnostic artifacts—its eligibility status is unclear
44 from the report but is likely not eligible. Two additional sites within the SEZ are noted on the
45 Utah Division of State History GIS database, but details regarding these sites are unknown at
46 this time (Utah SHPO 2009). Four additional sites were recorded from these surveys in areas

1 just outside of the SEZ boundary—two of unknown type and eligibility status, a minor ineligible
2 lithic scatter, and a hearth and burned rock scatter with one mano and a few flakes—its eligibility
3 status is unclear (Dalley 2009; Utah SHPO 2009).
4

5 Approximately 60 sites have been recorded within 5 mi (8 km) of the SEZ; one-third of
6 these sites were recorded north of the SEZ in blowout areas in the dunes for a geothermal leasing
7 project, and the others are mostly northwest of the main UP Railroad line or south of the SEZ.
8 No historic structures were observed within the proposed SEZ.
9

10 The SEZ has the potential to contain significant cultural resources, in addition to the two
11 previously recorded NRHP-eligible sites. Several chert flakes were found in the dune area in the
12 southwestern portion of the SEZ during a preliminary site visit; additional artifacts are likely to
13 be encountered in the area. Of all of the Utah SEZs, the dune areas in the Escalante Valley SEZ
14 have the highest potential to contain sites.
15

16 The Dominguez-Escalante Trail is reported to have come very close to the SEZ, likely to
17 the west. On the basis of preliminary maps, the Old Spanish Trail is located about 6 mi (10 km)
18 from the southern boundary of the SEZ; the mapped location is considered approximate. The UP
19 Railroad passes to the northwest of the SEZ with a rail stop in Lund; the branch line to Cedar
20 City cuts through the northeast corner of the SEZ.
21
22

23 ***National Register of Historic Places***

24

25 Within Iron County, 19 properties are listed in the NRHP. Most of these properties are
26 houses or are related to town (post offices, meeting halls, schools) and industrial (railroad depots,
27 mining sites) development. Other property types include cabins, farmsteads, and archaeological
28 sites. A historic district is also included, located in Cedar City. None of these properties is
29 located within or adjacent to the SEZ or within 5 mi (8 km) of the SEZ; the closest NRHP-listed
30 property is Old Irontown, just under 20 mi (32 km) from the SEZ to the south. Two of the sites in
31 Iron County listed on the NRHP are located on BLM-administered lands—Parowan Gap and
32 Gold Spring Historic Site. Parowan Gap is a Fremont rock art site of importance to the Paiute
33 Indians and is located approximately 20 mi (6 km) east of the Escalante Valley SEZ. The Gold
34 Spring Historic Site is a mining town located west of Escalante Valley near the Nevada border.
35
36

37 **13.1.17.2 Impacts**

38

39 Direct impacts on significant cultural resources could occur in the proposed Escalante
40 Valley SEZ; however, further investigation is needed at the project-specific level. A cultural
41 resource survey of the entire area of potential effects, including consultation with affected Native
42 American Tribes, would first need to be conducted to identify archaeological sites, historic
43 structures and features, and traditional cultural properties, and an evaluation would need to
44 follow to determine whether any are eligible for listing in the NRHP as historic properties. The
45 proposed Escalante Valley SEZ has a high potential for containing prehistoric sites in the dune
46 area on the west side of the SEZ; it also has some potential for containing historic sites.

1 Section 5.15 discusses the types of impacts that could occur on any significant cultural resources
2 found to be present within the Escalante Valley SEZ. Impacts will be minimized through the
3 implementation of required programmatic design features described in Appendix A,
4 Section A.2.2. Programmatic design features assume that the necessary surveys, evaluations, and
5 consultations will occur.
6

7 The Dominguez-Escalante Trail is reported to have come very close to the SEZ, likely
8 to the west, but since there is relatively little potential for finding traces of the single pack trail
9 itself, the potential for adverse effects on the trail is very low. The nearest well-documented
10 site related to the Dominguez-Escalante Trail is the Thermo Hot Springs (the BLM has a
11 Thermo Hot Springs and Casting of the Lots Wayside just outside of Lund, a few miles north
12 of the SEZ); this site would not be affected by solar development within the SEZ. The Old
13 Spanish Trail is located approximately 6 mi (10 km) from the southern boundary of the SEZ
14 and would not be affected physically by solar development within the SEZ. However, the
15 trail could be affected from a visual standpoint, although Table Butte would screen, or block,
16 the view of the solar development from the trail in the southwestern portion of the SEZ
17 (see Section 13.1.14.2.2). The largest potential for adverse impacts on significant cultural
18 resources is in the dune area of the SEZ. Dunes and blowout areas tend to have higher
19 archaeological site densities (Dalley 2009). At least two of the five prehistoric sites previously
20 recorded in this portion of the Escalante Valley SEZ have been determined eligible for the
21 NRHP. If solar development were to take place in this portion of the SEZ, direct impacts on
22 these sites, as described in Section 5.15, could occur and additional resources could be found
23 in the area.
24

25 Indirect impacts on cultural resources resulting from erosion outside of the SEZ boundary
26 (including along ROWs) are unlikely assuming programmatic design features to reduce water
27 runoff and sedimentation are implemented (as described in Appendix A, Section A.2.2). If
28 indirect impacts are likely to occur on the setting of historic properties, then these should be
29 examined and mitigated in an appropriate manner at the project-specific level.
30

31 The nearest state or U.S. route is 15 mi (24 km) from the SEZ (State Route 56), so a new
32 road is anticipated to be needed to access the Escalante Valley SEZ, resulting in approximately
33 109 acres (0.44 km²) of disturbance. The area nearest to State Route 56, the southwest corner of
34 the SEZ, is the area of highest potential for containing archaeological sites; direct impacts on
35 cultural resources from road construction are possible in this area. The access road could also
36 parallel the Old Spanish Trail as it turns south along the west side of Antelope Range at a
37 distance of less than 6 mi (10 km); no direct impacts as a result of road construction are
38 anticipated on the trail as long as the road is located sufficiently west of the base of the Antelope
39 Range. Approximately 3 mi (5 km) of transmission line is anticipated to be needed to connect to
40 the nearest existing line, resulting in approximately 91 acres (0.37 km²) of disturbance. The
41 nearest line is also closest to the southwest portion of the SEZ but to the east, away from the
42 dry lake and dune area, so the potential is somewhat reduced for direct impacts resulting from
43 construction. Impacts on cultural resources are possible in areas related to these associated
44 ROWs, because new areas of potential cultural significance could be directly affected by
45 construction or opened to increased access due to road and transmission ROW construction and
46 use. Indirect impacts are also possible from unauthorized surface collection depending on the

1 proximity of the ROW to potential archaeological sites. Impacts on cultural resources related to
2 the creation of new corridors not assessed in this PEIS would be evaluated at the project-specific
3 level if new road or transmission construction or line upgrades were to occur. Programmatic
4 design features assume that the necessary surveys, evaluations, and consultations will occur with
5 the ROWs, as with the SEZ footprint.
6
7

8 **13.1.17.3 SEZ-Specific Design Features and Design Feature Effectiveness** 9

10 Programmatic design features to mitigate adverse effects on significant cultural
11 resources, such as avoidance of significant sites and features, are provided in Appendix A,
12 Section A.2.2.
13

14 SEZ-specific design features would be determined in consultation with the Utah SHPO
15 and affected Tribes. Consultation efforts should include discussions on significant archaeological
16 sites and traditional cultural properties and on sacred sites and trails.
17

18 One design feature that can be identified at this time is the following:
19

- 20 • Avoidance of significant resources clustered in specific areas, such as those in
21 the vicinity of the dunes, is recommended.
22

1 **13.1.18 Native American Concerns**
2

3 Native Americans share many environmental and socioeconomic concerns with other
4 ethnic groups. For a discussion of issues of possible Native American concern shared with the
5 population as a whole, several sections in this PEIS should be consulted. General topics of
6 concern are addressed in Section 4.16. Specifically for the proposed Escalante Valley SEZ,
7 Section 13.1.17 discusses archaeological sites, structures, landscapes, and traditional cultural
8 properties; Section 13.1.8 discusses mineral resources; Section 13.1.9.1.3 discusses water rights
9 and water use; Section 13.1.10 discusses plant species; Section 13.1.11 discusses wildlife
10 species, including wildlife migration patterns; Section 13.1.13 discusses air quality;
11 Section 13.1.14 discusses visual resources; Sections 13.1.19 and 13.1.20 discuss socioeconomics
12 and environmental justice, respectively; and issues of human health and safety are discussed in
13 Section 5.21. This section focuses on concerns that are specific to Native Americans and to
14 which Native Americans bring a distinct perspective.
15

16
17 **13.1.18.1 Affected Environment**
18

19 The three Utah SEZs are clustered in the valleys and deserts of west-central Utah. They
20 fall within a Tribal traditional use area generally attributed to the Southern Paiute, most of which
21 has been so recognized by the courts (Royster 2008), but are close to the traditional ranges of the
22 Western Shoshone and the Utes with whom the Southern Paiute interacted. It is likely that
23 members of all three Tribes were present from time to time in this area. All federally recognized
24 Tribes with Southern Paiute roots or possible associations with the Utah SEZs have been
25 contacted and provided an opportunity to comment or consult regarding this PEIS. They are
26 listed in Table 13.1.18.1-1. A listing of all federally recognized Tribes contacted for this PEIS
27 is found in Appendix K.
28

29
30 ***13.1.18.1.1 Territorial Boundaries***
31

32
33 **Southern Paiutes**
34

35 The traditional territory of the Southern Paiute stretches from close to the Mojave River
36 in California to Moencopi Wash in Arizona, and from the Colorado River as far north as Sevier
37 Lake in Utah. It generally follows the right bank of the Colorado, including its tributary streams
38 and canyons in southern Nevada and Utah. The Southern Paiutes refer to this as *Puaxant Tuvip*,
39 sacred land or power land. According to Southern Paiute tradition, this is the land where they
40 were created and which they have a divine birthright to manage and protect. In the past, the
41 Southern Paiutes have occupied all of *Puaxant Tuvip*. While Southern Paiute groups tend to be
42 more concerned with lands close to where they now live, some places, such as *Nuvangantu*
43 (Mount Charleston, Nevada) are clearly recognized as important for all. In their view, all the
44 Southern Paiutes have a right to understand the impacts of any project being undertaken within
45 *Puaxant Tuvip*, and to participate in identifying, evaluating, and making recommendations about
46 potential impacts (Stoffle et al. 1997; Stoffle and Dobyns 1983).

TABLE 13.1.18.1-1 Federally Recognized Tribes with Traditional Ties to the Utah SEZs

Tribe	Location	State
Chemehuevi Indian Tribe	Havasu Lake	California
Colorado River Indian Tribes	Parker	Arizona
Confederated Tribes of the Goshute Reservation	Ibapah	Utah
Ely Shoshone Tribe	Ely	Nevada
Hopi Tribe	Kykotsmovi	Arizona
Kaibab Paiute Tribe	Fredonia	Arizona
Las Vegas Paiute Tribe	Las Vegas	Nevada
Moapa Band of Paiutes	Moapa	Nevada
Pahrump Paiute Tribe	Pahrump	Nevada
Paiute Indian Tribe of Utah	Cedar City	Utah
Cedar Band	Cedar City	Utah
Indian Peak Band	Cedar City	Utah
Kanosh Band	Kanosh	Utah
Koosharem Band	Cedar City	Utah
Shivwits Band	Ivins	Utah
San Juan Southern Paiute Tribe	Tuba City	Arizona
Skull Valley Band of Goshute Indians	Grantsville	Utah
Ute Indian Tribe	Fort Duchesne	Utah
Ute Mountain Ute Tribe	Towaoc	Colorado

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The three Utah SEZs are located in the northern part of Southern Paiute territory, in an area assigned by ethnographers to groups, or economic clusters, they designated Cedar and Beaver (Kelly 1934). Unlike most other Southern Paiute groups, these bands were not tied to a tributary of the Colorado River but were more closely linked to the internal drainage of the Sevier River. Stable dwelling sites were located along the river. The flat, largely waterless, valley bottoms where the SEZs are located would have seen more transitory use, mostly as a route of travel between resources clustered in the mountains (Kelly and Fowler 1986).

On the edge of *Puaxant Tuvip*, they acquired many attributes of their northern neighbors, the Utes, and were on friendly terms with the Western Shoshone. From a traditional Southern Paiute perspective, these groups were part of the eastern subtribe or *Yanawant* (Stoffle et al. 1997). Their descendants are found mainly in the Indian Peak and Cedar Bands of the Paiute Indian Tribe of Utah, and the Moapa Reservation in Nevada (Stoffle and Dobyns 1983). A summary of the history of the Southern Paiute is found in Section 13.1.17.1.2.

Western Shoshone

The Western Shoshone, although mainly ranging to the northwest of the SEZs, as friends of the Southern Paiute are likely to have been familiar with border regions and may have been present in the SEZs. Their traditional subsistence base was similar, although for the most part lacking in horticulture (Callaway et al. 1986). They share many concerns with the Southern

1 Paiute. All federally recognized Western Shoshone Tribes, including the Goshutes, have been
2 contacted. Those with the closest ties to the Utah SEZs are the Ely Shoshone Tribe, the
3 Confederated Tribes of the Goshute Reservation, and the Skull Valley Goshute Tribe.
4

5 6 **Ute**

7
8 The home territory of the Pahvant Band of the western Utes was located in the Sevier
9 River drainage and around Sevier Lake. Their territory overlapped that of the Beaver Southern
10 Paiute group, with whom they shared a language and many other cultural traits. Pahvant Ute
11 descendants are to be found on the Ute Reservation at Fort Duchesne, Utah, and scattered among
12 the reservations of the Paiute Indian Tribe of Utah (Thomas et al. 1986; Simmons 2000).
13

14 The proposed Escalante Valley SEZ yielded more evidence of Native American use than
15 the other two Utah SEZs (see Section 13.1.17.1.5). This suggests that in the past it was the
16 source of plant, animal, or mineral resources important to Native Americans and that those
17 resources are likely to still exist there.
18

19 20 **13.1.18.1.2 Plant Resources**

21
22 The vegetation present at the proposed Escalante Valley SEZ is described in
23 Section 13.1.10. The cover types present in the SEZ are from the Inter-Mountain Basins series.
24 They are mostly Mixed Salt Desert and Active and Stabilized Dune. There are smaller areas of
25 Greasewood Flat and Big Sagebrush. Greasewood and sagebrush are dominant species. Native
26 Americans made use of these plants for medicinal purposes, and greasewood seeds were
27 harvested for food. As shown in Table 13.1.18.1-2, very few of the many other plant species
28 traditionally used by Native Americans for food (Stoffle et al. 1999; Stoffle and Dobyns 1983)
29 are likely to be present in the SEZ.
30

31 32 **13.1.18.1.3 Other Resources**

33
34 Wildlife likely to be found in the proposed Escalante Valley SEZ is described in
35 Section 13.1.11. Because of the general aridity of the SEZ, few game species traditionally
36 important to Native Americans are found within the SEZ, although archaeological resources
37 found in the dune areas suggest that some species were exploited there in the past. The most
38 important are the black-tailed jackrabbit (*Lepus californicus*) and the pronghorn antelope
39 (*Antilocapra Americana*) (Stoffle and Dobyns 1983; Kelly and Fowler 1986). Of the large
40 game species, mule deer (*Odocoileus hemionus*) occur in the surrounding mountains but are
41 less common on the desert floor. Smaller game important to Native Americans found in the
42 SEZ include cottontails (*Sylvilagus audubonii*), chipmunks (*Neotamias minimus*), and wood
43 rats (*Neotoma lepida*).
44

45 Other animals traditionally important to the Southern Paiute include lizards, seven
46 species of which are likely to occur in the SEZ, and the golden eagle (*Aquila chrysaetos*).

TABLE 13.1.18.1-2 Plant Species Important to Native Americans Observed or Likely To Be Present in the Proposed Escalante Valley SEZ

Common Name	Scientific Name	Status
Food		
Chokecherry	<i>Prunus virginiana</i>	Possible
Dropseed	<i>Sporobolus</i> spp.	Possible
Greasewood	<i>Sarcobatus vermiculatus</i>	Observed
Indian ricegrass	<i>Achnatherum hymenoides</i>	Possible
Juniper	<i>Juniperus</i> sp.	Possible
Muhly	<i>Muhlenbergis</i> sp.	Possible
Saltbush	<i>Atriplex</i> spp.	Possible
Saltgrass	<i>Distichlis spicata</i>	Possible
Wolfberry	<i>Lycium andersonii</i>	Possible
Medicine		
Greasewood	<i>Sarcobatus vermiculatus</i>	Observed
Mormon tea	<i>Ephedra nevadensis</i>	Possible
Sagebrush	<i>Artemisia</i> spp.	Observed
Rabbitbrush	<i>Ericameria nauseosa</i>	Possible

Sources: Field visit and USGS (2005a).

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The SEZ falls within the range of the wide-ranging eagle. Animal species important to Native Americans that are likely to be present in the proposed SEZ are listed in Table 13.1.18.2-1.

Other natural resources traditionally important to the Southern Paiute include clay for pottery, salt, and naturally occurring mineral pigments for the decoration and protection of the skin (Stoffle and Dobyns 1983). There are some clay deposits in the playa soils along the southwestern edge of the SEZ (see Section 13.1.7).

13.1.18.2 Impacts

In the past, Southern Paiutes and the Western Shoshone have expressed concern over project impacts on a variety of resources. They tend to take a holistic view of their traditional homeland. For them, both cultural and natural features are inextricably bound together. Effects on one part have ripple effects on the whole. Western distinctions between the sacred and the secular have no meaning in their traditional worldview (Stoffle and Dobyns 1983). While no comments specific to the proposed Escalante Valley SEZ have been received from Native American Tribes to date, the Paiute Indian Tribe of Utah and the Skull Valley Band of Goshute Indians have asked to be kept informed of project developments. During energy development projects in adjacent areas, the Southern Paiute have expressed concern over adverse effects on a wide range of resources. Geophysical features and physical cultural remains are listed in Section 13.1.17.1.4. However, these places are often seen as important because they are the

TABLE 13.1.18.2-1 Animal Species Used by Native Americans as Food Whose Range Includes the Proposed Escalante Valley SEZ

Common Name	Scientific Name	Status
Mammals		
Black-tailed jackrabbit	<i>Lepus californicus</i> .	All year
Chipmunks	Various species	All year
Coyote	<i>Canis latrans</i>	All year
Desert cottontail	<i>Sylvilagus audubonii</i>	All year
Desert woodrat	<i>Neotoma lepida</i>	All year
Great Basin pocket mouse	<i>Perognathus parvus</i>	All year
Kangaroo rat	<i>Dipodomys ordii</i>	All year
Kit fox	<i>Vulpes macotis</i>	All year
Mule deer	<i>Odocoileus hemionus</i>	All year
Mountain cottontail	<i>Sylvilagus nuttallii</i>	All year
Mountain lion	<i>Puma concolor</i>	All year
Pocket gophers	<i>Thomomys</i> spp.	All year
Pronghorn	<i>Antilocarpa americana</i>	All year
Porcupine	<i>Erethizon dorsatum</i>	All year
White-tailed antelope squirrel	<i>Ammospermophilus leucurus</i>	All year
Birds		
Burrowing owl	<i>Athene cunicularia</i>	Summer
Common raven	<i>Corvus corax</i>	All year
Ferruginous hawk	<i>Buteo regalis</i>	Winter
Golden eagle	<i>Aquila chrysaetos</i>	All year
Great horned owl	<i>Bubo virginianus</i>	All year
Greater roadrunner	<i>Geococcyx californianus</i>	All year
Horned lark	<i>Eremophila alpestris</i>	All year
Mourning dove	<i>Zenaida macroura</i>	All year
Northern mockingbird	<i>Mimus polyglottos</i>	All year
Piñon jay	<i>Gymnorhinus cyanocephalus</i>	All year
Prairie falcon	<i>Falco mexicanus</i>	All year
Red-tailed hawk	<i>Buteo jamaicensis</i>	All year
Rough-legged hawk	<i>Buteo lagopus</i>	Winter
Sage grouse	<i>Centrocercus urophasianus</i>	All year
Western meadow lark	<i>Sturnella neglecta</i>	All year
Reptiles		
Horned lizard	<i>Phrynosoma platyrhinos</i>	All year
Large lizards	Various species	All year
Western rattlesnake	<i>Crotalis viridis</i>	All year

Sources: USGS (2005b); Fowler (1986).

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1 location of or have ready access to a range of plant, animal, and mineral resources
2 (Stoffle et al. 1997). Resources mentioned as important include food plants; medicinal plants;
3 plants used in basketry; plants used in construction; large game animals; small game animals;
4 birds; and sources of clay, salt, and pigments (Stoffle and Dobyns 1983). Those likely to be
5 found within the proposed Escalante Valley SEZ are discussed in Section 3.1.18.1.2. Traditional
6 plant knowledge is found most abundantly in Tribal elders, especially female elders
7 (Stoffle et al. 1999).

8
9 The Escalante Desert appears to have been a no-man's-land, for the most part rarely used
10 by the surrounding Native American groups. While it includes some plant species traditionally
11 important to Native Americans, they appear to be relatively scant. The most important
12 traditionally collected resource is likely to be the black-tailed jackrabbit. Development of utility-
13 scale solar energy facilities in the proposed SEZ would result in the loss of some plants
14 traditionally important to Native Americans and some habitat for traditionally important animal
15 species. As discussed in Section 13.1.10, the impact on plant resources is expected to be small to
16 moderate. For the most part, the vegetation communities that would be impacted are widely
17 distributed. As discussed in Section 13.1.11, the impact of the loss of animal habitat is expected
18 to be small since it is likewise widely distributed outside the SEZ.

19
20 As consultation with the Tribes continues and project-specific analyses are undertaken,
21 it is possible that Native American concerns will be expressed over potential visual, acoustic, and
22 other effects of solar energy development within the SEZ on specific resources and any
23 culturally important landscape.

24
25 Implementation of programmatic design features, as discussed in Appendix A,
26 Section A.2.2, should eliminate impacts on Tribes' reserved water rights and the potential for
27 groundwater contamination issues.

30 **13.1.18.3 SEZ-Specific Design Features and Design Feature Effectiveness**

31
32 Programmatic design features to address impacts of potential concern to Native
33 Americans, such as avoidance of sacred sites, water sources, and tribally important plant and
34 animal species, are provided in Appendix A, Section A.2.2.

35
36 The need for and nature of SEZ-specific design features regarding potential issues of
37 concern would be determined during government-to-government consultation with affected
38 Tribes listed in Table 13.1.18.1-1.

39
40 Mitigation of impacts on archaeological sites and traditional cultural properties is
41 discussed in Section 13.1.17.3, in addition to design features for historic properties discussed in
42 Section A.2.2 in Appendix A.

1 **13.1.19 Socioeconomics**

2
3
4 **13.1.19.1 Affected Environment**

5
6 This section describes current socioeconomic conditions and local community services
7 within the region of influence (ROI) surrounding the proposed Escalante Valley SEZ. The ROI
8 is a two-county area consisting of Iron County and Washington County in Utah. It encompasses
9 the area in which workers are expected to spend most of their salaries and in which a portion of
10 site purchases and nonpayroll expenditures from the construction, operation, and
11 decommissioning phases of the proposed SEZ facility is expected to take place.
12

13
14 **13.1.19.1.1 ROI Employment**

15
16 In 2008, employment in the ROI stood at 79,939 (Table 13.1.19.1-1). Over the period
17 1999 to 2008, the annual average employment growth rate was slightly higher in Washington
18 County (4.8%) than in Iron County (3.4%). At 4.4%, growth rates in the ROI as a whole were
19 higher than the average rate for Utah (2.1%).
20

21 In 2006, the service sector provided the highest percentage (34.2%) of employment in
22 the ROI, followed by the wholesale and retail trade at 23.2% (Table 13.1.19.1-2). Smaller
23 employment shares were held by transportation and public utilities. Within the ROI, the
24 distribution of employment across sectors varied compared with the ROI as a whole, with a
25 higher percentage of employment in transportation and public utilities in Washington County
26 (20.6%), and a higher percentage in agriculture (7.0%), construction (13.8%), and manufacturing
27 (13.1%) in Iron County.
28
29

**TABLE 13.1.19.1-1 Employment in the ROI
Surrounding the Proposed Escalante Valley SEZ**

SEZ and Location	1999	2008	Average Annual Growth Rate, 1999–2008 (%)
Iron County	14,571	20,300	3.4
Washington County	37,351	59,639	4.8
ROI	51,922	79,939	4.4
Utah	1,080,441	1,336,556	2.1

Sources: U.S. Department of Labor (2009a,b).

30
31

TABLE 13.1.19.1-2 Employment, by Sector, in 2006,^a in the ROI Surrounding the Proposed Escalante Valley SEZ

Industry	Iron County		Washington County		ROI	
	Employment	% of Total	Employment	% of Total	Employment	% of Total
Agriculture ^a	934	7.0	381	0.9	1,315	2.3
Mining	10	0.1	60	0.1	70	0.1
Construction	1,829	13.8	3,202	7.2	5,031	8.7
Manufacturing	1,732	13.1	1,344	3.0	3,076	5.3
Transportation and public utilities	363	2.7	9,146	20.6	9,509	16.5
Wholesale and retail trade	2,650	20.0	10,720	24.1	13,370	23.2
Finance, insurance, and real estate	646	4.9	3,678	8.3	4,324	7.5
Services	5,068	38.2	14,689	33.0	19,757	34.2
Other	10	0.1	10	0.0	20	0.0
Total	13,250		44,495		57,745	

^a Agricultural employment includes 2007 data for hired farmworkers.

Sources: U.S. Bureau of the Census (2009a); USDA (2009a).

1
2
3 **13.1.19.1.2 ROI Unemployment**
4

5 Unemployment rates have been similar in both counties in the ROI. Over the period
6 1999 to 2008, the average rate in both Iron County and Washington County was 4.1%, the same
7 as the rate for Utah as a whole (Table 13.1.19.1-3). Unemployment rates for the first five months
8 of 2009 contrast somewhat with rates for 2008 as a whole; in Washington County, the
9 unemployment rate increased to 7.1%, while rates reached 6.4% in Iron County. The average
10 rates for the ROI (6.9%) and Utah (5.2%) were also higher during this period than the
11 corresponding average rates for 2008.
12

13
14 **13.1.19.1.3 ROI Urban Population**
15

16 The population of the ROI in 2006 to 2008 was 92% urban, with a group of cities and
17 towns centered around St. George, in the south-central portion of Washington County and
18 centered on Cedar City, in the southwestern part of Iron County.
19

20 The largest urban area in Washington County, St. George, had an estimated
21 2008 population of 71,702; other cities in the county include Washington (17,452), Hurricane
22 (13,149), Ivins (7,729), Santa Clara (6,767), and La Verkin (4,448) (Table 13.1.19.1-4). In
23 addition, there are nine other cities and towns in the county with a 2008 population ranging from
24 192 to 1,952 persons. Most of these urban areas are about 50 mi (80 km) from the site of the
25 proposed SEZ. Population growth rates among these urban areas have varied over the period

**TABLE 13.1.19.1-3 Unemployment Rate (%)
in the ROI Surrounding the Proposed
Escalante Valley SEZ**

Location	1999–2008 (average)	2008	2009 ^a
Iron County	4.1	4.2	6.4
Washington County	4.1	4.6	7.1
ROI	4.1	4.5	6.9
Utah	4.1	3.4	5.2

^a Rates for 2009 are the average for January through May.

Sources: U.S. Department of Labor (2009a–c).

2000 to 2008. Washington grew at an annual rate of 9.9% during this period, with higher-than-average growth also experienced in Ivins (7.1%), Hurricane (6.0%), and Toquerville (5.1%). Rockville (0.7%), Apple Valley (0.6%), Hilldale (0.4%), and New Harmony (0.1%) all experienced lower growth rates between 2000 and 2008.

In Iron County, in addition to Cedar City (28,439), there are two cities, Enoch (5,076) and Parowan (2,606), with a 2008 population of more than 2,000 people. Population growth between 2000 and 2008 has been relatively high in Enoch (4.9%), with annual growth rates of 4.2% in Cedar City and less than 1% elsewhere in the county.

13.1.19.1.4 ROI Urban Income

Median household incomes varied considerably across cities and towns in the ROI. One city in Washington County, Santa Clara (\$67,942), had median incomes in 1999 that were higher than the average for the state (\$58,873), while median incomes were below the state average elsewhere in the ROI (Table 13.1.19.1-4). The cities of Hurricane (\$42,314), Hilldale (\$42,010), Parowan (\$41,749), and Cedar City (\$41,719) had relatively low median incomes in 1999.

Data on median household incomes for the period 2006 to 2008 were available for only two cities in the ROI. The median income growth rate for the period 1999 and 2006 to 2008 for St. George was 0.1%, while median incomes in Cedar City declined slightly (–0.1%). The average median household income growth rate for the state as a whole over this period was –0.5%.

TABLE 13.1.19.1-4 ROI Urban Population and Income for the Proposed Escalante Valley SEZ

City	Population			Median Household Income (\$ 2008)		
	2000	2008	Average Annual Growth Rate, 2000–2008 (%)	1999	2006–2008	Average Annual Growth Rate, 1999 and 2006–2008 (%) ^a
St. George	49,663	71,702	4.7	47,001	47,308	0.1
Cedar City	20,527	28,439	4.2	41,719	41,318	-0.1
Washington	8,816	17,452	9.9	45,502	NA ^b	NA
Hurricane	8,250	13,149	6.0	42,314	NA	NA
Ivins	4,450	7,729	7.1	53,171	NA	NA
Santa Clara	4,630	6,767	4.9	67,942	NA	NA
Enoch	3,467	5,076	4.9	48,112	NA	NA
La Verkin	3,392	4,448	3.4	46,285	NA	NA
Parowan	2,565	2,606	0.2	41,749	NA	NA
Hilldale	1,895	1,952	0.4	42,010	NA	NA
Enterprise	1,285	1,617	2.9	45,957	NA	NA
Toquerville	910	1,351	5.1	43,824	NA	NA
Leeds	547	756	4.1	53,110	NA	NA
Springdale	457	573	2.9	53,570	NA	NA
Virgin	394	551	4.3	47,578	NA	NA
Paragonah	470	477	0.2	43,721	NA	NA
Apple Valley	440	460	0.6	NA	NA	NA
Kannaraville	311	314	0.1	44,258	NA	NA
Rockville	247	261	0.7	48,819	NA	NA
New Harmony	190	192	0.1	44,526	NA	NA
Brian Head	118	126	0.8	56,732	NA	NA

^a Data are averages for the period 2006 to 2008.

^b NA = data not available.

Source: U.S. Bureau of the Census (2009b-d).

13.1.19.1.5 ROI Population

Table 13.1.19.1-5 presents recent and projected populations in the ROI surrounding the proposed SEZ and for the state as a whole for the period 2000 to 2008. Population in the ROI stood at 179,872 in 2008, having grown at an average annual rate of 4.7% since 2000. The growth rate for the ROI was higher than the rate for Utah (2.5%) over the same period.

Each county in the ROI has experienced growth in population since 2000. Washington County recorded a population growth rate of 5.2% between 2000 and 2008, while Iron County grew by 3.4% over the same period. The ROI population is expected to increase to 328,894 by 2021 and to 351,677 by 2023.

TABLE 13.1.19.1-5 Population in the ROI Surrounding the Proposed Escalante Valley SEZ

Location	2000	2008	Average Annual Growth Rate, 2000–2008 (%)	2021	2023
Iron County	33,779	44,194	3.4	66,796	69,173
Washington County	90,354	135,678	5.2	262,099	282,504
ROI	124,133	179,872	4.7	328,894	351,677
Utah	2,233,169	2,727,343	2.5	3,546,228	3,666,248

Sources: U.S. Bureau of the Census (2009e,f); Governor’s Office of Planning and Budget (2009).

13.1.19.1.6 ROI Income

Personal income in the ROI stood at \$4.3 billion in 2007 and has grown at an annual average rate of 4.7% over the period 1998 to 2007 (Table 13.1.19.1-6). ROI personal income per capita increased slightly over the same period, at a rate of 0.5%, from \$23,081 to \$24,290. Per capita incomes were slightly higher in Washington County (\$25,064) in 2007 than in Iron County (\$21,922). Personal income growth rates were higher in Washington County (5.1%), and lower in Iron County (3.5%), than for the state as a whole (2.9%). Personal income per capita was higher in Utah (\$30,927) in 2007 than in the ROI as a whole.

Median household income in the ROI in 2006 to 2008 varied between \$42,687 in Iron County and \$49,747 in Washington County (U.S. Bureau of the Census 2009d).

13.1.19.1.7 ROI Housing

In 2007, nearly 70,000 housing units were located in the two counties, with almost 75% of these located in Washington County (Table 13.1.19.1-7). Owner-occupied units compose approximately 74% of the occupied units in the two counties, with rental housing making up 26% of the total. Vacancy rates in 2007 were higher in Iron County (23.46%) than in Washington County (17.1%). With an overall vacancy rate of 18.7% in the ROI, there were 9,530 vacant housing units in the ROI in 2007, of which 4,075 (2,540 in Washington County, and 1,643 in Iron County) are estimated to be rental units that would be available to construction workers. There were 6,348 seasonal, recreational, or occasional-use units vacant at the time of the 2000 Census.

Housing stock in the ROI as a whole grew at an annual rate of 4.9% over the period 2000 to 2007, with 19,888 new units added to the existing housing stock in the ROI (Table 13.1.19.1-7).

TABLE 13.1.19.1-6 Personal Income in the ROI Surrounding the Proposed Escalante Valley SEZ

Location	1998	2007	Annual Average Growth Rate, 1998–2007 (%)
Iron County			
Total income ^a	0.7	0.9	3.5
Per-capita income	21,352	21,922	0.3
Washington County			
Total income ^a	2.0	3.3	5.1
Per-capita income	23,726	25,064	0.6
ROI			
Total income ^a	2.7	4.3	4.7
Per-capita income	23,081	24,290	0.5
Utah			
Total income ^a	61.9	82.4	2.9
Per-capita income	28,567	30,927	0.8

^a Unless indicated otherwise, values are reported in \$ billion 2008.

Sources: U.S. Department of Commerce (2009); U.S. Bureau of the Census (2009e,f).

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The median value of owner-occupied housing in the ROI in 2006 to 2008 varied between \$217,700 in Iron County and \$250,800 in Washington County (U.S. Bureau of the Census 2009g).

13.1.19.1.8 ROI Local Government Organizations

Table 13.1.19.1-8 lists the various local and county government organizations in the ROI. In addition, there is one Tribal government located in the ROI, with members of other Tribal groups located in the ROI, but whose Tribal governments are located in adjacent states.

13.1.19.1.9 ROI Community and Social Services

This section describes educational, health-care, law enforcement, and firefighting resources in the ROI for the proposed Escalante Valley SEZ.

TABLE 13.1.19.1-7 Housing Characteristics in the ROI Surrounding the Proposed Escalante Valley SEZ

Parameter	2000	2007 ^a
Iron County		
Owner-occupied	7,040	8,387
Rental	3,587	5,387
Vacant units	2,991	4,202
Seasonal and recreational use	1,986	NA ^a
Total units	13,618	17,976
Washington County		
Owner-occupied	22,128	30,795
Rental	7,811	12,326
Vacant units	6,539	8,887
Seasonal and recreational use	4,362	NA
Total units	36,478	52,008
ROI		
Owner-occupied	29,168	39,182
Rental	11,398	17,713
Vacant units	9,530	13,089
Seasonal and recreational use	6,348	NA
Total units	50,096	69,984

^a NA = data not available.

Sources: U.S. Bureau of the Census (2009h-j).

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Schools

In 2007, there were a total of 64 public and private elementary, middle, and high schools in the three-county ROI (NCES 2009). Table 13.1.19.1-9 provides summary statistics for enrollment, educational staffing, and two indices of educational quality—student teacher ratios, and levels of service (number of teachers per 1,000 population). The student-teacher ratio in Washington County schools (22.1) is slightly higher than that for schools in Iron County (21.2), while the level of service is slightly higher in Iron County (9.3).

Health Care

With a much larger number of physicians (277), the number of doctors per 1,000 population in Washington County (2.1) is also higher than in Iron County (1.3) (Table 13.1.19.1-10). The smaller number of health-care professionals in Iron County may mean that residents of these counties have poorer access to specialized health care; a substantial number of county residents might also travel to Washington County for their medical care.

TABLE 13.1.19.1-8 ROI Local Government Organizations and Social Institutions in the Proposed Escalante Valley SEZ

Governments

City

Brian Head	Paragonah
Cedar City	Parowan
Enoch	Rockville
Enterprise	Santa Clara
Hilldale	Springdale
Hurricane	St. George
Ivins	Toquerville
La Verkin	Virgin
Leeds	Washington

County

Iron County	Washington County
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Tribal

Paiute Indian Tribe of Utah

Sources: U.S. Bureau of the Census (2009b);
U.S. Department of the Interior (2010).

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TABLE 13.1.19.1-9 School District Data in 2007 for the ROI Surrounding the Proposed Escalante Valley SEZ

Location	Number of Students	Number of Teachers	Student-Teacher Ratio	Level of Service ^a
Iron County	8,522	402	21.2	9.3
Washington County	24,357	1,103	22.1	8.3
ROI	32,879	1,505	21.9	8.6

^a Number of teachers per 1,000 population.

Source: NCES (2009).

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Public Safety

7 Several state, county, and local police departments provide law enforcement in
8 the ROI. Iron County has 31 officers and would provide law enforcement services to the
9 SEZ (Table 13.1.19.1-11), while Washington County has 45 officers. There are currently
10 8 professional firefighters in Iron County, and 10 in Washington County (Table 13.1.19.1-11).
11 Levels of service in police protection are similar in both Iron County and Washington County.

TABLE 13.1.19.1-10 Physicians in 2007 in the ROI Surrounding the Proposed Escalante Valley SEZ

Location	Number of Primary Care Physicians	Level of Service ^a
Iron County	55	1.3
Washington County	277	2.1
ROI	332	1.9

^a Number of physicians per 1,000 population.

Source: AMA (2009).

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TABLE 13.1.19.1-11 Public Safety Employment in the ROI Surrounding the Proposed Escalante Valley SEZ

Location	Number of Police Officers ^a	Level of Service ^b	Number of Firefighters ^c	Level of Service ^b
Iron County	31	0.7	8	0.2
Washington County	45	0.3	10	0.1
ROI	76	0.4	18	0.1

^a 2007 data.

^b Number per 1,000 population.

^c 2008 data; number does not include volunteers.

Sources: Fire Departments Network (2009); U.S. Department of Justice (2008).

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13.1.19.1.10 ROI Social Structure and Social Change

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7 Community social structures and other forms of social organization within the ROI are
8 related to various factors, including historical development, major economic activities and
9 sources of employment, income levels, race and ethnicity, and forms of local political
10 organization. Although an analysis of the character of community social structures is beyond the
11 scope of the current programmatic analysis, project-level NEPA analyses would include a
12 description of ROI social structures, contributing factors, their uniqueness, and consequently, the
13 susceptibility of local communities to various forms of social disruption and social change.

14

15 Various energy development studies have suggested that once the annual growth in
16 population is between 5 and 15% in smaller rural communities, alcoholism, depression, suicide,

TABLE 13.1.19.1-12 County and ROI Crime Rates for the Proposed Escalante Valley SEZ^a

	Violent Crime ^b		Property Crime ^c		All Crime	
	Offenses	Rate	Offenses	Rate	Offenses	Rate
Iron County	56	1.2	1,085	23.7	1,141	24.9
Washington County	270	1.8	3,197	21.6	3,467	23.4
ROI	326	1.7	4,282	22.1	4,608	23.8

^a Rates are the number of crimes per 1,000 population.

^b Violent crime includes murder and non-negligent manslaughter, forcible rape, robbery, and aggravated assault.

^c Property crime includes burglary, larceny, theft, motor vehicle theft, and arson.

Sources: U.S. Department of Justice (2009a,b).

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TABLE 13.1.19.1-13 Alcoholism, Drug Use, Mental Health, and Divorce in the Proposed Escalante Valley SEZ ROI^a

Geographic Area	Alcoholism	Illicit Drug Use	Mental Health ^b	Divorce ^c
Utah Southwest Region (includes Iron County and Washington County)	5.6	2.5	11.3	— ^d
Utah				4.3

^a Data for alcoholism and drug use represent percentage of the population over 12 years of age with dependence or abuse of alcohol, illicit drugs. Data are averages for 2004 to 2006.

^b Data for mental health represent percentage of the population over 18 years of age suffering from serious psychological distress. Data are averages for 2002 to 2004.

^c Divorce rates are the number of divorces per 1,000 population. Data are for 2007.

^d A dash indicates not applicable.

Sources: SAMHSA (2009); CDC (2009).

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social conflict, divorce, and delinquency would increase and levels of community satisfaction would deteriorate (BLM 1980, 1983, 1996). Data on violent crime and property crime rates and on alcoholism and illicit drug use, mental health, and divorce, which might be used as indicators of social change, are presented in Tables 13.1.19.1-12 and 13.1.19.1-13, respectively.

10 There is some variation in the level of crime across the ROI, with slightly higher rates of
11 violent crime in Washington County (1.8 per 1,000 population) than in Iron County (1.2), and

1 slightly higher rates of property crime in Iron County (23.7) than in Washington County (21.6)
2 (Table 13.1.19.1-12). The overall crime rate in the ROI was 23.8 offenses per 1,000 population.
3

4 Other measures of social change—alcoholism, illicit drug use, and mental health—are
5 not available at the county level and thus are presented for the Substance Abuse and Mental
6 Health Services Administration (SAMHSA) region in which the ROI is located
7 (Table 13.1.19.1-13).
8
9

10 **13.1.19.1.11 ROI Recreation**

11
12 There are various areas in the vicinity of the proposed SEZ that are used for recreational
13 purposes, with natural, ecological, and cultural resources in the ROI attracting visitors for a
14 range of activities, including hunting, fishing, boating, canoeing, wildlife watching, camping,
15 hiking, horseback riding, mountain climbing, and sightseeing. These activities are discussed in
16 Section 13.1.5.
17

18 Because the number of visitors using state and federal lands for recreational activities is
19 not available from the various administering agencies, the value of recreational resources in these
20 areas, based solely on the number of recorded visitors, is likely to be an underestimation. In
21 addition to visitation rates, the economic valuation of certain natural resources can also be
22 assessed in terms of the potential recreational destination for current and future users, that is,
23 their nonmarket value (see Section 5.17.1.1.1).
24

25 Another method is to estimate the economic impact of the various recreational activities
26 supported by natural resources on public land in the vicinity of the proposed solar development,
27 by identifying sectors in the economy in which expenditures on recreational activities occur. Not
28 all activities in these sectors are directly related to recreation on state and federal lands, with
29 some activity occurring on private land (e.g., dude ranches, golf courses, bowling alleys, and
30 movie theaters). Expenditures associated with recreational activities form an important part of
31 the economy of the ROI. In 2007, 9,219 people were employed in the ROI in the various sectors
32 identified as recreation, constituting 11.3% of total ROI employment (Table 13.1.19.1-14).
33 Recreation spending also produced almost \$163.3 million in income in the ROI in 2007. The
34 primary sources of recreation-related employment were eating and drinking places.
35
36

37 **13.1.19.2 Impacts**

38
39 The following analysis begins with a description of the common impacts of solar
40 development, including common impacts on recreation and on social change. These
41 impacts would occur regardless of the solar technology developed in the SEZ. The impacts
42 of developments employing various solar energy technologies are analyzed in detail in
43 subsequent sections.
44

TABLE 13.1.19.1-14 Recreation Sector Activity in the Proposed Escalante Valley SEZ ROI, 2007

ROI	Employment	Income (\$ million)
Amusement and recreation services	565	11.3
Automotive rental	66	1.8
Eating and drinking places	6,318	99.9
Hotels and lodging places	1,340	31.0
Museums and historic sites	30	0.9
Recreational vehicle parks and campsites	87	1.3
Scenic tours	118	5.2
Sporting goods retailers	695	11.9
Total ROI	9,219	163.3

Source: MIG, Inc. (2010).

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3 **13.1.19.2.1 Common Impacts**
4

5 Construction and operation of a solar energy facility at the proposed SEZ would produce
6 direct and indirect economic impacts. Direct impacts would occur as a result of expenditures on
7 wages and salaries, procurement of goods and services required for project construction and
8 operation, and the collection of state sales and income taxes. Indirect impacts would occur as
9 project wages and salaries, procurement expenditures, and tax revenues subsequently circulate
10 through the economy of each state, thereby creating additional employment, income, and tax
11 revenues. Facility construction and operation would also require in-migration of workers and
12 their families into the ROI surrounding the site, which would affect population, rental housing,
13 health service employment, and public safety employment. Socioeconomic impacts common to
14 all utility-scale solar energy developments are discussed in detail in Section 5.17.1. These
15 impacts will be minimized through the implementation of programmatic design features
16 described in Appendix A, Section A.2.2.
17
18

19 **Recreation Impacts**
20

21 Estimating the impact of solar facilities on recreation is problematic because it is
22 not clear how solar development in the SEZ would affect recreational visitation and
23 nonmarket values (i.e., the value of recreational resources for potential or future visits; see
24 Section 5.17.1.2.3). While it is clear that some land in the ROI would no longer be accessible
25 for recreation, the majority of popular recreational locations would be precluded from solar
26 development. It is also possible that solar development in the ROI would be visible from popular
27 recreation locations, and that construction workers residing temporarily in the ROI would occupy
28 accommodation otherwise used for recreational visits, thus reducing visitation and consequently
29 affecting the economy of the ROI.
30

1 **Social Change**

2
3 Although an extensive literature in sociology documents the most significant components
4 of social change in energy boomtowns, the nature and magnitude of the social impact of energy
5 developments in small rural communities are still unclear (see Section 5.17.1.1.4). While some
6 degree of social disruption is likely to accompany large-scale in-migration during the boom
7 phase, there is insufficient evidence to predict the extent to which specific communities are
8 likely to be affected, which population groups within each community are likely to be most
9 affected, and the extent to which social disruption is likely to persist beyond the end of the boom
10 period (Smith et al. 2001). Accordingly, because of the lack of adequate social baseline data, it
11 has been suggested that social disruption is likely to occur once an arbitrary population growth
12 rate associated with solar energy development projects has been reached, with an annual rate of
13 between 5 and 10% growth in population assumed to result in a breakdown in social structures,
14 with a consequent increase in alcoholism, depression, suicide, social conflict, divorce,
15 delinquency, and deterioration in levels of community satisfaction (BLM 1980, 1983, 1996).

16
17 In overall terms, the in-migration of workers and their families into the ROI would
18 represent an increase of 0.4% in county population during construction of the trough technology,
19 with smaller increases for the power tower, dish engine, and PV technologies, and during the
20 operation of each technology. While it is possible that some construction and operations workers
21 will choose to locate in communities closer to the SEZ, the lack of available housing in smaller
22 rural communities in the ROI to accommodate all in-migrating workers and families, and the
23 insufficient range of housing choices to suit all solar occupations, make it likely that many
24 workers will commute to the SEZ from larger communities elsewhere in the ROI, thus reducing
25 the potential impact of solar development on social change. Regardless of the pace of population
26 growth associated with the commercial development of solar resources, and the likely residential
27 location of in-migrating workers and families in communities some distance from the SEZ itself,
28 the number of new residents from outside the ROI is likely to lead to some demographic and
29 social change in small rural communities in the ROI. Communities hosting solar development
30 are likely to be required to adapt to a different quality of life, with a transition away from a more
31 traditional lifestyle involving ranching and taking place in small, isolated, close-knit,
32 homogenous communities with a strong orientation toward personal and family relationships,
33 toward a more urban lifestyle, with increasing cultural and ethnic diversity and increasing
34 dependence on formal social relationships within the community.

35
36
37 **Livestock Grazing Impacts**

38
39 Cattle ranching and farming supported 138 jobs and \$0.6 million in income in the ROI
40 in 2007 (MIG, Inc. 2010). The construction and operation of solar facilities in the proposed
41 Escalante Valley SEZ could result in a decline in the amount of land available for livestock
42 grazing, resulting in total (direct plus indirect) impacts of the loss of three jobs and less than
43 \$0.1 million in income in the ROI. There would also be a decline in grazing fees payable to the
44 BLM and to the USFS by individual permittees based on the number of AUMs required to
45 support livestock on public land. Assuming the 2008 fee of \$1.35 per AUM, grazing fee losses
46 would amount to \$147 annually on land dedicated to solar development in the SEZ.

1 **Transmission Line Impacts**

2

3 The impacts of transmission line construction could include the addition of 15 jobs in the

4 ROI (including direct and indirect impacts) in the peak year of construction (Table 13.1.19.2-1).

5 Construction activities in the peak year would constitute less than 1% of total ROI employment.

6 A transmission line would also produce \$0.6 million in ROI income. Direct sales taxes and direct

7 income taxes would be less than \$0.1 million in the peak year.

8

9 Given the likelihood of local worker availability in the required occupational categories,

10 construction of a transmission line would mean that some in-migration of workers and their

11 families from outside the ROI would be required, with 11 persons in-migrating into the Escalante

12

13

TABLE 13.1.19.2-1 ROI Socioeconomic Impacts of a 230-kV Transmission Line at the Proposed Escalante Valley SEZ^a

Parameter	Construction	Operations
Employment (no.)		
Direct	6	<1
Total	15	<1
Income ^b		
Total	0.6	<0.1
Direct state taxes ^b		
Sales	<0.1	<0.1
Income	<0.1	<0.1
In-migrants (no.)	11	0
Vacant housing ^c (no.)	6	0
Local community service employment		
Teachers (no.)	0	0
Physicians (no.)	0	0
Public safety (no.)	0	0

^a Construction impacts assume 3 mi (5 km) of new transmission line for the Escalante Valley SEZ. Construction impacts are assessed for the peak year of construction.

^b Unless indicated otherwise, values are reported in \$ million 2008.

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

1 Valley ROI during the peak construction year. Although in-migration may potentially affect
2 local housing markets, the relatively small number of in-migrants and the availability of
3 temporary accommodations (hotels, motels, and mobile home parks) would mean that the impact
4 of solar facility construction on the number of vacant rental housing units is not expected to be
5 large, with six rental units expected to be occupied in the Escalante Valley ROI. This occupancy
6 rate would represent less than 1% of the vacant rental units expected to be available in the ROI in
7 the peak year.

8
9 No new community service employment would be required in order to meet existing
10 levels of service in the three ROIs.

11
12 Total operations employment impacts in the ROI (including direct and indirect impacts)
13 of a transmission line would be less than one job during the first year of operation
14 (Table 13.1.19.2-1) and would produce less than \$0.1 million in income. Direct sales taxes
15 would be less than \$0.1 million in the first year, with direct income taxes of less than
16 \$0.1 million.

17
18 Operation of a transmission line would not require the in-migration of workers and their
19 families from outside the ROI; consequently, no impacts on housing markets in the ROI would
20 be expected, and no new community service employment would be required in order to meet
21 existing levels of service in the ROI.

22 23 24 **Access Road Impacts**

25
26 The impacts of construction of an access road connecting the Escalante Valley SEZ could
27 include the addition of 346 jobs in the ROI (including direct and indirect impacts) in the peak
28 year of construction (Table 13.1.19.2-2). Construction activities in the peak year would
29 constitute less than 1% of total ROI employment. Access road construction would also produce
30 \$10.0 million in ROI income. Direct income taxes and direct sales taxes would be \$0.3 million
31 and \$0.2 million, respectively, in the peak year.

32
33 Given the likelihood of local worker availability in the required occupational categories,
34 construction of an access road would mean that some in-migration of workers and their families
35 from outside the ROI would be required, with 138 persons in-migrating into the Escalante Valley
36 ROI during the peak construction year. Although in-migration may potentially affect local
37 housing markets, the relatively small number of in-migrants and the availability of temporary
38 accommodations (hotels, motels, and mobile home parks) would mean that the impact of
39 access road construction on the number of vacant rental housing units is not expected to be large,
40 with 69 rental units expected to be occupied in the Escalante Valley ROI. This occupancy rate
41 would represent less than 1% of the vacant rental units expected to be available in the ROI in the
42 peak year.

43
44 In addition to the potential impact on housing markets, in-migration would affect
45 community service employment (education, health, and public safety). An increase in such
46 employment would be required to meet existing levels of service in the ROI. Accordingly,

TABLE 13.1.19.2-2 ROI Socioeconomic Impacts of an Access Road Connecting to the Proposed Escalante Valley SEZ^a

Parameter	Construction	Operations
Employment (no.)		
Direct	177	<1
Total	346	<1
Income ^b		
Total	10.0	<0.1
Direct state taxes ^b		
Sales	0.3	<0.1
Income	0.2	<0.1
In-migrants (no.)	138	0
Vacant housing ^c (no.)	69	0
Local community service employment		
Teachers (no.)	1	0
Physicians (no.)	0	0
Public safety (no.)	0	0

^a Construction impacts assume 15 mi (24 km) of new access road for the Escalante Valley SEZ. Construction impacts are assessed for the peak year of construction.

^b Unless indicated otherwise, values are reported in \$ million 2008.

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

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one new teacher would be required in the ROI. The increase would represent less than 0.1% of total ROI employment expected in this occupation.

Total operations (maintenance) employment impacts in the ROI (including direct and indirect impacts) of an access road would be less than one job during the first year of operation (Table 13.1.19.2-1) and would produce less than \$0.1 million in income. Direct sales taxes would be less than \$0.1 million in the first year, and direct income taxes, less than \$0.1 million.

Operation of an access road would not require the in-migration of workers and their families from outside the ROI; consequently, no impacts on housing markets in the ROI would

1 be expected, and no new community service employment would be required in order to meet
2 existing levels of service in the ROI.
3
4

5 **13.1.19.2.2 Technology-Specific Impacts**

6

7 The economic impacts of solar energy development in the proposed SEZ were measured
8 in terms of employment, income, state tax revenues (sales and income), population in-migration,
9 housing, and community service employment (education, health, and public safety). More
10 information on the data and methods used in the analysis are provided in Appendix M.
11

12 The assessment of the impact of the construction and operation of each technology was
13 based on SEZ acreage, assuming 80% of the area could be developed, with one solar project
14 assumed to be constructed within a given year, and assumed to disturb up to 3,000 acres
15 (12 km²) of land. To capture a range of possible impacts, solar facility size was assessed
16 according to the land requirements of various solar technologies, assuming that 9 acres/MW
17 (0.04 km²/MW) would be required for power tower, dish engine, and PV technologies and
18 5 acres/MW (0.02 km²/MW) would be required for solar trough technologies. Impacts of
19 multiple facilities employing a given technology at each SEZ were assumed to be the same as
20 impacts for a single facility with the same total capacity. Construction impacts were assessed for
21 a representative peak year of construction, assumed to be 2021 for each technology. For
22 operations impacts, a representative first year of operations was assumed to be 2023 for trough
23 and power tower and 2022 for the minimum facility size for dish engine and PV, and 2023 was
24 assumed for the maximum facility size for these technologies. The years of construction and
25 operations were selected as representative of the entire 20-year study period because they are the
26 approximate midpoint; construction and operations could begin earlier.
27
28

29 **Solar Trough**

30
31

32 **Construction.** Total construction employment impacts in the ROI (including direct
33 and indirect impacts) from the use of solar trough technologies would be up to 3,518 jobs
34 (Table 13.1.19.2-3). Construction activities would constitute 2.4% of total ROI employment.
35 A solar facility would also produce \$177.6 million in income. Direct sales taxes would be
36 \$3.5 million, and direct income taxes \$6.1 million.
37

38 Given the scale of construction activities and the likelihood of local worker availability
39 in the required occupational categories, construction of a solar facility would mean that some
40 in-migration of workers and their families from outside the ROI would be required, with
41 1,325 persons in-migrating into the ROI. Although in-migration may potentially affect local
42 housing markets, the relatively small number of in-migrants and the availability of temporary
43 accommodations (hotels, motels, and mobile home parks) mean that the impact of solar facility
44 construction on the number of vacant rental housing units would not be expected to be large,
45 with 663 rental units expected to be occupied in the ROI. This occupancy rate would represent
46 9.2% of the vacant rental units expected to be available in the ROI.

TABLE 13.1.19.2-3 ROI Socioeconomic Impacts Assuming Full Build-out of the Proposed Escalante Valley SEZ with Trough Facilities^a

Parameter	Maximum Annual Construction Impacts	Operations Impacts
Employment (no.)		
Direct	1,682	232
Total	3,518	380
Income ^b		
Total	177.6	11.6
Direct state taxes ^b		
Sales	3.5	0.1
Income	6.1	0.4
BLM payments (\$ million 2008)		
Rental	NA ^c	0.4
Capacity ^d	NA	7.0
In-migrants (no.)	1,325	76
Vacant housing ^e (no.)	663	68
Local community service employment		
Teachers (no.)	11	1
Physicians (no.)	3	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 600 MW (corresponding to 3,000 acres [12 km²] of land disturbance) could be built. Operations impacts were based on full build-out of the site, producing a total output of 1,058 MW.

^b Unless indicated otherwise, values are reported in \$ million 2008.

^c NA = not applicable.

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

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

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,
4 11 new teachers, 3 physicians, and 1 public safety employee (career firefighters and uniformed
5 police officers) would be required in the ROI. These increases would represent 0.4% of total
6 ROI employment expected in these occupations.
7
8

9 **Operations.** Total operations employment impacts in the ROI (including direct
10 and indirect impacts) of a build-out using solar trough technologies would be 380 jobs
11 (Table 13.1.19.2-3). Such a solar facility would also produce \$11.6 million in income.
12 Direct sales taxes would be \$0.1 million, and direct income taxes, \$0.4 million. Based on fees
13 established by the BLM in its Solar Energy Interim Rental Policy (BLM 2010b), acreage rental
14 payments would be \$0.4 million, and solar generating capacity payments would total at least
15 \$7.0 million.
16

17 Given the likelihood of local worker availability in the required occupational categories,
18 operation of a solar facility would mean that some in-migration of workers and their families
19 from outside the ROI would be required, with 76 persons in-migrating into the ROI. Although
20 in-migration may potentially affect local housing markets, the relatively small number of
21 in-migrants and the availability of temporary accommodations (hotels, motels, and mobile home
22 parks) mean that the impact of solar facility operation on the number of vacant owner-occupied
23 housing units would not be expected to be large, with 68 owner-occupied units expected to be
24 occupied in the ROI.
25

26 In addition to the potential impact on housing markets, in-migration would affect
27 community service (health, education, and public safety) employment. An increase in such
28 employment would be required to meet existing levels of service in the provision of these
29 services in the ROI. Accordingly, one new teacher would be required in the ROI.
30
31

32 **Power Tower**

33
34

35 **Construction.** Total construction employment impacts in the ROI (including direct
36 and indirect impacts) from the use of power tower technologies would be up to 1,394 jobs
37 (Table 13.1.19.2-4). Construction activities would constitute 1.0% of total ROI employment.
38 Such a solar facility would also produce \$70.7 million in income. Direct sales taxes would be
39 \$1.0 million, with direct income taxes of \$2.4 million.
40

41 Given the scale of construction activities and the likelihood of local worker availability
42 in the required occupational categories, construction of a solar facility would mean that some
43 in-migration of workers and their families from outside the ROI would be required, with
44 528 persons in-migrating into the ROI. Although in-migration may potentially affect local
45 housing markets, the relatively small number of in-migrants and the availability of temporary
46 accommodations (hotels, motels, and mobile home parks) mean that the impact of solar facility

TABLE 13.1.19.2-4 ROI Socioeconomic Impacts Assuming Full Build-out of the Proposed Escalante Valley SEZ with Power Tower Facilities^a

Parameter	Maximum Annual Construction Impacts	Operations Impacts
Employment (no.)		
Direct	670	120
Total	1,394	167
Income ^b		
Total	70.7	5.0
Direct state taxes ^b		
Sales	1.0	<0.1
Income	2.4	0.2
BLM payments (\$ million 2008)		
Rental	NA ^c	0.4
Capacity ^d	NA	7.0
In-migrants (no.)	528	39
Vacant housing ^e (no.)	264	35
Local community service employment		
Teachers (no.)	5	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 333 MW (corresponding to 3,000 acres [12 km²] of land disturbance) could be built. Operations impacts were based on full build-out of the site, producing a total output of 588 MW.

^b Unless indicated otherwise, values are reported in \$ million 2008.

^c NA = not applicable.

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

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

1 construction on the number of vacant rental housing units would not be expected to be large,
2 with 264 rental units expected to be occupied in the ROI. This occupancy rate would represent
3 3.6% of the vacant rental units expected to be available in the ROI.
4

5 In addition to the potential impact on housing markets, in-migration would affect
6 community service (education, health, and public safety) employment. An increase in such
7 employment would be required to meet existing levels of service in the ROI. Accordingly,
8 five new teachers and one physician would be required in the ROI. These increases would
9 represent 0.2% of total ROI employment expected in these occupations.
10

11
12 **Operations.** Total operations employment impacts in the ROI (including direct
13 and indirect impacts) of a build-out using power tower technologies would be 167 jobs
14 (Table 13.1.19.2-4). Such a solar facility would also produce \$5.0 million in income. Direct
15 sales taxes would be less than \$0.1 million, and direct income taxes, \$0.2 million. Based on
16 fees established by the BLM in its Solar Energy Interim Rental Policy (BLM 2010b), acreage
17 rental payments would be \$0.4 million, and solar generating capacity payments would total at
18 least \$7.0 million.
19

20 Given the likelihood of local worker availability in the required occupational categories,
21 operation of a solar facility means that some in-migration of workers and their families from
22 outside the ROI would be required, with 39 persons in-migrating into the ROI. Although
23 in-migration may potentially affect local housing markets, the relatively small number of
24 in-migrants and the availability of temporary accommodations (hotels, motels, and mobile home
25 parks) mean that the impact of solar facility operation on the number of vacant owner-occupied
26 housing units would not be expected to be large, with 35 owner-occupied units expected to be
27 required in the ROI.
28

29 No new community service employment would be required to meet existing levels of
30 service in the ROI.
31

32 **Dish Engine**

33
34
35
36 **Construction.** Total construction employment impacts in the ROI (including direct
37 and indirect impacts) from the use of dish engine technologies would be up to 567 jobs
38 (Table 13.1.19.2-5). Construction activities would constitute 0.4% of total ROI employment.
39 Such a solar facility would also produce \$28.7 million in income. Direct sales taxes would be
40 \$0.4 million, and direct income taxes, \$1.0 million.
41

42 Given the scale of construction activities and the likelihood of local worker availability
43 in the required occupational categories, construction of a solar facility would mean that some
44 in-migration of workers and their families from outside the ROI would be required, with
45 215 persons in-migrating into the ROI. Although in-migration may potentially affect local
46 housing markets, the relatively small number of in-migrants and the availability of temporary

1 accommodations (hotels, motels, and mobile home parks) mean that the impact of solar facility
2 construction on the number of vacant rental housing units would not be expected to be large,
3 with 107 rental units expected to be occupied in the ROI. This occupancy rate would represent
4 1.5% of the vacant rental units expected to be available in the ROI.

5
6 In addition to the potential impact on housing markets, in-migration would affect
7 community service (education, health, and public safety) employment. An increase in such
8 employment would be required to meet existing levels of service in the ROI. Accordingly, two
9 new teachers would be required in the ROI. This increase would represent 0.1% of total ROI
10 employment expected in this occupation.

11
12
13 **Operations.** Total operations employment impacts in the ROI (including direct
14 and indirect impacts) of a build-out using dish engine technologies would be 163 jobs
15 (Table 13.1.19.2-5). Such a solar facility would also produce \$4.9 million in income. Direct
16 sales taxes would be less than \$0.1 million, and direct income taxes, \$0.2 million. Based on fees
17 established by the BLM in its Solar Energy Interim Rental Policy (BLM 2010b), acreage rental
18 payments would be \$0.4 million, and solar generating capacity payments would total at least
19 \$3.9 million.

20
21 Given the likelihood of local worker availability in the required occupational categories,
22 operation of a dish engine solar facility means that some in-migration of workers and their
23 families from outside the ROI would be required, with 38 persons in-migrating into the ROI.
24 Although in-migration may potentially affect local housing markets, the relatively small number
25 of in-migrants and the availability of temporary accommodations (hotels, motels, and mobile
26 home parks) mean that the impact of solar facility operation on the number of vacant owner-
27 occupied housing units would not be expected to be large, with 34 owner-occupied units
28 expected to be required in the ROI.

29
30 No new community service employment would be required to meet existing levels of
31 service in the ROI.

32 33 34 **Photovoltaic**

35
36
37 **Construction.** Total construction employment impacts in the ROI (including direct and
38 indirect impacts) from the use of PV technologies would be up to 264 jobs (Table 13.1.19.2-6).
39 Construction activities would constitute 0.2 % of total ROI employment. Such a solar
40 development would also produce \$13.4 million in income. Direct sales taxes would be
41 \$0.2 million, and direct income taxes, \$0.5 million.

42
43 Given the scale of construction activities and the likelihood of local worker availability
44 in the required occupational categories, construction of a solar facility would mean that some
45 in-migration of workers and their families from outside the ROI would be required, with
46 100 persons in-migrating into the ROI. Although in-migration may potentially affect local

TABLE 13.1.19.2-5 ROI Socioeconomic Impacts Assuming Full Build-out of the Proposed Escalante Valley SEZ with Dish Engine Facilities^a

Parameter	Maximum Annual Construction Impacts	Operations Impacts
Employment (no.)		
Direct	272	116
Total	567	163
Income ^b		
Total	28.7	4.9
Direct state taxes ^b		
Sales	0.4	<0.1
Income	1.0	0.2
BLM payments (\$ million 2008)		
Rental	NA ^c	0.4
Capacity ^d	NA	3.9
In-migrants (no.)	215	38
Vacant housing ^e (no.)	107	34
Local community service employment		
Teachers (no.)	2	0
Physicians (no.)	0	0
Public safety (no.)	0	0

^a Construction impacts are based on the development at the site in a single year; it was assumed that several facilities with a combined capacity of up to 333 MW (corresponding to 3,000 acres [12 km²] of land disturbance) could be built. Operations impacts were based on full build-out of the site, producing a total output of 588 MW.

^b Unless indicated otherwise, values are reported in \$ million 2008.

^c NA = not applicable.

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

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

TABLE 13.1.19.2-6 ROI Socioeconomic Impacts Assuming Full Build-out of the Proposed Escalante Valley SEZ with PV Facilities^a

Parameter	Maximum Annual Construction Impacts	Operations Impacts
Employment (no.)		
Direct	127	12
Total	264	16
Income ^b		
Total	13.4	0.5
Direct state taxes ^b		
Sales	0.2	<0.1
Income	0.5	<0.1
BLM payments (\$ million 2008)		
Rental	NA ^c	0.4
Capacity ^d	NA	3.1
In-migrants (no.)	100	4
Vacant housing ^e (no.)	50	3
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 333 MW (corresponding to 3,000 acres [12 km²] of land disturbance) could be built. Operations impacts were based on full build-out of the site, producing a total output of 588 MW.

^b Unless indicated otherwise, values are reported in \$ million 2008.

^c NA = not applicable.

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

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

1
2

1 housing markets, the relatively small number of in-migrants and the availability of temporary
2 accommodations (hotels, motels, and mobile home parks) mean that the impact of solar facility
3 construction on the number of vacant rental housing units would not be expected to be large,
4 with 50 rental units expected to be occupied in the ROI. This occupancy rate would represent
5 0.7% of the vacant rental units expected to be available in the ROI.
6

7 In addition to the potential impact on housing markets, in-migration would affect
8 community service (education, health, and public safety) employment. An increase in such
9 employment would be required to meet existing levels of service in the ROI. Accordingly,
10 one new teacher would be required in the ROI. This increase would represent less than 0.1% of
11 total ROI employment expected in this occupation.
12
13

14 **Operations.** Total operations employment impacts in the ROI (including direct and
15 indirect impacts) of a build-out using PV technologies would be 16 jobs (Table 13.1.19.2-6).
16 Such a solar facility would also produce \$0.5 million in income. Direct sales taxes would be
17 less than \$0.1 million, and direct income taxes, less than \$0.1 million. Based on fees established
18 by the BLM in its Solar Energy Interim Rental Policy (BLM 2010b), acreage rental payments
19 would be \$0.4 million, and solar generating capacity payments would total at least \$3.1 million.
20

21 Given the likelihood of local worker availability in the required occupational categories,
22 operation of a solar facility would mean that some in-migration of workers and their families
23 from outside the ROI would be required, with four persons in-migrating into the ROI. Although
24 in-migration may potentially affect local housing markets, the relatively small number of
25 in-migrants and the availability of temporary accommodations (hotels, motels, and mobile home
26 parks) mean that the impact of solar facility operation on the number of vacant owner-occupied
27 housing units would not be expected to be large, with three owner-occupied units expected to be
28 required in the ROI.
29

30 No new community service employment would be required to meet existing levels of
31 service in the ROI.
32
33

34 **13.1.19.3 SEZ-Specific Design Features and Design Feature Effectiveness** 35

36 No SEZ-specific design features addressing socioeconomic impacts have been identified
37 for the proposed Escalante Valley SEZ. Implementing the programmatic design features
38 described in Appendix A, Section A.2.2, as required under BLM's Solar Energy Program, would
39 reduce the potential for socioeconomic impacts during all project phases.
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1 **13.1.20 Environmental Justice**

2
3
4 **13.1.20.1 Affected Environment**

5
6 E.O. 12898, “Federal Actions to Address Environmental Justice in Minority Populations
7 and Low-Income Populations” (*Federal Register*, Vol. 59, page 7629, Feb. 11, 1994), formally
8 requires federal agencies to incorporate environmental justice as part of their missions.
9 Specifically, it directs them to address, as appropriate, any disproportionately high and adverse
10 human health or environmental effects of their actions, programs, or policies on minority and
11 low-income populations.

12
13 The analysis of the impacts of solar energy projects on environmental justice issues
14 follows guidelines described in *Environmental Justice Guidance under the National*
15 *Environmental Policy Act* (CEQ 1997). The analysis method has three parts: (1) a description
16 of the geographic distribution of low-income and minority populations in the affected area is
17 undertaken; (2) the issue of whether the impacts from construction and operation would
18 produce impacts that are high and adverse is assessed; and (3) if impacts are high and adverse,
19 a determination is made as to whether the impacts would disproportionately affect minority and
20 low-income populations.

21
22 Construction and operation of solar energy projects in the proposed SEZ could affect
23 environmental justice if any adverse health and environmental impacts from either phase of
24 development are significantly high, and if these impacts would disproportionately affect minority
25 and low-income populations. If the analysis determines that health and environmental impacts
26 are not significant, there can be no disproportionate impacts on minority and low-income
27 populations. In the event impacts are significant, disproportionality would be determined by
28 comparing the proximity of any high and adverse impacts with the locations of low-income and
29 minority populations.

30
31 The analysis of environmental justice issues associated with the development of solar
32 facilities considered impacts within the proposed SEZs in Utah and an associated 50-mi (80-km)
33 radius around the facility boundary. The geographic distribution of minority and low-income
34 groups was based on demographic data from the 2000 Census (U.S. Bureau of the
35 Census 2009k,1). The following definitions were used to define minority and low-income
36 population groups:

- 37
38 • **Minority.** Persons are included in the minority category if they identify
39 themselves as belonging to any of the following racial groups: (1) Hispanic,
40 (2) Black (not of Hispanic origin) or African American, (3) American Indian
41 or Alaska Native, (4) Asian, or (5) Native Hawaiian or Other Pacific Islander.

42
43 Beginning with the 2000 Census, where appropriate, the census form allows
44 individuals to designate multiple population group categories to reflect their
45 ethnic or racial origin. In addition, persons who classify themselves as being
46 of multiple racial origins may choose up to six racial groups on the basis of

1 their racial origins. The term minority includes all persons, including those
2 classifying themselves in multiple racial categories, except those who classify
3 themselves as not of Hispanic origin and as White or “Other Race”
4 (U.S. Bureau of the Census 2009k).

5
6 The Council on Environmental Quality (CEQ) guidance proposed that
7 minority populations should be identified where either (1) the minority
8 population of the affected area exceeds 50%, or (2) the minority population
9 percentage of the affected area is meaningfully greater than the minority
10 population percentage in the general population or another appropriate unit
11 of geographic analysis.

12
13 This PEIS applies both criteria in using the Census Bureau data for census
14 block groups, wherein consideration is given to the minority population that
15 is both greater than 50% and 20 percentage points higher than it is in the state
16 (the reference geographic unit).

- 17
18 • **Low-Income.** Individuals who fall below the poverty line. The poverty line
19 takes into account family size and age of individuals in the family. In 1999,
20 for example, the poverty line for a family of five with three children below
21 the age of 18 was \$19,882. For any given family below the poverty line, all
22 family members are considered as being below the poverty line for the
23 purposes of analysis (U.S. Bureau of the Census 2009l).

24
25 The data in Table 13.1.20.1-1 show the minority and low-income composition of the total
26 population located in the proposed Escalante Valley SEZ on the basis of 2000 Census data and
27 CEQ guidelines. Individuals identifying themselves as Hispanic or Latino are included in the
28 table as a separate entry. However, because Hispanics can be of any race, this number also
29 includes individuals also identifying themselves as being part of one or more of the population
30 groups listed in the table.

31
32 A small number of minority and low-income individuals are located in the 50-mi (80-km)
33 radius around the boundary of the SEZ. When census data are averaged across all the block
34 groups within the 50-mi (80-km) radius, within the Nevada portion, 11.8% of the population is
35 classified as minority and, within the Utah portion, 8.3% of the population is classified as
36 minority. Because the minority population within the 50-mi (80-km) radius does not exceed 50%
37 of the total population in either portion of the 50-mi (80-km) radius, and because the minority
38 population does not exceed the state average by 20 percentage points in either portion of the
39 50-mi (80-km) radius, in aggregate, there are no minority populations in these states on the basis
40 of 2000 Census data and CEQ guidelines. In addition, there are no minority populations within
41 individual census block groups in this area based on CEQ guidelines.

42
43 When census data are averaged across all the block groups within the 50-mi (80-km)
44 radius, within the Nevada portion, 15.3% of the population is classified as low-income and,
45 within the Utah portion, 14.0% of the population is classified as low-income. Because the
46 number of low-income individuals does not exceed the state average by 20 percentage points or
47 more, and because it does not exceed 50% of the total population in either state, there are no

TABLE 13.1.20.1-1 Minority and Low-Income Populations within the 50-mi (80-km) Radius Surrounding the Proposed Escalante Valley SEZ

Parameter	Nevada	Utah
Total population	3,069	80,187
White, non-Hispanic	2,708	73,497
Hispanic or Latino	178	3,520
Non-Hispanic or Latino minorities	183	3,170
One race	134	2,257
Black or African American	70	190
American Indian or Alaskan Native	51	1,385
Asian	11	409
Native Hawaiian or other Pacific Islander	1	197
Some other race	1	76
Two or more races	49	913
Total minority	361	6,690
Total low-income	470	11,220
Percentage minority	11.8	8.3
Percentage low-income	15.3	14.0
State percentage minority	34.8	14.7
State percentage low-income	10.5	9.4

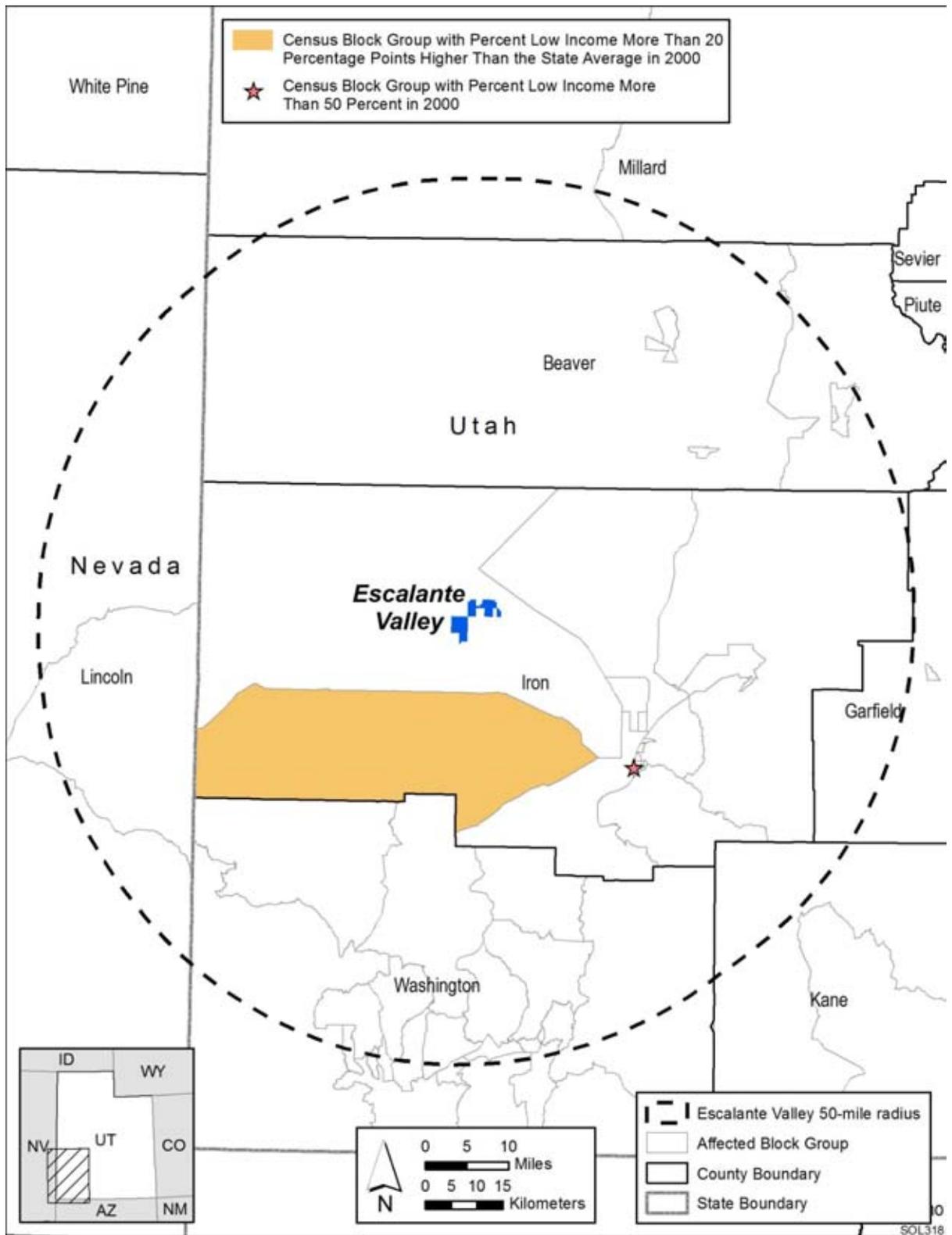
Source: U.S. Bureau of the Census (2009k,1).

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low-income populations within the 50-mi (80-km) radius of the proposed Escalante Valley SEZ according to 2000 Census data and CEQ guidelines.

Figure 13.1.20.1-1 shows the locations of the low-income population groups within the 50-mi (80-km) radius around the boundary of the SEZ.

At the individual block group level, there are low-income populations in specific census block groups within this area as shown in Figure 13.1.20.1-1. Low-income populations are located in two block groups in Iron County. One block group in Cedar City has more than 50% of the total population below the poverty line, while one block group to the west of Cedar City, including the towns of Newcastle and Modena, has a low-income population that is more than 20 percentage points higher than the state average. There are no minority populations that exceed 50% of the total population in the block group, and the number of minority individuals does not exceed the state average by 20 percentage points or more at the individual block group level.



1

2

3

FIGURE 13.1.20.1-1 Low-Income Population Groups within the 50-mi (80-km) Radius Surrounding the Proposed Escalante Valley SEZ (Source: U.S. Bureau of the Census 2009f)

1 **13.1.20.2 Impacts**
2

3 Environmental justice concerns common to all utility-scale solar energy facilities
4 are described in detail in Section 5.18. These impacts would be minimized through the
5 implementation of the programmatic design features described in Appendix A, Section A.2.2,
6 which address the underlying environmental impacts contributing to the concerns. The
7 potentially relevant environmental impacts associated with solar facilities within the proposed
8 SEZ include noise and dust during construction; noise and electromagnetic field (EMF) effects
9 associated with operations; visual impacts of solar generation and auxiliary facilities, including
10 transmission lines; access to land used for economic, cultural, or religious purposes; and effects
11 on property values as areas of concern that might potentially affect minority and low-income
12 populations.
13

14 Potential impacts on low-income and minority populations could be incurred as a result
15 of the construction and operation of solar facilities involving each of the four technologies.
16 Although impacts are likely to be small, and therefore unlikely to produce disproportionate
17 impacts, there are low-income populations defined by CEQ guidelines (Section 13.1.20.1) within
18 the 50-mi (80-km) radius around the boundary of the SEZ, meaning that any adverse impacts of
19 solar projects could disproportionately affect low-income populations. Because there are no
20 minority populations within the 50-mi (80-km) radius, according to CEQ guidelines, there would
21 be no impacts on minority populations.
22
23

24 **13.1.20.3 SEZ-Specific Design Features and Design Feature Effectiveness**
25

26 No SEZ-specific design features addressing environmental justice impacts have been
27 identified for the proposed Escalante Valley SEZ. Implementing the programmatic design
28 features described in Appendix A, Section A.2.2, as required under BLM’s Solar Energy
29 Program, would reduce the potential for environmental justice impacts during all project phases.
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1 **13.1.21 Transportation**
2

3 The proposed Escalante Valley SEZ is accessible by road and by rail. In addition to
4 three small airports, one major railroad and two secondary roads serve the immediate area.
5 General transportation considerations and impacts are discussed in Sections 3.4 and 5.19,
6 respectively.
7
8

9 **13.1.21.1 Affected Environment**
10

11 Beryl Milford Road passes by the proposed Escalante Valley SEZ to the northwest,
12 and Lund Highway passes by to the northeast, as shown in Figure 13.1.21.1-1. Both roads
13 are secondary paved roads. Beryl Milford Road connects with North Beryl Highway in Beryl,
14 approximately 8 mi (13 km) west of the SEZ. North Beryl Highway travels 13 mi (21 km) south
15 to its junction with State Route 56 at Beryl Junction. Lund Highway travels approximately 30 mi
16 (48 km) southeast from Lund to its junction with State Route 56, approximately 1.5 mi east of
17 I-15 and Cedar City. The SEZ area has not been designated for vehicle travel in a BLM land use
18 plan but will be considered in the upcoming revision of the land use plans in the Cedar City Field
19 Office.
20

21 Current access to the SEZ from Beryl Milford Road would be on Cow Trail or on
22 7200 E Road, both unimproved dirt roads, which provide access to the western and central
23 sections of the SEZ, respectively. Access to the eastern portion of the SEZ from Lund Highway
24 would be on 15200 N, another unimproved dirt road. There have been no reports on annual
25 average traffic (AADT) volumes for the roads in the immediate vicinity, but the AADT volume
26 for I-15 is about 21,000 vehicles as it passes through Cedar City, which is about 30 mi (48 km)
27 to the southeast of the SEZ (UDOT 2009). Table 13.1.21.1-1 shows the AADT on major roads
28 near the proposed Escalante Valley SEZ in 2008. AADT volumes on State Route 56 average
29 about 11,000 vehicles at the turnoff for Lund Highway, 3,000 vehicles at the turnoff for Iron
30 Springs about 2.5 mi (4.0 km) west of Lund Highway, and 1,500 vehicles at the junction with
31 North Beryl Highway, an additional 27 mi (43 km) to the west. AADT volumes drop below
32 1,000 vehicles within a few miles of Cedar City on the secondary roads and highways that
33 emanate from the city in the direction of the proposed Escalante Valley SEZ.
34

35 The UP Railroad serves the area. The main line connecting Las Vegas and Salt Lake City
36 runs just to the northwest of the proposed Escalante Valley SEZ. The railroad has a rail stop in
37 Lund, about 4 mi (6 km) directly north of the proposed Escalante Valley SEZ, where Beryl
38 Milford Road and Lund Highway meet. A rail spur breaks away from the main line at Lund,
39 passing to the southeast on its way to Cedar City. This spur passes through the northeastern edge
40 of the SEZ.
41

42 The nearest public airport is the Cedar City Regional Airport, about 27 mi (43 km)
43 southeast of the SEZ. The airport has two runways, one in good condition with a length of
44 4,822 ft (1,470 m), and the other in fair condition with a length of 8,653 ft (2,637 m)

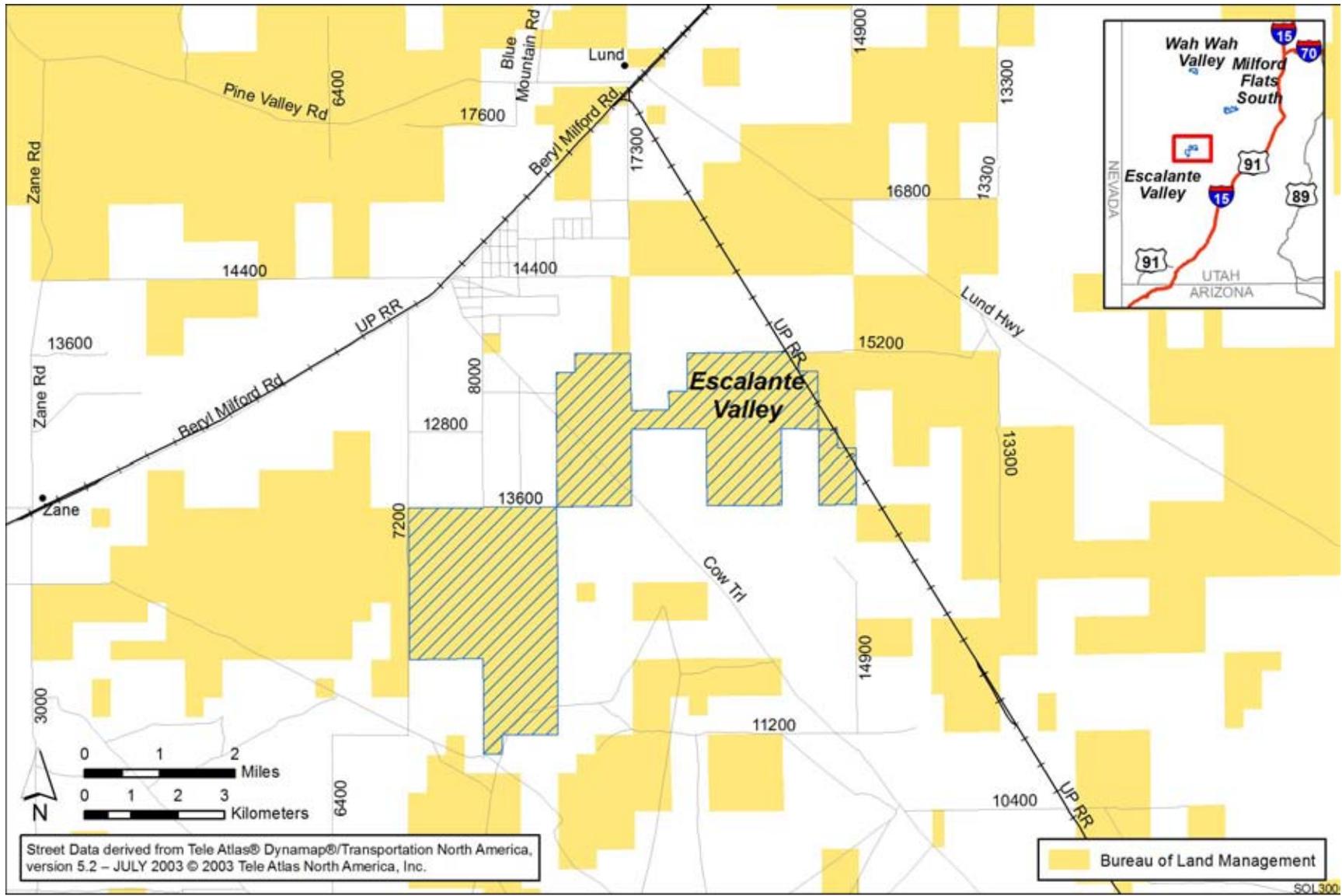


FIGURE 13.1.21.1-1 Local Transportation Network Serving the Proposed Escalante Valley SEZ

TABLE 13.1.21.1-1 AADT on Major Roads near the Proposed Escalante Valley SEZ for 2008

Road	General Direction	Location	AADT (Vehicles)
I-15	North-south	Junction with State Route 130 north of Cedar City	18,255
		Intersection with State Route 56 in Cedar City	25,140
State Route 130	North-south	Between Minersville and Cedar City	900

Source: UDOT (2009).

(FAA 2009). The airport is served by one regional carrier, Skywest Airlines, with scheduled service between Cedar City and Salt Lake City (Cedar City 2009). In 2008, approximately 7,800 passengers departed from Cedar City and 1,900 passengers arrived at Cedar City. About 133,000 lb (60,300 kg) of freight departed and 159,000 lb (72,100 kg) arrived at the airport in 2008 (BTS 2008).

The other public airports in the area are in Milford and Beaver, about 40 mi (64 km) and 55 mi (8 km) to the north-northeast and northeast, respectively. The Milford Municipal Airport has a 5,000-ft (1,524-m) asphalt runway that is in good condition and equipped with landing lights (FAA 2009). There is no control tower, but the airport is staffed during daylight hours. An average of approximately 125 aircraft operations (takeoffs/landings) occur on a weekly basis (Milford 2009). The Beaver Municipal Airport has two runways—a 4,984-ft (1,519-m) asphalt runway in fair condition with landing lights and a 2,150-ft (655-m) dirt runway in fair condition without landing lights (FAA 2009). This latter airport is unattended (Beaver 2009).

13.1.21.2 Impacts

As discussed in Section 5.19, primary transportation impacts are anticipated to be from commuting worker traffic. Single projects could involve up to 1,000 workers each day, with an additional 2,000 vehicle trips per day (maximum). The volume of traffic on regional corridors would be more than double the current values in most cases. As discussed above, Beryl Milford Road and Lund Highway provide regional traffic corridors for the proposed Escalante Valley SEZ. Local road improvements would be necessary on any portion(s) of Beryl Milford Road and Lund Highway that might be developed so as not to overwhelm the local access roads near any site access point(s). Potential existing site access roads would require improvements, including asphalt pavement.

Solar development within the SEZ would affect public access along OHV routes designated open and available for public use. If there are any designated as open within the proposed SEZ, open routes crossing areas granted ROWs for solar facilities would be re-designated as closed (see Section 5.5.1 for more details on how routes coinciding with proposed solar facilities would be treated).

1 **13.1.21.3 SEZ-Specific Design Features and Design Feature Effectiveness**
2

3 No SEZ-specific design features have been identified related to impacts on transportation
4 systems around the proposed Escalante Valley SEZ. The programmatic design features described
5 in Appendix A, Section A.2.2, including local road improvements, multiple site access locations,
6 staggered work schedules, and ride-sharing, would all provide some relief to traffic congestion
7 on local roads leading to the site. Depending on the location of solar facilities within the SEZ,
8 more specific access locations and local road improvements could be implemented.
9

1 **13.1.22 Cumulative Impacts**
2

3 The analysis presented in this section addresses the potential cumulative impacts in
4 the vicinity of the proposed Escalante Valley SEZ in Iron County in southwestern Utah. The
5 CEQ guidelines for implementing NEPA define cumulative impacts as environmental impacts
6 resulting from the incremental effects of an action when added to other past, present, and
7 reasonably foreseeable future actions (40 CFR 1508.7). The impacts of other actions are
8 considered without regard to the agency (federal or nonfederal), organization, or person that
9 undertakes them. The time frame of this cumulative impacts assessment could appropriately
10 include activities that would occur up to 20 years in the future (the general time frame for PEIS
11 analyses), but little or no information is available for projects that could occur further than 5 to
12 10 years in the future.
13

14 The largest nearby town is Cedar City, located about 30 mi (48 km) southeast of the SEZ.
15 Lund is located about 4 mi (6 km) to the north, and Zane is about 5 mi (8 km) to the west. The
16 surrounding land is rural. Both state and private lands are nearby. Farther away, are two sections
17 of the Dixie National Forest—one about 20 mi (32 km) to the south and one about 30 mi (48 km)
18 to the southwest. Tribal lands—Cedar City Reservation—are about 25 mi (40 km) to the
19 southeast, and Zion NP is about 30 mi (48 km) to the southeast. In addition, the proposed
20 Escalante Valley SEZ is located close to both the proposed Milford Flats South SEZ and the
21 proposed Wah Wah Valley SEZ, and in some areas, impacts from the three SEZs overlap.
22

23 The geographic extent of the cumulative impacts analysis for potentially affected
24 resources near the Escalante Valley SEZ is identified in Section 13.1.22.1. An overview of
25 ongoing and reasonably foreseeable future actions is presented in Section 13.1.22.2. General
26 trends in population growth, energy demand, water availability, and climate change are
27 discussed in Section 13.1.22.3. Cumulative impacts for each resource area are discussed in
28 Section 13.1.22.4.
29
30

31 **13.1.22.1 Geographic Extent of the Cumulative Impacts Analysis**
32

33 Table 13.1.22.1-1 presents the geographic extent of the cumulative impacts analysis for
34 potentially affected resources near the Escalante Valley SEZ. These geographic areas define the
35 boundaries encompassing potentially affected resources. Their extent varies on the basis of the
36 nature of the resource being evaluated and the distance at which an impact may occur (thus, for
37 example, the evaluation of air quality may have a greater regional extent of impact than visual
38 resources). Lands around the SEZ are State or privately owned, administered by the USFS, or
39 administered by the BLM. The BLM administers approximately 56% of the lands within a
40 50-mi (80-km) radius of the SEZ.
41
42

43 **13.1.22.2 Overview of Ongoing and Reasonably Foreseeable Future Actions**
44

45 The future actions described below are those that are “reasonably foreseeable”; that is,
46 they have already occurred, are ongoing, are funded for future implementation, or are included in
47 firm near-term plans. Types of proposals with firm near-term plans are as follows:

TABLE 13.1.22.1-1 Geographic Extent of the Cumulative Impacts Analysis by Resource Area: Proposed Escalante Valley SEZ

Resource Area	Geographic Extent
Lands and Realty	Southern Escalante Desert Valley
Specially Designated Areas and Lands with Wilderness Characteristics	Southern Escalante Desert Valley
Rangeland Resources	Southern Escalante Desert Valley
Recreation	Southern Escalante Desert Valley
Military and Civilian Aviation	Southern Escalante Desert Valley
Soil Resources	Areas within and adjacent to the Escalante Valley SEZ
Minerals	Southern Escalante Desert Valley
Water Resources Surface Water Groundwater	Fourmile Wash, Mud Spring Wash, Dick Palmer Wash Beryl-Enterprise basin
Vegetation, Wildlife and Aquatic Biota, Special Status Species	Known or potential occurrences within a 50-mi (80-km) radius of the Escalante Valley SEZ
Air Quality and Climate	Southern Escalante Desert Valley and beyond
Visual Resources	Viewshed within a 25-mi (40-km) radius of the Escalante Valley SEZ
Acoustic Environment (noise)	Areas adjacent to the Escalante Valley SEZ
Paleontological Resources	Areas within and adjacent to the Escalante Valley SEZ
Cultural Resources	Areas within and adjacent to the Escalante Valley SEZ for archaeological sites; viewshed within a 25-mi (40-km) radius of the Escalante Valley SEZ for other properties, such as historic trails and traditional cultural properties
Native American Concerns	Escalante Desert Valley; viewshed within a 25-mi (40-km) radius of the Escalante Valley SEZ
Socioeconomics	Iron County and Washington County
Environmental Justice	Iron County and Washington County
Transportation	Local Roads (e.g., Lund Highway) and I-15

1
2

- 1 • Proposals for which NEPA documents are in preparation or finalized;
- 2
- 3 • Proposals in a detailed design phase;
- 4
- 5 • Proposals listed in formal Notices of Intent (NOIs) published in the Federal
- 6 Register or state publications;
- 7
- 8 • Proposals for which enabling legislation has been passed; and
- 9
- 10 • Proposals that have been submitted to federal, state, or county regulators to
- 11 begin a permitting process.
- 12

13 Projects in the bidding or research phase or that have been put on hold were not included
14 in the cumulative impacts analysis.

15
16 The ongoing and reasonably foreseeable future actions described below are grouped
17 into two categories: (1) actions that relate to energy production and distribution, including
18 potential solar energy projects under the proposed action (Section 13.1.22.2.1), and (2) other
19 ongoing and reasonably foreseeable actions, including those related to mining and mineral
20 processing, grazing management, transportation, recreation, water management, and
21 conservation (Section 13.1.22.2.2). Together, these actions have the potential to affect human
22 and environmental receptors within the geographic range of potential impacts over the next
23 20 years.

24 25 26 ***13.1.22.2.1 Energy Production and Distribution***

27
28 Recent developments in the state of Utah have emphasized more future reliance on
29 renewable sources for energy production. In 2008, Utah enacted the Energy Resource and
30 Carbon Emission Reduction Initiative (Senate Bill 202), which established a voluntary renewable
31 portfolio goal (RPG) of 20% by 2025. This bill is similar to those in states that have adopted
32 Renewable Portfolio Standards (RPSs); however, this bill requires that utilities pursue renewable
33 energy only to the extent that it is “cost-effective” to do so. The voluntary renewable goals are
34 being addressed by companies that intend to be energy producers, possibly resulting in several
35 projects being sited in the same geographic areas of southwestern Utah during the same time
36 frame.

37
38 Reasonably foreseeable future actions related to energy development and distribution
39 in the vicinity of the proposed Escalante Valley SEZ are identified in Table 13.1.22.2-1 and
40 described in the following sections. Renewable energy projects identified include wind and
41 geothermal projects, but no foreseeable solar energy projects have been identified. Other energy-
42 related projects include transmission lines and oil and gas leasing. The following is a summary
43 of planned renewable energy and transmission distribution projects.

TABLE 13.1.22.2-1 Reasonably Foreseeable Future Actions Related to Energy Development and Distribution near the Proposed Escalante Valley SEZ

Description	Status	Resources Affected	Primary Impact Location
Renewable Energy Development			
Milford Wind (UTU 82972)	Ongoing	Land use, ecological resources, visual	About 50 mi (80 km) northeast of Escalante Valley SEZ (Beaver County)
Milford Wind Phase II (UTU 83073)	Under way	Land use, ecological resources, visual	About 50 mi (80 km) northeast of Escalante Valley SEZ (Beaver and Millard Counties)
Milford Wind Phases III-IV (UTU 8307301)	Planned	Land use, ecological resources, visual	About 50 mi (80 km) northeast of Escalante Valley SEZ (Beaver County)
Geothermal Energy Project UTU 66583O	Authorized	Land use, terrestrial habitats, visual	About 45 mi (72 km) northeast of Escalante Valley SEZ (Beaver County)
Geothermal Energy Project UTU 66583X	Authorized	Land use, terrestrial habitats, visual	About 45 mi (72 km) northeast of Escalante Valley SEZ (Beaver County)
Transmission and Distribution Systems			
Sigurd to Red Butte No. 2 345-kV Transmission Line Project	Planned	Land use, ecological resources, visual	East of Milford Flats South and Escalante Valley SEZs
Three Peaks 138-kV Transmission Line Project	Planned	Land use, ecological resources, visual	Southeast of Escalante Valley SEZ
Energy Gateway South 500-kV AC Transmission Line Project	Planned	Land use, ecological resources, visual	About 5 mi (8 km) southeast of Escalante Valley SEZ and 3 mi (5 km) west of Milford Flats South SEZ
TransWest Express 600-kV DC Transmission Line Project	Planned	Land use, ecological resources, visual	About 5 mi (8 km) southeast of Escalante Valley SEZ and 3 mi (5 km) west of Milford Flats South SEZ
UNEV Liquid Fuel Pipeline (UTU-79766)	FEIS April 2010	Disturbed areas, terrestrial habitats along pipeline ROW	About 5 mi (8 km) southeast of Escalante Valley SEZ and 3 mi (5 km) west of Milford Flats South SEZ
Oil and Gas Leasing			
Oil and gas leasing	Planned	Land use, ecological resources, visual	Eastern portions of Iron and Beaver counties.

1 **Solar Energy Development**
2

3 There are no existing solar energy projects in the Escalante Valley SEZ. A search of the
4 BLM database of ROW grant applications did not identify any new solar projects in the vicinity
5 of the SEZ.
6

7
8 **Wind Energy Development**
9

10 The Milford Wind Corridor Project, Phases I–V, which are either planned, under way, or
11 ongoing, are currently the only reasonably foreseeable wind energy development within a 50-mi
12 (80-km) radius of the proposed Escalante Valley SEZ. This development is administered under
13 three BLM ROW applications, as listed in Table 13.1.22.2-1. The footprints of these and
14 numerous other renewable energy ROW applications in various stages of authorization are
15 shown in Figure 13.1.22.2-1. The identified reasonably foreseeable energy development and
16 distribution projects are discussed in the following subsections, followed by a brief discussion of
17 pending wind applications, also shown in Figure 13.1.22.2-1, which are considered to represent
18 potential, if not foreseeable, projects at this time.
19

- 20 • *Milford Wind Phase I (UTU 82972)*. Phase I of the Milford Wind Corridor
21 Project, a 203.5-MW facility, began operations in October 2009. At least
22 four more phases will follow. The facility is located about 10 mi (16 km)
23 northeast of Milford, east of State Route 287, and on 25,00 acres (103 km²)
24 covering land in both Beaver and Millard Counties. The facility has 97 wind
25 turbines, including 58 Clipper Liberty 2.5-MW wind turbines and 39 GE
26 1.5-MW wind turbines. Power from this facility is being purchased by the
27 Southern California Public Power Authority. The project also includes a new
28 transmission line connecting the facility to the existing Intermountain Power
29 Project substation near Delta, Utah. The Milford Wind Corridor Project is the
30 first wind energy facility permitted under the BLM Wind Energy PEIS for
31 western states (First Wind 2009).
32
- 33 • *Milford Wind Phases II, III, IV, and V*. Four additional phases of the Milford
34 Wind Corridor Project, adjacent to Milford Wind Phase I, are in development.
35 Construction of Milford Wind Phase II (UTU 83073) is under way. Each of
36 the four projects will be a 200-MW wind energy facility (First Wind 2009).
37
38

39 ***Pending Wind ROW Applications on BLM-Administered Lands.*** Applications for right-
40 of-way grants that have been submitted to the BLM include three pending authorization for wind
41 site testing, eight authorized for wind testing, and three pending authorization for development of
42 wind facilities that would be located within 50 mi (80 km) of the SEZ as of May 14, 2010 (BLM
43 and USFS 2010b). Table 13.1.22.2-2 lists these applications and Figure 13.1.22.2-1 shows their
44 locations.
45

TABLE 13.1.22.2-2 Pending Wind Energy Project Applications on BLM-Administered Land within 50 mi (80 km) of the Escalante Valley SEZ^a

Serial No.	Technology	Status (NOI date)	Field Office
<i>Pending Wind Site Testing</i>			
UTU 082975	Wind	Pending	Cedar City
UTU 083046	Wind	Pending	Cedar City
UTU 085819	Wind	Pending	Cedar City
<i>Authorized Wind Site Testing</i>			
UTU 082105	Wind	Site testing	Cedar City
UTU 082966	Wind	Site testing	Cedar City, Fillmore
UTU 083001	Wind	Site testing	Cedar City, St. George
UTU 083062	Wind	Site testing	Cedar City, Fillmore
UTU 083063	Wind	Site testing	Cedar City
UTU 083210	Wind	Site testing	Cedar City, Fillmore
UTU 086055	Wind	Pending	Cedar City
NVN 084477	Wind	Site testing	Ely
<i>Pending Wind Development Facilities</i>			
UTU 083061	Wind	Pending	Cedar City
UTU 083075	Wind	Pending	Cedar City
NVN 087411	Wind	Pending	Cedar City

^a Pending wind applications information downloaded from GeoCommunicator (BLM and USFS 2010b).

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The likelihood of any of the pending wind ROW application projects actually being developed is uncertain, but it is generally assumed that applications authorized for wind testing are closer to fruition. However, wind testing alone is not considered a sufficient basis to classify these as reasonably foreseeable projects. The pending applications are listed in Table 13.1.22.2-2 for completeness and as an indication of the level of interest in development of wind energy in the region. Some number of these applications would be expected to result in actual projects. Thus, the cumulative impacts of these potential projects are analyzed in their aggregate effects.

Wind testing will involve some relatively minor activities that could have some environmental effects, mainly the erection of meteorological towers and monitoring of wind conditions. These towers may or may not employ guy wires and may be 200 ft (60 m) high.

Geothermal Energy Development

Two applications for the development of geothermal energy facilities within 50 mi (80 km) of the proposed SEZ have geothermal agreements authorized by the BLM, as listed in Table 13.1.22.2-1 and shown in Figure 13.1.22.2-1. The two applications are located in close proximity to each other, about 45 mi (72 km) northeast of the SEZ and about 10 mi (16 km)

1 northeast of Milford. These projects are considered only minimally reasonably foreseeable
2 because applications have received only authorized geothermal agreements (BLM and
3 USFS 2010b), and there is a good likelihood that they might not actually be built.
4
5

6 **Transmission and Distribution Systems**

7

8 Existing and proposed electric transmission lines are considered in the cumulative
9 impact analysis related to solar energy project development in the proposed Utah SEZs.
10 Several transmission line projects and a petroleum pipeline project occur or are planned
11 within the geographic extent of effects for the proposed Escalante Valley SEZ.
12

- 13 • *Sigurd to Red Butte No. 2, 345-kV Transmission Line.* Rocky Mountain Power
14 submitted a preliminary ROW application form to the BLM (i.e., Form 299)
15 along with a Plan of Development for the project in December 2008. The
16 project would traverse public lands administered by the BLM and the USFS
17 and private lands over a distance of 150 to 160 mi (241 to 258 km) from the
18 Sigurd Substation in Sevier County near Richfield, Utah, to the Red Butte
19 Substation in southwestern Utah near the town of Central in Washington
20 County. Transmission towers would be steel H-frame design spaced about
21 1,000 to 1,200 ft (305 to 366 m) apart. The transmission line would need to be
22 operating by 2012 to meet the expected energy demands of southwestern Utah
23 because of population growth in the St. George area and surrounding
24 communities. The proposed route and alternative segments under
25 consideration by Rocky Mountain Power would pass about 10 to 15 mi
26 (16 to 24 km) east of the Milford Flats South and Escalante Valley SEZs
27 (BLM 2009a).
28
- 29 • *Three Peaks 138-kV Transmission Line Project.* PacifiCorp requested BLM
30 approval to construct a 6.35-mi (10.2-km), single-circuit 138-kV line that
31 would extend eastward in Iron County from a facility owned by Western
32 Electrochemical Company to the proposed Three Peaks Substation. The
33 transmission line would cross BLM-administered land in the vicinity of the
34 Escalante Valley SEZ, some private land, and land controlled by the Utah
35 School and Institutional Trust Lands Administration. An estimated 63 wood
36 poles would be needed for the line, which would parallel and join the existing
37 Sigurd to Red Butte No.1 345-kV transmission line.
38
- 39 • *Energy Gateway South 500-kV AC Line.* PacifiCorp, as part of its Energy
40 Gateway Transmission Expansion Project, is planning to build a high-voltage
41 transmission line, known as the Gateway South segment, from the Aeolus
42 substation in southeastern Wyoming into the new Clover substation near
43 Mona, Utah. An additional segment would continue from the new Clover
44 substation to the existing Crystal substation north of Las Vegas. The larger
45 Gateway Transmission Expansion Project would provide a broad regional
46 expansion of transmission capacity in the West, in part to connect new

1 renewable energy sources to load centers. The Gateway South portion is in the
2 early planning, siting, and permitting stages. Rights of way and an EIS are
3 expected to be completed by 2015, while PacifiCorp projects an in-service
4 date of 2017 to 2019 (PacifiCorp 2010).

- 5
6 • *TransWest Express 600-kV DC Line.* The TransWest Express, LLC, is
7 proposing a 600-kV DC transmission line that would deliver 3,000 MW of
8 wind energy from Wyoming to the desert southwest by way of Las Vegas.
9 The proposed route would cover 725 mi (1160 km) and pass through
10 southwestern Utah, about 20 mi (32 km) northwest of Cedar City in the
11 vicinity of the three proposed Utah SEZs and within or adjacent to federally
12 designated or proposed utility corridors, or parallel to existing transmission
13 lines or pipelines. The project is in the planning, permitting, and design stages.
14 Project proponents entered the project into the Western Electricity
15 Coordinating Council's rating process for grid integration in January 2008
16 jointly with PacifiCorp's Gateway South project and anticipate a path rating
17 by 2011. An EIS to be prepared by BLM and the Western Area Power
18 Administration is expected to be completed by 2013 and the line is expected
19 to be in service in 2015 (TransWest 2010).
- 20
21 • *UNEV Pipeline Project.* Holly Energy Partners proposes to construct and
22 operate a 399-mi (640-km) long, 12-in (0.3-m) wide petroleum products
23 (gasoline and diesel fuel) pipeline that will originate at the Holly
24 Corporation's Woods Cross, Utah, refinery near Salt Lake City and terminate
25 near the Apex Industrial Park northeast of Las Vegas, Nevada. The pipeline
26 would run along the same route as the proposed TransWest Express
27 transmission line described above, passing about 20 mi (32 km) northwest of
28 Cedar City, Utah, and would include a lateral pipeline from the main line to a
29 pressure reduction station at a terminal about 10 mi (16 km) northwest of
30 Cedar City. Access roads would be built to all aboveground infrastructures.
31 BLM issued a Final EIS for the project in April 2010 (BLM 2010c).

32
33
34 ***Oil and Gas Leasing.*** The BLM Cedar City Field Office prepared an environmental
35 assessment (EA) in August 2008 (EA UT-040-08-036) that addressed the impacts of ongoing
36 and new oil and gas leases in the eastern portions of Beaver and Iron Counties. The geographical
37 area covered in the analysis extended from about 10 mi (16 km) north of Milford, south and east
38 to New Harmony, 10 mi (16 km) south of Cedar City. A smaller area east of I-15, east and
39 northeast of Cedar City, was also evaluated. A total of 960,000 acres (3,885 km²) of federal
40 mineral lands was considered in the EA. Of this total, about half has been leased (374,000 acres
41 [1,514 km²]) or has been issued a lease but awaits protest resolution (108,000 acres
42 [437.1 km²]). Of the remaining land (478,000 acres [1,934 km²]), almost one-fourth
43 (121,000 acres [490 km²]) is being considered for development by industry. The intent of the
44 proposed action is for the BLM to protect environmental resources in future leased areas by
45 imposing additional resource protective measures.

1 **13.1.22.2.2 Other Actions**

2
3
4 **Grazing Allotments**

5
6 Grazing is a common use of the lands in the vicinity of the proposed Escalante Valley
7 SEZ. The management authority for grazing allotments on these lands rests with the BLM’s
8 Cedar City Field Office. Some of the allotments currently in effect or under review by the BLM
9 in the area include Adams Well, Lowe Jones, Neck of the Desert, Norte Well, Willow Spring,
10 Lone Pine Spring, Matheson, Wood West, Bennion Spring, Jackson Wash, Bergstrom, Horse
11 Hollow, Long Hollow Cattle, Parowan Gap, and Lund (BLM 2009a). While many factors could
12 influence the level of authorized use, including livestock market conditions, natural drought
13 cycles, increasing nonagricultural land development, and long-term climate change, it is
14 anticipated that the current level of use will continue in the near term. A long-term reduction in
15 federal authorized grazing use would affect the value of the private grazing lands.

16
17
18 **Other Projects**

19
20 Many projects requesting ROW grant approvals on BLM and USFS lands are under
21 review or have received recent BLM approval for locations in Beaver, Iron, and Millard
22 Counties. These projects include initiatives such as minerals mining, communication tower
23 construction or modification, habitat improvement, and vegetation removal for fire control. The
24 following is a summary of larger projects in the vicinity of the three proposed SEZs in Utah
25 (because of the close proximity of the three proposed SEZs in Utah and overlapping geographic
26 extent of boundaries for various resource areas, the projects described in this section apply to all
27 three SEZs in Utah). Following these summaries, a list of other identified projects is provided in
28 Table 13.1.22.2-3. The list was derived from the BLM web site for the State of Utah on projects
29 recently approved or under review for ROW permits (BLM 2009a).

- 30
31 • *Blawn Mountain Stewardship.* The BLM implemented a project in
32 January 2009 to improve wildlife habitat in the south end of the Wah Wah
33 Mountains located about 33 mi (53 km) southwest of Milford. The largest part
34 of the project area is dominated by pinyon-juniper stands, where understory
35 species are in decline. The objectives are to improve forage for wild horses
36 and provide good deer habitat. An estimated 1,065 acres (4.3 km²) was to be
37 improved by cutting, lopping, and scattering juniper while retaining most of
38 the pinyon pine. Riparian habitat improvement includes removing the danger
39 of crown fire in ponderosa pine, which can threaten survival of pinyon pine,
40 and improving habitat around springs and where perennial water occurs. The
41 desired condition is to have a patchy density of shrublands, forbs, and grasses
42 to support wildlife. The project also is planning to thin up to 3,180 acres
43 (13 km²) of pinyon-juniper stands that surround the Blawn Mountain
44 Chainings. All other actions would be to improve the overall forest health and
45 suitability for wildlife.

TABLE 13.1.22.2-3 Other Projects in the Vicinity of the Proposed SEZs in Utah

Project Name	Description	Status	County	Location
AirCell, LLC, Communication Site	Communication tower	Approved Nov. 2009	Beaver	Frisco Peak, San Francisco Mountains.
Utah Alunite, LLC, Potassium Prospecting Permit Applications	Request to conduct prospect mining for potassium minerals	Applications received Sept. 2009; scoping Dec. 2008	Iron	Vicinity of Bible, Typhoid, and Mountain Springs.
Utah Copper Company Hidden Treasure Mine	Amendment to change some mine facilities, haul road change, and perimeter disturbances on BLM and private lands	Approved Jan. 2009	Beaver	5 to 10 mi (8 to 16 km) northwest of Milford, south end of Rocky Range and Beaver Lake Mountains.
Copper Ranch Knoll Exploration Plan of Operation	Authorization requested to initiate a copper reserve delineation project on the Marguerite No. 15 and Jewel Mine patented claims	EA completed Jan. 2009, signed Jan. 28, 2009	Beaver	About 7 mi (11.3 km) northwest of Milford on and around Copper Ranch Knoll, about halfway between west side of Rocky Range and the southeast edge of Beaver Lake Mountains.
Clark Livestock Pipeline ROW Renewal	Renewal of permit to transport water to livestock along 17,253-ft (5,259-m) long ROW across about 3,950 acres (16 km ²) of BLM lands	Approved Aug. 7, 2008	Iron	Iron Springs/Big Hollow Wash about 10 mi (16.1 km) northwest of Cedar City, Utah.
Highway 56 Fuels Reduction	Decrease fire hazard by removal of up to 1,000 acres (4 km ²) of standing pinyon-juniper; project would involve controlled burning, seeding, controlled grazing	Categorical Exclusion prepared in 2008	Iron	Adjacent to residential and outlying properties near Newcastle in southwestern Iron County.
Bible Spring Complex Wild Horse Gather and Removal	Removal of about 380 wild horses through capture; information gained used to update HMA Plans	EA approved June 30, 2009	Beaver, Iron	Wah Wah and Peak Mountain Ranges.
Kern River Gas Transportation Co. Apex Expansion Temporary Use Permit	Request to conduct four geotechnical borings for a proposed compressor site; borings to be conducted early June 2009	No information found	Beaver	Northwest of Minersville.

TABLE 13.1.22.2-3 (Cont.)

Project Name	Description	Status	County	Location
Sunrise Exploration Project	Exploration to evaluate grade, depth, and thickness of in-place copper to allow delineation of mineable reserves; 100 to 200 rotary drill holes would occur over about 160 acres (0.67 km ²)	Finding of No Significant Impact (FONSI) and Decision Record approved Sept. 24, 2009	Beaver	Located about 4 mi (6.4 km) northwest of the City of Milford at the southern extent of the Rocky Range.
Mineral Mountain Communication Site	Upgrade requested for existing communication site; upgrades expand existing site from 45 ft × 35 ft (14 m × 11 m) to 80 ft × 35 ft (24 m × 11 m); internal building modifications; new 70-ft (21-m) tall steel lattice tower	Application to the BLM received in June 2009; EA checklist received in Sept. 2009	Beaver	Township 26S, Range 8W, Section 30.
Enel's Proposed Cove Fort Wind Testing ROW	Three-year ROW requested to erect one met tower; about 2.4 acres (0.01 km ²) total disturbance to erect 197-ft (60-m) high tower, anchors and guy wires	Application received in July 2009, currently under review by the BLM	Beaver, Millard	West of I-15 near Cove Fort, Utah, in an area known as Cinder Crater.
Hamlin Valley Habitat Improvement	Improve vegetation conditions in Hamlin Valley Project Area; goals include habitat improvements in sagebrush-steppe, pinyon-juniper woodlands, and riparian areas; techniques include harrowing of sagebrush and seeding, thinning of pinyon juniper	EA started in Nov. 2005	Beaver, Iron	Project involves parts of Modena, Spanish George, Rosebud, Butcher, Stateline, Indian Peak, Atchison, South Pine Valley, North Pine Valley, and Indian Peak Grazing Allotments.

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- *Paradise Mountain Stewardship.* The BLM initiated a NEPA review in January 2009 on 8,850 acres (36 km²) of montane vegetation in the Paradise Mountains near the Utah–Nevada border to evaluate the impacts of vegetation removal and selective thinning to improve wildlife habitat and reduce fire hazards in the areas. The project objectives are to improve forest health; improve wildlife habitat; improve and maintain shrub, grass, and forb habitats in meadow and riparian areas; and decrease the probability of crown fires, which would eliminate individual stands. The Paradise Mountains are located 10 mi (16 km) northwest of the town of Modena, about 50 mi (80 km) southwest of the Wah Wah Valley SEZ and 20 mi (32 km) west of the Escalante Valley SEZ.

- 1 • *Lake Powell Pipeline.* Washington, Kane, and Iron Counties are pursuing
2 the construction of a pipeline that would run from Lake Powell, near Glen
3 Canyon Dam, through Kane County, to Sand Hollow Reservoir, which is
4 located approximately 10 mi (16 km) east of St. George. The pipeline would
5 then run parallel to I-15 into Iron County. The pipeline would be 158 mi
6 (254 km) long and bring 70,000 ac-ft (86 million m³) of water to Washington
7 County, 10,000 ac-ft (12 million m³) to Kane County, and 20,000 ac-ft
8 (25 million m³) to Iron County. The NEPA review could be completed
9 by 2012 based on the results of technical studies currently under way.
10 Construction of the pipeline may begin as soon as 2015 and is estimated to
11 take only 3 years. The pipeline would be located about 15 to 20 mi (24 to
12 32 km) southeast of the Escalante Valley SEZ (Utah Foundation 2008).
13
- 14 • *Clark, Lincoln, and White Pine Counties Groundwater Development Project.*
15 The Southern Nevada Water Authority (SNWA) proposes to construct a
16 groundwater development project that will be capable of transporting as
17 much as 200,000 ac-ft/yr (247 million m³/yr) of groundwater, including
18 11,584 ac-ft/yr (14 million m³/yr) of water rights in the Dry Lake Valley
19 groundwater basin. The proposed facilities include production wells, water
20 pipelines, pumping stations, water treatment, power, and other appurtenant
21 facilities. The project would draw groundwater from the Snake Valley aquifer
22 in western Millard County and the adjacent Spring Valley aquifer in Nevada,
23 as well as the Cave Valley and Dry Lake Valley basins to the southwest. A
24 DEIS is expected in 2010 (SNWA 2010).
25
26

27 **13.1.22.3 General Trends**

28
29 General trends of population growth, energy demand, water availability, and climate
30 change are similar for all three SEZs in Utah and are presented together in this section.
31 Table 13.1.22.3-1 lists the relevant impacting factors for the trends.
32
33

34 **13.1.22.3.1 Population Growth**

35
36 Over the period 2000 to 2008, the population grew by 5.7% annually in the ROI for
37 the Escalante Valley SEZ (see Section 13.1.19.1.4). The annual population growth rates for
38 the Milford Flats and Wah Wah Valley proposed SEZs in the same period were 3.7 and 3.2%,
39 respectively. The growth rate for the state of Utah as a whole was 2.5%. Within each ROI, each
40 county experienced growth in population since 2000, ranging from 1.4% in Millard County to
41 6.4% for Washington County. County populations are expected to continue to increase over the
42 period 2010 to 2023 (Governor’s Office of Planning and Budget 2009). Most of the population
43 growth in the Escalante SEZ ROI over this period will be in Cedar City.
44
45

TABLE 13.1.22.3-1 General Trends Relevant to the Proposed SEZs in Utah

General Trend	Impacting Factors
Population growth	Urbanization Increased use of roads and traffic Land use modification Employment Education and training Increased resource use (e.g., water and energy) Tax revenue
Energy demand	Increased resource use Energy development (including alternative energy sources) Energy transmission and distribution
Water availability	Drought conditions and water loss Conservation practices Changes in water distribution
Climate change	Water cycle changes Increased wildland fires Habitat changes Changes in farming production and costs

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13.1.22.3.2 Energy Demand

The growth in energy demand is related to population growth through increases in housing, commercial floorspace, transportation, manufacturing, and services. Given that population growth is expected in the three-SEZ area in Utah (by as much as 19% between 2006 and 2016), an increase in energy demand is also expected. However, the Energy Information Administration (EIA) projects a decline in per-capita energy use through 2030, mainly because of improvements in energy efficiency and the high cost of oil throughout the projection period. Primary energy consumption in the United States between 2007 and 2030 is expected to grow by about 0.5% each year, with the fastest growth projected for the commercial sector (at 1.1% each year). Transportation, residential, and industrial energy consumption are expected to grow by about 0.5, 0.4, and 0.1% each year, respectively (EIA 2009).

13.1.22.3.3 Water Availability

As described in Section 13.1.9.1.2, the proposed Escalante SEZ is located within the Escalante Valley groundwater basin, which is also referred to as the Beryl-Enterprise basin. Groundwater extraction in the Beryl-Enterprise area located 40 mi (64.4 km) west of Cedar City averaged 80,000 ac-ft/yr (98.7 million m³/yr) during the period 1989 to 1998 based on well pumping data (Utah Division of Water Resources 2001). In comparison, the Cedar Valley and

1 Parowan Valley groundwater areas had withdrawal rates of 33,000 and 29,000 ac-ft/yr
2 (40.7 million and 35.8 million m³/yr), respectively, during this period. The groundwater
3 withdrawal rate of 80,000 ac-ft/yr (98.7 million m³/yr) in the Beryl-Enterprise area caused
4 a lowering of the groundwater table by 1.2 ft (0.4 m) per year during this 11-year period.
5 Recent information reported by the USGS showed a continued increase in annual rate of
6 groundwater withdrawal in the Beryl-Enterprise area to about 93,000 ac-ft/yr (114.7 million
7 m³/yr) in 2008, which was an increase of 1,000 ac-ft (1.2 million m³) from 2007, and 8,000 ac-ft
8 (9.9 million m³) above the average annual withdrawal from 1998 to 2007 of 85,000 ac-ft/yr
9 (105 million m³). This increase was mostly the result of increased withdrawals for irrigation
10 (Burden et al. 2009). Groundwater use in the Milford area of the Escalante Valley basin also
11 has increased in recent years. The total of estimated withdrawals in the Milford area in 2008
12 was about 51,000 ac-ft (62.9 million m³), which is 2,000 ac-ft (2.5 million m³) more than was
13 reported for 2007 and 6,000 ac-ft (7.4 million m³) more than the average annual withdrawal for
14 1998 to 2007. The increase was due mainly to increased industrial water use. The Utah DWR
15 reports that 4,009 water rights have been approved in the Milford area of the Escalante Valley.
16 Almost all of the area is closed to new water appropriations (Utah DWR 2004).

17
18 In 2008, water usage of the total groundwater withdrawals in the Beryl-Enterprise basin
19 was primarily for agriculture (97%) (Burden et al. 2009). This is slightly higher than the average
20 agricultural water usage (96%) for Iron County in 2005, with the remaining water being used for
21 domestic (3%) and industrial (1%) purposes (Kenny et al. 2009). The majority of the agricultural
22 water use occurs in the Beryl-Enterprise region in the southwestern portion of the southern
23 Escalante Desert Valley.

24
25 Pumping has resulted in ground surface subsidence in some areas of western Iron County,
26 Utah. Groundwater levels dropped as much as 150 ft (46 m) in the Beryl-Enterprise region
27 between 1948 and 2009 because of excessive groundwater withdrawals in the southwestern
28 portion of the southern Escalante Desert Valley. Monitoring wells located within 1 mi (1.6 km)
29 of the proposed Escalante Valley SEZ indicate a current depth to groundwater of 20 to 25 ft
30 (6 to 8 m), while groundwater levels in these wells have been falling at a rate of 0.2 to 1.5 ft/yr
31 (0.06 to 0.5 m/yr) (Burden et al. 2009). Land subsidence likely caused by groundwater
32 withdrawals and overdrafts in the Beryl-Enterprise basin has resulted in earth fissures (Thomas
33 and Lowe 2007).

34
35 To meet future increases in water demand, Washington, Iron, and Kane Counties in
36 southwestern Utah are studying the feasibility of an agreement to obtain water from Lake Powell
37 on the Lower Colorado River via a pipeline. Despite water conservation efforts, this area of
38 Utah may begin to experience water shortfalls by 2012. Washington, Kane, and Iron Counties
39 are pursuing the construction of a pipeline that would run from Lake Powell, near Glen Canyon
40 Dam, through Kane County, to Sand Hollow Reservoir, which is located approximately 10 mi
41 (16.1 km) east of St. George. The pipeline would then run parallel to I-15 into Iron County.
42 The pipeline would be 158 mi (254 km) long and bring 70,000 ac-ft (86.3 million m³) of water
43 to Washington County, 10,000 ac-ft (12.3 million m³) to Kane County, and 20,000 ac-ft
44 (24.7 million m³) to Iron County. It would tap into Utah's unused portion of the Upper Colorado
45 River, which was defined as belonging to Utah in the 1922 Colorado River Compact. The
46 pipeline would cross both private and BLM-administered lands in Iron County and would

1 be about 15 to 20 mi (24 to 32 km) southeast of the Escalante Valley SEZ. Construction could
2 begin in 2015 and be completed in 3 years (Utah Foundation 2008).

3
4
5 **13.1.22.3.4 Climate Change**
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7 A study of climate change and its effects on Utah was conducted by the Governor’s Blue
8 Ribbon Advisory Council on Climate Change (BRAC 2007). The report, generated by scientists from
9 the three major universities in Utah, summarizes present scientific understanding of climate change
10 and its potential impacts on Utah and the western United States. Excerpts of researchers’ findings
11 and conclusions from the report follow:
12

- 13 • *Temperature Change.* In Utah, the average temperature during the past decade
14 was higher than observed during any comparable period of the past century
15 and roughly 2°F (1°C) higher than the 100-year average. Precipitation in
16 Utah during the twentieth century was unusually high; droughts during other
17 centuries have been more severe, prolonged, and widespread. Declines in
18 low-elevation mountain snowpack have been observed over the past several
19 decades in the Pacific Northwest and California. However, clear trends in
20 snowpack levels in Utah’s mountains from temperature increases cannot be
21 developed at this time based on recent historic data. Climate models suggest
22 that the average earth’s surface temperature will increase between 3 and 7°F
23 (2 and 4°C). GHG emissions at current rates will continue to exacerbate
24 climate change and associated impacts. For Utah, the projected change in
25 annual mean temperature under the 2.5 times increase in CO₂ concentrations
26 by the end of this century is about 8°F (5°C), which is comparable to the
27 present difference in annual mean temperature between Park City (44°F
28 [24°C]) and Salt Lake City (52°F [29°C]).
29
- 30 • *Impacts of Climate Change in Utah.* Utah is projected to warm more than the
31 average for the entire globe and more than coastal regions of the contiguous
32 United States. The expected consequences of this warming are fewer frost
33 days, longer growing seasons, and more heat waves. Agricultural impacts
34 anticipated include (1) an increase in crop productivity, assuming that water
35 use for irrigation remains relatively constant and more precipitation falls as
36 rain than as snow; (2) grazing use decreases on nonirrigated lands because
37 there is less forage for livestock; and (3) changes in insect and other animal
38 populations which, in turn, affect pollination and crop damage.
39

40 Snowpack, water supply, and drought potential are predicted to be affected by GHG
41 emissions holding at current levels or increasing. Year-to-year variations in snowfall will
42 continue to dominate mountain snowpack, streamflow, and water supply during the next couple
43 of decades. As temperature increases, it is likely that a greater fraction of precipitation will fall as
44 rain rather than as snow, and the length of the snow accumulation season will decrease. Projected
45 trends likely to occur in the twenty-first century are as follows:
46

- A reduction in natural snowpack and snowfall in the early and late winter for the winter recreation industry, particularly in low- to mid-elevation mountain areas (trends in high-elevation areas are unclear);
- An earlier and less intense average spring runoff for reservoir recharge;
- Increased demand for agricultural and residential irrigation due to more rapid drying of soils; and
- Warming of lakes and rivers with associated changes on aquatic life, including increased algal abundance and upstream shifts of fish.

Increasing temperatures will cause soils to dry more rapidly and likely increase soil vulnerability to wind erosion. Increased dust transport during high wind events would likely occur, particularly from salt flats and dry lakebeds such as Sevier Lake. Dust deposited on mountain snowpack would also accelerate spring snowmelt.

Forests, desert communities, and wildlife will likely be affected by increasing temperatures and associated climate change. Drier conditions would result in changes in plant distribution, quality of wildlife habitat, and increased potential for and intensity of wildfires. Plant distribution may change such that species occupy higher elevations.

The three proposed SEZs in Utah are in dry areas that experience drought conditions that will become worse with temperature increases and climate-induced changes on rainfall amounts and patterns. Groundwater availability for agriculture and livestock grazing on BLM-administered and private lands in southwestern Utah will likely be adversely affected by climate change.

13.1.22.4 Cumulative Impacts on Resources

This section addresses potential cumulative impacts in the proposed Escalante Valley SEZ on the basis of the following assumptions: (1) because of the relatively small size of the proposed SEZ (less than 10,000 acres [41 km²]), only one project would be constructed at a time, and (2) maximum total disturbance over 20 years would be about 5,291 acres (21 km²) (80% of the entire proposed SEZ). For purposes of analysis, it is also assumed that no more than 3,000 acres (12.1 km²) would be disturbed per project annually and 250 acres (1 km²) monthly on the basis of construction schedules planned in current applications. In addition, it is assumed that a 3-m (5-km) long transmission line would be constructed from the proposed SEZ to the nearest available transmission line. The new transmission line would disturb an additional 91 acres (0.37 km²) (Table 13.1.1.2-1). Regarding site access, it may be necessary to construct a new access road to the proposed SEZ to support construction and operation of solar facilities in the SEZ. If an access road were constructed to State Route 56, which is approximately 15 mi (24 km) from the SEZ, it would disturb an area of about 109 acres (0.44 km²) of land. In addition, some improvement of county roads might be required.

1 Cumulative impacts in each resource area that would result from the construction,
2 operation, and decommissioning of solar energy development projects within the proposed SEZ
3 when added to other past, present, and reasonably foreseeable future actions described in the
4 previous section are discussed below. At this stage of development, because of the uncertainties
5 of the future projects in terms of location within the proposed SEZ, size, number, and the types
6 of technology that would be employed, the impacts are discussed qualitatively or
7 semiquantitatively, with ranges given as appropriate. More detailed analyses of cumulative
8 impacts would be performed in the environmental reviews for the specific projects in relation to
9 all other existing and proposed projects in the geographic areas.

10 11 12 ***13.1.22.4.1 Lands and Realty*** 13

14 The area covered by the proposed Escalante Valley SEZ is largely undeveloped and rural.
15 In general, the areas surrounding the SEZ are rural in nature. Numerous dirt/ranch roads provide
16 access throughout the SEZ.
17

18 Development of the SEZ for utility-scale solar energy production would establish a
19 large industrial area that would exclude many existing and potential uses of the land, perhaps
20 in perpetuity. Access to such areas by both the general public and much wildlife would be
21 eliminated. Traditional uses of public lands would no longer be allowed. Utility-scale solar
22 energy development would be a new and discordant land use to the area. It also is possible that
23 similar development of state and private lands located adjacent to the SEZ would be induced by
24 development on public lands and might include additional industrial or support facilities and
25 activities.
26

27 In addition, numerous wind energy projects are proposed within a 50-mi (80-km) radius
28 of the Escalante Valley SEZ. As shown in Table 13.1.22.2-2 and Figure 13.1.22.2-1, in addition
29 to the ongoing Milford Wind Corridor project, there are three pending authorization for wind site
30 testing, eight authorized for wind testing, and three pending authorization for development of
31 wind facilities within this distance. The majority of these wind applications lie 40 to 50 mi
32 (60 to 80 km) to the northeast of the SEZ; no wind applications lie within 10 mi (16 km). Two
33 authorized geothermal leases are located about 50 mi (80 km) to the northeast, while there are
34 currently no solar applications within 50 mi (80 km) of the SEZ (Figure 13.1.22.2-1). The
35 Milford Flats South SEZ is located about 20 mi (32 km) northeast and the Wah Wah SEZ is
36 located about 33 mi (53 km) north of the Escalante Valley SEZ.
37

38 In combination with ongoing and foreseeable actions within the geographic extent of
39 effects, nominally 50 mi (80 km), the cumulative effects on land use of development of utility-
40 scale solar projects on public lands on the Escalante Valley SEZ would be small to moderate.
41 Most other actions outside of the proposed SEZ are wind energy projects located 30 to 50 mi
42 (48 to 80 km) away, which would allow many current land uses to continue, including farming.
43 However, the number and size of such projects could result in cumulative effects, especially if
44 the SEZ is fully developed, or all three Utah SEZs are fully developed, with solar projects.
45
46

1 **13.1.22.4.2 Specially Designated Areas and Lands with Wilderness Characteristics**
2

3 There are no specially designated areas within the proposed Escalante Valley SEZ. No
4 specially designated areas exist within 5 mi (8 km) of the SEZ either. Portions of the historic
5 route of the Old Spanish Trail pass about 6 mi (10 km) south of the SEZ. Other than some
6 potential to contribute cumulatively to visual impacts from the Old Spanish Trail, no cumulative
7 impacts would be expected on specially designated areas from the construction of utility-scale
8 solar energy facilities within the SEZ. The actual nature of cumulative visual impacts on the
9 users of the Old Spanish Trail would depend on the specific solar technologies employed in the
10 SEZ and the locations selected within the SEZ. No lands with wilderness characteristics have
11 been identified within 25 mi (40 km) of the SEZ.
12

13
14 **13.1.22.4.3 Rangeland Resources**
15

16 Currently, there is one grazing allotment in the proposed Escalante Valley SEZ. If utility-
17 scale solar facilities were constructed on the SEZ, those areas occupied by the solar projects
18 would be excluded from grazing. Depending on the number and size of potential projects, the
19 impact on the ranger(s) who currently utilize the same lands could be significant. If water rights
20 supporting agricultural use are purchased to support solar development, some areas that are
21 currently farmed by using that water would be converted to dry land uses. The effects of other
22 renewable energy projects within the geographic extent of effects, including the Milford Wind
23 project and two authorized geothermal applications within 50 mi (80 km) of the SEZ, would
24 result in at most small cumulative impacts due to the distance to the locations of the proposed
25 projects and the low impacts of wind facilities on grazing. Additional pending or authorized
26 wind applications fall within this distance, but none would be closer than about 20 mi (32 km) to
27 the SEZ.
28

29 Because the proposed SEZ is more than 6 mi (10 km) from any wild horse and burro
30 HMA managed by the BLM and more than 24 mi (39 km) from any wild horse and burro
31 territory administered by the USFS, solar energy development within the SEZ would not
32 contribute to cumulative impacts on wild horses and burros managed by the BLM or the USFS.
33

34
35 **13.1.22.4.4 Recreation**
36

37 Limited outdoor recreation (e.g., backcountry driving, OHV use, and hunting for both
38 small and big game) occurs on or in the immediate vicinity of the SEZ. Construction of utility-
39 scale solar projects on the SEZ would preclude recreational use of the affected lands for the
40 duration of the projects. However, improvements to or additional access roads could increase the
41 amount of recreational use in unaffected areas of the SEZ or in the immediate vicinity. There
42 would be a potential for visual impacts on recreational users of the Old Spanish Trail in the area
43 (Section 13.1.22.3.2). Since the area of the proposed SEZ has low current recreation use and the
44 surrounding area holds similar or better opportunities for recreation, while major foreseeable
45 actions, mainly wind projects, lie 15 mi (24 km) or more away, cumulative impacts on recreation
46 within the geographic extent of effects would be small.
47

1 **13.1.22.4.5 Military and Civilian Aviation**
2

3 The proposed Escalante Valley SEZ is located more than 100 mi (161 km) away from
4 any military installation. The closest civilian municipal aviation facility is the Cedar City
5 Regional Airport, located about 30 mi (48 km) east-southeast of the SEZ. Recent information
6 from the DoD indicates that there are no concerns about solar development in the SEZ.
7 Considering the distance to other ongoing and reasonably foreseeable future actions discussed in
8 Section 13.1.22.2, the cumulative impacts from the solar energy development in the proposed
9 SEZ on military and civilian aviation would be small.
10

11
12 **13.1.22.4.6 Soil Resources**
13

14 Ground-disturbing activities (e.g., grading, excavating, and drilling) during the
15 construction phase of a solar project, including any associated transmission line connections and
16 new roads, would contribute to the soil loss due to wind erosion. Road use during construction,
17 operations, and decommissioning of the solar facilities, would further contribute to soil loss.
18 Design features would be employed to minimize erosion and loss. Residual soil losses with
19 mitigations in place would be in addition to losses from construction of other renewable energy
20 facilities, recreational uses, and agricultural. Overall the cumulative impacts on soil resources
21 would be small, however, due to the generally low level of foreseeable development within the
22 geographic extent of effects.
23

24 Landscaping of solar energy facility areas could alter drainage patterns and lead to
25 increased siltation of surface water streambeds, in addition to that caused by other development
26 activities and agriculture. However, with the programmatic design features in place, cumulative
27 impacts would be small.
28

29
30 **13.1.22.4.7 Minerals (Fluids, Solids, and Geothermal Resources)**
31

32 As discussed in Section 13.1.8, there are currently oil and gas leases that cover the entire
33 SEZ; however, there are no producing oil and gas facilities. There are no mining claims or
34 proposals for geothermal energy development in the SEZ. If the proposed SEZ were approved
35 for solar energy development, conflicts would have to be resolved with existing oil and gas lease
36 holders. Development of both solar resources and oil and gas resources in the SEZ would be
37 possible utilizing directional drilling techniques for oil and gas. Because of the generally low
38 mineral productivity of the proposed SEZ and surrounding area and the expected low impact on
39 mineral accessibility of other foreseeable actions within the geographic extent of effects, mainly
40 wind facilities, cumulative impacts on mineral resources would be small.
41

42
43 **13.1.22.4.8 Water Resources**
44

45 The water requirements for various technologies if they were to be employed on the
46 proposed SEZ to develop utility-scale solar energy facilities are described in Section 13.1.9.2.

1 If the SEZ were to be fully developed over 80% of its available land area, the amount of
2 water needed during the peak construction year for all evaluated solar technologies would be
3 885 to 1,261 ac-ft (1.1 million to 1.6 million m³). During operations, the amount of water
4 needed for all evaluated solar technologies would range from 30 to 15,888 ac-ft/yr (36,000 to
5 20 million m³). The amount of water needed during decommissioning would be similar to or less
6 than the amount used during construction. As discussed in Section 13.1.22.2.3, the amount of
7 groundwater extracted in the Beryl-Enterprise in the vicinity of the proposed Escalante Valley
8 SEZ averaged 85,000 ac-ft/yr (105 million m³/yr) during the period 1998 to 2007. Therefore,
9 the additional water needed for solar facilities in the SEZ during operations would constitute
10 from a relatively small (0.03%) to a relative large (18%) increment (the ratio of the annual
11 water requirement to the annual amount withdrawn in Beryl-Enterprise) depending on the solar
12 technology used (PV technology at the low end and the wet-cooled parabolic technology at the
13 high end). However, as discussed in Section 13.1.9.1.3, since the water resources in the area
14 are fully appropriated, any new uses would simply replace any existing use and no net increase
15 or decrease would occur in the total amount of water used. Small cumulative effects on
16 groundwater supplies might result from withdrawals from solar projects in the SEZ combined
17 with withdrawals from the Southern Nevada Water Authority's proposed Clark, Lincoln, and
18 White Pine Counties (Nevada) Groundwater Development Project, which would draw water
19 from the Snake Valley and Spring Valley aquifers located about 40 mi (64 km) north and west of
20 the Escalante SEZ. The proposed Lake Powell Pipeline project could supply a portion of current
21 demands or offset future demands on groundwater in the region.
22

23 Sanitary wastewater would range from 9 to 74 ac-ft (11,000 to 91,000 m³) during the
24 peak construction year and would range from less than 1 to 15 ac-ft/yr (up to 18,000 m³/yr)
25 during operations of utility-scale solar energy facilities. Such volumes would not strain available
26 sanitary wastewater treatment facilities in the general area of the SEZ. For technologies that
27 use conventional wet-cooling systems, there would also be from 167 to 301 ac-ft/yr (200,000 to
28 370,000 m³) of blowdown water from cooling towers. Blowdown water would need to be either
29 treated on-site or sent to an off-site facility. Any on-site treatment of wastewater would have to
30 ensure that treatment ponds are effectively lined in order to prevent any groundwater
31 contamination. Thus blowdown water would not contribute to cumulative effects on treatment
32 systems or on groundwater.
33

34 ***13.1.22.4.9 Vegetation***

35
36
37 The proposed Escalante Valley SEZ is located mostly within the Shadscale-dominated
38 Saline Basins ecoregion, which primarily supports a sparse saltbush-greasewood shrub
39 community. Because of the long history of livestock grazing, the plant communities in the area
40 have likely been affected by grazing. If utility-scale solar energy projects were to be constructed
41 within the SEZ, all vegetation within the footprints of the facilities would likely be removed
42 during land-clearing and land-grading operations. Facility construction would primarily affect
43 Semi-Desert Shrub Steppe, Mixed Salt Desert Scrub, or Big Sagebrush Shrubland, which are
44 relatively common in the Escalante Desert Valley area. There are no known wetlands within the
45 proposed SEZ; however, any wetland or riparian habitats outside of the SEZ that are supported
46 by groundwater discharge could be affected by hydrologic changes resulting from groundwater

1 withdrawal or other project activities. The fugitive dust generated during the construction of the
2 solar facilities could increase the dust loading in habitats outside a solar project area in
3 combination with that from other construction, agriculture, recreation, and transportation. The
4 cumulative dust loading could result in reduced productivity or changes in plant community
5 composition. Programmatic and SEZ-specific design features would be used to reduce the
6 impacts on plant communities from solar energy projects. Other ongoing and reasonably
7 foreseeable future actions would affect the same plant species affected by development within
8 the SEZ. However, cumulative effects would be small due to the abundance of the affected
9 species; the distance to other major actions, mainly wind energy facilities; and the relatively
10 low impact of these actions on vegetation.

11 12 13 ***13.1.22.4.10 Wildlife and Aquatic Biota*** 14

15 Wildlife species that can potentially be affected by the development of utility-scale solar
16 energy facilities in the proposed SEZ include amphibians, reptiles, birds, mammals, and aquatic
17 species. The construction of utility-scale solar energy projects in the SEZ and any associated
18 transmission line connections and roads in or near the SEZ would have an impact on wildlife
19 through habitat disturbance (i.e., habitat reduction, fragmentation, and alteration), wildlife
20 disturbance, and wildlife injury or mortality. In general, impacted species with broad
21 distributions and a variety of habitats would be less affected than species with a narrowly
22 defined habitat within a limited area. Design features may include pre-disturbance biological
23 surveys to identify key habitat areas used by wildlife followed by avoidance or minimization
24 of disturbance to those habitats (e.g., areas of crucial habitat for pronghorn).

25
26 Other ongoing and reasonably foreseeable future actions within 50 mi (80 km) of the
27 proposed SEZ are dominated by wind energy projects (Section 13.1.22.2). The majority of these
28 projects lie 20 to 50 mi (30 to 80 km) to the northeast (Figure 13.1.22.2-1). The Milford Flats
29 South and Wah Wah Valley SEZs are also located within this distance. Since many of the
30 wildlife species present within the proposed SEZ that could be affected by other actions have
31 extensive available habitat within the affected counties (e.g., mule deer and pronghorn) and most
32 of the major actions, wind facilities, would be at some distance from the proposed SEZ and
33 would have low to moderate impacts on most species, cumulative impacts on wildlife within the
34 geographic extent of effects would be small to moderate.

35
36 Surface water within the proposed Escalante Valley SEZ is typically limited to
37 intermittent washes and dry lakebeds that contain water only for short periods during or
38 following precipitation events, and no perennial surface water bodies, seeps, or springs are
39 present within its boundaries. Similarly, wetlands are uncommon on the proposed SEZ
40 (Section 13.1.11.1). In addition, there are no perennial streams in close proximity to the proposed
41 SEZ. Thus, potential contributions to cumulative impacts on aquatic biota and habitats resulting
42 from groundwater drawdown or soil transport to surface streams from solar facilities within the
43 SEZ would be minimal. Further, other major foreseeable actions within the geographic extent of
44 effects, proposed wind facilities, would be more than 15 mi (30 km) away and would not use
45 groundwater for operations. Thus cumulative impacts on aquatic species would be small. Design

1 features, such as settling basins, silt fences, or directing water draining from the developed areas
2 away from specific drainages, would limit cumulative impacts on aquatic biota and habitats.
3
4

5 ***13.1.22.4.11 Special Status Species (Threatened, Endangered, Sensitive, 6 and Rare Species)*** 7

8 As many as 18 special status species could occur within the proposed Escalante Valley
9 SEZ based on suitable habitat, while 5 of these species have been recorded within the SEZ:
10 ferruginous hawk, greater sage-grouse, western burrowing owl, pygmy rabbit, and Utah prairie
11 dog. Numerous additional species listed as threatened or endangered by the states of Utah and
12 Nevada or listed as a sensitive species by the BLM (see Section 13.1.12.1) are known to occur
13 within 50 mi (80 km) of the proposed SEZ. Potential design features that could be used to reduce
14 or eliminate the potential for effects on these species from the construction and operation of
15 utility-scale solar energy projects in the SEZs and related developments (e.g., access roads and
16 transmission line connections) outside the SEZ include avoidance of habitat and minimization
17 of erosion, sedimentation, and dust deposition. Ongoing effects on special status species include
18 those from roads, agriculture, and recreational activities in the area, while foreseeable actions
19 are dominated by proposed wind projects 20 to 50 mi (32 to 80 km) to the northeast. Many of the
20 special status species present on the SEZ are also likely to be present at the locations of proposed
21 wind projects where the same habitats exist. Wind projects, however, would be generally less
22 disruptive to habitats than would solar projects. Thus, depending on where other projects are
23 actually built, small cumulative impacts on protected species could occur within the geographic
24 extent of effects. Projects would employ programmatic and SEZ-specific design features to limit
25 such effects.
26

27 ***13.1.22.4.12 Air Quality and Climate*** 28

29 While solar energy generates minimal emissions compared with fossil fuel-generated
30 energy, the site preparation and construction activities associated with solar energy facilities
31 would produce some emissions, mainly particulate matter (fugitive dust) and engine exhaust
32 emissions from vehicles and construction equipment. When these emissions are combined with
33 those from other projects near solar energy facilities or when they are added to natural dust
34 generated by winds and windstorms, the air quality in the general vicinity of the projects could
35 be temporarily degraded. For example, particulate matter (dust) concentration at or near the SEZ
36 boundaries could at times exceed state or federal ambient air quality standards. Generation of
37 dust from construction activities can be controlled by implementing aggressive dust control
38 measures, such as increased watering frequency or road paving or treatment.
39
40

41 Because the area proposed for the SEZ is rural and undeveloped land, there are no
42 significant industrial sources of air emissions in the area. The only type of air pollutant of
43 concern is dust generated by winds. Other ongoing and reasonably foreseeable future activities
44 in the general vicinity of the SEZ are described in Section 13.1.22.2. Because the other major
45 actions that could produce fugitive dust emissions are located more than 15 mi (24 km) from

1 the proposed SEZ, cumulative air quality effects due to dust emissions during any overlapping
2 construction periods would be small.

3
4 Over the long term and across the region, the development of solar energy may have
5 beneficial cumulative impacts on the air quality and air quality–related values by offsetting
6 the need for energy production that results in higher levels of emissions, such as coal, oil, and
7 natural gas. As discussed in Section 13.1.13, air emissions from operating solar energy facilities
8 are relatively minor, while the displacement of criteria air pollutants, VOCs, TAPs, and GHG
9 emissions currently produced from fossil fuels could be relative large. For example, if the
10 Escalante SEZ were fully developed (80% of its acreage) with solar facilities, the quantity of
11 pollutants avoided could be as large as 5% of all emissions from the current electric power
12 systems in Utah.

13 14 15 ***13.1.22.4.13 Visual Resources***

16
17 The proposed Escalante Valley SEZ is within a relatively flat, treeless valley floor. The
18 SEZ is visible from upper elevations of the Wah Wah Mountains to the northeast and the
19 Antelope Range to the south. The area is sparsely inhabited, remote, and rural in character. Other
20 than a few dirt roads and some livestock management-related modifications such as wire fences,
21 normally dry livestock ponds, and cattle trails, there is little evidence of cultural modifications
22 that detract from the area’s natural scenic quality. Given the natural state of the SEZ,
23 construction of utility-scale solar facilities on the SEZ would significantly alter the natural scenic
24 quality of the area. If other reasonably foreseeable activities as described in Section 13.1.22.2
25 take place, they would cumulatively affect the visual resources in the area. Additional impacts
26 would occur as a result of the construction, operation, and decommissioning/reclamation of
27 related facilities, such as access roads and electric transmission line connections.

28
29 Because of the large size of utility-scale solar energy facilities and the generally flat,
30 open nature of the proposed SEZ, some lands outside the SEZ, including portions of the Old
31 Spanish Trail, would also be subjected to visual impacts related to the construction, operation,
32 and decommissioning of utility-scale solar energy developments within the SEZ.

33
34 Visual impacts resulting from solar energy development within the SEZ would be in
35 addition to impacts caused by other potential projects in the area, such as the Sigurd to Red
36 Butte, Energy Gateway South, TransWest Express, and Three Peaks transmission line projects.
37 In addition, the Milford Wind project and two authorized geothermal applications lie within
38 50 mi (80 km), while three applications pending authorization for wind site testing, eight
39 authorized for wind testing, and three pending authorization for development of wind facilities
40 on public lands also lie within 50 mi (80 km) of the SEZ, most located 20 to 50 mi (30 to 80 km)
41 to the northeast (Figure 13.1.22.2-1). The Milford Flats South and Wah Wah Valley SEZs are
42 also located within 50 mi (80 km) of the Escalante SEZ. While proposed and potential facilities
43 would lie some distance from the SEZ and their contribution to cumulative impacts in the area
44 would depend on the number of projects that are actually built, it may be concluded that the
45 general visual character of the landscape within this distance could be altered by the presence of
46 solar facilities and windmills from what is currently rural desert. Because of the topography of

1 the region, solar facilities within the SEZ and wind facilities located in basin flats would be
2 visible at great distances from surrounding mountains. It is possible that two or more facilities
3 might be viewable from a single location, but facilities would be widely separated under current
4 proposals. Also, facilities would be located near major roads, and thus would be viewable by
5 motorists, who would also be viewing transmission line corridors, towns, and other
6 infrastructure, as well as the road system itself.
7

8 In addition, as additional facilities are added, several projects might become visible in
9 succession, as viewers move through the landscape, as by driving on local roads. In general, the
10 new facilities would not be expected to be consistent in terms of their appearance, and depending
11 on the number and type of facilities, the resulting visual disharmony could exceed the visual
12 absorption capability of the landscape and add significantly to the cumulative visual impact.
13 Considering all of the above, the overall cumulative visual impacts within the geographic extent
14 of effects from solar, wind, and other developments could be in the range of small to moderate.
15
16

17 ***13.1.22.4.14 Acoustic Environment*** 18

19 The areas around the proposed Escalante valley SEZ are relatively quiet. The existing
20 noise sources around the SEZ include road traffic, railroad traffic, aircraft flyover, and
21 agricultural activities. Other noise sources associated with current land use around the SEZ
22 include outdoor recreation, backcountry and OHV driving, and hunting. The construction of
23 solar energy facilities could increase the noise levels periodically for up to three years, but there
24 would be little noise during operation of solar facilities, except from solar dish engine facilities
25 and from parabolic trough or power tower facilities using TES, which could affect nearby
26 residences.
27

28 Other ongoing and reasonably foreseeable future activities in the general vicinity of the
29 SEZs are described in Section 13.1.22.2. Because proposed projects are far from the SEZ, the
30 area is sparsely populated, and noise seldom exerts its influence over several miles. Cumulative
31 noise effects during the construction or operation of solar facilities are unlikely.
32
33

34 ***13.1.22.4.15 Paleontological Resources*** 35

36 The proposed Escalante Valley SEZ has low potential for the occurrence of significant
37 fossil material (Section 13.1.16). While impacts on significant paleontological resources are
38 unlikely to occur in the SEZ, specific sites selected for future projects would be investigated to
39 determine whether a paleontological survey is needed. Any paleontological resources
40 encountered would be mitigated to the extent possible as determined through consultation with
41 the BLM. A similar process would be employed at other facilities constructed in the area. No
42 significant cumulative impacts on paleontological resources are expected.
43
44
45

1 **13.1.22.4.16 Cultural Resources**
2

3 The Escalante Desert is rich in cultural history with settlements dating as far back as
4 12,000 years. The area covered by the proposed Escalante Valley SEZ has the potential to
5 contain significant cultural resources. Although surveys of small portions of the SEZ have been
6 conducted and five sites have been recorded in the Escalante Valley SEZ, the acreage of the
7 areas surveyed is small compared with the total acreage in the SEZ. Two of the five sites
8 recorded in the dune area of the Escalante Valley SEZ are eligible for listing in the NRHP. In
9 addition, several historic properties are found near the SEZ (see Section 13.1.17.1). It is possible
10 that the development of utility-scale solar energy projects in the SEZ, when added to other
11 potential projects likely to occur in the area, such as the several authorized and pending wind
12 applications on public lands, could contribute cumulatively to cultural resource impacts
13 occurring in the region. However, only four wind applications—two pending wind site testing
14 and two authorized for wind site testing—lie within the 25-mi (40-km) geographic extent of
15 effects, while no foreseeable wind projects have been identified within this distance. The
16 proposed Milford Flats South SEZ also lies about 25 mi (40 km) to the northeast, but currently
17 has no solar applications pending. Potential future wind projects would cover large areas but
18 would result in a relatively low level of actual land disturbance. In addition, the specific sites
19 selected for future projects would be surveyed, and historic properties would be avoided or
20 mitigated to the extent possible. Through ongoing consultation with the Utah SHPO and
21 appropriate Native American governments, it is likely that many adverse effects on significant
22 resources in the region could be mitigated to some degree. In addition, given what is currently
23 known archaeologically about the valley floors in this area of Utah, it is unlikely that sites
24 recorded in the SEZ would be of such significance that, if properly mitigated, development
25 would cumulatively cause an irretrievable loss of information about a significant resource type.
26

27
28 **13.1.22.4.17 Native American Concerns**
29

30 Government-to-government consultation is under way with Native American
31 governments with possible traditional ties to the Escalante Desert. All federally recognized
32 Tribes with Southern Paiute roots or possible associations with the Utah SEZs have been
33 contacted and provided an opportunity to comment or consult regarding this PEIS. To date, no
34 specific concerns regarding the proposed Escalante Valley SEZ have been raised to the BLM. It
35 is, however, possible that the development of utility-scale solar energy projects in the SEZ, when
36 added to other potential projects likely to occur in the area, including wind energy facilities and
37 other renewable energy projects outside of the SEZ, could contribute cumulatively to visual and
38 acoustic impacts on their traditional landscape and the destruction of other resources in the valley
39 important to Native Americans. Continued discussions with the area Tribes through government-
40 to-government consultation is necessary to effectively consider and address the Tribes' concerns
41 tied to solar energy development in the Escalante Desert.
42
43
44

1 **13.1.22.4.18 Socioeconomics**
2

3 Solar energy development projects in the proposed Escalante Valley SEZ could
4 cumulatively contribute to socioeconomic effects in the immediate vicinity of the SEZs and
5 in the surrounding multicounty ROI. The effects could be positive (e.g., creation of jobs and
6 generation of extra income, increased revenues to local governmental organizations through
7 additional taxes paid by the developers and workers) or negative (e.g., added strain on social
8 institutions such as schools, police protection, and health care facilities). Impacts from solar
9 development would be most intense during facility construction but of greatest duration during
10 operations. Construction would temporarily increase the number of workers in the area
11 needing housing and services in combination with temporary workers involved in other new
12 developments in the area, including other renewable energy development. The number of
13 workers involved in the construction of solar projects in the peak construction year could range
14 from about 130 to 1,700 depending on the technology being employed, with solar PV facilities
15 at the low end and solar trough facilities at the high end. The total number of jobs created in
16 the area could range from approximately 300 (solar PV) to as high as 3,900 (solar trough).
17 Cumulative socioeconomic effects in the ROI from construction of solar, wind, or geothermal
18 facilities would occur to the extent that multiple construction projects of any type were ongoing
19 at the same time. It is a reasonable expectation that this condition would occur within a 50-mi
20 (80-km) radius of the SEZ occasionally over the 20-or-more year solar development period.
21

22 Annual impacts during the operation of solar facilities would be less, but of 20- to
23 30-year duration, and could combine with those from other new developments in the area.
24 The number of workers needed at the solar facilities would be in the range of 12 to 230, with
25 approximately 16 to 380 total jobs created in the region (Section 13.1.19.2.2). Population
26 increases would contribute to general upward trends in the region in recent years. The
27 socioeconomic impacts overall would be positive, through the creation of additional jobs
28 and income. The negative impacts, including some short-term disruption of rural community
29 quality of life, would not likely be considered large enough to require specific mitigation
30 measures.
31

32
33 **13.1.22.4.19 Environmental Justice**
34

35 Low-income populations have been identified within 50 mi (80 km) of the proposed
36 SEZ in both Utah and Nevada; no minority populations are present. Any impacts from solar
37 development could have cumulative impacts on low-income populations in combination with
38 other development in the area. Such impacts could be both positive, such as from increased
39 economic activity, and negative, such as visual impacts, noise, and exposure to fugitive dust.
40 Actual impacts would depend on where low-income populations are located relative to solar and
41 other proposed facilities and on the geographic range of effects. Overall, effects from facilities
42 within the SEZ are expected to be small, while other major foreseeable actions are widely
43 separated and would not likely combine with effects from the SEZ on low-income populations.
44 If needed, mitigation measures can be employed to reduce the impacts on the population in the
45 vicinity of the SEZ, including the low-income populations. Thus, it is not expected that the

1 proposed Escalante Valley SEZ would contribute to cumulative impacts on low-income
2 populations.
3

4 5 **13.1.22.4.20 Transportation** 6

7 Major roads that run close to the proposed Escalante Valley SEZ are Beryl Milford
8 Road and Lund Highway. The AADT on the roads near the SEZ is currently relatively low,
9 less than 1,000. During construction of utility-scale solar energy facilities, there could be up to
10 1,000 workers commuting to the construction site at the SEZ, which could increase the AADT
11 on these roads by 2,000 vehicles. This increase in highway traffic from construction workers
12 could have moderate cumulative impacts in combination with existing traffic levels and increases
13 from construction traffic from other major future actions, should construction schedules overlap.
14 Local road improvements may be necessary so as not to overwhelm the local roads near site
15 access points. Any impacts during construction activities would be temporary. The impacts can
16 also be mitigated to some degree by staggered work schedules and ride-sharing programs. Traffic
17 increases during operation of future actions would be relatively small because of the low number
18 of workers needed to operate the solar and wind facilities and would have little contribution to
19 cumulative impacts.
20

13.1.23 References

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

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41

1 **13.2 MILFORD FLATS SOUTH**

2
3
4 **13.2.1 Background and Summary of Impacts**

5
6
7 **13.2.1.1 General Information**

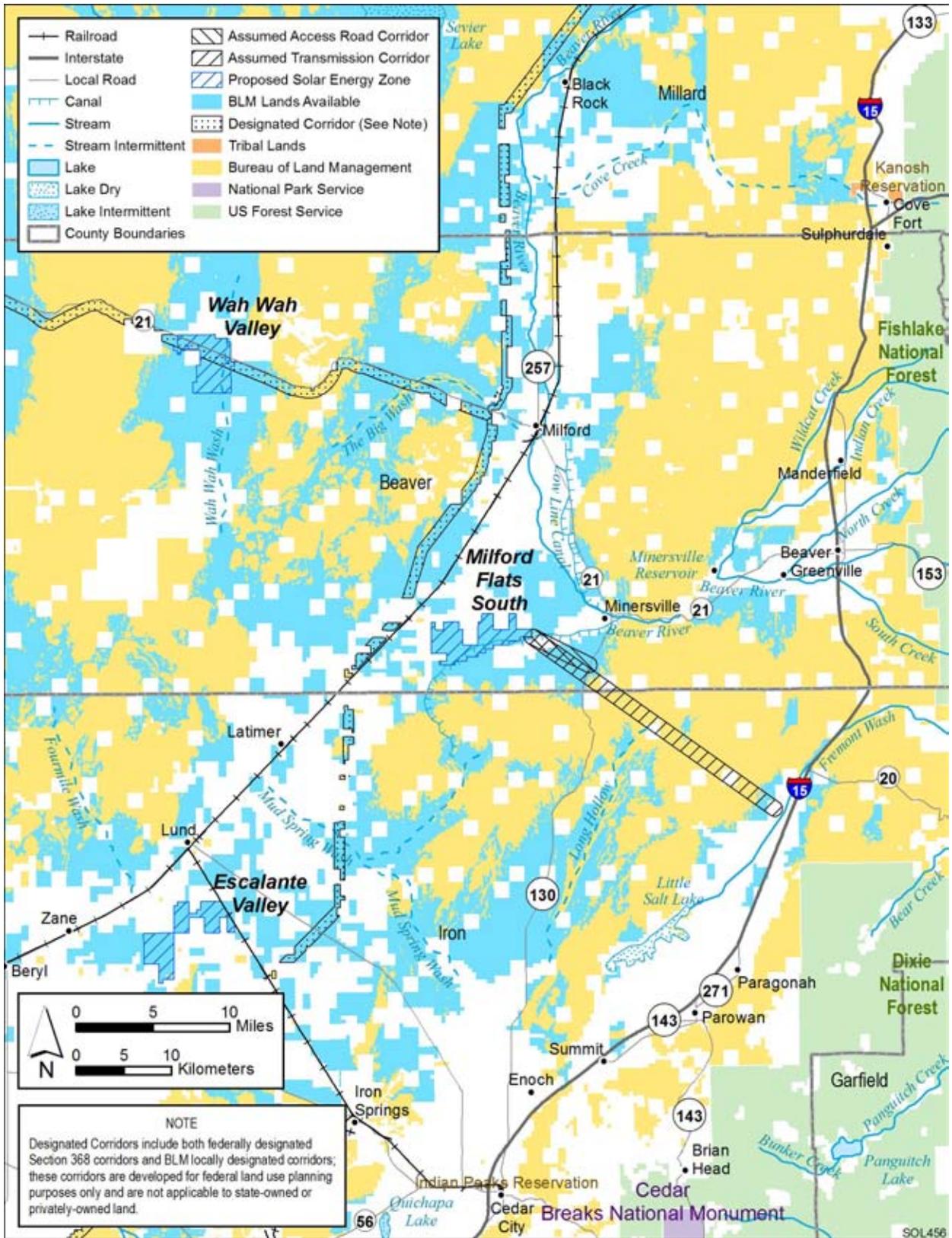
8
9 The proposed Milford Flats South SEZ is located in Beaver County in southwestern Utah
10 about 21 mi (34 km) northeast of the Escalante Valley SEZ (Figure 13.2.1.1-1). The SEZ has a
11 total area of 6,480 acres (26 km²). In 2008, the county population was 7,265, while adjacent Iron
12 County to the south had a population of 45,833. The largest nearby city is Cedar City, about
13 30 mi (48 km) south-southeast in Iron County. Several small towns are located closer to the
14 SEZ; Minersville is about 5 mi (8 km) east, and Milford is about 13 mi (21 km) north-northeast.
15 Salt Lake City is about 200 mi (322 km) to the north-northeast.

16
17 The nearest major road is State Route 21/130, about 5 mi (8 km) east in Minersville. A
18 smaller spur of State Route 129 is about 3 mi (5 km) northwest of the SEZ. Access to the Milford
19 Flats South SEZ is by county and local roads. Access to the interior of the SEZ is by dirt roads.
20 The UP Railroad passes 2 mi (3 km) to the west of the SEZ and has a rail stop in Lund, 20 mi
21 (32 km) southwest, and in Milford. The nearest public airports are near Milford and Beaver,
22 about 17 mi (28 km) and 23 mi (37 km) north-northeast and east, respectively. The area does not
23 have good access to transmission. The nearest transmission line is a 345-kV line that runs north
24 to south about 19 mi (31 km) southeast of the eastern boundary of the SEZ.

25
26 As of February 2010, there were no ROW applications for solar projects within the SEZ.

27
28 The proposed Milford Flats South SEZ is undeveloped, and the SEZ and surrounding
29 lands are rural in character. Numerous large buildings that are part of a commercial confined
30 hog-rearing operation are located on private land adjacent to the northern border of the SEZ.
31 There are irrigated farms to the east of the area. The SEZ is located in the northeastern section of
32 the Escalante Desert, a large, southwest-northeast trending valley. The Escalante Desert is
33 bounded by the Mineral Mountains to the northeast, Black Mountains to the south and southeast,
34 Shauntie Hills to the northwest, and the Wah Wah Mountains to the west. Land within the SEZ is
35 undeveloped scrubland characteristic of a high-elevation, semiarid basin.

36
37 The proposed Milford Flats South SEZ and other relevant information are shown in
38 Figure 13.2.1.1-1. The criteria used to identify the SEZ as an appropriate location for solar
39 energy development included proximity to existing transmission lines or designated corridors,
40 proximity to existing roads, a slope of generally less than 2%, and an area of more than
41 2,500 acres (10 km²). In addition, the area was identified as being free of other types of conflicts,
42 such as USFWS-designated critical habitat for threatened and endangered species, ACECs,
43 SRMAs, and NLCS lands (see Section 2.2.2.2 for the complete list of exclusions). Although
44 these classes of restricted lands were excluded from the proposed Milford Flats South SEZ, other
45 restrictions might be appropriate. The analyses in the following sections address the affected
46



1

2 **FIGURE 13.2.1.1-1 Proposed Milford Flats South SEZ**

3

1 environment and potential impacts associated with utility-scale solar energy development in the
2 proposed SEZ for important environmental, cultural, and socioeconomic resources.

3
4 As initially announced in the *Federal Register* on June 30, 2009, the proposed Milford
5 Flats South SEZ encompassed 6,440 acres (26 km²). Subsequent to the study area scoping
6 period, the Milford Flats South boundaries were altered somewhat to facilitate the BLM's
7 administration of the SEZ area. The revised SEZ is approximately 40 acres (0.16 km²) larger
8 than the original SEZ as published in June 2009.

10 11 **13.2.1.2 Development Assumptions for the Impact Analysis**

12
13 Maximum solar development of the proposed Milford Flats South SEZ was assumed to
14 be 80% of the SEZ area over a period of 20 years, a maximum of 5,184 acres (21 km²). These
15 values are shown in Table 13.2.1.2-1, along with other development assumptions. Full
16 development of the proposed Milford Flats South SEZ would allow development of facilities
17 with an estimated total of 576 MW of electrical power capacity if power tower, dish engine, or
18 PV technologies were used, based on the assumption of 9 acres/MW (0.04 km²/MW) of land
19 required, and an estimated 1,037 MW of power if solar trough technologies were used, based on
20 the assumption of 5 acres/MW (0.02 km²/MW) of land required.

21
22 Availability of transmission from SEZs to load centers will be an important consideration
23 for future development in SEZs. The nearest existing transmission line is a 345-kV line 19 mi
24 (31 km) southeast of the SEZ. It is possible that this existing line could be used to provide access
25 from the SEZ to the transmission grid, but the 345-kV capacity of that line may be inadequate for
26 576 to 1,037 MW of new capacity (note: a 500-kV line can approximately accommodate the load
27 of one 700-MW facility). At full build-out capacity, it is likely that new transmission and/or
28 upgrades of existing transmission lines would be required to bring electricity from the proposed
29 Milford Flats South SEZ to load centers; however, at this time, the location and size of such new
30 transmission facilities is unknown. Generic impacts of transmission and associated infrastructure
31 construction and of line upgrades for various resources are discussed in Chapter 5. Project-
32 specific analyses would need to identify the specific impacts of new transmission construction
33 and line upgrades for any projects proposed within the SEZ.

34
35 To evaluate the locations and the amount of disturbed acreage for new transmission
36 lines, it was assumed that a transmission line segment would be constructed from the proposed
37 Milford Flats South SEZ to the nearest existing transmission line to connect the SEZ to the
38 transmission grid. This assumption was made without additional information on whether the
39 nearest existing transmission line would actually be available for connection of future solar
40 facilities. Establishing a connection to the line closest to the SEZ would involve the construction
41 of about 19 mi (31 km) of new transmission line outside of the SEZ. The ROW for this
42 transmission line would occupy approximately 576 acres (2.3 km²) of land, assuming a 250-ft
43 (76-m) wide ROW. If a connecting transmission line were constructed in the future to connect
44 facilities within the SEZ to a different off-site grid location from the one assumed here, site
45 developers would need to determine the impacts from construction and operation of that line. In
46 addition, developers would need to determine the impacts of line upgrades if they are needed.

TABLE 13.2.1.2-1 Proposed Milford Flats South SEZ—Assumed Development Acreages, Maximum Solar MW Output, Access Roads, and Transmission Line ROWs

Total 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 Transmission Line and Road ROWs	Distance to Nearest Designated Corridor ^e
6,480 acres and 5,184 acres ^a	576 MW ^b and 1,037 MW ^c	State Route 21/130: 5 mi ^d	19 mi and 345 kV	576 acres and 36 acres	2 mi (3 km)

- ^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 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.

1
2
3 State Route 21/130 lies about 5 mi (8 km) to the east of the proposed Milford Flats South
4 SEZ. Assuming construction of a new access road to reach State Route 21/130 would be needed
5 to support construction and operation of solar facilities, approximately 36 acres (0.15 km²) of
6 land disturbance would occur (a 60-ft [18-m] wide ROW is assumed).
7
8

9 **13.2.1.3 Summary of Major Impacts and SEZ-Specific Design Features**

10
11 In this section, the impacts and SEZ-specific design features assessed in Sections 13.2.2
12 through 13.2.21 for the proposed Milford Flats South SEZ are summarized in tabular form.
13 Table 13.2.1.3-1 is a comprehensive list of the impacts discussed in these sections; the reader
14 may reference the applicable sections for detailed support of the impact assessment.
15 Section 13.2.22 discusses potential cumulative impacts from solar energy development in the
16 proposed SEZ.
17

18 Only those design features specific to the proposed Milford Flats South SEZ are included
19 in Sections 13.2.2 through 13.2.21 and in the summary table. The detailed programmatic design
20 features for each resource area to be required under BLM’s Solar Energy Program are presented
21 in Appendix A, Section A.2.2. These programmatic design features would also be required for
22 development in this and other SEZs.
23

TABLE 13.2.1.3-1 Summary of Impacts of Solar Energy Development within the Proposed Milford Flats South SEZ and SEZ-Specific Design Features^a

Resource Area	Environmental Impacts—Proposed Milford Flats South SEZ	SEZ-Specific Design Features
Lands and Realty	<p>Full development of the SEZ (80% of the total area) could disturb up to 5,184 acres (21 km²), which would exclude many existing and potential uses of the land, perhaps in perpetuity.</p> <p>Establishing connection to the existing transmission line located about 19 mi (31 km) to the southeast would disturb as much as 576 acres (2.3 km²) of private and BLM-administered land. New road construction would disturb as much as 36 acres (0.15 km²) of private and BLM-administered land.</p> <p>Solar development would require coordination with existing ROWs for two energy pipelines, one power line, two roads, and one telecommunications line crossing the SEZ.</p>	<p>None.</p> <p>Priority consideration should be given to utilizing upgraded existing county roads to provide construction and operational access to the SEZ.</p>
Specially Designated Areas and Lands with Wilderness Characteristics	None.	None.
Rangeland Resources: Livestock Grazing	Up to 6,440 acres (26 km ²), in three grazing allotments could be removed from grazing. Approximately 10 to 13% of two allotments could be lost with potential impacts on six permittees.	Consideration should be given to the feasibility of replacing all or part of the lost AUMs through development of additional range improvements on public lands remaining in the allotment.
Rangeland Resources: Wild Horses and Burros	None.	None.
Recreation	Developed portions of the SEZ would become unavailable for recreational use, but the overall loss would not be significant.	None.
Military and Civilian Aviation	None.	None.

TABLE 13.2.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Milford Flats South SEZ	SEZ-Specific Design Features
Geologic Setting and Soil Resources	Impacts on soil resources would occur mainly as a result of ground-disturbing activities (e.g., grading, excavating, and drilling) during the construction phase. Impacts include soil compaction, soil horizon mixing, soil erosion and deposition by wind, soil erosion by water and surface runoff, sedimentation, and soil contamination. These impacts may be impacting factors for other resources (e.g., air quality, water quality, and vegetation).	None.
Minerals (fluids, solids, and geothermal resources)	Existing oil and gas leases represent prior existing rights that could affect solar development of the SEZ.	Coordination with existing oil and gas lessees should be required in the earliest project planning stages of consideration for a solar development project to determine the feasibility of protecting lessees' development rights.
Water Resources	<p>Ground-disturbing activities (affecting up to 47% of the total area in the peak construction year) could affect surface water quality due to surface runoff, sediment erosion, and contaminant spills.</p> <p>Water requirements for dust suppression and potable water supply during the peak construction year could be as high as 1,244 ac-ft (1.5 million m³).</p> <p>Potential impacts on water resources related to land disturbance activities associated with utility-scale solar energy development include direct and indirect impacts on surface waters and groundwater.</p> <p>Runoff of water and sediments from the proposed SEZ could potentially affect natural drainage patterns and natural groundwater recharge and discharge properties.</p> <p>Up to 74 ac-ft (91,000 m³) of sanitary wastewater could be generated during the peak construction year.</p>	<p>Wet-cooling options would not be feasible; other technologies should incorporate water conservation measures;</p> <p>During site characterization, hydrologic investigations would need to identify 100-year floodplains and potential jurisdictional water bodies subject to Clean Water Act Section 404 permitting. Siting of solar facilities and construction activities should avoid areas identified as within a 100-year floodplain;</p> <p>Land disturbance and operations activities should prevent erosion and sedimentation in the vicinity of the ephemeral washes present on the site;</p> <p>Groundwater rights must be obtained from the Utah Division of Water;</p>

TABLE 13.2.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Milford Flats South SEZ	SEZ-Specific Design Features
Water Resources (Cont.)	<p>Assuming full development of the SEZ, the following amounts of water would be used during operations:</p> <ul style="list-style-type: none"> • For parabolic trough facilities (1,037-MW capacity), 740 to 1,570 ac-ft/yr (0.5 to 1.9 million m³/yr) for dry-cooled systems; and 5,199 to 15,567 ac-ft/yr (6.4 to 19 million m³/yr) for wet-cooled systems; • For power tower facilities (576-MW capacity), 410 to 870 ac-ft/yr (0.5 to 1.1 million m³/yr) for dry-cooled systems; and 2,886 to 8,646 ac-ft/yr (3.6 to 11 million m³/yr) for wet-cooled systems; • For dish engine facilities (576-MW capacity), 294 ac-ft/yr (0.36 million m³/yr); and • For PV facilities (576-MW capacity), 29 ac-ft/yr (0.036 million m³/yr). <p>Assuming full development of the SEZ, operations would generate up to 15 ac-ft/yr (18,000 m³/yr) of sanitary wastewater and up to 295 ac-ft/yr (0.36 million m³/yr) of blowdown water.</p>	<p>Groundwater monitoring and production wells should be constructed in accordance with Utah standards.</p> <p>Stormwater management plans and BMPs should comply with standards developed by the Utah Division of Water Quality.</p> <p>Water for potable uses would have to meet or be treated to meet Utah drinking water standards as defined by <i>Utah Administrative Code</i> Rule R309-200.</p>
Vegetation ^b	<p>Up to 80% (5,184 acres [21 km²]) of the SEZ would be cleared of vegetation. Additional clearing would result from any transmission line and access road construction outside the SEZ. Re-establishment of shrub communities in temporarily disturbed areas would likely be very difficult because of the arid conditions.</p> <p>Noxious weeds could become established in disturbed areas and colonize adjacent undisturbed habitats; thus, reducing restoration success and potentially resulting in widespread habitat degradation.</p>	<p>An Integrated Vegetation Management Plan, addressing invasive species control, and an Ecological Resources Mitigation and Monitoring Plan, addressing habitat restoration should be approved and implemented to increase the potential for successful restoration of affected habitats and minimize the potential for the spread of invasive species, such as those occurring in Beaver County, that could be introduced as a result of solar energy</p>

TABLE 13.2.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Milford Flats South SEZ	SEZ-Specific Design Features
Vegetation ^b (Cont.)	<p>The deposition of fugitive dust from disturbed soil areas in habitats outside the SEZ and transmission line and access road ROWs could result in reduced productivity or changes in plant community composition.</p> <p>Communities associated with playa habitats, greasewood flats communities, or other intermittently flooded areas downgradient from solar projects in the SEZ could be affected by ground-disturbing activities.</p> <p>Project-related groundwater use resulting in reductions in groundwater discharges at springs in the vicinity of the SEZ that support wetland or riparian habitats could result in degradation of those habitats.</p>	<p>project activities. Invasive species control should focus on biological and mechanical methods where possible to reduce the use of herbicides.</p> <p>Appropriate engineering controls should be used to minimize impacts on dry wash, playa, and greasewood flat habitats, including downstream occurrences, resulting from surface water runoff, erosion, sedimentation, altered hydrology, accidental spills, or fugitive dust deposition to these habitats. Appropriate buffers and engineering controls would be determined through agency consultation.</p> <p>All dry wash habitats within the SEZ and all dry wash and riparian habitats within the assumed transmission line corridor should be avoided to the extent practicable, and any impacts minimized and mitigated. A buffer area should be maintained around dry washes and riparian habitats to reduce the potential for impacts. Transmission line towers should be sited and constructed to minimize impacts on dry washes and riparian areas; towers should span such areas whenever practicable.</p>
Wildlife: Amphibians and Reptiles ^b	<p>Direct impacts on amphibians and reptiles from development on the SEZ would be small (loss of $\leq 1.0\%$ of potentially suitable habitats identified for the species in the SEZ region). With implementation of programmatic design features, indirect impacts would be expected to be negligible.</p>	<p>Minersville Canal, which could provide potential breeding sites for the Great Basin spadefoot and Great Plains toad, should be avoided.</p>

TABLE 13.2.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Milford Flats South SEZ	SEZ-Specific Design Features
Wildlife: Birds ^b	<p>Direct impacts on bird species would be small (loss of $\leq 1.0\%$ of potentially suitable habitats identified for the species in the SEZ region).</p> <p>Other impacts on birds could result from collision with vehicles and infrastructure (e.g., buildings and fences), surface water and sediment runoff from disturbed areas, fugitive dust generated by project activities, noise, lighting, spread of invasive species, accidental spills, and harassment.</p>	<p>The requirements contained within the 2010 Memorandum of Understanding between the BLM and USFWS to promote the conservation of migratory birds will be followed.</p> <p>Take of golden eagles and other raptors should be avoided.</p> <p>The steps outlined in the <i>Utah Field Office Guidelines for Raptor Protection from Human and Land Use Disturbances</i> should be followed.</p> <p>Minersville Canal, which could provide an occasional watering and feeding site for some bird species, should be avoided.</p>
Wildlife: Mammals ^b	<p>Direct impacts on big game, small game, furbearers, and small mammals from habitat disturbance and long-term habitat reduction/fragmentation would be small (loss of $\leq 1.0\%$ of potentially suitable habitats identified for the species in the SEZ region).</p> <p>The pronghorn is the only big game species with crucial habitat contained within the SEZ; however, direct impacts could occur to only about 0.2% of crucial habitat; thus, impacts on pronghorn would be expected to be small. The assumed transmission line would directly affect about 0.03% of crucial American black bear habitat, 0.04% of preferred cougar habitat, and 0.01% of crucial mule deer habitat. These impacts would be considered small.</p>	<p>The fencing around the solar energy development should not block the free movement of mammals, particularly big game species.</p> <p>Development near Minersville Canal should be avoided.</p>

TABLE 13.2.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Milford Flats South SEZ	SEZ-Specific Design Features
Aquatic Biota ^b	<p>No permanent water bodies, streams, or wetlands occur within the boundaries of either the Milford Flats South SEZ or the presumed new access road and transmission line corridors. Consequently, there would be no direct impacts on aquatic habitats from solar energy development.</p> <p>The man-made Minersville Canal is within the area of direct and indirect effects for the SEZ and the transmission line and access road. Although it may contain aquatic biota when water is present, Minersville Canal is an irrigation channel and does not support significant aquatic habitat or communities. Indirect effects on water quality could result from inputs of dust, sediment, and contaminants from the SEZ.</p>	None.
Special Status Species ^b	Potentially suitable habitat for 20 special status species occurs in the affected area of the Milford Flats South SEZ. For all of these special status species, less than 1% of the potentially suitable habitat in the region occurs in the area of direct effects.	<p>Pre-disturbance surveys should be conducted within the SEZ to determine the presence and abundance of special status species. Disturbance to occupied habitats for these species should be avoided or impacts on occupied habitats minimized to the extent practicable. If avoiding or minimizing impacts on occupied habitats is not possible for some species, translocation of individuals from areas of direct effect, or compensatory mitigation of direct effects on occupied habitats could reduce impacts. A comprehensive mitigation strategy for special status species that used one or more of these options to offset the impacts of development should be developed in coordination with the appropriate federal and state agencies.</p> <p>Avoidance of woodland habitats, rocky cliffs, and outcrops in the area of direct effects could reduce impacts on six special status species.</p>

TABLE 13.2.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Milford Flats South SEZ	SEZ-Specific Design Features
<p>Special Status Species^b (Cont.)</p>		<p>Consultations with the USFWS and the UDWR should be conducted to address the potential for impacts on the Utah prairie dog, a species listed as threatened under the ESA. Consultation would identify an appropriate survey protocol, avoidance measures, and, if appropriate, reasonable and prudent alternatives, reasonable and prudent measures, and terms and conditions for incidental take statements.</p> <p>Coordination with the USFWS and the UDWR should be conducted to address the potential for impacts on the greater sage-grouse—a candidate species for listing under the ESA. Coordination would identify an appropriate pre-disturbance survey protocol, avoidance measures, and any potential compensatory mitigation actions.</p> <p>Harassment or disturbance of special status species and their habitats in the affected area should be mitigated. This can be accomplished by identifying any additional sensitive areas and implementing necessary protection measures based upon consultation with the USFWS and UDWR.</p>
<p>Air Quality and Climate</p>	<p><i>Construction:</i> Predicted 24-hour and annual PM₁₀ and 24-hour PM_{2.5} concentration levels would temporarily exceed AAQS at the SEZ boundaries and in the immediate surrounding areas but would decrease quickly with distance. Construction emissions from the engine exhaust from heavy equipment and vehicles could cause some impacts, which would be temporary in nature, on AQRVs (e.g., visibility and acid deposition) at the nearest federal Class I area, Zion NP, which is not located directly downwind of prevailing winds.</p>	<p>None.</p>

TABLE 13.2.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Milford Flats South SEZ	SEZ-Specific Design Features
Air Quality and Climate (Cont.)	<i>Operations:</i> Positive impact due to avoided emission of air pollutants from combustion-related power generation: from 2.7 to 4.9% of total emissions of SO ₂ , NO _x , Hg, and CO ₂ from electric power systems in the state of Utah avoided (up to 1,808 tons/yr SO ₂ , 3,457 tons/yr NO _x , 0.007 tons/yr Hg, and 1,960,000 tons/yr CO ₂).	
Visual Resources	<p>The SEZ is in an area of low scenic quality, with numerous cultural disturbances already present. Residents, workers, and visitors to the area may experience visual impacts from solar energy facilities located within the SEZ (as well as any associated access roads and transmission lines) as they travel area roads. The residents nearest to the SEZ could be subjected to large visual impacts from solar energy development within the SEZ.</p> <p>The SEZ and surrounding lands within the SEZ viewshed would incur large visual impacts due to major modification of the character of the existing landscape.</p> <p>Utility-scale solar energy development within the proposed Milford Flats South SEZ is unlikely to cause even moderate visual impacts on highly sensitive visual resource areas, the closest of which is more than 25 mi (40 km) from the SEZ. The closest community is about 5 mi (8 km) from the SEZ and is likely to experience weak visual contrasts from solar development within the SEZ.</p> <p>The communities of Minersville and Milford are located within the 25-mi (40-km) viewshed of the SEZ; slight variations in topography and vegetation provide some screening. Visual contrasts visible from Minersville would be expected to be weak; contrasts visible from Milford would be expected to be minimal.</p> <p>Travelers on State Routes 21 and 129 might observe moderate levels of visual contrast associated with solar development within the SEZ.</p>	None.

TABLE 13.2.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Milford Flats South SEZ	SEZ-Specific Design Features
Acoustic Environment	<p><i>Construction.</i> For construction activities occurring near the eastern SEZ boundary, estimated noise levels at the nearest residence (located about 1.1 mi [1.8 km] southeast of the SEZ boundary) would be about 41 dBA, which is below the Iron County regulation of 50 dBA for a solar facility and comparable to typical daytime mean rural background level of 40 dBA. In addition, an estimated 42 dBA L_{dn} at this residence is well below the EPA guideline of 55 dBA L_{dn} for residential areas.</p> <p><i>Operations.</i> For a parabolic trough or power tower facility located near the eastern corner of the SEZ, the predicted noise level at the nearest residence would be about 40 dBA, which is lower than the Iron County regulation of 50 dBA and the same as the typical daytime mean rural background level of 40 dBA. For 12-hour daytime operation, the estimated 42 dBA L_{dn} falls well below the EPA guideline of 55 dBA for residential areas. In the case of 6-hour TES at night, the estimated nighttime noise level at the nearest residence would be 50 dBA, which is the same as Iron County regulation of 50 dBA, but higher than the typical nighttime mean rural background level of 30 dBA. The day-night average noise level is estimated to be about 52 dBA L_{dn}, which is lower than the EPA guideline of 55 dBA L_{dn} for residential areas.</p> <p>If 80% of the SEZ were developed with dish engine facilities, the estimated noise level at the nearest residence would be about 44 dBA, which is lower than the Iron County regulation of 50 dBA for a solar facility but higher than the typical daytime mean rural background level of 40 dBA. If assuming 12-hour daytime operation, the estimated 44 dBA L_{dn} at this residence would be well below the EPA guideline of 55 dBA L_{dn} for residential areas.</p>	<p>Noise levels from cooling systems equipped with TES should be managed so that levels at the nearest residence to the southeast of the SEZ are kept within applicable guidelines. This could be accomplished in several ways, for example, through placing the power block approximately 1 to 2 mi (1.6 to 3 km) or more from residences, limiting operations to a few hours after sunset, and/or installing fan silencers.</p> <p>Dish engine facilities within the Milford Flats South SEZ should be located more than 1 to 2 mi (1.6 to 3 km) from the nearest residence around the SEZ (i.e., the facilities should be located in the central or western area of the proposed SEZ). Direct noise control measures applied to individual dish engine systems could also be used to reduce noise impacts at nearby residences.</p>

TABLE 13.2.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Milford Flats South SEZ	SEZ-Specific Design Features
Paleontological Resources	Few, if any, impacts on significant paleontological resources are likely to occur in the proposed SEZ or along the additional ROWs for the associated access road and transmission line. However, a more detailed look at the geological deposits of the SEZ is needed to determine whether a paleontological survey is warranted.	None.
Cultural Resources	No adverse impacts are currently anticipated at the proposed Milford Flats South SEZ or along associated ROWs, but such could be possible if significant cultural resources are found in the area during survey. A cultural resource survey of the entire area of potential effect, including consultation with affected Native American Tribes, would first need to be conducted to identify archaeological sites, historic structures and features, and traditional cultural properties, and an evaluation would need to follow to determine whether any are eligible for listing in the NRHP as historic properties.	SEZ-specific design features would be determined during consultations with the Utah SHPO and affected Tribes and would depend on the findings of cultural surveys.
Native American Concerns	While no specific concerns regarding the proposed Milford Flats South SEZ have been expressed, as consultation with the Tribes continues and project-specific analyses are undertaken, it is possible that Native American concerns will emerge over potential effects of solar energy development within the SEZ.	The need for and nature of SEZ-specific design features would be determined during government-to-government consultation with the affected Tribes.
Socioeconomics	<p><i>Construction of solar facilities within the SEZ:</i> 216 to 2,856 total jobs; \$11.2 million to \$148.1 million income in ROI.</p> <p><i>Operations of solar facilities within the SEZ:</i> 15 to 337 annual total jobs; \$0.5 million to \$10.2 million annual income in the ROI.</p> <p><i>Construction of new transmission line:</i> 84 total jobs; \$3.4 million income.</p> <p><i>Construction of access road:</i> 100 total jobs; \$2.8 million income.</p>	None.

TABLE 13.2.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Milford Flats South SEZ	SEZ-Specific Design Features
Environmental Justice	Low-income populations, as defined by CEQ guidelines, occur within the 50-mi (80-km) radius around the boundary of the SEZ; therefore, any adverse impacts that occur (although likely to be small) could disproportionately affect low-income populations. Because there are no minority populations within the 50-mi (80-km) radius, according to CEQ guidelines, there would be no impacts on minority populations.	None.
Transportation	The primary transportation impacts are anticipated to be from commuting worker traffic. Single projects could involve up to 1,000 workers each day, with an additional 2,000 vehicle trips per day (maximum). The volumes of traffic on regional corridors would be more than double the current values in most cases. Beryl Milford Road and State Routes 21, 129, and 130 provide regional traffic corridors near the Milford Flats South SEZ.	None.

Abbreviations: AAQS = ambient air quality standards; AQRV = air quality-related value; AUM = animal unit month; BMP = best management practice; CEQ = Council on Environmental Quality; CO₂ = carbon dioxide; dBA = A-weighted decibel; EPA = U.S. Environmental Protection Agency; ESA = Endangered Species Act; Hg = mercury; L_{dn} = day-night average sound level; NO_x = nitrogen oxides; NP = National Park; NRHP = *National Register of Historic Places*; PM_{2.5} = particulate matter with an aerodynamic diameter of 2.5 μm or less; PM₁₀ = particulate matter with an aerodynamic diameter of 10 μm or less; PV = photovoltaic; ROI = region of influence; ROW = right-of-way; SEZ = solar energy zone; SHPO = State Historic Preservation Office; SO₂ = sulfur dioxide; TES = thermal energy storage; UDWR = Utah Division of Wildlife Resources; USFWS = U.S. Fish and Wildlife Service.

- ^a The detailed programmatic design features for each resource area to be required under BLM's Solar Energy Program are presented in Appendix A, Section A.2.2. These programmatic design features would be required for development in the proposed Milford Flats South SEZ.
- ^b The scientific names of all plants, wildlife, aquatic biota, and special status species are provided in Sections 13.2.10 through 13.2.12.

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1 **13.2.2 Lands and Realty**

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4 **13.2.2.1 Affected Environment**

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6 The area around the proposed Milford Flats South SEZ is rural and is located on the
7 north end of a well-blocked unit of BLM-administered public lands. There are private lands
8 adjacent to the north and southeast of the SEZ and a substantial number of large buildings used
9 for commercial, confined, hog-rearing operations. There are also several parcels of state land
10 both adjacent to and southwest of the SEZ. A geothermal steam-generating station is being
11 constructed about 2 mi (3 km) southwest of the SEZ.

12
13 In the proposed Milford Flats South SEZ, there are ROWs for two energy pipelines,
14 one transmission line, two roads, and one telecommunications line. There is a
15 Section 368 designated energy corridor 2 mi (3 km) west of the SEZ and a county road passing
16 along the northern edge of the SEZ that connects to State Highway 21 at Minersville, about 5 mi
17 (8 km) east of the SEZ. In addition, Beaver County has asserted Revised Statute 2477 Class B
18 and D road ROWs within the Milford Flats South SEZ. As of February 2010, there were no
19 applications for solar facility ROWs on BLM-administered lands in the vicinity of the proposed
20 Milford Flats South SEZ or in the state of Utah.

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23 **13.2.2.2 Impacts**

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26 **13.2.2.2.1 Construction and Operations**

27
28 Full development of the proposed Milford Flats South SEZ could disturb 5,184 acres
29 (21 km²) (Table 13.2.1.2-1). Development of the SEZ for utility-scale solar energy production
30 would establish a large industrial area that would exclude many existing and potential uses of the
31 land, perhaps in perpetuity. Since the setting of the SEZ is rural, utility-scale solar energy
32 development would substantially dominate the area, but because of the presence of a large
33 number of enclosed hog-rearing facilities, the development would not be completely out of
34 place. It also is possible that with landowner agreement, the state and private lands adjacent to
35 the SEZ could be developed in the same or a complementary manner as the public lands.
36 Development of additional industrial or support activities also could be induced on additional
37 state and private lands near the SEZ.

38
39 Existing ROW authorizations on the SEZ would not be affected by solar energy
40 development because they are prior rights. Should the proposed SEZ be identified as an SEZ
41 in the ROD for this PEIS, the BLM would still have discretion to authorize additional ROWs in
42 the area until solar energy development was authorized, and then future ROWs would be subject
43 to the rights granted for solar energy development.

1 **13.2.2.2.2 Transmission Facilities and Other Off-Site Infrastructure**
2

3 Delivery of energy produced in the SEZ would require establishing connection to the
4 regional grid, and for analysis, it is assumed that connection would be made to the existing
5 345-kV transmission line located about 19 mi (31 km) southeast of the SEZ, as this line might be
6 available to transport the power produced in this SEZ (See Section 13.2.1.2 for a description of
7 analysis assumptions). This line would likely cross private, state, and BLM-administered lands
8 and could disturb as much as 576 acres (2.3 km²) of land.
9

10 At full build-out capacity, it is clear that additional new transmission lines and/or
11 upgrades of existing transmission lines would be required to bring electricity from the proposed
12 Milford Flats South SEZ to load centers; however, at this time, the location and size of such new
13 transmission facilities are unknown. Generic impacts of transmission and associated
14 infrastructure construction and of line upgrades for various resources are discussed in Chapter 5.
15 Project-specific analyses would need to identify the specific impacts of new transmission
16 construction and line upgrades for any solar projects requiring additional transmission capacity.
17

18 Because the SEZ is 5 mi (8 km) from the nearest state highway, it is assumed that a new
19 road would need to be constructed to State Route 21/131 east of the SEZ, disturbing
20 approximately 36 acres (0.15 km²) of private and BLM-administered land. Existing county roads
21 may also be able to provide access to the SEZ; upgrades to these roads may be required to
22 support construction and operation. Roads and transmission lines would also be constructed
23 within the SEZ to facilitate development of the area.
24
25

26 **13.2.2.3 SEZ-Specific Design Features and Design Feature Effectiveness**
27

28 Implementing the programmatic design features described in Appendix A, Section A.2.2,
29 as required under BLM’s Solar Energy Program would provide adequate mitigation for some
30 identified impacts. The exceptions may be impacts related to the exclusion of many existing and
31 potential uses of the public land, perhaps in perpetuity; the visual impact of an industrialized-
32 looking solar facility within an otherwise rural area; and, any induced changes in land use on
33 private and state lands.
34

35 A proposed design feature specific to the proposed SEZ is:

- 36
- 37 • Priority consideration should be given to utilizing upgraded existing county
38 roads to provide construction and operational access to the SEZ.
39
- 40

1 **13.2.3 Specially Designated Areas and Lands with Wilderness Characteristics**

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4 **13.2.3.1 Affected Environment**

5
6 The latest revision to the 1999 Utah inventory for wilderness characteristics within
7 BLM’s Cedar City district office was completed in January 2005. The Granite Peak wilderness
8 inventory unit, which includes a total of 18,300 acres (74 km²), is located about 12 mi (19 km)
9 from the eastern boundary of the proposed Milford Flats South SEZ. This is one of the units
10 having wilderness characteristics that has been identified and refined through various BLM
11 inventory efforts since 1980.¹ These lands do not receive the same protection as designated
12 wilderness and WSAs. The BLM has the authority through its land use planning system to
13 manage these lands to protect their wilderness characteristics, but as of this time no such decision
14 has been made. The viewshed of the inventory unit includes highways, roads, agricultural
15 development, and residential development in Minersville and Milford. See Figure 13.2.3.1-1 for
16 the location of this area.

17
18 The route of the Old Spanish National Historic Trail is located about 25 mi (40 km)
19 southeast of the SEZ.

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22 **13.2.3.2 Impacts**

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25 ***13.2.3.2.1 Construction and Operations***

26
27 Visitors in about 1,835 acres (7 km²) (which is about 10%) of the Granite Peak
28 wilderness inventory unit would have a distant and elevated view of development within the
29 SEZ. However, because of the distance to the SEZ and the development currently within the
30 viewshed between the unit and the SEZ, development of the SEZ would not be expected to have
31 a significant additional impact on the wilderness characteristics of the Granite Peak unit.

32
33 Depending on the solar technology employed, development within the SEZ might be
34 visible from the route of the Old Spanish Trail, but because of the distance from the SEZ, it is
35 anticipated that there would be no impact on future designation or management of the trail.

36
37
38 ***13.2.3.2.2 Transmission Facilities and Other Off-Site Infrastructure***

39
40 Construction of a new transmission line would add about 576 acres (2.3 km²) of surface
41 disturbance on private, state, and BLM-administered lands. Construction of an access road to
42 State Route 130 would add about 36 acres (0.15 km²) of surface disturbance to private and

¹ For more information on the BLM-Utah wilderness inventories, see http://www.blm.gov/ut/st/en/prog/blm_special_areas/utah_wilderness.

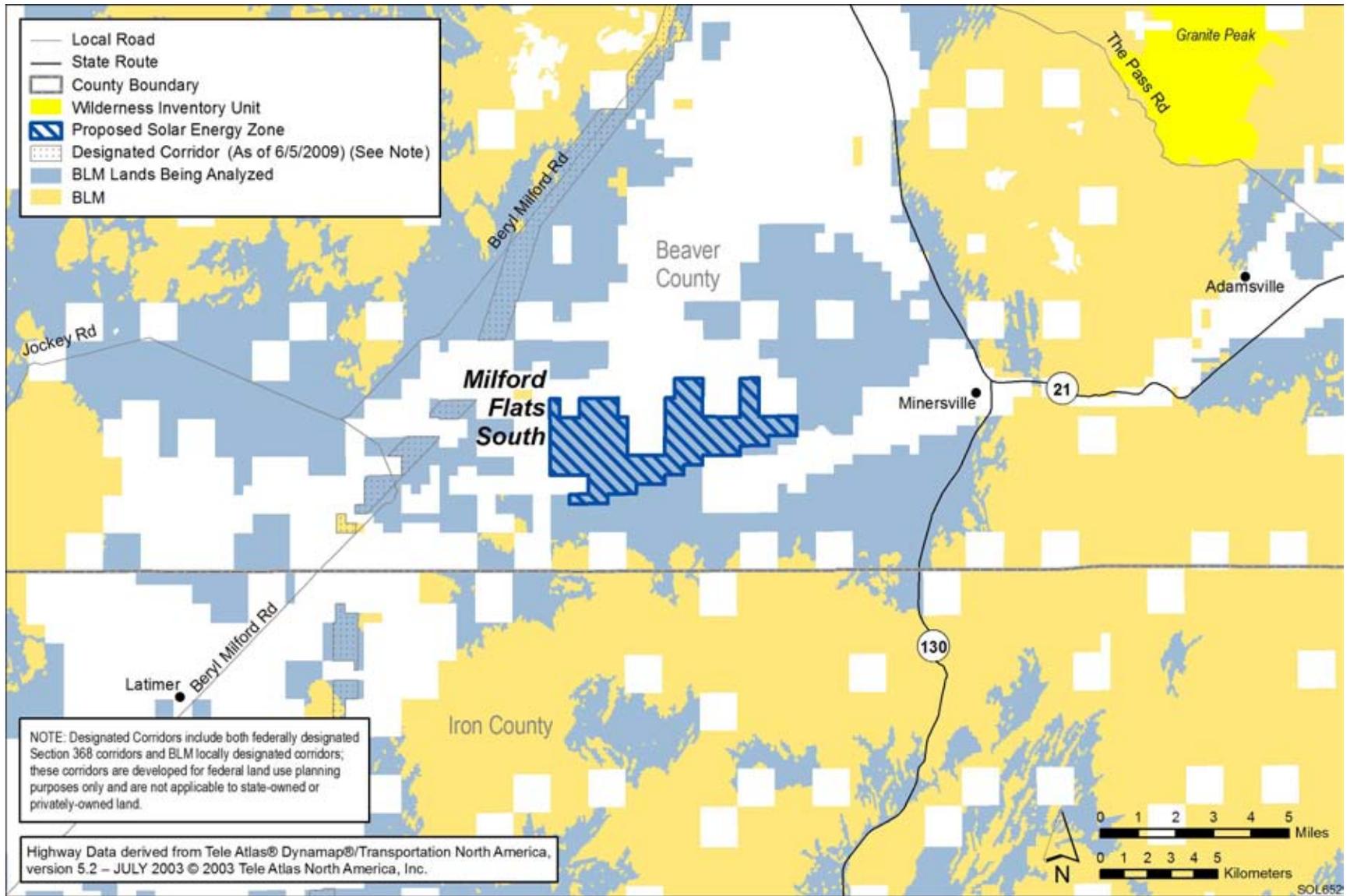


FIGURE 13.2.3.1-1 Specially Designated Areas in the Vicinity of the Proposed Milford Flats South SEZ

1 BLM-administered land to the impact associated with the SEZ facilities. These disturbances
2 would not likely cause additional adverse impacts on specially designated areas.
3

4
5 **13.2.3.3 SEZ-Specific Design Features and Design Feature Effectiveness**
6

7 No SEZ-specific design features would be required. Implementing the programmatic
8 design features described in Appendix A, Section A.2.2, as required under BLM’s Solar Energy
9 Program would provide adequate mitigation for specially designated areas.
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1 **13.2.4 Rangeland Resources**

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3 Rangeland resources include livestock grazing and wild horses and burros; both are
4 managed by the BLM. These resources and possible impacts on them from solar development
5 within the proposed Milford Flats South SEZ are discussed in Sections 13.2.4.1 and 13.2.4.2.
6

7
8 **13.2.4.1 Livestock Grazing**

9
10
11 ***13.2.4.1.1 Affected Environment***

12
13 Grazing is currently authorized on the proposed Milford Flats South SEZ.
14 Table 13.2.4.1-1 summarizes the grazing allotments, along with the percentages of the allotments
15 that lie within the SEZ. The SEZ encompasses portions of three perennial grazing allotments.
16 These allotments are used by nine permittees and support the production of 4,986 AUMs of
17 forage per year.
18

19
20 ***13.2.4.1.2 Impacts***

21
22
23 **Construction and Operations**

24
25 Should utility-scale solar development occur in this SEZ, grazing would be excluded
26 from the areas that would be developed, as provided for in the BLM grazing regulations (43 CFR
27 Part 4100). This would include reimbursement of permittees for their portion of the value for any
28 range improvements in the area removed from the grazing allotment. There would be little to no
29 impact on the Minersville No. 5 allotment and small impacts on the Minersville No. 4 and No. 6
30 allotments. The impact of this change in the grazing permits would depend on several factors,
31 including (1) how much of the allotment each permittee might lose to the development, (2) how
32 important the specific land lost is to each permittee’s overall operation, and (3) the amount of
33 actual forage production that would be lost by each permittee. Based on the assumption of a loss
34 of AUMs comparable to the percentages of the allotments included in the SEZ, a total of
35 360 AUMs could be lost among the three allotments.
36

37 Defining the specific impacts on individual grazing permits and permittees would require
38 a specific analysis of each case on the basis of, at a minimum, the three factors identified above.
39 For this PEIS and based on an assumed loss of 360 AUMs as described above, there would be no
40 significant impact on livestock use from the designation and development of the SEZ. This
41 conclusion is derived from comparing the loss of the 360 AUMs with the total BLM-authorized
42 AUMs in the Cedar City Field Office for grazing year 2008, which totaled 139,998 AUMs.
43 While small from an overall perspective, the loss of 10 to 13% of the AUMs from a relatively
44 small livestock operation could have a significant impact on specific permittees, depending how
45 important the public lands in the allotment are to their overall livestock operations and whether

TABLE 13.2.4.1-1 Grazing Allotments within the Proposed Milford Flats South SEZ

Allotment	Total Acres ^a	Percentage of the Total in the SEZ ^b	Active BLM AUMs	Number of Permittees in the Allotment
Minersville No. 4	29,956	13	1,488	4
Minersville No. 5	24,289	2	2,301	3
Minersville No. 6	20,618	10	1,197	2

^a Includes all federal, state, and private acreage in the allotment.

^b Represents the percentage of public land in the allotment(s) within the SEZ.

Source: Data were derived from BLM (2009a) and are for the 2008 grazing year because these are the most current data available.

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or not any mitigation of the loss (e.g., change in livestock management or provision of new range improvements) could be accomplished on the remaining public lands in the allotment. The anticipated 2% loss for the Minersville No. 5 allotment would result in a minor impact on the permittees.

Although the degree of impact on the permittees in this allotment would vary with their individual situations, there would be an adverse economic impact on each of them from the loss of use of a portion of the allotment. It is possible that solar energy development proponents could pay livestock operators for the loss of all or portions of the existing grazing permits and range improvements for the allotment to facilitate solar operations and to minimize the impact on existing permittees; however, that is not required as part of BLM regulations.

Transmission Facilities and Other Off-Site Infrastructure

Construction of a new transmission line would add about 576 acres (2.3 km²) of surface disturbance and would cross portions of four additional grazing allotments. Construction of an access road to State Route 130 would cross one additional grazing allotment and would add about 36 acres (0.15 km²) of surface disturbance to the impact associated with the SEZ facilities. These disturbances would not add a significant impact on grazing operations.

13.2.4.1.3 SEZ-Specific Design Features and Design Feature Effectiveness

Implementing the programmatic design features described in Appendix A, Section A.2.2, as required under BLM’s Solar Energy Program, would provide some mitigation for some identified impacts. The exception would be any adverse economic impact on the grazing permittees.

1 A proposed design feature specific to the Milford Flats South SEZ is:
2

- 3 • Consideration should be given to the feasibility of replacing all or part of the
4 lost AUMs through development of additional range improvements on public
5 lands remaining in the allotment.
6

7
8 **13.2.4.2 Wild Horses and Burros**
9

10
11 ***13.2.4.2.1 Affected Environment***
12

13 Section 4.4.2 discusses wild horses (*Equus caballus*) and burros (*E. asinus*) that occur
14 within the six-state study area. Nineteen wild horse and burro HMAs occur within Utah.
15 Figure 13.2.4.2-1 shows the location of the HMAs within the proposed Milford Flats South SEZ
16 region. The SEZ is located about 16 mi (26 km) east of the Four Mile HMA. The Four Mile
17 HMA contains an estimated 90 horses (30 over the appropriate management level of 60 horses)
18 (BLM 2009b).
19

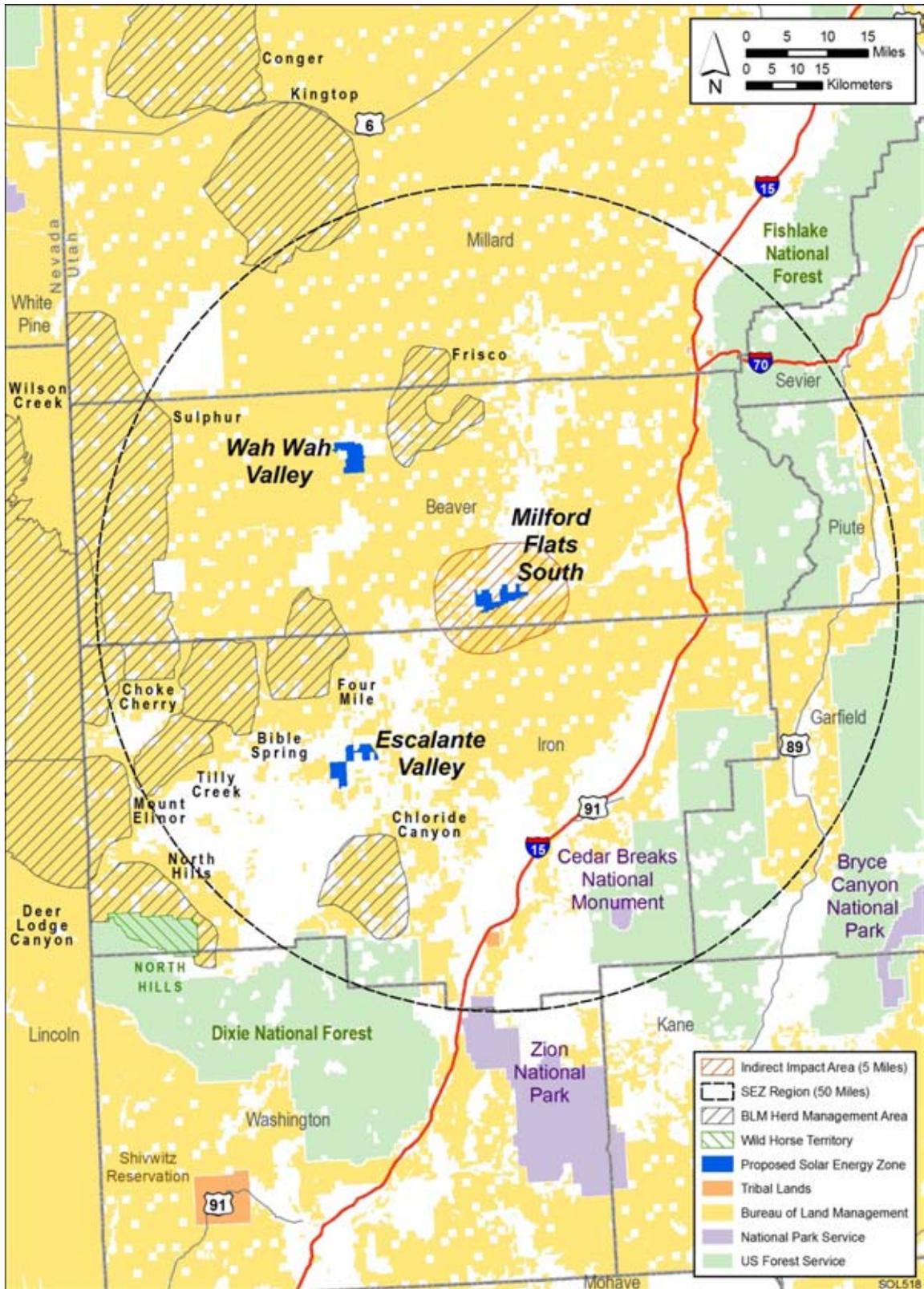
20 In addition to the BLM-managed HMAs, the USFS has 51 established wild horse and
21 burro territories in Arizona, California, Nevada, New Mexico, and Utah and is the lead
22 management agency that administers 37 of the territories (Giffen 2009; USFS 2007). The closest
23 territory to the proposed Milford Flats South SEZ is the North Hills Territory within Dixie
24 National Forest. This territory is adjacent to the North Hills HMA managed by the BLM and is
25 located southwest of the SEZ (Figure 13.2.4.2-1). The proposed Escalante Valley SEZ is about
26 51 mi (82 km) from the North Hills Territory.
27

28
29 ***13.2.4.2.2 Impacts***
30

31 Because the proposed Milford Flats South SEZ is 16 mi (26 km) or more from any wild
32 horse and burro HMA managed by the BLM and about 51 mi (82 km) from any wild horse and
33 burro territory administered by the USFS, solar energy development within the SEZ would not
34 affect any wild horses and burros managed by these agencies.
35

36
37 ***13.2.4.2.3 SEZ-Specific Design Features and Design Feature Effectiveness***
38

39 No SEZ-specific design features would be necessary to protect or minimize impacts on
40 wild horses and burros due to solar energy development within the proposed Milford Flats South
41 SEZ.
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FIGURE 13.2.4.2-1 Wild Horse Herd Management Areas within the Proposed Milford Flats South SEZ Region

1 **13.2.5 Recreation**

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4 **13.2.5.1 Affected Environment**

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6 The area of the proposed Milford Flats South SEZ is flat, and its unremarkable nature
7 offers little potential for recreation use. The presence of hog-rearing operations, along with the
8 odor from those operations, also detracts from the potential recreation value of the area. The area
9 would not be expected to attract recreational visitors from outside the area; however, the area
10 may receive limited use by local residents for general outdoor recreation, including backcountry
11 driving and OHV use, recreational shooting, and small and big game hunting. Site visits in
12 September 2009 showed limited signs of recent vehicle and OHV use. The SEZ area has not
13 been designated for vehicle travel in a BLM land use plan but will be considered in the
14 upcoming revision of the land use plans in the Cedar City Field Office.

15
16
17 **13.2.5.2 Impacts**

18
19 Recreational users would be excluded from any portion of the SEZ developed for solar
20 energy production. Whether recreational visitors would continue to use the remaining
21 undeveloped portions of the SEZ is unknown. Public access through areas developed for solar
22 power production could be lost unless access routes were identified and retained. Roads through
23 any solar development area remaining open for public use would likely be improved as part of
24 the access provided to construct and operate the solar facilities. It is not anticipated that there
25 would be a significant loss in recreational use if the SEZ were developed, but some users would
26 be displaced.

27
28 Solar development within the SEZ would affect public access along OHV routes
29 designated open and available for public use. There may be routes designated as open within the
30 proposed SEZ. Such open routes crossing areas granted ROWs for solar facilities would be re-
31 designated as closed (see Section 5.5.1 for more details on how routes coinciding with proposed
32 solar facilities would be treated).

33
34
35 **13.2.5.3 SEZ-Specific Design Features and Design Feature Effectiveness**

36
37 No SEZ-specific design features would be required. Implementing the programmatic
38 design features described in Appendix A, Section A.2.2, as required under BLM's Solar Energy
39 Program, would provide adequate mitigation for some identified impacts.

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1 **13.2.6 Military and Civilian Aviation**

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4 **13.2.6.1 Affected Environment**

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6 The SEZ is not located under any MTRs or SUAs, and the closest military installation to
7 the proposed Milford Flats South SEZ is the Deseret Test Center, about 118 mi (190 km) north
8 of the SEZ. More distant are the Tooele Army Depot, Dugway Proving Ground, the Wendover
9 Test Range, the Nevada Test Site, and Camp Williams. Hill Air Force Base is located in Salt
10 Lake City.

11
12 The closest civilian municipal airports to the Milford Flats South SEZ are the Milford and
13 Beaver Municipal Airports, about 17 mi (28 km) and 23 mi (37 km) north and east, respectively,
14 of the SEZ.

15
16
17 **13.2.6.2 Impacts**

18
19 On the basis of comments received from the military there are no concerns with respect
20 to military aviation for the SEZ.

21
22 Because all municipal airports are located 17 mi (28 km) or more from the SEZ, no
23 impacts on civilian aviation from solar development within the area are expected.

24
25
26 **13.2.6.3 SEZ-Specific Design Features and Design Feature Effectiveness**

27
28 No SEZ-specific design features would be necessary to protect military or civilian
29 aviation uses. The programmatic design features described in Appendix A, Section A.2.2, would
30 require early coordination with the DoD to identify and mitigate, if possible, potential impacts on
31 the use of MTRs.

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1 **13.2.7 Geologic Setting and Soil Resources**

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4 **13.2.7.1 Affected Environment**

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7 **13.2.7.1.1 Geologic Setting**

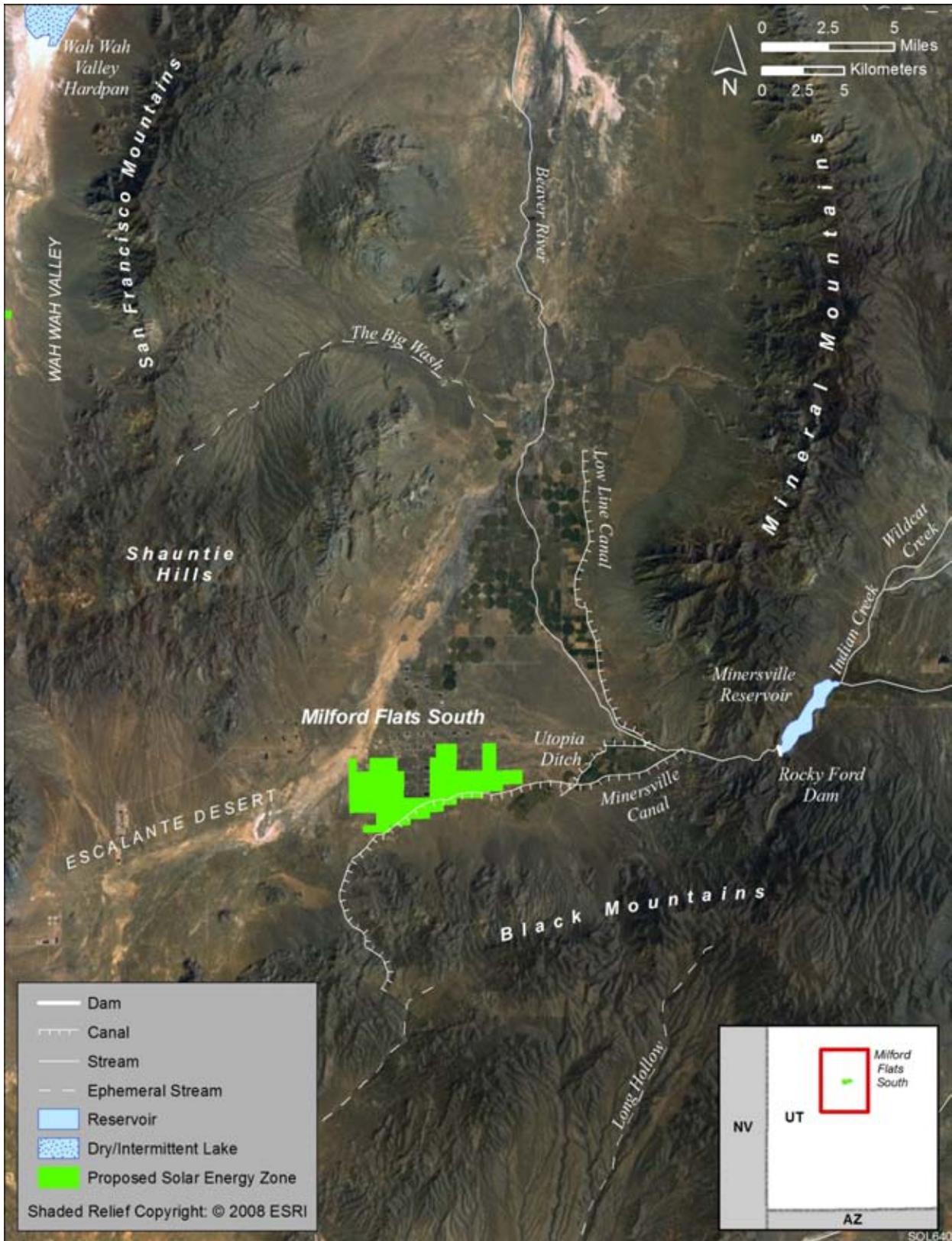
8
9
10 **Regional Setting**

11
12 The proposed Milford Flats South SEZ is located in the Escalante Desert region of the
13 Basin and Range physiographic province in southwestern Utah. The SEZ sits at the southern end
14 of a north-trending valley, just to the north of the Black Mountains. The northern part of the
15 valley lies between the San Francisco Mountains to the west and the Mineral Mountains to the
16 east (Figure 13.2.7.1-1).

17
18 The Milford area has a long depositional history, with thick sequences of marine
19 miogeosynclinal sediments (carbonates, sandstone, siltstone, and shale) deposited throughout the
20 Late Precambrian and Paleozoic followed by several orogenic episodes (from the Early Triassic
21 to Oligocene). Volcanic activity in southwestern Utah during the Oligocene and Miocene
22 produced extensive deposits of ignimbrites, lava flows, and volcanic breccias in the region.
23 Block faulting associated with crustal extension in the Basin and Range province began in the
24 Miocene, about 20 million years ago (Mason 1998).

25
26 Basin fill is composed predominantly of Sevier River Formation and Salt Lake Formation
27 sediments interlayered with volcanic rocks (basalts and rhyolites) of Quaternary and Tertiary age
28 (Hintze 1980). Sediments are estimated to be up to 4,900 ft (1,490 m) thick, with the uppermost
29 layer consisting of lacustrine deposits of fine-grained clay, silt, and marl in the valley center,
30 intertongued with deltaic and alluvial deposits of clay, silt, sand and gravel along the valley
31 margins (Mason 1998; Lund et al. 2005). Gerston and Smith (1979) estimate that the thickness of
32 the upper layer ranges from 300 ft (90 m) near the valley margins to as much as 3,900 ft
33 (1,190 m) along the valley axis. The lacustrine and deltaic sediments are associated with Lake
34 Bonneville, an ancient (Pleistocene) lake that covered most of western Utah and parts of eastern
35 Nevada and southern Idaho from 32,000 to 14,000 years ago (UGS 2010). Shoreline deposits of
36 Lake Bonneville occur at elevations up to about 5,200 ft (1,585 m) (White 1932; Mason 1998).
37 The upper 200 to 300 ft (60 to 90 m) of unconsolidated basin fill compose the principal aquifer
38 system in the Milford area. The composition of deeper sediments (greater than 3,900 ft
39 [1,190 m]) is unknown, but seismic refraction profiles indicate that they are more consolidated
40 (i.e., cemented and compacted) than sediments of the upper layer. These sediments overlie
41 Tertiary (Oligocene) volcanics and basement rocks composed of Cambrian quartzite and
42 Precambrian gneiss (Hintze 1980; Mason 1998).

43
44 Exposed sediments in the Milford area are predominantly modern alluvial fan deposits
45 (Figure 13.2.7.1-2). The surrounding mountains are capped with volcanic rocks of Tertiary and
46 Quaternary age (Hintze, 1980; Mason 1998).



1

2 **FIGURE 13.2.7.1-1 Physiographic Features of the Escalante Desert Region**

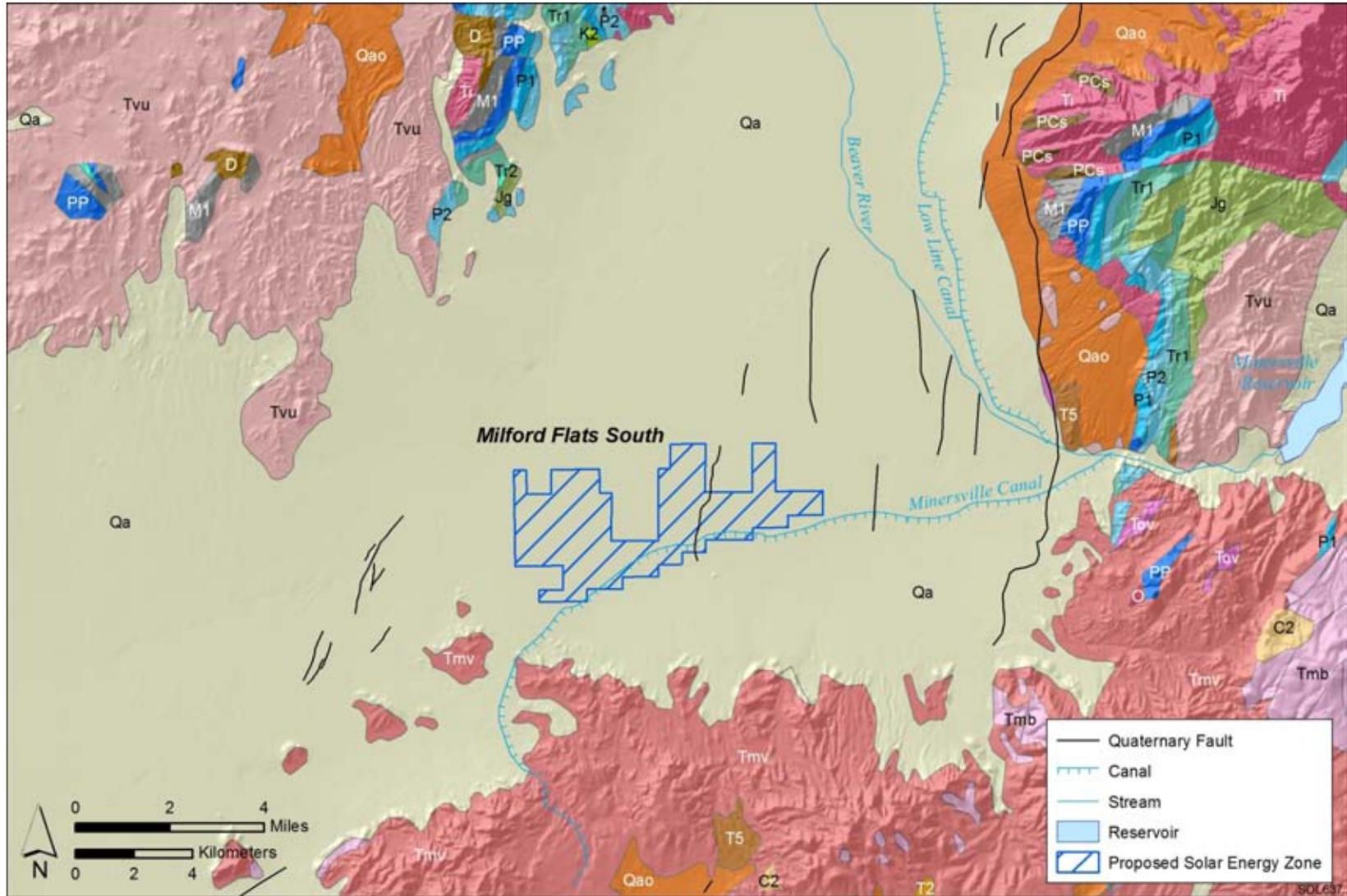


FIGURE 13.2.7.1-2 Geologic Map of the Milford Flats South Region (adapted from Ludington et al. 2007 and Hintze 1980)

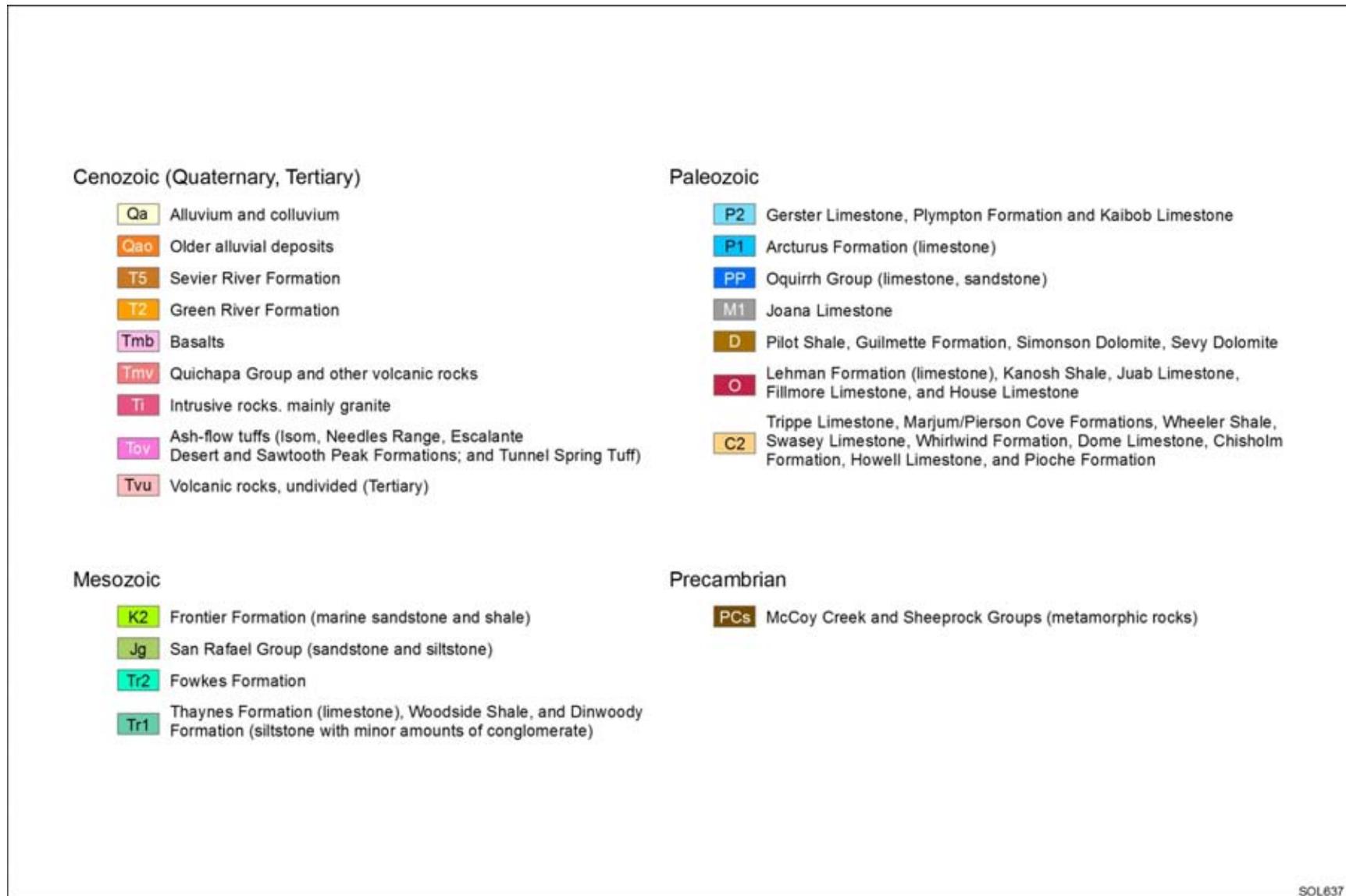


FIGURE 13.2.7.1-2 (Cont.)

1 **Topography**

2
3 Elevations along the Milford area valley axis range from about 5,500 ft (1,700 m) near
4 the south end and along the valley sides to less than 4,900 ft (1,500 m) along the Beaver River
5 north of Milford in the valley center. Gently sloping alluvial fan deposits occur along the valley
6 margins. The surrounding mountains range in elevation from 5,500 to 9,000 ft (1,700 to
7 2,700 m), with the highest peak, 9,660 ft (2,940 m), in the San Francisco Mountains. The valley
8 is drained by the Beaver River (which flows into the valley from the east through a narrow gap
9 between the Black and Mineral Mountains) and numerous ephemeral tributaries that are part of
10 the Sevier River drainage system terminating in Sevier Lake. The Beaver River was a perennial
11 river until the Rocky Ford Dam was built in the early 1900s to impound water in a reservoir to
12 the east of Minersville (Figure 13.2.7.1-3). Currently, flow in the Beaver River below the
13 reservoir is small (except in wet years), and most of its water is diverted for irrigation
14 (Mason 1998).

15
16 The proposed Milford Flats South SEZ is located just north of the Black Mountains in the
17 Escalante Desert, about 4.5 mi (7.2 km) to the west of Minersville. Its surface is relatively flat,
18 with a gentle slope to the west-northwest (Figure 13.2.7.1-3). Elevations range from 5,120 ft
19 (1,560 m) along the site’s eastern border to 5,020 ft (1,530 m) at its northwest corner. The
20 highest point in the area is Ninemile Knoll, just to the south of the SEZ, with a maximum
21 elevation of 5,176 ft (1,578 m). Several irrigation ditches run along the site’s southern boundary.

22
23
24 **Geologic Hazards**

25
26 The types of geologic hazards that could potentially affect solar project sites and their
27 mitigation are discussed in Sections 5.7.3 and 5.7.4.2. The following sections provide a
28 preliminary assessment of these hazards at the proposed Milford Flats South SEZ. Solar project
29 developers may need to conduct a geotechnical investigation to assess geologic hazards locally
30 to better identify facility design criteria and site-specific mitigation measures to minimize their
31 risk.

32
33
34 **Seismicity.** Southwestern Utah is tectonically active. The proposed Milford Flats South
35 SEZ lies within the ISB, a north-trending zone of seismic activity that coincides with the eastern
36 margin of the transitional zone between the Basin and Range and Colorado Plateau provinces,
37 stretching from northwestern Montana, through Wyoming, Idaho, and Utah, to southern Nevada
38 and northern Arizona. The major active faults in southwestern Utah are located within the ISB.
39 Earthquake activity in southwestern Utah typically occurs in dense clusters or swarms with
40 magnitudes less than 4.0 (University of Utah 2009; UGS 2009; Lund et al. 2007). Historically,
41 several earthquakes with magnitudes greater than 6.0 have occurred in southwestern Utah. A
42 1992 earthquake in the St. George area (magnitude of 5.9), about 80 mi (130 km) to the
43 southwest of the Milford Flats South SEZ, caused little damage to local buildings but triggered
44 the largest landslide known for an earthquake of its magnitude (University of Utah 2009;
45 Christensen 1995).

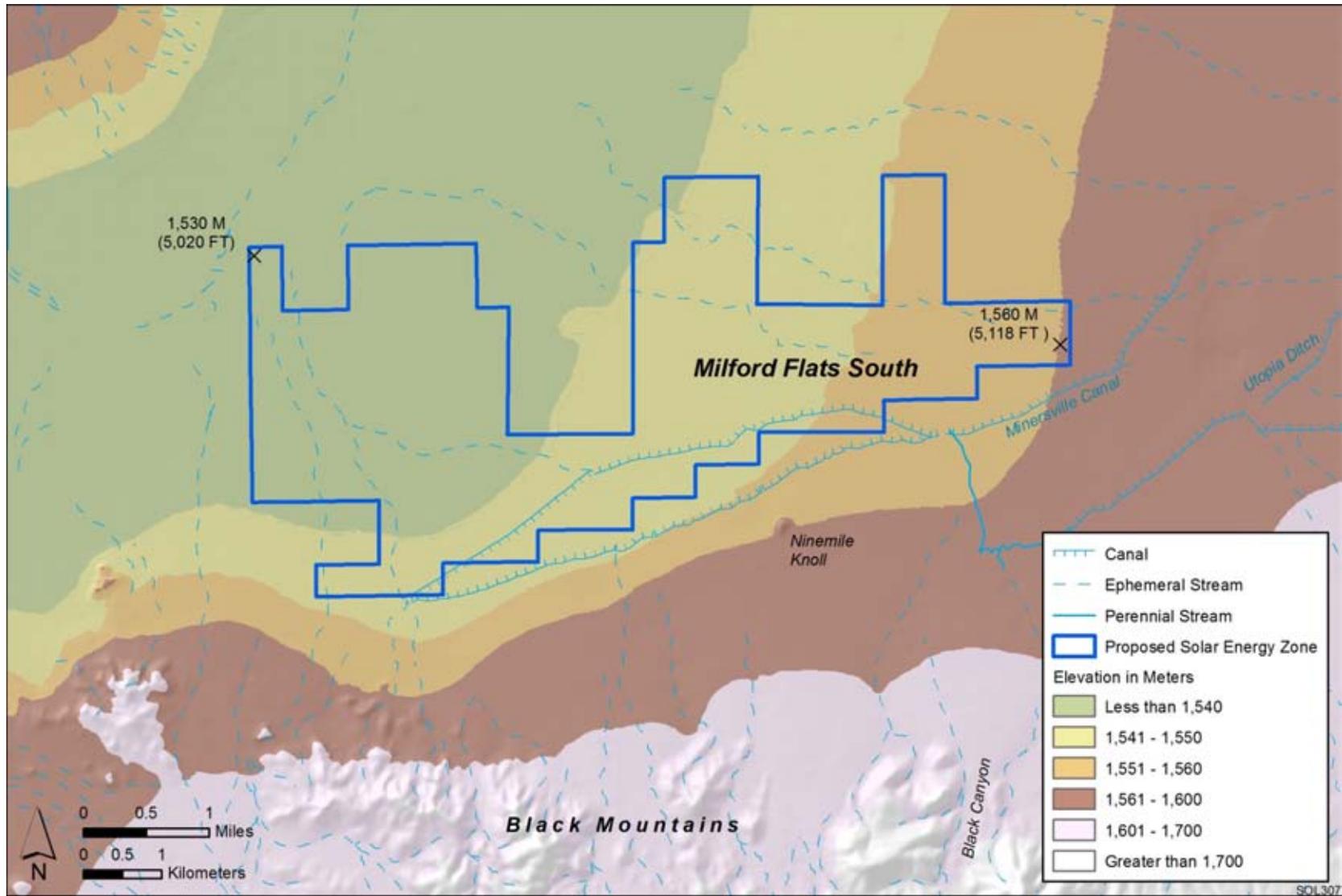


FIGURE 13.2.7.1-3 General Terrain of the Proposed Milford Flats South SEZ

1 A segment of the Mineral Mountains fault system runs through the center of the Milford
2 Flats South SEZ (Figure 13.2.7.1-4). The Mineral Mountains fault is a normal northeast-striking
3 fault that runs along the western side of the Mineral Mountains. Highly dissected scarps along
4 this fault system and displacement of sediments associated with post-Lake Bonneville drainage
5 development in the valley suggest that movement occurred less than 15,000 years ago (Black and
6 Hecker 1999).

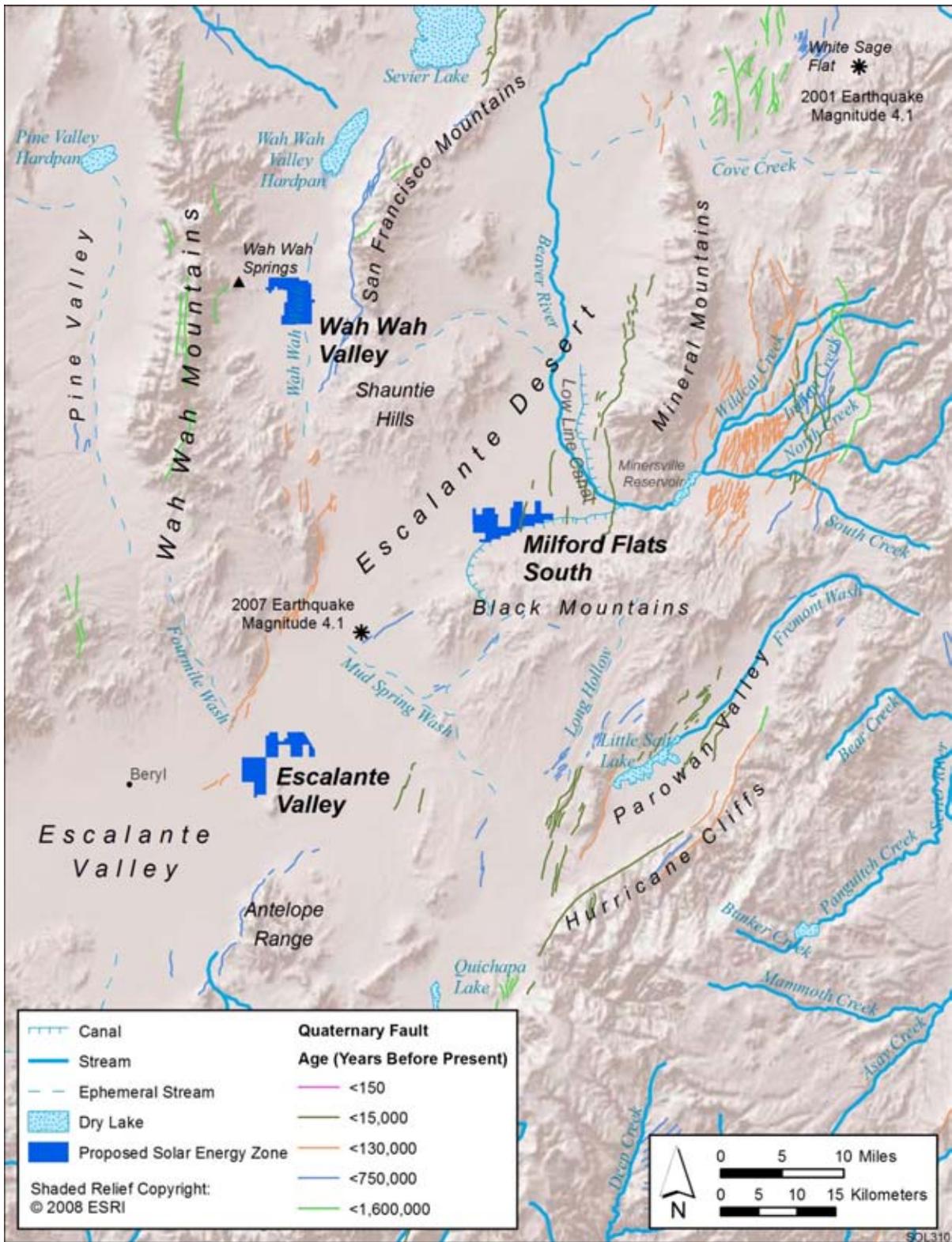
7
8 From June 1, 2000, to May 31, 2010, 80 earthquakes were recorded within a 61-mi
9 (100-km) radius of the proposed Milford Flats South SEZ. The largest earthquakes during that
10 period occurred on February 23, 2001, and August 18, 2007. The 2001 earthquake was located
11 about 44 mi (70 km) to the northeast of the SEZ near White Sage Flat and registered a Richter
12 scale magnitude² (ML) of 4.1; the 2007 earthquake was located about 13 mi (20 km) to the
13 southwest of the SEZ near Mud Spring Wash and registered a moment magnitude³ (Mw) of 4.1
14 (Figure 13.1.7.1-4). During this period, 27 (34%) of the recorded earthquakes within a 61-mi
15 (100-km) radius of the SEZ had magnitudes greater than 3.0 (USGS 2010c); none was greater
16 than 4.1.

17
18
19 **Liquefaction.** The proposed Milford Flats South SEZ lies within an area where the peak
20 horizontal acceleration with a 10% probability of exceedance in 50 years is between 0.09 and
21 0.10 g. Shaking associated with this level of acceleration is generally perceived as moderate to
22 strong; however, the potential damage to structures is light (USGS 2008). Given the low
23 intensity of ground shaking estimated for the Milford Valley, the potential for liquefaction in
24 Milford Flats sediments is also likely to be low. The UGS has published liquefaction
25 susceptibility maps for several counties within Utah (mainly those counties encompassing
26 portions of the Great Salt Lake shoreline and other lakes and rivers); however, none have been
27 prepared for Beaver County.

28
29
30 **Volcanic Hazards.** Extensive volcanic activity occurred in southwestern Utah throughout
31 the Tertiary period, shifting in composition from calc-alkaline ash flow tuff eruptions to basalt
32 and rhyolite lava flows about 23 million years ago, when extensional faulting in the eastern
33 Basin and Range province began. Although there are numerous Quaternary age volcanic (basalt
34 and lesser quantities of rhyolite) vents and flows in the region, there is little evidence of volcanic
35 activity in the past 1,000 years (Anderson and Christenson 1989; Klauk and Gourley 1983;
36 Hecker 1993).

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

3 ³ Moment magnitude (Mw) is used for earthquakes with magnitudes greater than 3.5 and is based on the moment of the earthquake, equal to the rigidity of the earth times the average amount of slip on the fault times the amount of fault area that slipped (USGS 2010d).



1
 2 **FIGURE 13.2.7.1-4 Quaternary Faults in the Escalante Desert Region (Sources: USGS and**
 3 **UGS 2009; USGS 2010c)**
 4

1 The nearest active volcano is Mount St. Helens in the Cascade Range (Washington),
2 located about 720 mi (1,155 km) to the northwest of the Milford Flats South SEZ, which has
3 shown some activity as recently as 2008.
4

5 The nearest volcano that meets the criterion for an unrest episode is the Long Valley
6 Caldera in east-central California, about 315 mi (510 km) to the west, which has experienced
7 recurrent earthquake swarms, changes in thermal springs and gas emissions, and uplift since
8 1980 (Diefenbach et al. 2009). The Long Valley Caldera is part of the Mono-Inyo Craters
9 volcanic chain that extends from Mammoth Mountain (on the caldera rim) northward about
10 25 mi (40 km) to Mono Lake. Small to moderate eruptions have occurred at various sites along
11 the volcanic chain in the past 5,000 years at intervals ranging from 250 to 700 years. Windblown
12 ash (tephra) from some of these eruptions is known to have drifted as far east as Nebraska. While
13 the probability of an eruption within the volcanic chain in any given year is small (less than 1%),
14 serious hazards could result from a future eruption. Depending on the location, size, timing
15 (season), and type of eruption, hazards could include mudflows and flooding, pyroclastic flows,
16 small to moderate volumes of tephra, and falling ash (Hill et al. 1998, 2000; Miller 1989).
17
18

19 ***Slope Stability and Land Subsidence.*** The incidence of rock falls and slope failures can
20 be moderate to high along mountain fronts and can present a hazard to facilities on the relatively
21 flat terrain of valley floors such as Milford Flats if they are located at the base of steep slopes.
22 The risk of rock falls and slope failures decreases toward the flat valley center.
23

24 The UGS has documented earth fissures along the surface due to ground subsidence
25 near Beryl Junction (in Escalante Valley to the southwest of the Milford Flats South SEZ). These
26 fissures are thought to result from groundwater withdrawal in the area, which has caused
27 compaction in the Escalante Valley aquifer. Lund et al. (2005) observed that between the late
28 1940s and 2002, water levels in monitoring wells had fallen as much as 105 ft (32 m). The earth
29 fissures tend to occur in areas of high drawdown. Even if stabilized (by increased recharge or
30 decreased pumping), residual compaction may still occur at a reduced rate for several decades
31 (Galloway et al. 1999). Subsidence has also been reported for the Milford area, but to a lesser
32 degree than that observed in the Escalante Valley (Forster 2006).
33
34

35 ***Other Hazards.*** Other potential hazards at the Milford Flats South SEZ include those
36 associated with soil compaction (restricted infiltration and increased runoff), expanding clay
37 soils (destabilization of structures), and hydro-compactable or collapsible soil (settlement).
38 Disturbance of soil crusts and desert varnish (and pavement) on soil surfaces may also increase
39 the likelihood of soil erosion by wind.
40

41 Alluvial fan surfaces, such as those found in parts of the Milford area, can be the sites of
42 damaging high-velocity flash floods and debris flows during periods of intense and prolonged
43 rainfall. The nature of the flooding and sedimentation processes (e.g., stream flow versus debris
44 flow) will depend on the specific morphology of the fan (National Research Council 1996).
45
46

1 **13.2.7.1.2 Soil Resources**
2

3 The dominant soil orders in southwestern Utah are Aridisols, Entisols, and Molisols
4 (see Table 4.2.1-1), which are generally very deep, loamy soils that are well drained to somewhat
5 excessively drained. Soils in the regions were formed on alluvial fans and flats and on lake
6 terraces and lake plains. Parent material consists mainly of alluvium and colluvium (with
7 some eolian materials) derived from mixed igneous and sedimentary rocks and lake sediments
8 (NRCS 2009a). Although mechanical and microbiotic crusts are common on Utah soils
9 (Milligan 2009), none have been reported for soils covering the Milford Flats South SEZ, and
10 none were observed in the field.
11

12 Soils within the proposed Milford Flats South SEZ are predominantly the silt loams of
13 the Thermosprings-Taylorflat, moderately saline Kunzler complex, and the Thermosprings-
14 Sevy complex, which together make up about 76% of the soil coverage (Figure 13.2.7.1-5).
15 These soils are very deep and well drained, with slow infiltration (due to a shallow hardpan) and
16 moderately high permeability. The natural soil surface for most soils is suitable for roads, with a
17 slight erosion hazard when used as roads or trails. The water erosion hazard is moderate for most
18 soils. The susceptibility to wind erosion is also moderate, with as much as 86 tons of soil eroded
19 by wind per acre each year (NRCS 2010). Soil map units are described in Table 13.2.7.1-1.
20 Biological soil crusts and desert pavement have not been documented within the SEZ, but may
21 be present.
22

23 With the exception of soils in the Uvada-Playas complex and Arents-Miscellaneous
24 water, sewage complex (covering less than 2% of the SEZ), none of the soils within the SEZ is
25 rated as hydric.⁴ Flooding is not likely for soils at the site (occurring less than once in 500 years)
26 (NRCS 2010).
27

28 Soils in this region are used mainly as rangeland for grazing cattle and sheep,
29 pastureland, and irrigated cropland. The major crops in the region are irrigated alfalfa hay,
30 wheat, barley, potatoes, and corn (USDA 1998).
31

32
33 **13.2.7.2 Impacts**
34

35 Impacts on soil resources would occur mainly as a result of ground-disturbing activities
36 (e.g., grading, excavating, and drilling), especially during the construction phase of a solar
37 project. These include soil compaction, soil horizon mixing, soil erosion and deposition by wind,
38 soil erosion by water and surface runoff, sedimentation, and soil contamination. Such impacts are
39 common to all utility-scale solar energy developments in varying degrees and are described in
40 more detail for the four phases of development in Section 5.7 .1.
41

⁴ A hydric soil is a soil formed under conditions of saturation, flooding, or ponding (NRCS 2010).

TABLE 13.2.7.1-1 Summary of Soil Map Units within the Proposed Milford Flats South SEZ

Map Unit Symbol	Map Unit Name	Water Erosion Potential ^a	Wind Erosion Potential ^b	Description	Area, in Acres ^c (% of SEZ)
139	Thermosprings-Taylorflat, moderately saline Kunzler complex (0 to 2% slopes)	Moderate	Moderate (WEG 4) ^d	Level to nearly level soils (silt loams) on lake plains. Parent material consists of alluvium from igneous and sedimentary rocks and/or lacustrine deposits. Soils are well drained, with slow infiltration (due to shallow impeding layer) and moderately high permeability. Slightly to strongly saline. Available water capacity is high. Severe rutting hazard. Used for rangeland, irrigated cropland, and wildlife habitat.	3,165 (49)
138	Thermosprings-Sevy complex (0 to 3% slopes)	Moderate	Moderate (WEG 3)	Level to nearly level soils (silt loams) on lake plains. Parent material consists of alluvium from igneous and sedimentary rocks. Soils are well drained, with slow infiltration (due to shallow impeding layer) and moderately high permeability. Available water capacity is high. Moderate rutting hazard. Used as rangeland and irrigated cropland.	1,766 (27)
129	Bylo silty clay loam (0 to 3% slopes)	Moderate	Moderate (WEG 4)	Level to nearly level soils on alluvial flats. Parent material consists of alluvium from igneous and sedimentary rocks. Soils are very deep and well drained, with slow infiltration (due to shallow impeding layer) and moderately high permeability. Available water capacity is high. Severe rutting hazard. Used for livestock grazing and wildlife habitat.	548 (9)
112	Heist-Crestline strongly alkaline complex (0 to 3% slopes)	Slight	Moderate (WEG 3)	Level to nearly level soils (fine sandy loams) on alluvial fan skirts, beach plains, and stream terraces. Parent material consists of alluvium from igneous and sedimentary rocks. Soils are very deep and well drained, with low surface runoff potential (high infiltration rate) and high permeability. Available water capacity is moderate. Moderate rutting hazard. Used for livestock grazing, irrigated cropland, and wildlife habitat.	317 (5)

TABLE 13.2.7.1-1 (Cont.)

Map Unit Symbol	Map Unit Name	Water Erosion Potential ^a	Wind Erosion Potential ^b	Description	Area, in Acres ^c (% of SEZ)
106	Dixie-Garbo complex (3 to 8% slopes)	Moderate	Low (WEG 7)	Nearly level to gently sloping soils (gravelly loams) on alluvial fan remnants. Parent material consists of alluvium from igneous and sedimentary rocks. Soils are very deep and well drained, with slow infiltration (due to shallow impeding layer) and moderately high permeability. Available water capacity is moderate. Severe rutting hazard. Used for rangeland, wildlife habitat, and recreation.	206 (3)
122	Decca-Drum complex (0 to 3% slopes)	Moderate	Low (WEG 7)	Level to nearly level soils (gravelly loams) on stream terraces. Parent material consists of alluvium from igneous rock. Soils are very deep and well drained, with slow infiltration (due to shallow impeding layer) and very high permeability. Available water capacity is low. Moderate rutting hazard. Used for rangeland and irrigated cropland.	169 (3)
128	Harding silt loam (0 to 2% slopes)	Severe	Moderate (WEG 4)	Level to nearly level soils on lake plains. Parent material consists of Lake Bonneville lacustrine deposits from igneous and sedimentary rocks. Soils are very deep and well drained, with slow infiltration (due to shallow impeding layer) and moderately low permeability. Available water capacity is moderate. Severe rutting hazard. Used mainly as winter rangeland.	154 (2)
123	Taylorflat silt loam (0 to 2% slopes)	Moderate	Moderate (WEG 6)	Level to nearly level soils on alluvial flats. Parent material consists of alluvium from igneous and sedimentary rocks. Soils are very deep and well drained, with slow infiltration (due to shallow impeding layer) and moderately high permeability. Available water capacity is high. Severe rutting hazard. Used for rangeland, irrigated cropland, and wildlife habitat.	80 (1)

TABLE 13.2.7.1-1 (Cont.)

Map Unit Symbol	Map Unit Name	Water Erosion Potential ^a	Wind Erosion Potential ^b	Description	Area, in Acres ^c (% of SEZ)
104	Uvada-Playas complex (0 to 2% slopes)	Moderate	Moderate (WEG 4)	Level to nearly level soils (silt loams) on lake plains. Parent material consists of Lake Bonneville lacustrine deposits from igneous and sedimentary rocks. Soils are very deep and well drained, with high surface runoff potential (very slow infiltration rate) and moderately high permeability. Available water capacity is moderate. Severe rutting hazard. Used for rangeland (Uvada).	71 (1)
102	Arents-Miscellaneous water, sewage complex (0 to 3% slopes)	Not rated	Not rated	Level to nearly level variable mixed (disturbed) soils. Soils are well drained, with low surface runoff potential (high infiltration rate) and high permeability. Slight rutting hazard. Used mainly as cropland, urban land, pasture, or wildlife habitat.	4 (<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 (whole soil; does not account for the presence of rock fragments) 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 “severe” indicates that erosion is expected; loss of soil productivity and damage are likely and erosion control measures may be costly or 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 WEG = wind erodibility group. WEGs are based on soil texture, content of organic matter, effervescence of carbonates, content of rock fragments, and mineralogy, and also take into account soil moisture, surface cover, soil surface roughness, wind velocity and direction, and the length of unsheltered distance (USDA 2004). Groups range in value from 1 (most susceptible to wind erosion) to 8 (least susceptible to wind erosion). The NRCS provides a wind erodibility index, expressed as an erosion rate in tons per acre (4,000 m²) per year, for each of the wind erodibility groups: WEGs 3 and 4, 86 tons (78 metric tons) per acre (4,000 m²) per year; WEG 6, 48 tons (44 metric tons) per acre (4,000 m²) per year; and WEG 7, 38 tons (34 metric tons) per acre (4,000 m²) per year.

Source: NRCS (2010).

1 Because impacts on soil resources result from ground-disturbing activities in the project
2 area, soil impacts would be roughly proportional to the size of a given solar facility, with larger
3 areas of disturbed soil having a greater potential for impacts than smaller areas (Section 5.7.2).
4 The magnitude of impacts would also depend on the types of components built for a given
5 facility since some components would involve greater disturbance and would take place over a
6 longer time frame.
7
8

9 **13.2.7.3 SEZ-Specific Design Features and Design Feature Effectiveness**

10
11 No SEZ-specific design features were identified for soil resources at the proposed
12 Milford Flats South SEZ. Implementing the programmatic design features described under both
13 Soils and Air Quality in Appendix A, Section A.2.2, as required under BLM’s Solar Energy
14 Program, would reduce the potential for soil impacts during all project phases.
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1 **13.2.8 Minerals (Fluids, Solids, and Geothermal Resources)**

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3
4 **13.2.8.1 Affected Environment**

5
6 There are no mining operations within the proposed Milford Flats South SEZ, and no
7 active mining claims or leases are on record (BLM and USFS 2010a). In June 2009, public land
8 in the SEZ was closed to locatable mineral entry pending the outcome of this PEIS. Four existing
9 oil and gas leases cover the entire SEZ and are classified as nonproducing (BLM and
10 USFS 2010b). The area remains open for discretionary mineral leasing for oil and gas and other
11 leasable minerals and for disposal of salable minerals.

12
13 The area around the Milford SEZ is considered an area of prospective geothermal
14 resources, and there have been previous geothermal leases within the SEZ. There are currently
15 no active leases in the SEZ, but a geothermal plant is being constructed about 3 mi (5 km)
16 southwest of the SEZ.

17
18
19 **13.2.8.2 Impacts**

20
21 The oil and gas leases within the Milford Flats South SEZ are prior existing rights and
22 represent a conflict with future solar development. As long as these leases remain in effect, solar
23 development would require the cooperation of the oil and gas lessees. Such cooperation might be
24 possible, since oil and gas development generally requires fewer than 5 acres (0.02 km²) per
25 well, but it would depend on accommodating the oil and gas lease holders' needs for continued
26 access to develop, maintain, and service their wells.

27
28 If the area is identified as a SEZ, it would continue to be closed to all incompatible forms
29 of mineral development. It is assumed that future development of oil and gas resources would
30 continue to be possible, since such development could occur under the existing leases or from
31 directional drilling outside the lease area. Since the SEZ does not contain existing mining claims,
32 it is also assumed that there would be no future loss of locatable mineral production. The
33 production of common minerals, such as sand and gravel and mineral materials used for road
34 construction, might take place in areas not directly developed for solar energy production.

35
36 Solar development is not expected to significantly affect future geothermal development
37 in the area of the SEZ, although the surface of the SEZ would not be available for such
38 development. It might be possible to develop geothermal resources under the SEZ, should any be
39 identified, by using directional drilling techniques to access hot water sources.

40
41
42 **13.2.8.3 SEZ-Specific Design Features and Design Feature Effectiveness**

43
44 Implementing the programmatic design features described in Appendix A, Section A.2.2,
45 as required under BLM's Solar Energy Program, would provide some mitigation for some

1 identified impacts. The exception would be any adverse economic impact on the grazing
2 permittees.
3

4 A proposed design features specific to the Milford Flats South SEZ is:
5

- 6 • Coordination with existing oil and gas lessees should be required in the
7 earliest stages of consideration for a solar development project to determine
8 the feasibility of protecting lessees' development rights.
9

10

1 **13.2.9 Water Resources**

2
3
4 **13.2.9.1 Affected Environment**

5
6 The proposed Milford Flats South SEZ is within the Escalante Desert–Sevier Lake
7 subregion of the Great Basin hydrologic region (USGS 2010a). The proposed Milford Flats
8 South SEZ is located in the Milford area of the Escalante Desert Valley, which covers an area of
9 approximately 742,000 acres (3,000 km²). The Escalante Desert Valley is within the Basin and
10 Range physiographic province, which is characterized by intermittent mountain ranges and
11 desert valleys (Robson and Banta 1995). The region consists of semiarid desert valleys where
12 surface waters are typically limited to ephemeral washes and dry lakebeds, and the primary water
13 resource is groundwater. The SEZ sits at the southern end of a north-trending valley, just to the
14 north of the Black Mountains. The northern part of the valley lies between the San Francisco
15 Mountains to the west and the Mineral Mountains to the east (Figure 13.2.9.1-1). Elevations
16 range from 5,120 ft (1,560 m) along the site’s eastern border to 5,020 ft (1,530 m) at its
17 northwest corner. The highest point in the area is Ninemile Knoll, just to the south of the SEZ,
18 with a maximum elevation of 5,176 ft (1,578 m). Average precipitation in the valley is estimated
19 to be 9 in./yr (20 cm/yr) (WRCC 2010a). The average annual pan evaporation rate is estimated to
20 be 70 in./yr (178 cm/yr) (Cowherd et al. 1988; WRCC 2010b).

21
22
23 **13.2.9.1.1 Surface Waters (Including Drainages, Floodplains, and Wetlands)**

24
25 The proposed Milford Flats South SEZ is located within Utah’s Cedar/Beaver River
26 Basin planning area (UBWR 1995). The primary surface water feature near the proposed SEZ is
27 the Beaver River, approximately 6 mi (10 km) west of the proposed Milford Flats South SEZ,
28 which flows into the valley from the east through a narrow gap between the Black and Mineral
29 Mountains (Figure 13.2.9.1-1). The Beaver River was a perennial river until the Rocky Ford
30 Dam was built in the early 1900s to impound water in a reservoir to the east of Minersville.
31 Currently, flow in the Beaver River below the reservoir is small (except in wet years), and most
32 of its water is diverted for irrigation (Mason 1998). The Minersville Canal flows through the
33 southern portion of the proposed Milford Flats South SEZ, and the Utopia Ditch is located
34 between the SEZ and the Beaver River. These irrigation canals are diverted from the Beaver
35 River in Minersville. Several unnamed, small ephemeral washes cross the proposed SEZ.
36 Ephemeral washes in the vicinity of the SEZ only flow in response to intense precipitation and/or
37 snowmelt (Mower and Cordova 1974).

38
39 The proposed Milford Flats South SEZ is located in an area that has not been examined
40 for flood risk (Zone D) by FEMA (FEMA 2009). Flooding caused by large rainfall events would
41 be limited to localized ponding and erosion, since there are no permanent surface water features
42 near the proposed SEZ. In addition, no wetlands have been identified within or near the proposed
43 SEZ according to the NWI (USFWS 2009).

44
45 Many springs are located in the mountains surrounding the SEZ; however, the majority of
46 the springs are sourced from igneous rock formations in the mountains. In 1971 and 1972,

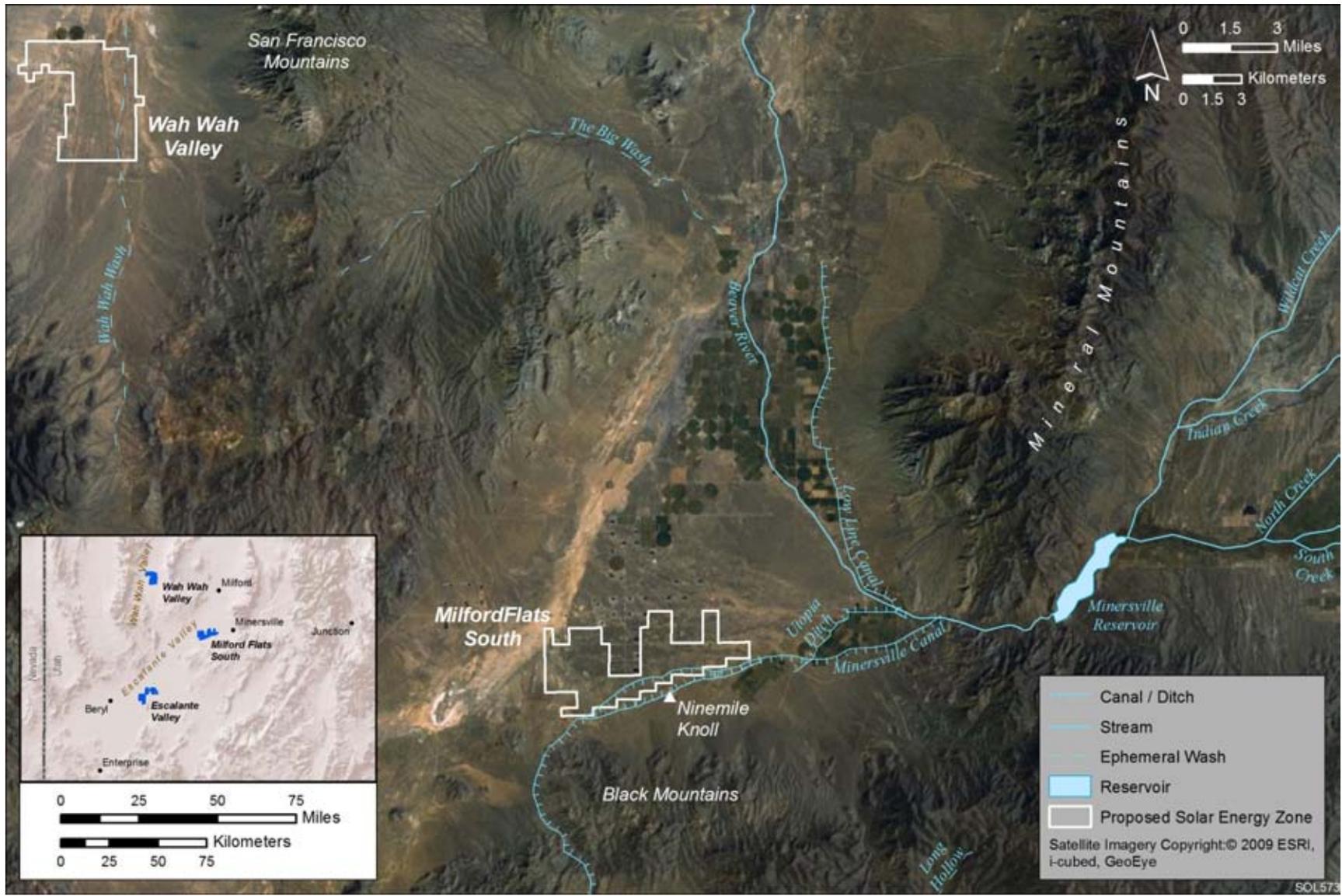


FIGURE 13.2.9.1-1 Surface Water Features near the Proposed Milford Flats South SEZ

1 10 springs were identified to be fed by the main basin-fill groundwater reservoir beneath
2 the SEZ. However, only three of the springs were observed to be flowing (Mower and
3 Sandberg 1982). It is unknown whether these springs continue to flow within the basin.
4
5

6 **13.2.9.1.2 Groundwater**

7

8 The proposed Milford Flats South SEZ is located within the Milford area groundwater
9 basin located in the northern Escalante Valley. The basin-fill aquifer in the Milford area ranges
10 between 300 and 500 ft (91 to 152 m) in thickness. The aquifer consists of Quaternary
11 age deposits of alternating layers of clay, sand, and gravel, with coarser material making up
12 between 25 and 50% of the aquifer material. Reported transmissivity values for the aquifer range
13 from 1,000 to 10,000 ft²/day (93 to 930 m²/day) (Mower and Cordova 1974). The natural
14 groundwater flow direction is from the south to the north, with negligible groundwater discharge
15 to the Lower Beaver basin to the north (Mason 1998; UBRW 1995). Approximately
16 1,000 ac-ft/yr (1.2 million m³/yr) is estimated to enter the Milford area basin from the adjacent
17 Beryl-Enterprise basin to the south, and 700 ac-ft/yr (860,000 m³/yr) is estimated to enter the
18 Milford area basin from the adjacent Beaver Valley to the east (UBRW 1995). Recharge in the
19 basin takes place primarily at basin margins, where infiltration of precipitation and runoff occurs
20 through coarse sediments.
21

22 Detailed information regarding groundwater processes in the northern Escalante Desert
23 Valley was obtained from a study by Mower and Cordova (1974) that examined the groundwater
24 conditions in 1970. Total groundwater storage was estimated to be 95,000,000 ac-ft
25 (117 billion m³) in 1970. The majority of the groundwater recharge (16,000 ac-ft
26 [20 million m³]) was in the form of runoff from higher elevations along the periphery of the
27 valley, and seepage from agricultural irrigation (22,800 ac-ft [28 million m³]) concentrated near
28 the towns of Milford and Minersville. Other inputs to the basin were estimated to be the
29 following: 7,200 ac-ft (8.9 million m³) as seepage from streams/washes in the valley, 8,500 ac-ft
30 (10 million m³) as seepage from canals, 2,000 ac-ft (2.5 million m³) as precipitation on the
31 valley floor, and 1,700 ac-ft (2.1 million m³) from subsurface inflow from adjacent basins.
32 Seepage from other basins in 1970 was estimated to be approximately 1,000 ac-ft
33 (1.2 million m³) from the Beryl-Enterprise basin and 700 ac-ft (860,000 m³) from the Beaver
34 Valley. The total inputs in 1970 were estimated to be 58,200 ac-ft (71.8 million m³) in the
35 Milford area groundwater basin (Mower and Cordova 1974). Groundwater discharge in 1970
36 was primarily by groundwater withdrawals (56,000 ac-ft [69 million m³]) and evapotranspiration
37 (24,000 ac-ft [30 million m³]), with very little subsurface discharge out of the valley (8 ac-ft
38 [10,000 m³]).
39

40 Groundwater levels dropped as much as 65 ft (20 m) in the Milford area basin between
41 1948 and 2009 because of excessive groundwater withdrawals in the basin (Burden et al 2009).
42 Two active USGS monitoring wells that are located within 1.0 mi (1.6 km) of the SEZ indicate
43 depths to groundwater of 90 ft (27 m) and 135 ft (41 m) (USGS 2010b; well numbers
44 381318113024801 and 381319113003501). The depth to groundwater records in these wells
45 and others within the northern Escalante Desert Valley have shown a groundwater table
46 falling at a rate of 0.4 to 2.5 ft/yr (0.1 to 0.8 m/yr); the larger rates are concentrated just to

1 the south of the town of Milford, which is 10 mi (16 km) northwest of the proposed SEZ
2 (Burden et al. 2009). Groundwater elevations have been observed to drop approximately 40 ft
3 (15 m) between 1950 and 2009 in wells within 2 mi (3.2 km) of the proposed Milford Flats
4 South SEZ (Burden et al. 2009; USGS 2010b). Fracturing and land subsidence due to aquifer
5 overdraft has been observed in the area of the highest groundwater withdrawals at a rate of less
6 than 0.6 in./yr (1.5 cm/yr) (Mower and Cordova 1974; Forster 2006).

7
8 The groundwater quality within the Milford area is generally good, with TDS
9 concentrations ranging between 490 and 910 mg/L and the median TDS concentration estimated
10 to be 580 mg/L (Burden et al. 2009).

11 12 13 **13.2.9.1.3 Water Use and Management**

14
15 In 2005, water withdrawals from surface waters and groundwater in Beaver County
16 were 102,350 ac-ft/yr (126 million m³/yr), of which 52% came from surface waters and 48%
17 from groundwater (Kenny et al. 2009). The largest water use was for agricultural irrigation
18 (87%), at 89,000 ac-ft/yr (110 million m³/yr). The remainder was for thermoelectric energy
19 production (6%), livestock (3%), public supply and domestic uses (2%), and industrial purposes
20 (2%) (Kenny et al. 2009). Usage of the total groundwater withdrawals in the northern Escalante
21 Desert Valley was primarily for agriculture (79%) in 2008 (Burden et al. 2009). The majority of
22 the agricultural water use occurs between the towns of Milford and Minersville, which are
23 located east and northeast of the SEZ. In 2008, groundwater withdrawals in the Milford area
24 groundwater basin were approximately 51,000 ac-ft (63 million m³), and the average
25 groundwater withdrawals between 1997 and 2007 were 45,000 ac-ft/yr (55 million m³)
26 (Burden et al. 2009).

27
28 In Utah, the appropriation doctrine is the basis of water appropriation, which implies that
29 water rights are allocated on a temporal basis (BLM 2001). All waters are the property of the
30 public in the State of Utah and subject to the laws described in *Utah Code*, Title 73, Water and
31 Irrigation (available at <http://www.le.state.ut.us/~code/TITLE73/TITLE73.htm>). A water right
32 establishes an entity's legal ability to divert surface water or groundwater for beneficial use and
33 contains five key elements: a definition of the beneficial use, a priority date, a defined flow or
34 quantity of water to be diverted, a location of the diversion, and location of the beneficial use.
35 Water rights are administered by the Office of the State Engineer, which was renamed the Utah
36 Division of Water Rights (Utah DWR) in 1963 (Utah DWR 2005).

37
38 The Utah DWR manages both surface water and groundwater appropriations (new
39 appropriations and transfer of existing water rights). In many regions of the state, both surface
40 water and groundwater resources are fully appropriated, so new water diversions can only be
41 made through the transfer of existing water rights. The application process for obtaining a water
42 right is the same for surface water and groundwater; however, the criteria used to evaluate new
43 surface water and groundwater diversions is different and can vary by region in the state.
44 Groundwater diversions can also be subject to groundwater management plans that have been
45 established to protect existing water rights and limit overuse and degradation of water quality in
46 sensitive areas. The Utah DWR assesses a water right application based on its potential for

1 beneficial use, as well as its potential to affect existing water rights or impair water quality
2 (BLM 2001). For water right transfer applications in regions where water resources are limited,
3 the seniority of a transferred water right will determine its ability to not affect more senior water
4 rights in the region and whether it can meet project demands (Utah DWR 2005).

5
6 The northern Escalante Desert Valley is under the jurisdiction of the southwestern
7 regional office of the Utah DWR and is located in Policy Area 71 (Escalante Valley) (Utah
8 DWR 2010). Surface waters in this Policy Area are fully appropriated, so any new surface water
9 diversions must be transferred from existing surface water rights (transfers between surface
10 water and groundwater diversions are typically not allowed). The proposed Milford Flats South
11 SEZ is located within the Milford groundwater administration district. New applications for
12 groundwater rights in the Milford district are not being accepted, and transfer of groundwater
13 rights from the adjacent Black Rock or Nada-Lund districts are usually not approved (Utah
14 DWR 2010). Thus, the purchase of existing water rights is necessary for solar energy
15 development. Currently, there is no groundwater management plan proposed for the Milford area
16 basin. The Utah Legislature passed a bill (S.B. 20) in May 2010 that allows the creation of local
17 districts to develop groundwater management plans under Statute 73-5-15 (Utah State
18 Legislature 2010).

21 **13.2.9.2 Impacts**

22
23 Potential impacts on water resources related to utility-scale solar energy development
24 include direct and indirect impacts on surface waters and groundwater. Direct impacts occur at
25 the place of origin and at the time of the proposed activity, while indirect impacts occur away
26 from the place of origin or later in time. Impacts on water resources considered in this analysis
27 are the result of land disturbance activities (construction, final developed site plan, and off-site
28 activities such as road and transmission line construction) and water use requirements for solar
29 energy technologies that take place during the four project phases: site characterization,
30 construction, operations, and decommissioning/reclamation. Both land disturbance and
31 consumptive water use activities can affect groundwater and surface water flows, cause
32 drawdown of groundwater surface elevations, modify natural drainage pathways, obstruct natural
33 recharge zones, and alter surface water–wetland–groundwater connectivity. Water quality can
34 also be degraded through the generation of wastewater, chemical spills, increased erosion and
35 sedimentation, and increased salinity (e.g., by the excessive withdrawal from aquifers).

38 ***13.2.9.2.1 Land Disturbance Impacts on Water Resources***

39
40 Impacts related to land disturbance activities are common to all utility-scale solar energy
41 developments, which Section 5.9.1 describes in more detail for the four phases of development;
42 these impacts will be minimized through the implementation of programmatic design features
43 described in Appendix A, Section A.2.2. Land disturbance impacts in the vicinity of the
44 proposed Milford Flats South SEZ could potentially impact natural drainage patterns and natural
45 groundwater recharge and discharge properties. The alteration of natural drainage pathways
46 during construction can lead to impacts related to flooding. Land-disturbance activities should be

1 avoided to the extent possible in the vicinity of the ephemeral stream washes and irrigation canal
2 present on the site. Alterations to these systems could enhance erosion processes, disrupt
3 groundwater recharge, and negatively affect plant and animal habitats associated with the
4 ephemeral channels.
5
6

7 ***13.2.9.2.2 Water Use Requirements for Solar Energy Technologies***

8
9

10 **Analysis Assumptions**

11

12 A detailed description of the water use assumptions for the four utility-scale solar energy
13 technologies (parabolic trough, power tower, dish engine, and PV systems) is presented in
14 Appendix M. Assumptions regarding water use calculations specific to the proposed Milford
15 Flats South SEZ include the following:
16

- 17 • On the basis of a total area less than 10,000 acres (40 km²), it is assumed that
18 one solar project could be constructed during the peak construction year;
19
 - 20 • Water needed for making concrete would come from an off-site source;
21
 - 22 • The maximum land disturbance for an individual solar facility during the peak
23 construction year is 3,000 acres (12 km²)
24
 - 25 • Assumptions on individual facility size and land requirements (Appendix M),
26 along with the assumed number of projects and maximum allowable land
27 disturbance, result in the potential to disturb approximately 47% of the total
28 SEZ area during peak construction year; and
29
 - 30 • Water use requirements for hybrid cooling systems are assumed to be on the
31 same order of magnitude as those using dry cooling (see Section 5.9.2.1).
32
- 33

34 **Site Characterization**

35

36 During site characterization, water would be used mainly for controlling fugitive dust
37 and the workforce potable water supply. Impacts on water resources during this phase of
38 development are expected to be negligible since activities would be limited in area, extent,
39 and duration; water needs could be met by trucking water in from an off-site source.
40
41

42 **Construction**

43

44 During construction, water would be used mainly for controlling fugitive dust and for
45 providing the workforce potable water supply. Because there are no significant surface water
46 bodies on the proposed Milford Flats South SEZ, the water requirements for construction

1 activities could be met by either trucking water to the sites or using on-site groundwater
 2 resources. Table 13.2.9.2-1 lists the estimated water use requirements during the peak
 3 construction year. The assumptions underlying these estimates for each solar energy technology
 4 are described in Appendix M. The total water requirements during the peak construction year
 5 could be as high as 1,244 ac-ft (1.1 to 1.5 million m³). Groundwater wells would have to yield an
 6 estimated 540 to 770 gal/min (2,000 to 2,900 L/min) to meet the water use requirements, which
 7 are similar to average well yields of small- to medium-sized irrigated farms in Utah
 8 (USDA 2009a). The availability of groundwater and the impacts of groundwater withdrawal
 9 would need to be assessed during the site characterization phase of a solar development project.
 10 In addition, up to 74 ac-ft (91,000 m³) of sanitary wastewater would be generated and would
 11 need to be either treated on-site or sent to an off-site facility.

12
 13
 14 **Operations**

15
 16 Water would be required for mirror/panel washing, the workforce potable water supply,
 17 and cooling during operations. Cooling water is required only for the parabolic trough and power
 18 tower technologies. Water needs for cooling are a function of the type of cooling used (dry, wet,
 19 hybrid). Further refinements to water requirements for cooling would result from the percentage
 20 of time the option was employed (30 to 60% range assumed) and the power of the system. The
 21 differences between the water requirements reported in Table 13.2.9.2-2 for the parabolic trough
 22 and power tower technologies are attributable to the assumptions of acreage per megawatt. As a
 23 result, water usage for the more energy-dense parabolic trough technology is estimated to be
 24 almost twice as large as that for the power tower technology.

25
 26 **TABLE 13.2.9.2-1 Estimated Water Requirements during the Peak Construction Year
 for the Proposed Milford Flats South SEZ**

Activity	Parabolic Trough	Power Tower	Dish Engine	PV
Water use requirements ^a				
Fugitive dust control (ac-ft) ^{b,c}	800	1,199	1,199	1,199
Potable supply for workforce (ac-ft)	74	45	19	9
Total water use requirements (ac-ft)	874	1,244	1,218	1,209
Wastewater generated				
Sanitary wastewater (ac-ft)	74	45	19	9

^a Assumptions of water use for fugitive dust control, potable supply for workforce, and wastewater generation are presented in Table M.9-1 (Appendix M).

^b Fugitive dust control estimation assumes a local pan evaporation of 70 in./yr (180 cm/yr) (Cowherd et al. 1988; WRCC 2010b).

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

27
 28

TABLE 13.2.9.2-2 Estimated Water Requirements during Operations at the Proposed Milford Flats South SEZ

Activity	Solar Energy Technology			
	Parabolic Trough	Power Tower	Dish Engine	PV
Full build-out capacity (MW) ^{a,b}	1,037	576	576	576
Water use requirements				
Mirror/panel washing (ac-ft/yr) ^{c,d}	518	288	288	29
Potable supply for workforce (ac-ft/yr)	15	6	6	0.6
Dry cooling (ac-ft/yr) ^e	207–1,037	115–576	NA ^f	NA
Wet cooling (ac-ft/yr) ^e	4,666–15,034	2,592–8,352	NA	NA
Total water use				
Non-cooled technologies (ac-ft/yr)	NA	NA	294	29
Dry-cooled (ac-ft/yr)	740–1,570	410–870	NA	NA
Wet-cooled (ac-ft/yr)	5,199–15,567	2,886–8,646	NA	NA
Wastewater generated				
Blowdown (ac-ft/yr) ^g	295	164	NA	NA
Sanitary wastewater (ac-ft/yr)	15	6	6	0.6

^a Land area for the parabolic trough technology was estimated at 5 acres/MW (0.02 km²/MW), and the land area for the power tower, dish engine, and PV technologies was estimated at 9 acres/MW (0.04 km²/MW).

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

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

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

^e Dry-cooling value assumes 0.2 to 1.0 ac-ft/yr per MW and wet-cooling value assumes 4.5 to 14.5 ac-ft/yr per MW; these ranges correspond to an assumed 30% and 60% operating time (DOE 2009).

^f NA = not applicable.

^g Value scaled from the 250-MW Beacon Solar project with an annual discharge of 44 gal/min (167 L/min) (AECOM 2009). Blowdown is relevant to wet cooling only.

1
2
3 The water use requirements among the solar energy technologies are a factor of the full
4 build-out capacity, as well as assumptions on water use and technology operations discussed in
5 Appendix M. Assuming that 80% of the SEZ's area would be used for solar energy production,
6 the full build-out capacity would generate 576 to 1,037 MW for the proposed Milford Flats
7 South SEZ. The estimated total water use requirements during operations range from 29 to
8 294 ac-ft/yr (0.04 million to 0.4 million m³/yr) for the PV and dish engine technologies (no
9 cooling required) and from 410 to 15,567 ac-ft/yr (0.5 million to 19 million m³/yr) for the
10 parabolic trough and power tower technologies (cooling required). Table 13.2.9.2-2 lists the

1 amounts of water needed for mirror/panel washing, potable water supply, and cooling activities
2 for each solar energy technology. In addition, operations of a solar energy development would
3 generate 0.6 to 15 ac-ft/yr (740 to 18,500 m³/yr) of sanitary wastewater, and for wet-cooled
4 technologies, 164 to 295 ac-ft/yr (190,000 to 370,000 m³/yr) of cooling system blowdown water
5 that would need to be treated either on-site or sent to an off-site facility.
6

7 Water demands during operations would most likely be met by withdrawing groundwater
8 from wells constructed on-site. The parabolic trough and power tower technologies would
9 require an estimated well yield of 250 to 970 gal/min (960 to 3,700 L/min) for dry cooling and
10 1,800 to 9,600 gal/min (6,800 to 36,000 L/min) for wet cooling. The required well yields for dry
11 cooling are similar to average well yields of small irrigated farms in Utah, while the required
12 well yields for wet cooling range from similar well yields of medium-sized irrigated farms to
13 three times greater than the average well yields of large irrigated farms in Utah (USDA 2009a).
14 For non-cooled technologies (dish engine and PV), wells would have to yield an estimated 18 to
15 180 gal/min (68 to 690 L/min), which is on the order of 2 to 25 times less than the average well
16 yields of small irrigated farms in Utah (USDA 2009a).
17

18 The water demands for technologies that require wet cooling are significant in
19 comparison to the overall water balance in the basin-fill aquifer. For the proposed Milford Flats
20 South SEZ, estimated well yields for wet cooling are equivalent to 6 to 30% (northern Escalante
21 Desert Valley) of the total groundwater withdrawals for the basin in 2009 (Burden et al. 2009).
22 Annual recharge in the basin has been estimated to be 58,200 ac-ft/yr (71.8 million m³) (Mower
23 and Cordova 1974). The estimated water requirements for wet cooling are equivalent to 4 to 27%
24 of the estimated annual recharge for the Beryl-Enterprise basin. The water use for wet cooling
25 could exacerbate existing conditions of groundwater overdraft in the Milford area basin. In
26 addition, obtaining water rights within the Milford area basin would be difficult, and water rights
27 would have to be transferred from existing uses. Based on the information presented here, wet
28 cooling for the full buildout scenario is not deemed feasible for the Milford Flats South SEZ. To
29 the extent possible, facilities using dry cooling should implement water conservation practices to
30 limit water needs.
31

32 The availability of water rights and the impacts associated with groundwater withdrawals
33 would need to be assessed during the site characterization phase of a proposed solar project. Less
34 water would be needed for any of the four solar technologies if the full build-out capacity were
35 reduced. The analysis of water use for the various solar technologies assumed a single
36 technology for full build-out. Water use requirements for development scenarios that assume a
37 mixture of solar technologies can be estimated by using the water use factors described in
38 Appendix M, Section M.9.
39

40 The effects of groundwater withdrawal rates on potential drawdown of groundwater
41 elevations would need to be assessed during the site characterization phase and during the
42 development of constructed wells. For the proposed Milford Flats South SEZ, groundwater
43 elevations are currently declining at a rate of 0.3 to 2.5 ft/yr (0.06 to 0.8 m/yr) in the Milford area
44 basin (Burden et al. 2009). The declining groundwater levels have been linked with land
45 subsidence and surface fissures south of the town of Milford (Mower and Cordova 1974;
46 Forster 2006). With these existing conditions, further groundwater withdrawals for solar energy

1 development at the proposed SEZ could potentially cause further drawdown of groundwater
2 elevations and land subsidence both on-site and more regionally in the Escalante Desert Valley.
3 These indirect impacts can disturb regional groundwater flow patterns and recharge patterns,
4 which have implications for ecological habitats (discussed in Section 13.2.10).
5
6

7 **Decommissioning/Reclamation**

8

9 All surface structures associated with the solar energy development would be dismantled,
10 and the site would be reclaimed to its preconstruction state during decommissioning. Land
11 disturbance and water use activities would be similar to those during the construction phase
12 (see Table 13.2.9.2-1) and may also include water to establish vegetation in some areas.
13 However, the total volume of water needed is expected to be less. Because quantities of water
14 needed during the decommissioning/reclamation phase would be less than those for construction,
15 impacts on surface and groundwater resources also would be less.
16
17

18 ***13.2.9.2.3 Off-Site Impacts: Roads and Transmission Lines***

19

20 The proposed Milford Flats South SEZ is approximately 5 mi (8 km) east of State
21 Route 130/21, and the nearest transmission lines are 19 mi (31 km) from the SEZ, as described in
22 Section 13.2.1.2. Impacts associated with the construction of roads and transmission lines
23 primarily deal with water use demands for construction, water quality concerns relating to
24 potential chemical spills, and land disturbance effects on the natural hydrology. Water needed
25 for road modification and transmission line construction activities (e.g., for soil compaction,
26 dust suppression, and potable supply for workers) could be trucked to the construction area
27 from an off-site source. As a result, water use impacts would be negligible. Impacts on surface
28 water and groundwater quality resulting from spills would be minimized by implementing the
29 programmatic design features described in Appendix A, Section A.2.2 (e.g., cleaning up spills as
30 soon as they occur). Ground-disturbing activities that have the potential to increase sediment and
31 dissolved solid loads in downstream waters would be conducted following the programmatic
32 design features to minimize impacts associated with alterations to natural drainage pathways and
33 hydrologic processes.
34
35

36 ***13.2.9.2.4 Summary of Impacts on Water Resources***

37

38 The impacts on water resources associated with developing solar energy in the proposed
39 Milford Flats South SEZ are associated with land disturbance effects on natural hydrology, water
40 use requirements for the various solar energy technologies, and water quality concerns. Impacts
41 related to water use requirements vary depending on the type of solar technology built and, for
42 technologies using cooling systems, the type of cooling (wet, dry, hybrid) employed. Water
43 requirements would be greatest for wet-cooled parabolic trough and power tower facilities.
44 Water use requirements for technologies using wet cooling could use up to approximately 26%
45 of the estimated annual groundwater recharge in the vicinity of the proposed Milford Flats South

1 SEZ. Dry cooling reduces water use requirements by approximately a factor of 10 compared
2 with wet cooling. PV requires the least amount of water among the solar energy technologies.
3

4 The alteration of natural drainage pathways during construction can lead to impacts
5 related to flooding. Land-disturbance activities should be avoided to the extent possible in the
6 vicinity of the ephemeral stream washes and the irrigation canal present on the site. Alterations
7 to these systems could enhance erosion processes, disrupt groundwater recharge, and negatively
8 affect plant and animal habitats associated with the ephemeral channels.
9

10 Water in the Milford area basin is currently over-appropriated and is closed to new
11 surface water and groundwater appropriations (Utah DWR 2010). In order to obtain water for
12 solar energy projects in the area, water rights would have to be transferred from existing water
13 rights, most of which are currently used for agriculture (Utah DWR 2010; Kenny et al. 2009).
14

15 The groundwater levels in the Milford area basin have been declining steadily since 1955
16 (Burden et al. 2009). Large withdrawals of groundwater in the Milford area basin have led to
17 ground subsidence and land fissures (Forster 2006). Based on the information presented here,
18 wet cooling for the full build-out scenario is not deemed feasible for the Milford Flats South
19 SEZ. To the extent possible, facilities using dry cooling should implement water conservation
20 practices to limit water needs.
21

22 **13.2.9.3 SEZ-Specific Design Features and Design Feature Effectiveness**

23

24
25 Implementing the programmatic design features described in Appendix A, Section A.2.2,
26 as required under BLM's Solar Energy Program, would mitigate some impacts on water
27 resources. Programmatic design features would focus on coordination with federal, state, and
28 local agencies that regulate the use of water resources to meet the requirements of permits and
29 approvals needed to obtain water for development, and on hydrological studies to characterize
30 the aquifer from which groundwater would be obtained (including drawdown effects if a new
31 point of diversion is created). The greatest consideration for mitigating water impacts would be
32 in the selection of solar technologies. The mitigation of impacts would be best achieved by
33 selecting technologies with low water demands.
34

35 Proposed design features specific to the Milford Flats South SEZ are as follows:

- 36 • Wet-cooling options would not be feasible; other technologies should
37 incorporate water conservation measures;
38
- 39 • During site characterization, hydrologic investigations would need to identify
40 100-year floodplains and potential jurisdictional water bodies subject to CWA
41 Section 404 permitting. Siting of solar facilities and construction activities
42 should avoid areas identified as within a 100-year floodplain;
43
- 44 • Land-disturbance and operations activities should prevent erosion and
45 sedimentation in the vicinity of the ephemeral washes present on the site;
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- Groundwater rights must be obtained from the Utah Division of Water Rights (Utah DWR 2005);
- Groundwater monitoring and production wells should be constructed in accordance with Utah standards (Utah DWR 2008);
- Stormwater management plans and best management practices (BMPs) should comply with standards developed by the Utah Division of Water Quality (UDWQ 2008); and
- Water for potable uses would have to meet or be treated to meet Utah drinking water standards as defined by *Utah Administrative Code* Rule R309-200.

1 **13.2.10 Vegetation**
2

3 This section addresses vegetation that could occur or is known to occur within the
4 potentially affected area of the proposed Milford Flats South SEZ. The affected area considered
5 in this assessment includes the areas of direct and indirect effects. The area of direct effects is
6 defined as the area that would be physically modified during project development (i.e., where
7 ground-disturbing activities would occur) and includes the SEZ, a 250-ft (76-m) wide portion of
8 an assumed transmission line corridor, and a 60-ft (18-m) wide portion of an assumed access
9 road corridor. The area of indirect effects was defined as the area within 5 mi (8 km) of the SEZ
10 boundary, within the 1-mi (1.6-km) wide assumed transmission line corridor, and within the 1-mi
11 (1.6-km) wide assumed access road corridor where ground-disturbing activities would not occur
12 but that could be indirectly affected by activities in the area of direct effect.
13

14 Indirect effects considered in the assessment included effects from surface runoff, dust,
15 and accidental spills from the SEZ, but do not include ground-disturbing activities. The potential
16 degree of indirect effects would decrease with increasing distance from the SEZ. This area of
17 indirect effect was identified on the basis of professional judgment and was considered
18 sufficiently large to bound the area that would potentially be subject to indirect effects. The
19 affected area is the area bounded by the areas of direct and indirect effects. These areas are
20 defined and the impact assessment approach is described in Appendix M.
21

22
23 **13.2.10.1 Affected Environment**
24

25 Most of the western and southern portions of the proposed Milford Flats South SEZ are
26 located within the Shadscale-dominated Saline Basins Level IV ecoregion, which primarily
27 supports a sparse saltbush-greasewood shrub community (Woods et al. 2001). This ecoregion
28 includes nearly flat to gently sloping valley bottoms and lower hillslopes. Soils have a high salt
29 and alkali content, and plants are salt- and drought-tolerant. The dominant shrub species in this
30 ecoregion are shadscale (*Atriplex confertifolia*), winterfat (*Krascheninnikovia lanata*),
31 greasewood (*Sarcobatus vermiculatus*), and bud sagebrush (*Picrothamnus desertorum*).
32 Perennial grasses are also typically present and include bottlebrush squirreltail (*Elymus*
33 *elymoides*), Indian ricegrass (*Achnatherum hymenoides*), and galleta (*Pleuraphis jamesii*). Most
34 of the eastern portion of the SEZ is within the Sagebrush Basins and Slopes Level IV ecoregion,
35 which supports a Great Basin sagebrush community dominated by Wyoming big sagebrush
36 (*Artemisia tridentata* ssp. *wyomingensis*) and includes perennial bunchgrasses. This ecoregion
37 includes valleys, alluvial fans, bajadas, mountain flanks, and stream terraces. Annual
38 precipitation in the vicinity of the SEZ is low, averaging 9.03 in. (22.9 cm) at Milford
39 (see Section 13.2.13).
40

41 The region surrounding the SEZ consists of a mosaic of these ecoregions, as well as the
42 Woodland- and Shrub-covered Low Mountains Level IV ecoregion. This ecoregion includes
43 pinyon-juniper woodlands and sagebrush communities, along with mountain brush communities
44 at higher elevations. Small areas of the Salt Deserts Level IV ecoregion also occur in the region.
45 This ecoregion is mostly barren and contains playas, salt flats, mud flats, low terraces, and saline
46 lakes. Playas and salt flats are ponded during wet periods and subject to wind erosion when they

1 are dry. Soils are poorly drained, have a high salt and alkali content, and are often salt-crusts.
2 Plants in this ecoregion are generally sparse and widely scattered, if present at all, and include
3 extremely salt-tolerant species such as salicornia (*Salicornia* sp.), saltgrass (*Distichlis spicata*),
4 alkali sacaton (*Sporobolus airoides*), iodine bush (*Allenrolfea occidentalis*), and greasewood.
5 These ecoregions are all located within the Central Basin and Range Level III ecoregion, which
6 is described in Appendix I.

7
8 Land cover types, described and mapped under SWReGAP (USGS 2005a), were used to
9 evaluate plant communities in and near the SEZ. Each cover type includes a range of similar
10 plant communities. Land cover types occurring within the potentially affected area of the
11 proposed Milford Flats South SEZ are shown in Figure 13.2.10.1-1. Table 13.2.10.1-1 provides
12 the surface area of each cover type within the potentially affected area.

13
14 Lands within the proposed Milford Flats South SEZ are classified primarily as Inter-
15 Mountain Basins Mixed Salt Desert Scrub, especially in the western portion of the SEZ; Inter-
16 Mountain Basins Big Sagebrush Shrubland, especially in the western portion; and Inter-
17 Mountain Basins Semi-Desert Shrub Steppe. Additional cover types within the SEZ are given in
18 Table 13.2.10.1-1. During a September 2009 visit to the site, dominant species observed in the
19 low scrub communities present over most of the SEZ included greasewood and sagebrush, with
20 sagebrush generally lower in abundance, except in some northern portions of the SEZ. Grasses,
21 such as galleta and Indian ricegrass, occur within these communities mostly in the eastern
22 portion of the SEZ. Cryptogammic soil crusts occur in some areas of the SEZ. Sensitive habitats
23 on the SEZ include ephemeral dry washes.

24
25 The indirect impact area, including the area within 5 mi (8 km) around the SEZ and the
26 access road and transmission line corridors, includes 26 cover types, which are listed in
27 Table 13.2.10.1-1. The predominant cover types are Inter-Mountain Basins Big Sagebrush
28 Shrubland, Inter-Mountain Basins Semi-Desert Shrub Steppe, and Inter-Mountain Basins Mixed
29 Salt Desert Scrub.

30
31 No NWI data are available for the region that includes the Milford Flats South SEZ
32 (USFWS 2009). Small ponds occur inside and outside the SEZ and are generally developed for
33 livestock or other uses. Numerous dry washes occur within the SEZ, access road corridor, and
34 transmission line corridor. These drainages typically do not support wetland or riparian habitats,
35 and generally convey surface runoff to ponds, drainages, or canals outside the SEZ.
36 Intermittently flooded areas were observed in the SEZ. These dry washes and intermittently
37 flooded areas typically contain water for short periods during or after precipitation events.
38 Several springs occur in the vicinity of the SEZ, however, they are unlikely to support riparian
39 communities (see Section 13.2.9). The Beaver River, a perennial stream, passes about 4 mi
40 (6 km) northeast of the Milford Flats South SEZ. Riparian habitats occur along the river near
41 Minersville. Although the downstream portion of the river is often dry because of irrigation
42 withdrawals, riparian habitats likely occur along some areas of the river channel nearest to the
43 SEZ. Minersville Canal runs along the southern edge of the SEZ, but that canal is also dry when
44 not being used for irrigation.

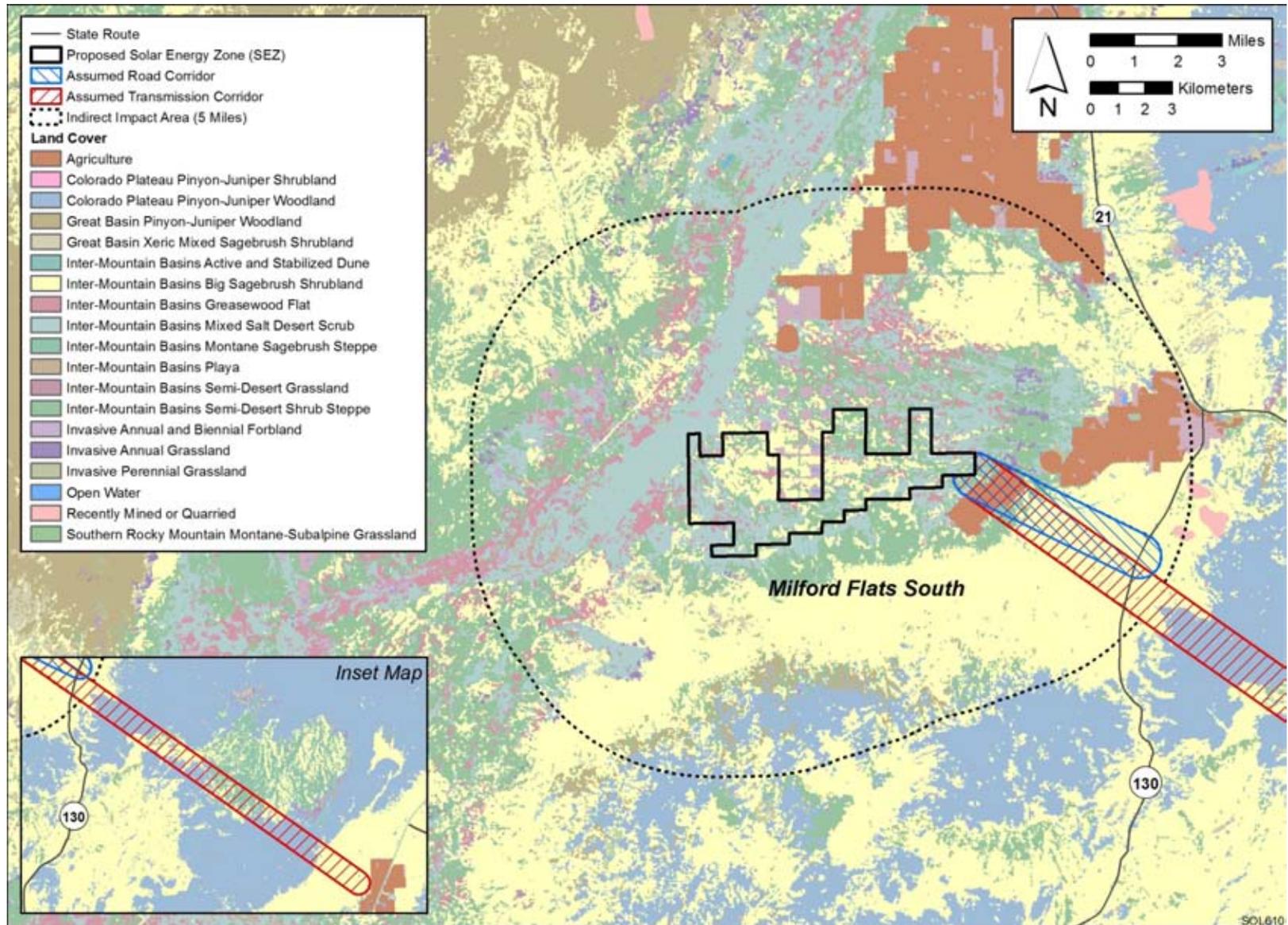


FIGURE 13.2.10.1-1 Land Cover Types within the Proposed Milford Flats South SEZ (Source: USGS 2004)

TABLE 13.2.10.1-1 Land Cover Types within the Potentially Affected Area of the Proposed Milford Flats South SEZ and Potential Impacts

Land Cover Type ^a	Area of Cover Type Affected (acres) ^b				Overall Impact Magnitude ^g
	Within SEZ (Direct Effects) ^c	Assumed Access Road (Direct Effects) ^d	Assumed Transmission Line (Direct Effects) ^e	Corridors and Outside SEZ (Indirect Effects) ^f	
<p>S065 Inter-Mountain Basins Mixed Salt Desert Scrub: Generally consists of open shrublands which include at least one species of <i>Atriplex</i> along with other shrubs. Perennial grasses dominate a sparse to moderately dense herbaceous layer.</p>	2,051 acres ^h (0.5%, 0.8%)	2 acres (<0.1%)	6 acres (<0.1%)	17,649 acres (4.0%)	Small
<p>S054 Inter-Mountain Basins Big Sagebrush Shrubland: Dominated by basin big sagebrush (<i>Artemisia tridentata tridentata</i>), Wyoming big sagebrush (<i>Artemisia tridentata wyomingensis</i>), or both. Other shrubs may be present. Perennial herbaceous plants are present but not abundant.</p>	1,966 acres (0.2%, 0.3%)	23 acres (<0.1 %)	285 acres (<0.1)	44,106 acres (4.1%),	Small
<p>S079 Inter-Mountain Basins Semi-Desert Shrub Steppe: Generally consists of perennial grasses with an open shrub and dwarf shrub layer.</p>	1,922 acres (0.4%, 0.6%)	5 acres (<0.1%)	17 acres (<0.1%)	20,706 acres (4.3%)	Small
<p>S096 Inter-Mountain Basins Greasewood Flat: Dominated or co-dominated by greasewood (<i>Sarcobatus vermiculatus</i>) and generally occurring in areas with saline soils, a shallow water table, and intermittent flooding, although remaining dry for most growing seasons (USGS 2005a). This community type generally occurs near drainages or around playas. These areas may include, or may be co-dominated by, other shrubs, and may include a graminoid herbaceous layer.</p>	525 acres (0.5%, 1.1%)	<1 acre (<0.1%)	1 acre (<0.1%)	6,542 acres (5.9%)	Small

TABLE 13.2.10.1-1 (Cont.)

Land Cover Type ^a	Area of Cover Type Affected (acres) ^b				Overall Impact Magnitude ^g
	Within SEZ (Direct Effects) ^c	Assumed Access Road (Direct Effects) ^d	Assumed Transmission Line (Direct Effects) ^e	Corridors and Outside SEZ (Indirect Effects) ^f	
N21 Developed, Open Space—Low Intensity: Includes housing, parks, golf courses, and other areas planted in developed settings. Impervious surfaces comprise up to 49% of the total land cover.	4 acres (<0.1%, 0.2%)	0 acres	0 acres	2,097 acres (6.6%)	Small
D09 Invasive Annual and Biennial Forbland: Areas dominated by annual and biennial non-native forb species.	3 acres (<0.1%, <0.1%)	<1 acre (<0.1%)	<1 acre (<0.1%)	329 acres (1.4%)	Small
S090 Inter-Mountain Basins Semi-Desert Grassland: Consists of perennial bunchgrasses as dominants or co-dominants. Scattered shrubs or dwarf shrubs may also be present.	<1 acre (<0.1%, <0.1%)	0 acres	0 acres	131 acres (0.3%)	Small
S046 Rocky Mountain Gambel Oak-Mixed Montane Shrubland: Occurs on dry foothills and lower mountain slopes. Gambel oak (<i>Quercus gambelii</i>) may be the only dominant species or share dominance with other shrubs.	0 acres	<1 acre (<0.1%)	2 acres (<0.1%)	79 acres (0.1%)	Small
S093 Rocky Mountain Lower Montane Riparian Woodland and Shrubland: Occurs on streambanks, islands, and bars, in areas of annual or episodic flooding, and often occurs as a mosaic of tree-dominated communities with diverse shrubs.	0 acres	<1 acre (<0.1%)	<1 acre (<0.1%)	14 acres (0.2%)	Small
S040 Great Basin Pinyon-Juniper Woodland: Occurs on low elevation slopes and ridges. Singleleaf pinyon (<i>Pinus monophylla</i>), Utah juniper (<i>Juniperus osteosperma</i>), or both, are the dominant species, generally associating with curl-leaf mountain mahogany (<i>Cercocarpus ledifolius</i>). Understory species include shrubs and grasses.	0 acres	<1 acre (<0.1%)	<1 acre (<0.1%)	1,561 acres (0.2%)	Small

TABLE 13.2.10.1-1 (Cont.)

Land Cover Type ^a	Area of Cover Type Affected (acres) ^b				Overall Impact Magnitude ^g
	Within SEZ (Direct Effects) ^c	Assumed Access Road (Direct Effects) ^d	Assumed Transmission Line (Direct Effects) ^e	Corridors and Outside SEZ (Indirect Effects) ^f	
S039 Colorado Plateau Pinyon-Juniper Woodland: Occurs on foothills, ridges, and low-elevation mountain slopes. Two-needle pinyon (<i>Pinus edulis</i>), Utah juniper (<i>Juniperus osteosperma</i>), or both, are the dominant species. Understory layers, if present, may be shrub- or grass-dominated.	0 acres	<1 acre (<0.1%)	207 acres (<0.1%)	8,466 acres (1.2 %)	Small
N11 Open Water: Plant or soil cover is generally less than 25%.	0 acres	<1 acre (<0.1%)	<1 acre (<0.1%)	87 acres (0.9%)	Small
D06 Invasive Perennial Grassland: Dominated by non-native perennial grasses.	0 acres	<1 acre (<0.1%)	<1 acre (<0.1%)	428 acres (2.4%)	Small
S006 Rocky Mountain Cliff and Canyon and Massive Bedrock: Occurs on steep cliffs, narrow canyons, rock outcrops, and scree and talus slopes. This cover type includes barren and sparsely vegetated areas (less than 10% cover) with scattered trees and/or shrubs, or with small dense patches. Herbaceous plant cover is limited.	0 acres	0 acres	2 acres (<0.1%)	34 acres (0.1%)	Small
S050 Inter-Mountain Basins Mountain Mahogany Woodland and Shrubland: Occurs in hills and mountain ranges on rocky outcrops or escarpments and small to large stands in forested areas. Mostly occurs as shrubland on ridges and steep slopes, but may be a small tree in steppe habitat. The dominant species is mountain mahogany (<i>Cercocarpus ledifolius</i>). A number of shrub species are often present, and scattered conifers may also occur.	0 acres	0 acres	1 acre (<0.1%)	16 acre (<0.1%)	Small

TABLE 13.2.10.1-1 (Cont.)

Land Cover Type ^a	Area of Cover Type Affected (acres) ^b				Overall Impact Magnitude ^g
	Within SEZ (Direct Effects) ^c	Assumed Access Road (Direct Effects) ^d	Assumed Transmission Line (Direct Effects) ^e	Corridors and Outside SEZ (Indirect Effects) ^f	
S085 Southern Rocky Mountain Montane-Subalpine Grassland: Typically occurs as a mosaic of two or three plant associations on well-drained soils. The dominant species is usually a bunchgrass.	0 acres	0 acres	<1 acre (<0.1%)	9 acres (0.1%)	Small
D08 Invasive Annual Grassland: Dominated by non-native annual grass species.	0 acres	0 acres	0 acres	762 acres (1.6%)	Small
S015 Inter-Mountain Basins Playa: Playa habitats are intermittently flooded and generally barren or sparsely vegetated. Depressions may contain small patches of grass and sparse shrubs may occur around playa margins.	0 acres	0 acres	0 acres	250 acres (0.4%)	Small
D03 Recently Mined or Quarried: Includes open pit mines and quarries.	0 acres	0 acres	0 acres	72 acres (1.2%)	Small
N22 Developed, Medium–High Intensity: Includes housing and commercial/industrial development. Impervious surfaces comprise 50–100 percent of the total land cover.	0 acres	0 acres	0 acres	26 acres (0.2%)	Small
S056 Colorado Plateau Mixed Low Sagebrush Shrubland: Occurs in canyons, draws, hilltops, and dry flats. Consists of open shrubland and steppe habitats. Black sagebrush (<i>Artemisia nova</i>) or Bigelow sage (<i>A. bigelovii</i>) are the dominant species, with Wyoming big sagebrush (<i>A. tridentata</i> ssp. <i>wyomingensis</i>) co-dominant in some areas. Semiarid grasses are often present and may exceed 25% cover.	0 acres	0 acres	0 acres	23 acres (0.1%)	Small

TABLE 13.2.10.1-1 (Cont.)

Land Cover Type ^a	Area of Cover Type Affected (acres) ^b				Overall Impact Magnitude ^g
	Within SEZ (Direct Effects) ^c	Assumed Access Road (Direct Effects) ^d	Assumed Transmission Line (Direct Effects) ^e	Corridors and Outside SEZ (Indirect Effects) ^f	
S009 Inter-Mountain Basins Cliff and Canyon: Includes barren and sparsely vegetated (generally <10% plant cover) steep cliff faces, narrow canyons, small rock outcrops, and scree and talus slopes. Composed of widely scattered coniferous trees and a variety of shrubs.	0 acres	0 acres	0 acres	20 acres (0.2%)	Small
S010 Colorado Plateau Mixed Bedrock Canyon and Tableland: Includes barren and sparsely vegetated (generally <10% plant cover) steep cliff faces, narrow canyons, and open tablelands. Composed of a very open coniferous tree canopy or scattered trees and shrubs. Herbaceous species are typically sparse.	0 acres	0 acres	0 acres	15 acres (0.3%)	Small
S024 Rocky Mountain Bigtooth Maple Ravine Woodland: Occurs in ravines, on toeslopes, and benches associated with riparian areas. It may also occur on steep north slopes at higher elevations. The dominant species is bigtooth maple (<i>Acer grandidentatum</i>), but gambel oak (<i>Quercus gambelii</i>) may be co-dominant in some areas. Other broadleaf trees or conifers may be present.	0 acres	0 acres	0 acres	2 acres (2.4%)	Small

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

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

^c Includes the area of the cover type within the SEZ, the percentage that area represents of all occurrences of that cover type within the SEZ region (i.e., a 50-mi [80-km] radius from the center of the SEZ), and the percentage that area represents of all occurrences of that cover type on BLM lands within the SEZ region.

Footnotes continued on next page.

TABLE 13.2.10.1-1 (Cont.)

- d For access road development, direct effects were estimated within a 5-mi (24-km) long, 60-ft (18-m) wide road ROW from the SEZ to the nearest state highway. Direct impacts within this area were determined from the proportion of the cover type within the 1-mi (1.6-km) wide road corridor. Impacts are for the area of the cover type within the assumed ROW, and the percentage that area represents of all occurrences of that cover type within the SEZ region.
- e For transmission development, direct effects were estimated within a 19-mi (5-km) long, 250-ft (76-m) wide transmission ROW from the SEZ to the nearest existing line. Direct impacts within this area were determined from the proportion of the cover type within the 1-mi (1.6-km) wide transmission corridor. Impacts are for the area of the cover type within the assumed ROW, and the percentage that area represents of all occurrences of that cover type within the SEZ region.
- f 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 portions of the 1-mi (1.6-km) wide road and transmission corridors where ground-disturbing activities would not occur. Indirect effects include effects from surface runoff, dust, and other factors from project developments. The potential degree of indirect effects would decrease with increasing distance away from the SEZ. Includes the area of the cover type within the indirect effects area and the percentage that area represents of all occurrences of that cover type within the SEZ region.
- g Overall impact magnitude categories were based on professional judgment and are (1) *small*: a relatively small proportion of the cover type ($\leq 1\%$) within the SEZ region would be lost; (2) *moderate*: an intermediate proportion of a cover type (>1 but $\leq 10\%$) would be lost; and (3) *large*: $>10\%$ of a cover type would be lost.
- h To convert acres to km^2 , multiply by 0.004047.

1 Table 13.2.10.1-2 lists the designated noxious weeds of Utah that are recorded as
 2 occurring in Beaver County (UDA 2008, USDA 2010), which includes the proposed Milford
 3 Flats South SEZ, and additional noxious weed species declared by Beaver County (UDA 2009).
 4 UDA (2008) provides a list of all Utah State designated noxious weeds. Cheatgrass (*Bromus*
 5 *tectorum*) and halogeton (*Halogeton glomeratus*), invasive species known to occur within the
 6 SEZ, are not included in Table 13.2.10.1-2.

7
 8
 9 **13.2.10.2 Impacts**

10
 11 The construction of solar energy facilities within the proposed Milford Flats South SEZ
 12 would result in direct impacts on plant communities due to the removal of vegetation within the
 13 facility footprint during land-clearing and land-grading operations. Approximately 80% of the
 14 SEZ (5,184 acres [21.0 km²]) would be expected to be cleared with full development of the SEZ.
 15 The plant communities affected would depend on facility locations and could include any of the
 16 communities occurring on the SEZ. Therefore, for the purposes of this analysis, all the area of
 17 each cover type within the SEZ is considered to be directly affected by removal with full
 18 development of the SEZ.

19
 20 Indirect effects (caused, for example, by surface runoff or dust from the SEZ) have the
 21 potential to degrade affected plant communities and may reduce biodiversity by promoting the
 22 decline or elimination of species sensitive to disturbance. Indirect effects can also cause an
 23 increase in disturbance-tolerant species or invasive species. High impact levels could result in
 24 the elimination of a community or the replacement of one community type for another. The
 25 proper implementation of programmatic design features, however, would reduce indirect effects
 26 to a minor or small level of impact.

27
 28
**TABLE 13.2.10.1-2 Utah State Designated
 Noxious Weeds Known to Occur in Beaver
 County**

Common Name	Scientific Name
Black henbane	<i>Hyoscyamus niger</i>
Bull thistle	<i>Cirsium vulgare</i>
Canada thistle	<i>Cirsium arvense</i>
Dalmatian toadflax	<i>Linaria dalmatica</i>
Field bindweed	<i>Convolvulus arvensis</i>
Hoary cress	<i>Cardaria</i> spp.
Houndstongue	<i>Cynoglossum officinale</i>
Poison hemlock	<i>Conium maculatum</i>
Quackgrass	<i>Agropyron repens</i>
Scotch thistle	<i>Onopordium acanthum</i>
Spotted knapweed	<i>Centaurea maculosa</i>
Yellow toadflax	<i>Linaria vulgaris</i>

Sources: UDA (2008, 2009), USDA (2010).

1 Possible impacts from solar energy facilities on vegetation encountered within the SEZ
2 are described in more detail in Section 5.10.1. Any such impacts would be minimized through
3 the implementation of required programmatic design features described in Appendix A,
4 Section A.2.2 and from any additional mitigations applied. Section 13.2.10.2.3, below identifies
5 design features of particular relevance to the proposed Milford Flats South SEZ.
6
7

8 ***13.2.10.2.1 Impacts on Native Species*** 9

10 The impacts of construction, operation, and decommissioning were considered small if
11 the impact affected a relatively small proportion (<1%) of the cover type in the SEZ region
12 (within 50 mi [80 km] of the center of the SEZ); a moderate impact (>1 but <10%) could affect
13 an intermediate proportion of cover type; a large impact could affect greater than 10% of a cover
14 type.
15

16 Solar facility construction and operation in the Milford Flats South SEZ would primarily
17 affect communities of the Inter-Mountain Basins Mixed Salt Desert Scrub, Inter-Mountain
18 Basins Big Sagebrush Shrubland, and Inter-Mountain Basins Semi-Desert Shrub Steppe cover
19 types. Additional cover types within the SEZ that would be affected include Inter-Mountain
20 Basins Greasewood Flat; Developed, Open Space-Low Density; Invasive Annual and Biennial
21 Forbland; and Inter-Mountain Basins Semi-Desert Grassland. The developed areas and Invasive
22 Annual and Biennial Forbland likely support few native plant communities. The potential
23 impacts on land cover types resulting from solar energy facilities in the proposed Milford Flats
24 South SEZ are summarized in Table 13.2.10.1-1. Many of these cover types are relatively
25 common in the SEZ region; however, several are relatively uncommon, representing less than
26 1% of the land area within the SEZ region: Inter-Mountain Basins Semi-Desert Grassland
27 (0.8%); Developed, Open Space-Low Intensity (0.6%); and Invasive Annual and Biennial
28 Forbland (0.5%). In addition, Rocky Mountain Lower Montane Riparian Woodland and
29 Shrubland (0.1%), Open Water (0.2%), Invasive Perennial Grassland (0.4%), Rocky Mountain
30 Cliff and Canyon (0.6%), Inter-Mountain Basins Mountain Mahogany Woodland and Shrubland
31 (0.8%), and Southern Rocky Mountain Montane-Subalpine Grassland (0.2%) would potentially
32 be impacted by the access road and/or transmission line ROWs.
33

34 The construction, operation, and decommissioning of solar projects within the Milford
35 Flats South SEZ would result in small impacts on all cover types in the affected area.
36

37 Re-establishment of shrub communities in temporarily disturbed areas would likely be
38 very difficult because of the arid conditions and might require extended periods of time. In
39 addition, noxious weeds could become established in disturbed areas and colonize adjacent
40 undisturbed habitats, thus reducing restoration success and potentially resulting in widespread
41 habitat degradation. Damage to cryptogamic soil crusts that occur within the SEZ, such as by
42 the operation of heavy equipment or other vehicles, can alter important soil characteristics, such
43 as nutrient cycling and availability, and affect plant community characteristics (Lovich and
44 Bainbridge 1999).
45

1 The deposition of fugitive dust from disturbed soil areas in habitats outside a solar project
2 area could result in reduced productivity or changes in plant community composition. Fugitive
3 dust deposition could affect plant communities of each of the cover types occurring within the
4 indirect impact area identified in Table 13.2.10.1-1.

5
6 Communities associated with playa habitats, greasewood flats communities, or other
7 intermittently flooded areas downgradient from solar projects in the SEZ could be affected by
8 ground-disturbing activities. Site clearing and grading could disrupt surface water, resulting in
9 changes in the frequency, duration, depth, or extent of inundation or soil saturation, and could
10 potentially alter playa or greasewood flats plant communities and affect community function.
11 Increases in surface runoff from a solar energy project site could also affect hydrologic
12 characteristics of these communities. The introduction of contaminants into these habitats could
13 result from spills of fuels or other materials used on a project site. Soil disturbance could result in
14 sedimentation in these areas, which could degrade or eliminate sensitive plant communities.
15 Grading could also affect dry washes within the SEZ, access road corridor, and transmission line
16 corridor. Alteration of surface drainage patterns or hydrology could adversely affect downstream
17 dry wash communities. Vegetation within these communities could be lost by erosion or
18 desiccation. Riparian communities occurring along Beaver River, northeast of the Milford Flats
19 South SEZ, could be affected by solar projects within the SEZ.

20
21 The use of groundwater within the Milford Flats South SEZ for technologies with high
22 water requirements, such as wet-cooling systems, could contribute to the depletion of the
23 regional groundwater system (see Section 13.2.9). Groundwater withdrawal for solar technology
24 cooling systems could result in reductions in inflows to riparian areas that are supported by
25 groundwater discharge, such as occur along portions of Beaver River. Inflow reductions could
26 alter riparian hydrologic characteristics and plant communities and could potentially reduce
27 riparian surface area.

28
29 The construction of access roads or transmission lines in ROWs outside of the SEZ could
30 potentially result in direct impacts on riparian habitat that may occur in or near the ROWs. Small
31 areas of Rocky Mountain Lower Montane Riparian Woodland and Shrubland occur within the
32 access road and transmission line corridors.

33
34 The construction of access roads or transmission lines could also result in impacts on
35 woodland communities. Several woodland cover types occur within the transmission line
36 corridor, and small areas occur within the access road corridor. Woodland habitat within the
37 ROWs would likely be converted to shrub- or grass-dominated habitat. Clearing of woodland
38 along the ROWs during construction would contribute to fragmentation of these habitats and
39 changes in characteristics in adjacent areas, such as light and soil moisture conditions. As a
40 result, woodland communities along the ROWs could be degraded. ROW management would
41 maintain altered habitat conditions within and adjacent to the ROWs.

1 **13.2.10.2 Impacts from Noxious Weeds and Invasive Plant Species**
2

3 Executive Order (E.O.) 13112, “Invasive Species,” directs federal agencies to prevent the
4 introduction of invasive species and provide for their control and to minimize the economic,
5 ecological, and human health impacts of invasive species (*Federal Register*, Volume 64, page
6 61836, Feb. 8, 1999). Potential impacts of noxious weeds and invasive plant species resulting
7 from solar energy facilities are described in Section 5.10.1. Noxious weeds and invasive species
8 could be inadvertently brought to a project site by equipment previously used in infested areas,
9 or they may be present on or near a project site. Despite required programmatic design features
10 to prevent the spread of noxious weeds, project disturbance could potentially increase the
11 prevalence of noxious weeds and invasive species in the affected area of the proposed Milford
12 Flats South SEZ and increase the probability that weeds could be transported into areas that were
13 previously relatively weed free. This could result in reduced restoration success and possible
14 widespread habitat degradation.

15
16 Noxious weeds, including cheat grass and halogeton, occur on the SEZ. Additional
17 species designated as noxious weeds in Utah, and those known to occur in Beaver County, are
18 given in Table 13.2.10.1-2. Past or present land uses, such as grazing or OHV use, may affect the
19 susceptibility of plant communities to the establishment of noxious weeds and invasive species.
20 Small areas of Developed, Open Space–Low Intensity totaling 4 acres (0.02 km²) occur within
21 the SEZ, and about 2,097 acres (8.5 km²) occur within 5 mi (8 km) of the SEZ; small areas of
22 Invasive Annual and Biennial Forbland, totaling 3 acres (0.01 km²) occur within the SEZ, and
23 approximately 329 acres (1.3 km²) occur within 5 mi (8 km) of the SEZ and in the access road
24 and transmission line corridors; 428 acres (1.7 km²) of Invasive Perennial Grassland occur
25 within 5 mi (8 km) of the SEZ and in the access road and transmission line corridor. About
26 26 acres (0.1 km²) of Developed, Medium-High Intensity and 762 acres (3.1 km²) of Invasive
27 Annual Grassland occur within 5 mi (8 km) of the SEZ. Because disturbance may promote the
28 establishment and spread of invasive species, developed areas may provide sources of such
29 species. Disturbance associated with existing roads, transmission lines, and rail lines within the
30 SEZ area of potential impacts also likely contributes to the susceptibility of plant communities to
31 the establishment and spread of noxious weeds and invasive species.
32
33

34 **13.2.10.3 SEZ-Specific Design Features and Design Feature Effectiveness**
35

36 In addition to the programmatic design features, SEZ-specific design features would
37 reduce the potential for impacts on plant communities. While the specifics of some of these
38 practices are best established when considering specific project details, some measures can be
39 identified at this time, as follows:
40

- 41 • An Integrated Vegetation Management Plan, addressing invasive species
42 control, and an Ecological Resources Mitigation and Monitoring Plan,
43 addressing habitat restoration should be approved and implemented to
44 increase the potential for successful restoration of affected habitats and
45 minimize the potential for the spread of invasive species, such as those
46 occurring in Beaver County, that could be introduced as a result of solar

1 energy project activities (see Section 13.2.10.2.2). Invasive species control
2 should focus on biological and mechanical methods where possible to reduce
3 the use of herbicides.

- 4
5 • Appropriate engineering controls should be used to minimize impacts on dry
6 wash, playa, and greasewood flat habitats, including downstream occurrences,
7 resulting from surface water runoff, erosion, sedimentation, altered hydrology,
8 accidental spills, or fugitive dust deposition to these habitats. Appropriate
9 buffers and engineering controls would be determined through agency
10 consultation.
- 11
12 • All dry wash habitats within the SEZ and all dry wash and riparian habitats
13 within the assumed transmission line corridor should be avoided to the extent
14 practicable, and any impacts minimized and mitigated. A buffer area should
15 be maintained around dry washes and riparian habitats to reduce the potential
16 for impacts. Transmission line towers should be sited and constructed to
17 minimize impacts on dry washes and riparian areas; towers should span such
18 areas whenever practicable.

19
20 If these SEZ-specific design features are implemented in addition to other programmatic
21 design features, it is anticipated that a high potential for impacts from invasive species and
22 impacts on dry washes, playas, and riparian habitats would be reduced to a minimal potential for
23 impact.

1 **13.2.11 Wildlife and Aquatic Biota**
2

3 This section addresses wildlife (amphibians, reptiles, birds, and mammals) and aquatic
4 biota that could occur within the potentially affected area of the proposed Milford Flats South
5 SEZ. Wildlife known to occur within 50 mi (80 km) of the SEZ (i.e., the SEZ region) were
6 determined from the Utah Conservation Data Center (UDWR 2009a). Land cover types suitable
7 for each species were determined from SWReGAP (USGS 2004, 2005a, 2007). The amount of
8 aquatic habitat within the SEZ region was determined by estimating the length of linear perennial
9 stream and canal features and the area of standing water body features (i.e., ponds, lakes, and
10 reservoirs) within 50 mi (80 km) of the SEZ using available GIS surface water datasets.
11

12 The affected area considered in this assessment included the areas of direct and indirect
13 effects. The area of direct effects was defined as the area that would be physically modified
14 during project development (i.e., where ground-disturbing activities would occur) and included
15 the SEZ, a 250-ft (76-m) wide portion of an assumed 19-mi (30.6-km) long transmission line
16 corridor, and a 60-ft (18-m) wide portion of an assumed 5-mi (8-km) long access road corridor.
17

18 The area of indirect effects was defined as the area within 5 mi (8 km) of the SEZ
19 boundary and within the 1.0-mi (1.6-km) wide assumed transmission and access road corridors
20 where ground-disturbing activities would not occur, but that could be indirectly affected by
21 activities in the area of direct effect (e.g., surface runoff, dust, noise, lighting, and accidental
22 spills in the SEZ or in the transmission line or road construction areas). Since the assumed access
23 road is within the 5 mi (8 km) area of indirect effect for the SEZ, no additional area of indirect
24 effect was considered for the access road. An additional area of indirect effect was considered for
25 14 mi (23 km) of the transmission corridor that would extend beyond the 5 mi (8 km) area of
26 indirect effect for the SEZ. The potential degree of indirect effects would decrease with
27 increasing distance away from the SEZ. The area of indirect effect was identified on the basis
28 of professional judgment and was considered sufficiently large to bound the area that would
29 potentially be subject to indirect effects. These areas of direct and indirect effect are defined and
30 the impact assessment approach is described in Appendix M.
31

32 Dominant land cover habitat in the affected area is intermountain scrub-shrub, and the
33 primary vegetation community types within the affected area are mixed salt desert scrub and
34 sagebrush (*Artemisia* spp.) (see Section 13.2.10). The only perennial stream in the affected area
35 is Beaver River which occurs about 4 mi (6.5 km) east of the SEZ; Minersville Canal, an
36 irrigation canal from the Beaver River intersects the southern portion of the SEZ
37 (Figure 13.2.9.1-1).
38
39
40

1 **13.2.11.1 Amphibians and Reptiles**

2
3
4 **13.2.11.1.1 Affected Environment**

5
6 This section addresses amphibian and reptile species that are known to occur, or for
7 which potentially suitable habitat occurs, on or within the potentially affected area of the
8 proposed Milford Flats South SEZ. The list of amphibian and reptile species potentially present
9 in the SEZ area was determined from range maps and habitat information available from the
10 Utah Conservation Data Center (UDWR 2009a). Land cover types suitable for each species were
11 determined from SWReGAP (USGS 2004, 2005a, 2007). See Appendix M for additional
12 information on the approach used.

13
14 Seven amphibian species occur in Beaver County, within which the proposed Milford
15 Flats South SEZ is located (UDWR 2009a). Based on species distributions within this area and
16 habitat preferences of the amphibian species, only the Great Basin spadefoot (*Spea*
17 *intermontana*) and the Great Plains toad (*Bufo cognatus*) would be expected to occur within the
18 SEZ (UDWR 2009a; Stebbins 2003).

19
20 Twenty-five reptile species are known to occur within Beaver County (UDWR 2009a).
21 About half of these species could occur within the proposed Milford Flats South SEZ
22 (UDWR 2009a; Stebbins 2003). Species expected to be fairly common to abundant within the
23 SEZ include the common sagebrush lizard (*Sceloporus graciosus*), desert horned lizard
24 (*Phrynosoma platyrhinos*), eastern fence lizard (*S. undulatus*), gophersnake (*Pituophis*
25 *catenifer*), greater short-horned lizard (*Phrynosoma hernandesi*), long-nosed leopard lizard
26 (*Gambelia wislizenii*), nightsnake (*Hypsiglena torquata*), tiger whiptail (*Aspidoscelis tigris*), and
27 wandering gartersnake (*Thamnophis elegans vagrans*, a subspecies of terrestrial gartersnake).

28
29 Table 13.2.11.1-1 provides habitat information for representative amphibian and reptile
30 species that could occur within the proposed Milford Flats South SEZ.

31
32
33 **13.2.11.1.2 Impacts**

34
35 The types of impacts that amphibians and reptiles could incur from construction,
36 operation, and decommissioning of utility-scale solar energy facilities are discussed in
37 Section 5.10.2.1. Any such impacts would be minimized through the implementation of required
38 programmatic design features described in Appendix A, Section A.2.2, and through and
39 additional mitigation applied. Section 13.2.11.1.3 identifies SEZ-specific design features of
40 particular relevance to the proposed Milford Flats South SEZ.

41
42 The assessment of impacts on amphibian and reptile species is based on available
43 information on the presence of species in the affected area as presented in Section 13.2.11.1.1
44

TABLE 13.2.11.1-1 Habitats, Potential Impacts, and Potential Mitigation for Representative Amphibian and Reptile Species That Could Occur on or in the Affected Area of the Proposed Milford Flats South SEZ

Common Name (Scientific Name)	Habitat ^a	Maximum Area of Potential Habitat Affected ^b				Overall Impact Magnitude ^g and Species-Specific Mitigation ^h
		Within SEZ (Direct Effects) ^c	Outside SEZ (Indirect Effects) ^d	Within Road Corridor (Indirect and Direct Effects) ^e	Within Transmission Corridor (Indirect and Direct Effects) ^f	
Amphibians						
Great Basin spadefoot (<i>Spea intermontana</i>)	Sagebrush flats, semidesert shrublands, pinyon-juniper woodlands, and spruce-fir forests. Breeds in temporary and permanent waters including rain pools, pools in intermittent streams, and flooded areas along streams. About 3,484,500 acres ¹ of potentially suitable habitat occurs within the SEZ region.	4,017 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat) during construction and operations	81,812 acres of potentially suitable habitat (2.3% of available potentially suitable habitat)	25 acres of potentially suitable habitat lost (<0.001% of available potentially suitable habitat) and 2,142 acres in area of indirect effect	740 acres of potentially suitable habitat lost (0.02% of available potentially suitable habitat) and 14,898 acres in area of indirect effect	Small overall impact. Avoid development in Minersville Canal.
Great Plains toad (<i>Bufo cognatus</i>)	Prefers desert, grassland, and agricultural habitats. Breeds in shallow temporary pools, quiet areas of streams, marshes, irrigation ditches, and flooded fields. In cold winter months, it burrows underground and becomes inactive. About 680,700 acres of potentially suitable habitat occurs within the SEZ region.	421 acres of potentially suitable habitat lost (0.06% of available potentially suitable habitat) during construction and operations	28,587 acres of potentially suitable habitat (4.2% of available potentially suitable habitat) and 416 acres in area of indirect effect	5 acres of potentially suitable habitat lost (<0.001% of available potentially suitable habitat) and 46 acres in area of indirect effect	51 acres of potentially suitable habitat lost (0.007% of available potentially suitable habitat) and 1,028 acres in area of indirect effect	Small overall impact. Avoid development within Minersville Canal.

TABLE 13.2.11.1-1 (Cont.)

Common Name (Scientific Name)	Habitat ^a	Maximum Area of Potential Habitat Affected ^b				Overall Impact Magnitude ^g and Species-Specific Mitigation ^h
		Within SEZ (Direct Effects) ^c	Outside SEZ (Indirect Effects) ^d	Within Road Corridor (Indirect and Direct Effects) ^e	Within Transmission Corridor (Indirect and Direct Effects) ^f	
Lizards						
Common sagebrush lizard (<i>Sceloporus graciosus</i>)	Open ground with scattered low bushes. Usually found in sagebrush habitat, but also occurs in many other types of habitat, including pinyon-juniper areas and open forests. Sometimes abundant in prairie dog colonies. It becomes inactive during the cold winter months, often using stone piles, shrubs, or rodent burrows for cover. About 4,109,700 acres of potentially suitable habitat occurs within the SEZ region.	5,184 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat) during construction and operations	104,148 acres of potentially suitable habitat (2.5% of available potentially suitable habitat)	29 acres of potentially suitable habitat lost (<0.001% of available potentially suitable habitat) and 2,550 acres in area of indirect effect	788 acres of potentially suitable habitat lost (0.02% of available potentially suitable habitat) and 15,848 acres in area of indirect effect	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.
Desert horned lizard (<i>Phrynosoma platyrhinos</i>)	Deserts dominated by sagebrush, creosotebush, greasewood, or cactus. Occurs on sandy flats, alluvial fans, washes, and edges of dunes. Burrows in soil during periods of inactivity. About 2,325,200 acres of potentially suitable habitat occurs in the SEZ region.	5,184 acres of potentially suitable habitat lost (0.2% of available potentially suitable habitat) during construction and operations	99,261 acres of potentially suitable habitat (4.3% of available potentially suitable habitat)	29 acres of potentially suitable habitat lost (0.001% of available potentially suitable habitat) and 2,551 acres in area of indirect effect	517 acres of potentially suitable habitat lost (0.02% of available potentially suitable habitat) and 10,398 acres in area of indirect effect	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.

TABLE 13.2.11.1-1 (Cont.)

Common Name (Scientific Name)	Habitat ^a	Maximum Area of Potential Habitat Affected ^b				Overall Impact Magnitude ^g and Species-Specific Mitigation ^h
		Within SEZ (Direct Effects) ^c	Outside SEZ (Indirect Effects) ^d	Within Road Corridor (Indirect and Direct Effects) ^e	Within Transmission Corridor (Indirect and Direct Effects) ^f	
Lizards (Cont.)						
Eastern fence lizard (<i>Sceloporus undulatus</i>)	Sunny, rocky habitats of cliffs, talus, old lava flows and cones, canyons, and outcrops. Various vegetation adjacent to or among rocks including montane forests, woodlands, semidesert shrubland, and various forbs and grasses. About 2,395,900 acres of potentially suitable habitat occurs in the SEZ region.	2,447 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat) during construction and operations	39,659 acres of potentially suitable habitat (1.7% of available potentially suitable habitat)	5 acres of potentially suitable habitat lost (<0.001% of available potentially suitable habitat) and 419 acres in area of indirect effect	260 acres of potentially suitable habitat lost (0.01% of available potentially suitable habitat) and 5,234 acres in area of indirect effect	Small overall impact.
Greater short- horned lizard (<i>Phrynosoma hernandesi</i>)	Short-grass prairies, sagebrush, semidesert shrublands, shale barrens, pinyon-juniper and pine- oak woodlands, oak-grass associations, and open conifer forests in mountainous areas. About 3,136,600 acres of potentially suitable habitat occurs in the SEZ region.	1,966 acres of potentially suitable habitat lost (0.06% of available potentially suitable habitat) during construction and operations	62,031 acres of potentially suitable habitat (2.0% of available potentially suitable habitat)	23 acres of potentially suitable habitat lost (<0.001% of available potentially suitable habitat) and 2,003 acres in area of indirect effect	658 acres of potentially suitable habitat lost (0.02% of available potentially suitable habitat) and 13,230 acres in area of indirect effect	Small overall impact.

TABLE 13.2.11.1-1 (Cont.)

Common Name (Scientific Name)	Habitat ^a	Maximum Area of Potential Habitat Affected ^b				Overall Impact Magnitude ^g and Species-Specific Mitigation ^h
		Within SEZ (Direct Effects) ^c	Outside SEZ (Indirect Effects) ^d	Within Road Corridor (Indirect and Direct Effects) ^e	Within Transmission Corridor (Indirect and Direct Effects) ^f	
Lizards (Cont.)						
Long-nosed leopard lizard (<i>Gambelia wislizenii</i>)	Desert and semidesert areas with scattered shrubs up to 6,000 ft (1,829 m). Prefers sandy or gravelly flats and plains. Also prefers areas with abundant rodent burrows that they occupy when inactive. About 1,657,100 acres of potentially suitable habitat occurs in the SEZ region.	4,017 acres of potentially suitable habitat lost (0.2% of available potentially suitable habitat) during construction and operations	70,353 acres of potentially suitable habitat (4.2% of available potentially suitable habitat)	25 acres of potentially suitable habitat lost (0.001% of available potentially suitable habitat) and 2,135 acres in area of indirect effect	466 acres of potentially suitable habitat lost (0.03% of available potentially suitable habitat) and 9,373 acres in area of indirect effect	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.
Tiger whiptail (<i>Aspidoscelis tigris</i>)	Primarily occurs in sparsely vegetated desert and shrubland habitats. During cold winter months, it often occupies underground burrows created by rodents or other lizards. About 2,730,000 acres of potentially suitable habitat occurs within the SEZ region.	4,498 acres of potentially suitable habitat lost (0.2% of available potentially suitable habitat) during construction and operations	57,554 acres of potentially suitable habitat (2.1% of available potentially suitable habitat)	6 acres of potentially suitable habitat lost (<0.001% of available potentially suitable habitat) and 562 acres in area of indirect effect	278 acres of potentially suitable habitat lost (0.01% of available potentially suitable habitat) and 5,589 acres in area of indirect effect	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.

TABLE 13.2.11.1-1 (Cont.)

Common Name (Scientific Name)	Habitat ^a	Maximum Area of Potential Habitat Affected ^b				Overall Impact Magnitude ^g and Species-Specific Mitigation ^h
		Within SEZ (Direct Effects) ^c	Outside SEZ (Indirect Effects) ^d	Within Road Corridor (Indirect and Direct Effects) ^e	Within Transmission Corridor (Indirect and Direct Effects) ^f	
Snakes						
Gophersnake (<i>Pituophis catenifer</i>)	Plains grasslands, sandhills, riparian areas, marshes, edges of ponds and lakes, rocky canyons, semidesert and mountain shrublands, montane woodlands, rural and suburban areas, and agricultural areas. Likely inhabits pocket gopher burrows in winter. About 3,269,900 acres of potentially suitable habitat occurs in the SEZ region.	1,970 acres of potentially suitable habitat lost (0.06% of available potentially suitable habitat) during construction and operations	73,547 acres of potentially suitable habitat (2.2% of available potentially suitable habitat)	29 acres of potentially suitable habitat lost (<0.001% of available potentially suitable habitat) and 2,480 acres in area of indirect effect	725 acres of potentially suitable habitat lost (0.02% of available potentially suitable habitat) and 14,583 acres in area of indirect effect	Small overall impact.
Nightsnake (<i>Hypsiglena torquata</i>)	Arid and semiarid desert flats, plains, and woodlands; areas with rocky and sandy soils are preferred. During cold periods of the year, it seeks refuge underground, in crevices, or under rocks. About 2,589,200 acres of potentially suitable habitat occurs within the SEZ region.	3,973 acres of potentially suitable habitat lost (0.2% of available potentially suitable habitat) during construction and operations	50,713 acres of potentially suitable habitat (2.0% of available potentially suitable habitat)	6 acres of potentially suitable habitat lost (<0.001% of available potentially suitable habitat) and 542 acres in area of indirect effect	274 acres of potentially suitable habitat lost (0.01% of available potentially suitable habitat) and 5,511 acres in area of indirect effect	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.

TABLE 13.2.11.1-1 (Cont.)

Common Name (Scientific Name)	Habitat ^a	Maximum Area of Potential Habitat Affected ^b				Overall Impact Magnitude ^g and Species-Specific Mitigation ^h
		Within SEZ (Direct Effects) ^c	Outside SEZ (Indirect Effects) ^d	Within Road Corridor (Indirect and Direct Effects) ^e	Within Transmission Corridor (Indirect and Direct Effects) ^f	
Snakes (Cont.)						
Wandering gartersnake (<i>Thamnophis elegans vagrans</i>)	Most terrestrial or wetland habitats in the vicinity of any lotic or lentic body of water. However, it also occurs many miles from surface waters. About 2,031,100 acres of potentially suitable habitat occurs within the SEZ region.	3,888 acres of potentially suitable habitat lost (0.2% of available potentially suitable habitat) during construction and operations	74,130 acres of potentially suitable habitat (3.6% of available potentially suitable habitat)	28 acres of potentially suitable habitat lost (0.001% of available potentially suitable habitat) and 2,399 acres in area of indirect effect	498 acres of potentially suitable habitat lost (0.02% of available potentially suitable habitat) and 10,011 acres in area of indirect effect	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.

- ^a Potentially suitable habitat was determined by using SWReGAP habitat suitability and land cover models. Area of potentially suitable habitat for each species is presented for the SEZ region, which is defined as the area within 50 mi (80 km) of the SEZ center.
- ^b Maximum area of potentially suitable habitat that could be affected relative to availability within the SEZ region. Habitat availability for each species within the region was determined by using SWReGAP habitat suitability and land cover models. This approach probably overestimates the amount of suitable habitat in the project area.
- ^c Direct effects within the SEZ would consist of the ground-disturbing activities associated with construction and the maintenance of an altered environment associated with operations. A maximum of 5,184 acres of direct effect within the SEZ was assumed.
- ^d Area of indirect effects was assumed to be the area adjacent to the SEZ within 5 mi (8 km) of the SEZ boundary and within the 1-mi (1.6-km) wide transmission line corridor (less the assumed area of direct effects) that extends beyond the 5-mi (8-km) area adjacent to the SEZ boundary. Indirect effects include effects from surface runoff, dust, noise, lighting, and so on from the SEZ, but do not include ground-disturbing activities. The potential degree of indirect effects would decrease with increasing distance away from the SEZ.
- ^e For access road development, direct effects were estimated within a 5-mi (8-km) long, 60-ft (18-m) wide ROW for an assumed access road from the SEZ to the nearest state highway. Indirect effects were estimated within a 1-mi (1.6-km) wide road corridor to the state highway, less the assumed area of direct effects.

Footnotes continued on next page.

TABLE 13.2.11.1-1 (Cont.)

-
- ^f For transmission development, direct effects were estimated within a 19-mi (30.6-km) long, 250-ft (76-m) wide ROW for an assumed new transmission line connecting the SEZ to the nearest existing line. Indirect effects were estimated within a 1-mi (1.6-km) wide transmission corridor to the existing transmission line, less the assumed area of direct effects.
- ^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; (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.
- ^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.

Sources: NatureServe (2010); UDWR (2009a); USGS (2004, 2005a, 2007).

1 following the analysis approach described in Appendix M. Additional NEPA assessments and
2 coordination with state natural resource agencies may be needed to address project-specific
3 impacts more thoroughly. These assessments and consultations could result in additional
4 required actions to avoid or mitigate impacts on amphibians and reptiles
5 (see Section 13.2.11.1.3).
6

7 In general, impacts on amphibians and reptiles would result from habitat disturbance
8 (i.e., habitat reduction, fragmentation, and alteration) and from disturbance, injury, or mortality
9 to individual amphibians and reptiles. On the basis of the magnitude of impacts on amphibians
10 and reptiles summarized in Table 13.2.11.1-1, direct impacts on amphibian and reptile species
11 would be small, as 0.2% or less of potentially suitable habitats identified for the species in the
12 SEZ region would be lost. Larger areas of potentially suitable habitats for most amphibian and
13 reptile species occur within the area of potential indirect effects (e.g., up to 4.3% of available
14 habitat for the desert horned lizard). Other impacts on amphibians and reptiles could result from
15 surface water and sediment runoff from disturbed areas, fugitive dust generated by project
16 activities, accidental spills, collection, and harassment. These indirect impacts are expected to be
17 negligible with implementation of programmatic design features.
18

19 Decommissioning after operations cease could result in short-term negative impacts on
20 individuals and habitats within and adjacent to the SEZ. The negative impacts of
21 decommissioning would be reduced or eliminated as reclamation proceeds. Potentially long-term
22 benefits could accrue as habitats are restored in previously disturbed areas. Section 5.10.2.1.4
23 provides an overview of the impacts of decommissioning and reclamation on wildlife. Of
24 particular importance for amphibian and reptile species would be the restoration of original
25 ground surface contours, soils, and native plant communities associated with semiarid
26 shrublands.
27

28 ***13.2.11.1.3 SEZ-Specific Design Features and Design Feature Effectiveness*** 29

30
31 The implementation of required programmatic design features described in Appendix A,
32 Section A.2.2, would reduce the potential for effects on amphibians and reptiles, especially for
33 those species that depend on habitat types that can be avoided (e.g., Minersville Canal). Indirect
34 impacts could be reduced to negligible levels by implementing programmatic design features,
35 especially those engineering controls that would reduce runoff, sedimentation, spills, and fugitive
36 dust. While SEZ-specific design features are best established when considering specific project
37 details, one design feature that can be identified at this time is:
38

- 39 • Minersville Canal, which could provide potential breeding sites for the Great
40 Basin spadefoot and Great Plains toad, should be avoided.
41

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

1 **13.2.11.2 Birds**

2
3
4 **13.2.11.2.1 Affected Environment**

5
6 This section addresses bird species that are known to occur, or for which potentially
7 suitable habitat occurs, on or within the potentially affected area of the proposed Milford Flats
8 South SEZ. The list of bird species potentially present in the SEZ area was determined from
9 range maps and habitat information available from the Utah Conservation Data Center
10 (UDWR 2009a). Land cover types suitable for each species were determined from SWReGAP
11 (USGS 2004, 2005a, 2007). See Appendix M for additional information on the approach used.

12
13 More than 235 species of birds are reported from Beaver County (Utah Ornithological
14 Society 2007). However, based on habitat preferences for these species, only about 10% of the
15 species would be expected to regularly occur within the proposed Milford Flats South SEZ.

16
17
18 **Waterfowl, Wading Birds, and Shorebirds**

19
20 As discussed in Section 4.10.2.2.2, waterfowl (ducks, geese, and swans), wading birds
21 (herons and cranes), and shorebirds (avocets, gulls, plovers, rails, sandpipers, stilts, and terns) are
22 among the most abundant groups of birds in the six-state solar study area. Around 80 waterfowl,
23 wading bird, and shorebird species have been reported from Beaver County (Utah Ornithological
24 Society 2007). However, within the proposed Milford Flats South SEZ, waterfowl, wading birds,
25 and shorebird species would be mostly absent to uncommon. The Minersville Canal within the
26 SEZ may attract some shorebird and waterfowl species, but the perennial stream, canal, lake, and
27 reservoir habitats within 50 mi (80 km) of the SEZ would provide more viable habitat for this
28 group of birds.

29
30
31 **Neotropical Migrants**

32
33 As discussed in Section 4.10.2.2.3, neotropical migrants represent the most diverse
34 category of birds within the six-state solar energy study area. Those species that are common or
35 abundant within Beaver County, and that would be expected to occur within the proposed
36 Milford Flats South SEZ, include Bewick’s wren (*Thryomanes bewickii*), Brewer’s sparrow
37 (*Spizella breweri*), common raven (*Corvus corax*), gray flycatcher (*Empidonax wrightii*), greater
38 roadrunner (*Geococcyx californianus*), horned lark (*Eremophila alpestris*), Le Conte’s thrasher
39 (*Toxostoma leconteii*), loggerhead shrike (*Lanius ludovicianus*), rock wren (*Salpinctes*
40 *obsoletus*), sage sparrow (*Amphispiza belli*), sage thrasher (*Oreoscoptes montanus*), vesper
41 sparrow (*Pooecetes gramineus*), and western kingbird (*Tyrannus verticalis*) (UDWR 2009a).

1 **Birds of Prey**

2
3 Section 4.10.2.2.4 provided an overview of the birds of prey (raptors, owls, and vultures)
4 within the six-state solar study area. Twenty-seven bird of prey species have been reported from
5 Beaver County (Utah Ornithological Society 2007). Raptor species that could occur within the
6 proposed Milford Flats South SEZ include the American kestrel (*Falco sparverius*), golden eagle
7 (*Aquila chrysaetos*), red-tailed hawk (*Buteo jamaicensis*), rough-legged hawk (*Buteo lagopus*,
8 only during winter), Swainson’s hawk (*Buteo swainsoni*), and turkey vulture (*Cathartes aura*)
9 (UDWR 2009a).

10
11
12 **Upland Game Birds**

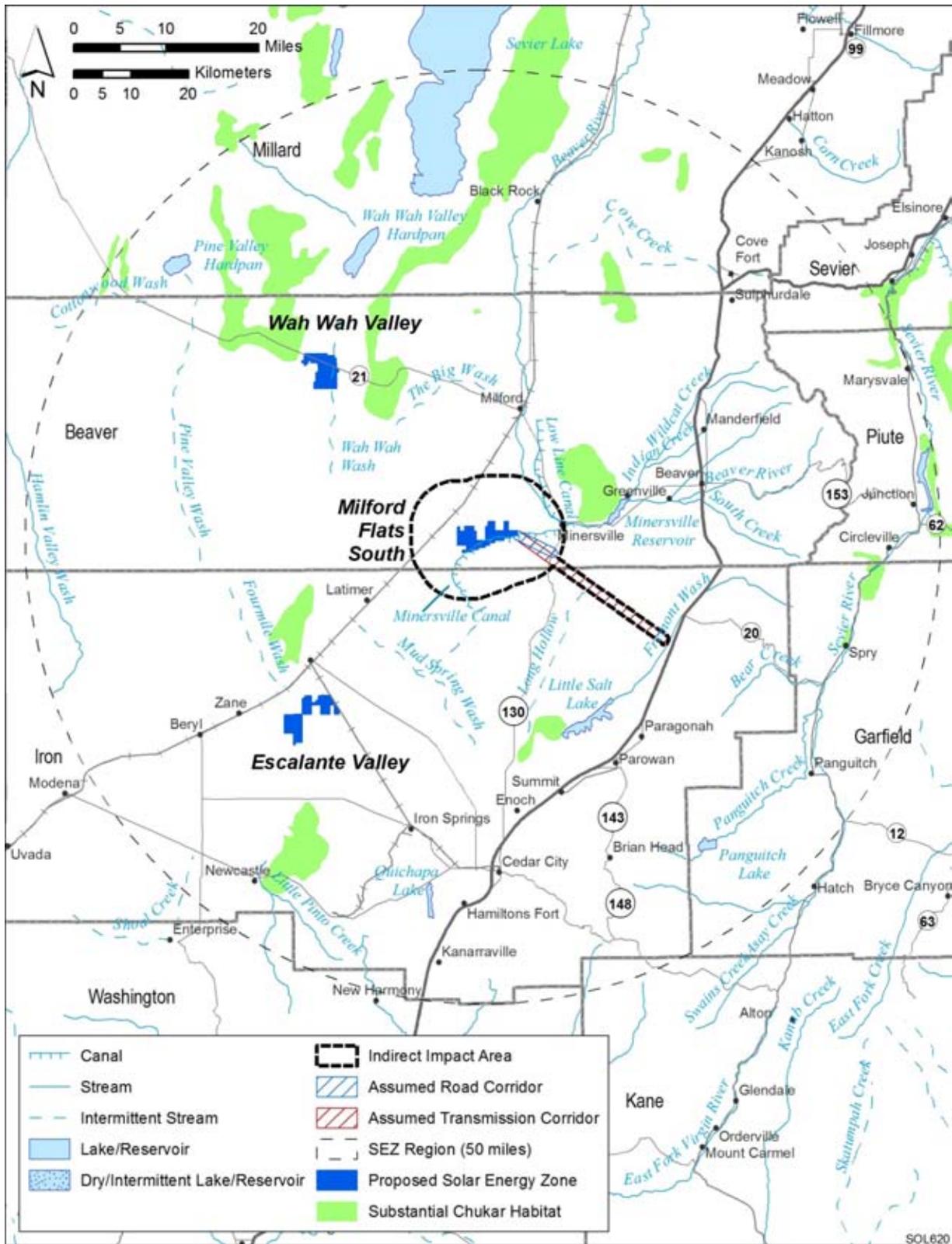
13
14 Section 4.10.2.2.5 provided an overview of the upland game birds (primarily pheasants,
15 grouse, quail, and doves) that occur within the six-state solar study area. Upland game species
16 that could occur within the proposed Milford Flats South SEZ include the chukar (*Alectoris*
17 *chukar*), mourning dove (*Zenaida macroura*), and wild turkey (*Meleagris gallopavo*)
18 (UDWR 2009a).

19
20 The chukar is an introduced upland game bird. A management plan has been developed
21 for the chukar in Utah (UDWR 2003). Preferred habitat for the chukar includes steep, semiarid
22 slopes with rocky outcrops and shrubs with a grass and forb understory. Sources of water are
23 required during hot, dry periods, with most birds found within 0.25 mi (0.4 km) of water during
24 the brooding period (UDWR 2003, 2009a). Grasses and seeds of forbs are their main food, and
25 insects are important to young chicks (UDWR 2003). Urbanization and elimination of sagebrush
26 are among the major factors that adversely affect chukar habitat. Population declines periodically
27 occur due to severe winters or droughts (UDWR 2003). The chukar is distributed throughout
28 Utah, with nearly 20,400,000 acres (82,556 km²) of potential high and substantial value habitats⁵
29 occurring in the state (UDWR 2003). Figure 13.2.11.2-1 shows the location of the proposed
30 Milford Flats South SEZ relative to substantial chukar habitat. No areas of this habitat type occur
31 within the SEZ. The shortest distance from the SEZ to substantial chukar habitat is about 7 mi
32 (11 km).

33
34 Two subspecies of wild turkey occur in Utah, the Rio Grande wild turkey (*Meleagris*
35 *gallopavo intermedia*) and Merriam’s wild turkey (*M. g. merriami*). Both subspecies have
36 established populations within Beaver County (UDWR 2009a). The Rio Grande wild turkey
37 prefers cottonwood riparian areas of rivers associated with oak-pine and pinyon-juniper forests,
38 while the Merriam’s wild turkey inhabits open stands of ponderosa pine interspersed with aspen,
39 grass meadows, and oaks grading into pinyon pine and juniper (UDWR 2009a). Areas of brushy
40 cover are used for nesting. Food items include pine nuts, acorns, grasses, weed seeds, and green
41 vegetation. Insects are also important in the diet of young poults (UDWR 2009a).

42

⁵ High value habitat is an area that provides for intensive use by a wildlife species. Substantial value habitat is an area used by a wildlife species but is not crucial for population survival. Degradation or unavailability of substantial value habitat will not lead to significant declines in carrying capacity and/or numbers of the wildlife species in question.



1

2 **FIGURE 13.2.11.2-1 Location of the Proposed Milford Flats South SEZ Relative to Substantial**
 3 **Chukar Habitat (Source: UDWR 2006a)**

4

1 Figure 13.2.11.2-2 shows the location of the proposed Milford Flats South SEZ relative to
2 crucial wild turkey habitat.⁶ The shortest distance from the SEZ to crucial wild turkey habitat is
3 about 8 mi (13 km). Nearly 1,065,300 acres (4,311 km²) of crucial wild turkey habitat occurs
4 within the SEZ region.
5

6 Table 13.2.11.2-1 provides habitat information for representative bird species that could
7 occur within the proposed Milford Flats South SEZ. Special status bird species are discussed in
8 Section 13.2.12.
9

10 **13.2.11.2.2 Impacts**

11
12
13 The types of impacts that birds could incur from construction, operation, and
14 decommissioning of utility-scale solar energy facilities are discussed in Section 5.10.2.1. Any
15 such impacts would be minimized through the implementation of required programmatic design
16 features described in Appendix A, Section A.2.2, and through any additional mitigation applied.
17 Section 13.2.11.2.3, below, identifies design features of particular relevance to the
18 proposed Milford Flats South SEZ.
19

20 The assessment of impacts on bird species is based on available information on the
21 presence of species in the affected area as presented in Section 13.2.11.2.1 following the analysis
22 approach described in Appendix M. Additional NEPA assessments and coordination with federal
23 or state natural resource agencies may be needed to address project-specific impacts more
24 thoroughly. These assessments and consultations could result in additional required actions to
25 avoid or mitigate impacts on birds (see Section 13.2.11.2.3).
26

27 In general, impacts on birds would result from habitat disturbance (i.e., habitat reduction,
28 fragmentation, and alteration), and from disturbance, injury, or mortality to individual birds.
29 Table 13.2.11.2-1 summarizes the magnitude of potential impacts on representative bird species
30 resulting from solar energy development in the proposed Milford Flats South SEZ. Direct
31 impacts on bird species would be small for all species, as only 0.5% or less of potentially
32 suitable habitats for the bird species would be lost (Table 13.2.11.2-1). Larger areas of
33 potentially suitable habitat for bird species occur within the area of potential indirect effects
34 (e.g., up to 4.6% of potentially suitable habitat for the western kingbird). Other impacts on birds
35 could result from collision with vehicles and infrastructure (e.g., buildings and fences), surface
36 water and sediment runoff from disturbed areas, fugitive dust generated by project activities,
37 noise, lighting, spread of invasive species, accidental spills, and harassment. Indirect impacts on
38 areas outside the SEZ (for example, impacts caused by dust generation, erosion, and
39 sedimentation) are expected to be negligible with implementation of programmatic design
40 features.
41
42

⁶ Crucial value habitat is essential to the life history requirements of the wildlife species. Degradation or unavailability of crucial habitat will lead to significant declines in carrying capacity and/or numbers of the wildlife species in question.

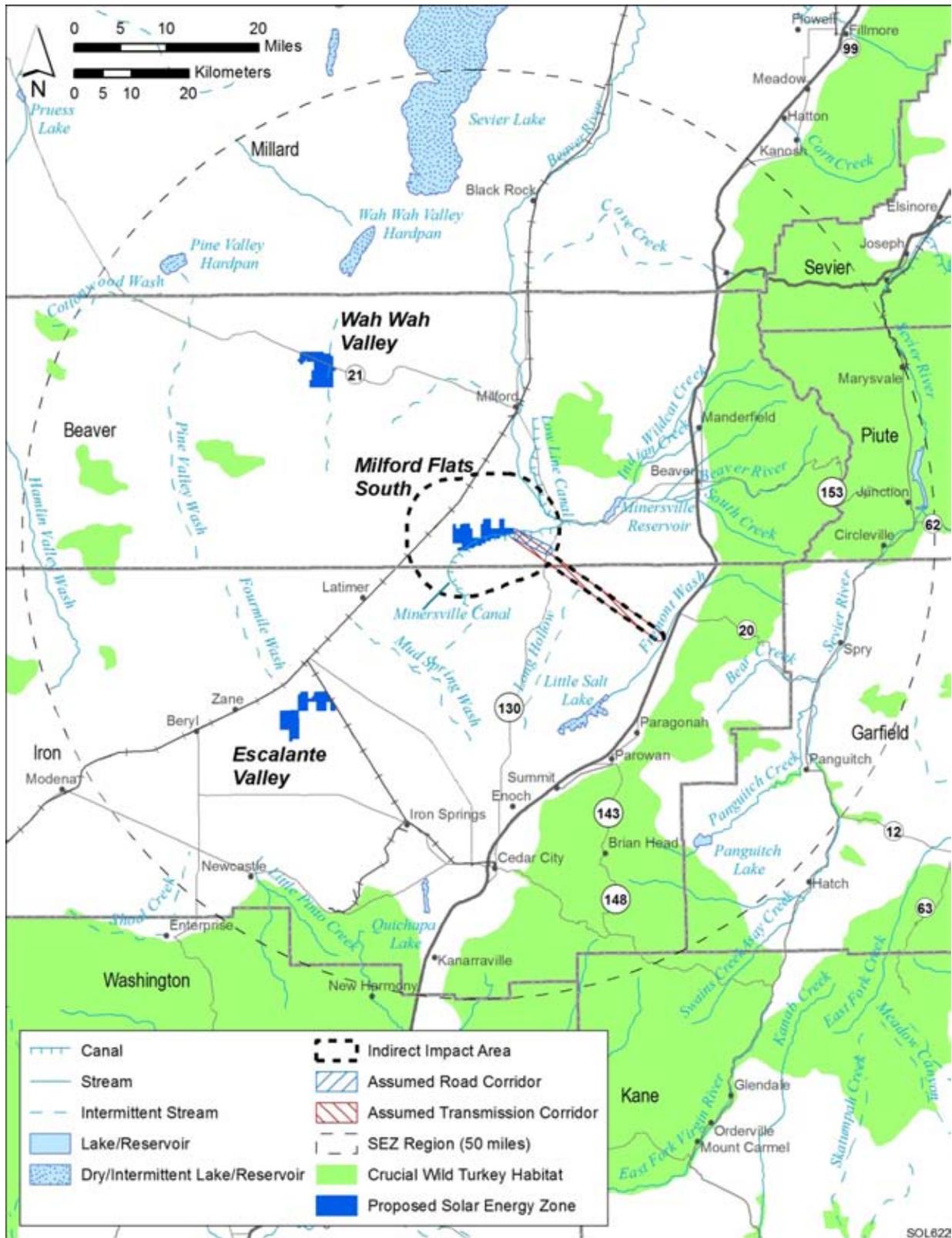


FIGURE 13.2.11.2-2 Location of the Proposed Milford Flats South SEZ Relative to Crucial Wild Turkey Habitat (Source: UDR 2006a)

TABLE 13.2.11.2-1 Habitats, Potential Impacts, and Potential Mitigation for Representative Bird Species That Could Occur on or in the Affected Area of the Proposed Milford Flats South SEZ

Common Name (Scientific Name)	Habitat ^a	Maximum Area of Potential Habitat Affected ^b			Overall Impact Magnitude ^g and Species-Specific Mitigation ^h	
		Within SEZ (Direct Effects) ^c	Outside SEZ (Indirect Effects) ^d	Within Road Corridor (Indirect and Direct Effects) ^e		Within Transmission Corridor (Indirect and Direct Effects) ^f
<i>Neotropical Migrants</i>						
Bewick's wren (<i>Thryomanes bewickii</i>)	Generally associated with dense, brushy habitats. It is a permanent resident of lowland deserts and pinyon-juniper forests of southern Utah. Breeding occurs in brushy areas of open woodlands and other open habitats. It is a cavity nester with nests constructed in small enclosed areas such as tree cavities, nesting boxes, rock crevices, or the center of a brush pile. About 4,050,200 acres ⁱ of potentially suitable habitat occurs within the SEZ region.	4,413 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat) during construction and operations	98,382 acres of potentially suitable habitat (2.4% of available potentially suitable habitat)	33 acres of potentially suitable habitat lost (<0.001% of available potentially suitable habitat) and 2,900 acres in area of indirect effect	840 acres of potentially suitable habitat lost (0.02% of available potentially suitable habitat) and 16,903 acres in area of indirect effect	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.

TABLE 13.2.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat ^a	Maximum Area of Potential Habitat Affected ^b				Overall Impact Magnitude ^g and Species-Specific Mitigation ^h
		Within SEZ (Direct Effects) ^c	Outside SEZ (Indirect Effects) ^d	Within Road Corridor (Indirect and Direct Effects) ^e	Within Transmission Corridor (Indirect and Direct Effects) ^f	
Neotropical Migrants (Cont.)						
Brewer's sparrow (<i>Spizella breweri</i>)	Considered a shrubsteppe obligate. It occupies open desert scrub and cropland habitats. However, it may also occur in high desert scrub (greasewood) habitats, particularly adjacent to shrubsteppe habitats. Nests are usually located in patches of sagebrush that are taller and denser, with more bare ground and less herbaceous cover, than the surrounding habitat. It also breeds in large sagebrush openings in pinyon-juniper or coniferous forest habitats. About 1,969,900 acres of potentially suitable habitat occurs in the SEZ region.	4,017 acres of potentially suitable habitat lost (0.2% of available potentially suitable habitat) during construction and operations	73,051 acres of potentially suitable habitat (3.7% of available potentially suitable habitat)	29 acres of potentially suitable habitat lost (0.001% of available potentially suitable habitat) and 2,139 acres in area of indirect effect	589 acres of potentially suitable habitat lost (0.03% of available potentially suitable habitat) and 11,860 acres in area of indirect effect	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.

TABLE 13.2.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat ^a	Maximum Area of Potential Habitat Affected ^b				Overall Impact Magnitude ^g and Species-Specific Mitigation ^h
		Within SEZ (Direct Effects) ^c	Outside SEZ (Indirect Effects) ^d	Within Road Corridor (Indirect and Direct Effects) ^e	Within Transmission Corridor (Indirect and Direct Effects) ^f	
Neotropical Migrants (Cont.)						
Common raven (<i>Corvus corax</i>)	Occurs in most habitats. Trees and cliffs provide cover. Roosts primarily in trees. Nests on cliffs, bluffs, tall trees, or human-made structures. Forages in sparse, open terrain. About 4,830,400 acres of potentially suitable habitat occurs in the SEZ region.	5,184 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat) during construction and operations	122,585 acres of potentially suitable habitat (2.5% of available potentially suitable habitat)	35 acres of potentially suitable habitat lost (<0.001% of available potentially suitable habitat) and 3,036 acres in area of indirect effect	859 acres of potentially suitable habitat lost (0.02% of available potentially suitable habitat) and 17,280 acres in area of indirect effect	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.
Gray flycatcher (<i>Empidonax wrightii</i>)	Inhabits woodlands and shrublands occurring predominately in pinyon-juniper, sagebrush, and desert shrublands. Nests are located low in shrubs or small trees, usually 2 to 5 ft (0.6 to 1.5 m) above ground. About 3,461,800 acres of potentially suitable habitat occurs within the SEZ region.	3,888 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat) during construction and operations	84,480 acres of potentially suitable habitat (2.4% of available potentially suitable habitat)	28 acres of potentially suitable habitat lost (<0.001% of available potentially suitable habitat) and 2,414 acres in area of indirect effect	708 acres of potentially suitable habitat lost (0.02% of available potentially suitable habitat) and 14,245 acres in area of indirect effect	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.

TABLE 13.2.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat ^a	Maximum Area of Potential Habitat Affected ^b				Overall Impact Magnitude ^g and Species-Specific Mitigation ^h
		Within SEZ (Direct Effects) ^c	Outside SEZ (Indirect Effects) ^d	Within Road Corridor (Indirect and Direct Effects) ^e	Within Transmission Corridor (Indirect and Direct Effects) ^f	
Neotropical Migrants (Cont.)						
Greater roadrunner (<i>Geococcyx californianus</i>)	Desert scrub, chaparral, edges of cultivated lands, and arid open areas with scattered brush. Fairly common in all desert habitats below 5,000 ft (1,524 m). Requires thickets, large bushes, or small trees for shade, refuge, and roosting. Usually nests low in trees, shrubs, or clumps of cactus. Rarely nests on ground. About 3,516,600 acres of potentially suitable habitat occurs in the SEZ region.	4,021 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat) during construction and operations	91,242 acres of potentially suitable habitat (2.6% of available potentially suitable habitat)	30 acres of potentially suitable habitat lost (<0.001% of available potentially suitable habitat) and 2,620 acres in area of indirect effect	742 acres of potentially suitable habitat lost (0.02% of available potentially suitable habitat) and 14,930 acres in area of indirect effect	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.
Horned lark (<i>Eremophila alpestris</i>)	Common to abundant resident in a variety of open habitats. Breeds in grasslands, sagebrush, semidesert shrublands, and alpine tundra. During migration and winter, inhabits the same habitats, other than tundra, and occurs in agricultural areas. Usually occurs where plant density is low and there are exposed soils. About 2,666,900 acres of potentially suitable habitat occurs in the SEZ region.	5,184 acres of potentially suitable habitat lost (0.2% of available potentially suitable habitat) during construction and operations	109,260 acres of potentially suitable habitat (4.1% of available potentially suitable habitat)	35 acres of potentially suitable habitat lost (0.001% of available potentially suitable habitat) and 3,024 acres in area of indirect effect	646 acres of potentially suitable habitat lost (0.02% of available potentially suitable habitat) and 13,001 acres in area of indirect effect	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.

TABLE 13.2.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat ^a	Maximum Area of Potential Habitat Affected ^b				Overall Impact Magnitude ^g and Species-Specific Mitigation ^h
		Within SEZ (Direct Effects) ^c	Outside SEZ (Indirect Effects) ^d	Within Road Corridor (Indirect and Direct Effects) ^e	Within Transmission Corridor (Indirect and Direct Effects) ^f	
Neotropical Migrants (Cont.)						
Le Conte's thrasher (<i>Toxostoma leconteii</i>)	Open desert wash, alkali desert scrub, and desert succulent shrub habitats. Prefers to nest and forage in arroyos and washes lined with dense stands of creosotebush and salt bush. About 439,600 acres of potentially suitable habitat occurs in the SEZ region.	2,051 acres of potentially suitable habitat lost (0.5% of available potentially suitable habitat) during construction and operations	18,139 acres of potentially suitable habitat (4.1% of available potentially suitable habitat)	2 acres of potentially suitable habitat lost (<0.001% of available potentially suitable habitat) and 135 acres in area of indirect effect	17 acres of potentially suitable habitat lost (0.004% of available potentially suitable habitat) and 351 acres in area of indirect effect	Small overall impact. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.
Loggerhead shrike (<i>Lanius ludovicianus</i>)	Open country with scattered trees and shrubs, savanna, desert scrub, desert riparian, Joshua tree, and occasionally open woodland habitats. Perches on poles, wires, or fence posts (suitable hunting perches are important aspect of habitat). Nests in shrubs and small trees. About 4,282,800 acres of potentially suitable habitat occurs in the SEZ region.	5,184 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat) during construction and operations	121,330 acres of potentially suitable habitat (2.8% of available potentially suitable habitat)	35 acres of potentially suitable habitat lost (<0.001% of available potentially suitable habitat) and 3,035 acres in area of indirect effect	856 acres of potentially suitable habitat lost (0.02% of available potentially suitable habitat) and 17,232 acres in area of indirect effect	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.

TABLE 13.2.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat ^a	Maximum Area of Potential Habitat Affected ^b				Overall Impact Magnitude ^g and Species-Specific Mitigation ^h
		Within SEZ (Direct Effects) ^c	Outside SEZ (Indirect Effects) ^d	Within Road Corridor (Indirect and Direct Effects) ^e	Within Transmission Corridor (Indirect and Direct Effects) ^f	
Neotropical Migrants (Cont.)						
Rock wren (<i>Salpinctes obsoletus</i>)	Arid and semiarid habitats at elevations as high as 10,000 ft (3,048 m). Breeds in areas with talus slopes, scrublands, or dry washes. Nests, constructed of plant materials, are located in rock crevices and the nest entrance is paved with small rocks and stones. About 4,473,100 acres of potentially suitable habitat occurs within the SEZ region.	5,184 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat) during construction and operations	112,898 acres of potentially suitable habitat (2.5% of available potentially suitable habitat)	29 acres of potentially suitable habitat lost (<0.001% of available potentially suitable habitat) and 2,558 acres in area of indirect effect	789 acres of potentially suitable habitat lost (0.02% of available potentially suitable habitat) and 15,884 acres in area of indirect effect	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.
Sage sparrow (<i>Amphispiza belli</i>)	Prefers shrubland, grassland, and desert habitats. The nest, constructed of twigs and grasses, is located either low in a shrub or on the ground. About 4,164,800 acres of potentially suitable habitat occurs within the SEZ region.	5,184 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat) during construction and operations	110,640 acres of potentially suitable habitat (2.7% of available potentially suitable habitat)	29 acres of potentially suitable habitat lost (<0.001% of available potentially suitable habitat) and 2,562 acres in area of indirect effect	790 acres of potentially suitable habitat lost (<0.02% of available potentially suitable habitat) and 15,904 acres in area of indirect effect	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.

TABLE 13.2.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat ^a	Maximum Area of Potential Habitat Affected ^b				Overall Impact Magnitude ^g and Species-Specific Mitigation ^h
		Within SEZ (Direct Effects) ^c	Outside SEZ (Indirect Effects) ^d	Within Road Corridor (Indirect and Direct Effects) ^e	Within Transmission Corridor (Indirect and Direct Effects) ^f	
Neotropical Migrants (Cont.)						
Sage thrasher (<i>Oreoscoptes montanus</i>)	It breeds in sagebrush shrublands, other shrublands, and cholla grasslands in the western United States and winters in the southwestern United States and northern Mexico. In Utah, the species nests in greasewood and sagebrush habitats in low-elevation deserts where it constructs a bulky nest in a concealed location, usually in sagebrush or on the ground, using twigs and grasses. About 3,272,500 acres of potentially suitable habitat occurs within the SEZ region.	5,184 acres of potentially suitable habitat lost (0.2% of available potentially suitable habitat) during construction and operations	108,729 acres of potentially suitable habitat (3.3% of available potentially suitable habitat)	29 acres of potentially suitable habitat lost (<0.001% of available potentially suitable habitat) and 2,570 acres in area of indirect effect	789 acres of potentially suitable habitat lost (0.02% of available potentially suitable habitat) and 15,581 acres in area of indirect effect	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.

TABLE 13.2.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat ^a	Maximum Area of Potential Habitat Affected ^b				Overall Impact Magnitude ^g and Species-Specific Mitigation ^h
		Within SEZ (Direct Effects) ^c	Outside SEZ (Indirect Effects) ^d	Within Road Corridor (Indirect and Direct Effects) ^e	Within Transmission Corridor (Indirect and Direct Effects) ^f	
Neotropical Migrants (Cont.)						
Vesper sparrow (<i>Pooecetes gramineus</i>)	Breeds in grasslands, open shrublands mixed with grasslands, and open pinyon-juniper woodlands. Occurs in open riparian and agricultural areas during migration. About 2,262,500 acres of potentially suitable habitat occurs in the SEZ region.	3,891 acres of potentially suitable habitat lost (0.2% of available potentially suitable habitat) during construction and operations	85,955 acres of potentially suitable habitat (3.8% of available potentially suitable habitat)	33 acres of potentially suitable habitat lost (0.001% of available potentially suitable habitat) and 2,883 acres in area of indirect effect	629 acres of potentially suitable habitat lost (0.03% of available potentially suitable habitat) and 12,662 acres in area of indirect effect	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.
Western kingbird (<i>Tyrannus verticalis</i>)	Occurs in a variety of habitats including riparian forests and woodlands, savannahs, shrublands, agricultural lands, deserts, and urban areas. Nests in trees, bushes, and other raised areas, such as buildings. Migrates to Central America or the southeastern United States for the winter. About 3,185,200 acres of potentially suitable habitat occurs within the SEZ region.	5,184 acres of potentially suitable habitat lost (0.2% of available potentially suitable habitat) during construction and operations	104,451 acres of potentially suitable habitat (4.6% of available potentially suitable habitat)	29 acres of potentially suitable habitat lost (<0.001% of available potentially suitable habitat) and 2,548 acres in area of indirect effect	787 acres of potentially suitable habitat lost (0.03% of available potentially suitable habitat) and 15,841 acres in area of indirect effect	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.

TABLE 13.2.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat ^a	Maximum Area of Potential Habitat Affected ^b				Overall Impact Magnitude ^g and Species-Specific Mitigation ^h
		Within SEZ (Direct Effects) ^c	Outside SEZ (Indirect Effects) ^d	Within Road Corridor (Indirect and Direct Effects) ^e	Within Transmission Corridor (Indirect and Direct Effects) ^f	
Birds of Prey						
American kestrel (<i>Falco sparverius</i>)	Occurs in most open habitats, in various shrub and early successional forest habitats, forest openings, and various ecotones. Perches on trees, snags, rocks, utility poles and wires, and fence posts. Uses cavities in trees, snags, rock areas, banks, and buildings for nesting and cover. About 4,612,700 acres of potentially suitable habitat occurs in the SEZ region.	5,184 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat) during construction and operations	121,391 acres of potentially suitable habitat (2.6% of available potentially suitable habitat)	35 acres of potentially suitable habitat lost (<0.001% of available potentially suitable habitat) and 3,035 acres in area of indirect effect	858 acres of potentially suitable habitat lost (0.02% of available potentially suitable habitat) and 17,262 acres in area of indirect effect	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.
Golden eagle (<i>Aquila chrysaetos</i>)	Grasslands, shrublands, pinyon-juniper woodlands, and ponderosa pine forests. Occasionally in most other habitats, especially during migration and winter. Nests on cliffs and sometimes trees in rugged areas, with breeding birds ranging widely over surrounding areas. About 4,709,700 acres of potentially suitable habitat occurs in the SEZ region.	5,184 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat) during construction and operations	119,266 acres of potentially suitable habitat (2.5% of available potentially suitable habitat)	35 acres of potentially suitable habitat lost (<0.001% of available potentially suitable habitat) and 3,035 acres in area of indirect effect	858 acres of potentially suitable habitat lost (0.02% of available potentially suitable habitat) and 17,262 acres in area of indirect effect	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect. Some measure of mitigation provided by the requirements of the Bald and Golden Eagle Protection Act.

TABLE 13.2.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat ^a	Maximum Area of Potential Habitat Affected ^b				Overall Impact Magnitude ^g and Species-Specific Mitigation ^h
		Within SEZ (Direct Effects) ^c	Outside SEZ (Indirect Effects) ^d	Within Road Corridor (Indirect and Direct Effects) ^e	Within Transmission Corridor (Indirect and Direct Effects) ^f	
Birds of Prey (Cont.)						
Red-tailed hawk (<i>Buteo jamaicensis</i>)	Wide variety of habitats from deserts, mountains, and populated valleys. Open areas with scattered, elevated perch sites such as scrub desert, plains and montane grassland, agricultural fields, pastures urban parklands, broken coniferous forests, and deciduous woodland. Nests on cliff ledges or in tall trees. About 2,573,700 acres of potentially suitable habitat occurs in the SEZ region.	5,184 acres of potentially suitable habitat lost (0.2% of available potentially suitable habitat) during construction and operations	102,812 acres of potentially suitable habitat (4.0% of available potentially suitable habitat)	35 acres of potentially suitable habitat lost (0.001% of available potentially suitable habitat) and 3,004 acres in area of indirect effect	581 acres of potentially suitable habitat lost (0.02% of available potentially suitable habitat) and 11,685 acres in area of indirect effect	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.
Rough-legged hawk (<i>Buteo lagopus</i>)	A winter resident in Utah where it is usually found in grasslands, fields, marshes, sagebrush flats, and other open habitats. About 1,994,500 acres of potentially suitable habitat occurs within the SEZ region.	3,892 acres of potentially suitable habitat lost (0.2% of available potentially suitable habitat) during construction and operations	85,223 acres of potentially suitable habitat (4.3% of available potentially suitable habitat)	33 acres of potentially suitable habitat lost (0.002% of available potentially suitable habitat) and 2,881 acres in area of indirect effect	566 acres of potentially suitable habitat lost (0.03% of available potentially suitable habitat) and 11,377 acres in area of indirect effect	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.

TABLE 13.2.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat ^a	Maximum Area of Potential Habitat Affected ^b				Overall Impact Magnitude ^g and Species-Specific Mitigation ^h
		Within SEZ (Direct Effects) ^c	Outside SEZ (Indirect Effects) ^d	Within Road Corridor (Indirect and Direct Effects) ^e	Within Transmission Corridor (Indirect and Direct Effects) ^f	
Birds of Prey (Cont.)						
Swainson's hawk (<i>Buteo swainsoni</i>)	Grasslands, agricultural areas, shrublands, and riparian forests. Nests in trees in or near open areas. Migrants occur often occur in treeless areas. Large flocks often occur in agricultural areas near locust infestations. About 2,194,400 acres of potentially suitable habitat occurs in the SEZ region.	1,922 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat) during construction and operations	40,923 acres of potentially suitable habitat (1.9% of available potentially suitable habitat)	10 acres of potentially suitable habitat lost (<0.001% of available potentially suitable habitat) and 880 acres in area of indirect effect	324 acres of potentially suitable habitat lost (0.01% of available potentially suitable habitat) and 6,526 acres in area of indirect effect	Small overall impact.
Turkey vulture (<i>Cathartes aura</i>)	Occurs in open stages of most habitats that provide adequate cliffs or large trees for nesting, roosting, and resting. Migrates and forages over most open habitats. Will roost communally in trees, exposed boulders, and occasionally transmission line support towers. About 2,139,000 acres of potentially suitable habitat occurs in the SEZ region.	2,051 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat) during construction and operations	36,878 acres of potentially suitable habitat (1.7% of available potentially suitable habitat)	7 acres of potentially suitable habitat lost (<0.001% of available potentially suitable habitat) and 616 acres in area of indirect effect	293 acres of potentially suitable habitat lost (0.01% of available potentially suitable habitat) and 5,903 acres in area of indirect effect	Small overall impact.

TABLE 13.2.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat ^a	Maximum Area of Potential Habitat Affected ^b				Overall Impact Magnitude ^g and Species-Specific Mitigation ^h
		Within SEZ (Direct Effects) ^c	Outside SEZ (Indirect Effects) ^d	Within Road Corridor (Indirect and Direct Effects) ^e	Within Transmission Corridor (Indirect and Direct Effects) ^f	
Upland Game Birds						
Chukar (<i>Alectoris chukar</i>)	Steep, semiarid slopes with rocky outcrops and shrubs with a grass and forb understory. Sources of water are required during hot, dry periods, with most birds found within 0.25 mi (0.4 km) of water during the brooding period. About 4,019,200 acres of potentially suitable habitat occurs in the SEZ region.	5,184 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat) during construction and operations	104,719 acres of potentially suitable habitat (2.6% of available potentially suitable habitat)	29 acres of potentially suitable habitat lost (<0.001% of available potentially suitable habitat) and 2,546 acres in area of indirect effect	788 acres of potentially suitable habitat lost (0.02% of available potentially suitable habitat) and 15,852 acres in area of indirect effect	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect. However, avoidance of Minersville Canal would protect a potential source of water.
Mourning dove (<i>Zenaida macroura</i>)	Habitat generalist, occurring in grasslands, shrublands, croplands, lowland and foothill riparian forests, ponderosa pine forests, deserts, and urban and suburban areas. Rarely in aspen and other forests, coniferous woodlands, and alpine tundra. Nests on ground or in trees. Winters mostly in lowland riparian forests adjacent to cropland. About 4,317,400 acres of potentially suitable habitat occurs in the SEZ region.	5,184 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat) during construction and operations	121,831 acres of potentially suitable habitat (2.8% of available potentially suitable habitat)	35 acres of potentially suitable habitat lost (<0.001% of available potentially suitable habitat) and 3,027 acres in area of indirect effect	854 acres of potentially suitable habitat lost (0.02% of available potentially suitable habitat) and 17,185 acres in area of indirect effect	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.

TABLE 13.2.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat ^a	Maximum Area of Potential Habitat Affected ^b				Overall Impact Magnitude ^g and Species-Specific Mitigation ^h
		Within SEZ (Direct Effects) ^c	Outside SEZ (Indirect Effects) ^d	Within Road Corridor (Indirect and Direct Effects) ^e	Within Transmission Corridor (Indirect and Direct Effects) ^f	
Upland Game Birds (Cont.)						
Wild turkey (<i>Meleagris gallopavo</i>)	The Rio Grande wild turkey prefers cottonwood riparian areas of rivers associated with oak-pine and pinyon-juniper forests, while the Merriam's wild turkey inhabits open stands of ponderosa pine interspersed with aspen, grass meadows, and oaks grading into pinyon pine and juniper. Areas of brushy cover are used for nesting. About 3,936,200 acres of potentially suitable habitat occurs within the SEZ region.	3,888 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat) during construction and operations	86,191 acres of potentially suitable habitat (2.2% of available potentially suitable habitat)	28 acres of potentially suitable habitat lost (<0.001% of available potentially suitable habitat) and 2,414 acres in area of indirect effect	772 acres of potentially suitable habitat lost (0.02% of available potentially suitable habitat) and 15,537 acres in area of indirect effect	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.

- ^a Potentially suitable habitat was determined by using SWReGAP habitat suitability and land cover models. Area of potentially suitable habitat for each species is presented for the SEZ region, which is defined as the area within 50 mi (80 km) of the SEZ center.
- ^b Maximum area of potentially suitable habitat that could be affected relative to availability within the SEZ region. Habitat availability for each species within the region was determined by using SWReGAP habitat suitability and land cover models. This approach probably overestimates the amount of suitable habitat in the project area.
- ^c Direct effects within the SEZ consist of the ground-disturbing activities associated with construction and the maintenance of an altered environment associated with operations. A maximum of 5,184 acres of direct effect within the SEZ was assumed.
- ^d Area of indirect effects was assumed to be the area adjacent to the SEZ within 5 mi (8 km) of the SEZ boundary and within the 1-mi (1.6-km) wide transmission line corridor (less the assumed area of direct effects) that extends beyond the 5-mi (8-km) area adjacent to the SEZ boundary. Indirect effects include effects from surface runoff, dust, noise, lighting, and so on from the SEZ, but do not include ground-disturbing activities. The potential degree of indirect effects would decrease with increasing distance away from the SEZ.

Footnotes continued on next page.

TABLE 13.2.11.2-1 (Cont.)

-
- ^e For access road development, direct effects were estimated within a 5-mi (8-km) long, 60-ft (18-m) wide ROW for an assumed new access road from the SEZ to the nearest state highway. Indirect effects were estimated within a 1-mi (1.6-km) wide road corridor to the state highway, less the assumed area of direct effects.
- ^f For transmission development, direct effects were estimated within a 19-mi (30.6-km) long, 250-ft (76-m) wide ROW for an assumed new transmission line connecting the SEZ to the nearest existing line. Indirect effects were estimated within a 1-mi (1.6-km) wide transmission corridor to the existing transmission line, less the assumed area of direct effects.
- ^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; (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.
- ^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.

Sources: NatureServe (2010); UDWR (2009a); USGS (2004, 2005a, 2007).

1 Decommissioning after operations cease could result in short-term negative impacts on
2 individuals and habitats within and adjacent to the SEZ. The negative impacts of
3 decommissioning would be reduced or eliminated as reclamation proceeds. Potentially long-term
4 benefits could accrue as habitats are restored in previously disturbed areas. Section 5.10.2.1.4
5 provides an overview of the impacts of decommissioning and reclamation on wildlife. Of
6 particular importance for bird species would be the restoration of original ground surface
7 contours, soils, and native plant communities associated with semiarid shrublands.
8
9

10 ***13.2.11.2.3 SEZ-Specific Design Features and Design Feature Effectiveness***

11

12 The successful implementation of programmatic design features presented in
13 Appendix A, Section A.2.2, would reduce the potential for effects on birds, especially for those
14 species that depend on habitat types that can be avoided (e.g., Minersville Canal). Indirect
15 impacts could be reduced to negligible levels by implementing programmatic design features,
16 especially those engineering controls that would reduce runoff, sedimentation, spills, and fugitive
17 dust. While SEZ-specific design features important for reducing impacts on birds are best
18 established when specific project details are considered, some design features can be identified at
19 this time, as follows:
20

- 21 • For solar energy developments within the SEZ, the requirements contained
22 within the 2010 Memorandum of Understanding between the BLM and
23 USFWS to promote the conservation of migratory birds will be followed.
24
- 25 • Take⁷ of golden eagles and other raptors should be avoided. Mitigation
26 regarding the golden eagle should be developed in consultation with the
27 USFWS and UDWR. A permit may be required under the Bald and Golden
28 Eagle Protection Act.
29
- 30 • The steps outlined in the *Utah Field Office Guidelines for Raptor Protection*
31 *from Human and Land Use Disturbances* (Romin and Muck 1999) should be
32 followed.
33

⁷ Take under the Bald and Golden Eagle Protection Act means to *pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, destroy, molest, or disturb*. *Disturb* means “to agitate or bother a Bald Eagle or a Golden Eagle to a degree that causes, or is likely to cause, based on the best scientific information available, (1) injury to an eagle, (2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or (3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior.” If compatible with the preservation of bald and golden eagles, the Secretary of the Interior may issue regulations authorizing the taking, possession and transportation of these eagles for scientific or exhibition purposes, for religious purposes of Indian tribes or for the protection of wildlife, agricultural, or other interests. Requests by Native Americans to take eagles from the wild, where the take is necessary to meet the religious purposes of the Tribe, will be given first priority over all other take except, as necessary, to alleviate safety emergencies.

- Minersville Canal, which could provide an occasional watering and feeding site for some bird species, should be avoided.

If these SEZ-specific design features are implemented in addition to programmatic project design features, impacts on bird species could be reduced. However, as potentially suitable habitats for a number of the bird species occur throughout much of the SEZ, additional species-specific mitigation of direct effects for those species would be difficult or infeasible.

13.2.11.3 Mammals

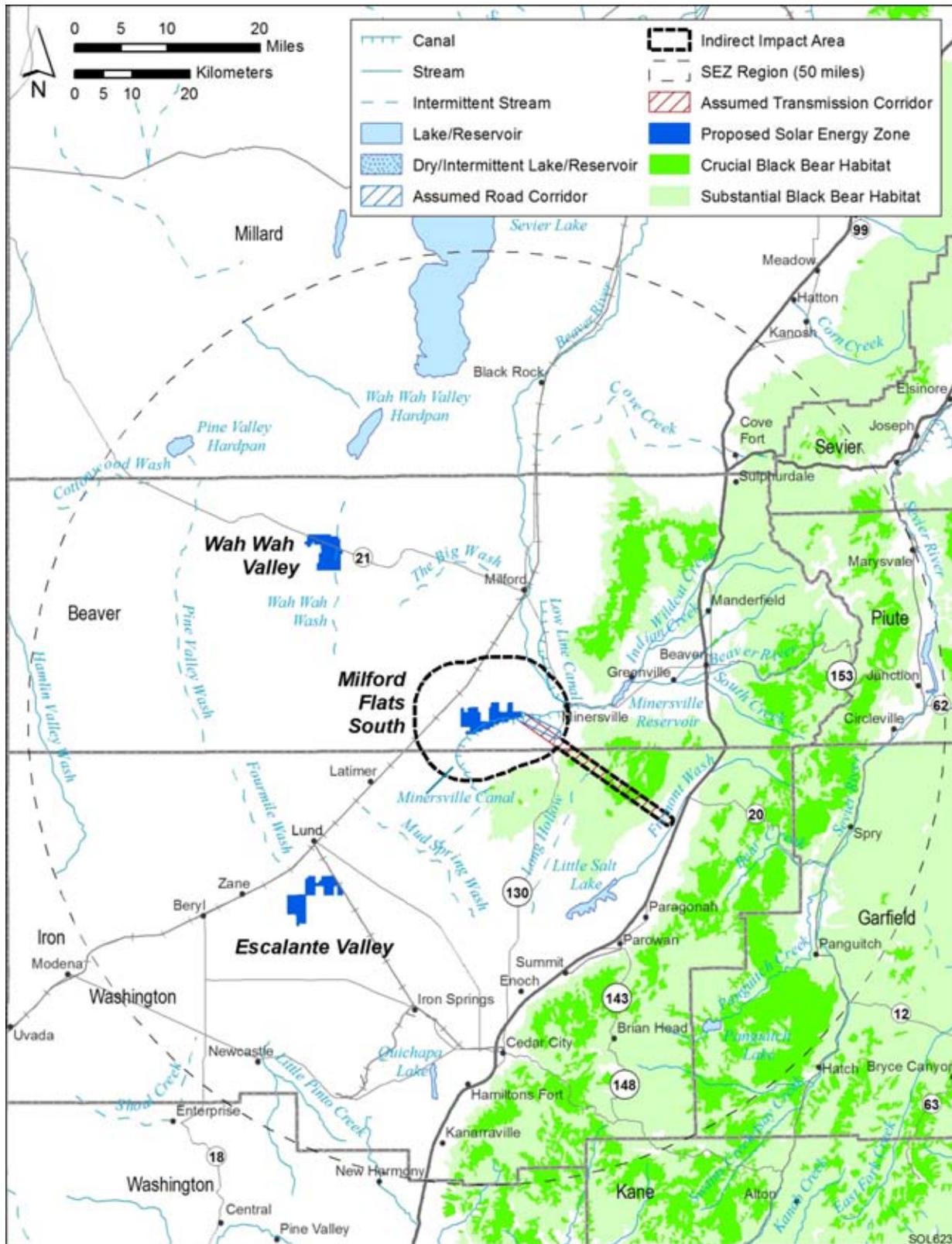
13.2.11.3.1 Affected Environment

This section addresses mammal species that are known to occur, or for which potentially suitable habitat occurs, on or within the potentially affected area of the proposed Milford Flats South SEZ. The list of mammal species potentially present in the SEZ area was determined from range maps and habitat information available from the Utah Conservation Data Center (UDWR 2009a). Land cover types suitable for each species were determined from SWReGAP (USGS 2004, 2005a, 2007). See Appendix M for additional information on the approach used. Nearly 80 species of mammals are known to occur within the area of Beaver County (UDWR 2009a). On the basis of species distributions and habitat preferences, fewer than 30 mammal species could occur within the proposed Milford Flats South SEZ (UDWR 2009a). Similar to the overview of mammals provided for the six-state solar energy study area (Section 4.6.2.3), the following discussion for the SEZ emphasizes big game and other mammal species that (1) have key habitats within or near the SEZ, (2) are important to humans (e.g., big game, small game, and furbearer species), and/or (3) are representative of other species that share important habitats.

Big Game

The big game species that could occur within the area of the proposed Milford Flats South SEZ include American black bear (*Ursus americanus*, fairly common in Utah), cougar (*Puma concolor*, fairly common in Utah), elk (*Cervis canadensis*, common in the mountainous regions of Utah), mule deer (*Odocoileus hemionus*, common in Utah), and pronghorn (*Antilocapra americana*, common in Utah) (UDWR 2009a).

American Black Bear. The American black bear occurs throughout much of Utah, where it primarily inhabits forested areas (UDWR 2009a). No areas of substantial or crucial habitat occur within the immediate area of the proposed Milford Flats South SEZ (Figure 13.2.11.3-1). The shortest distance from the SEZ to substantial American black bear habitat is 6 mi (10 km), whereas the closest distance to crucial American black bear habitat is 19 mi (31 km). About 388,900 acres (1,574 km²) of crucial black bear habitat and 1,080,100 acres (4,371 km²) of substantial black bear habitat occur within the SEZ region.



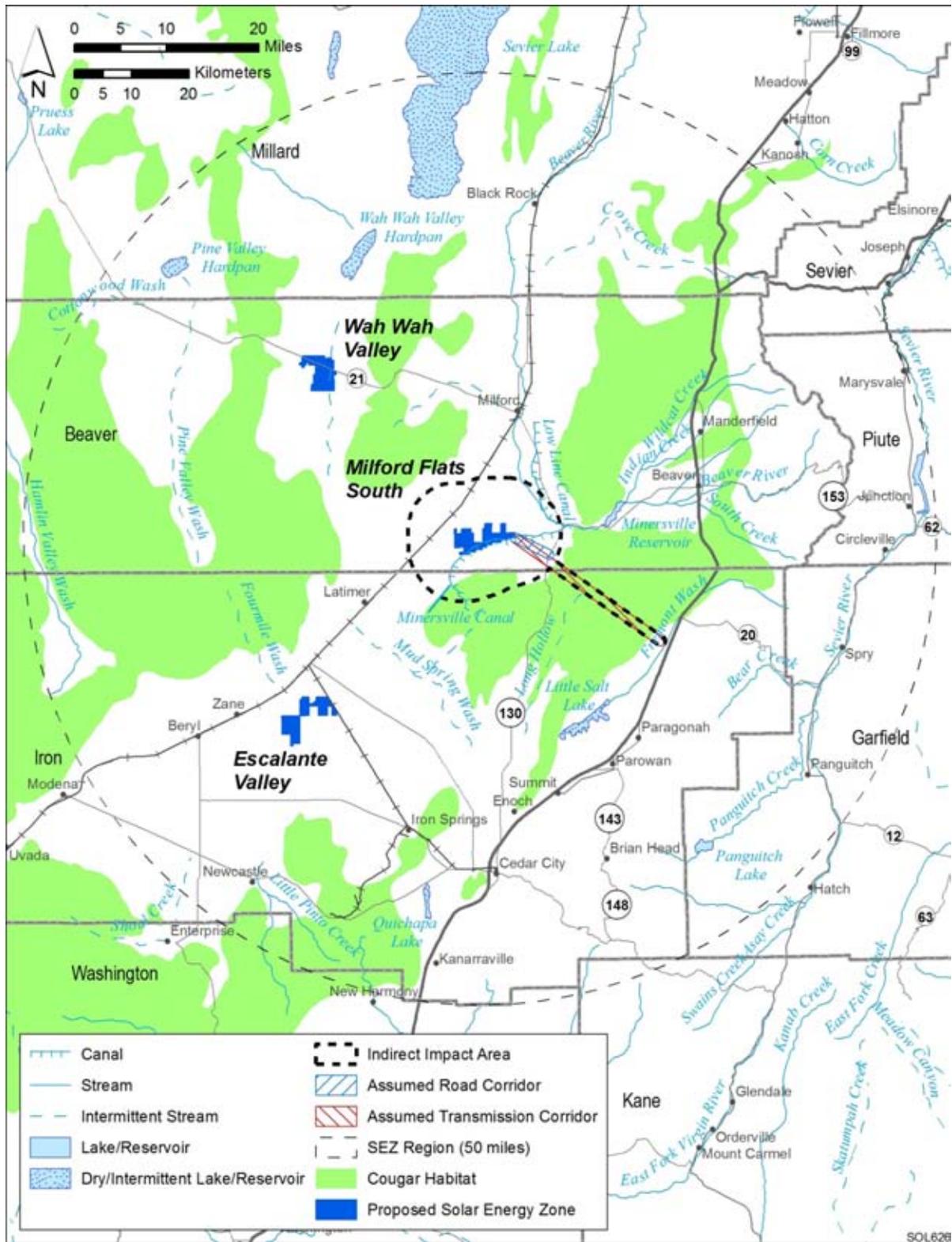
1
 2 **FIGURE 13.2.11.3-1 Location of the Proposed Milford Flats South SEZ Relative to Crucial and**
 3 **Substantial Black Bear Habitat (Source: UDRW 2006a)**
 4

1 **Cougar.** The cougar is fairly common in Utah (UDWR 2009a). A management plan for
2 the cougar in Utah has been developed (UDWR 2009b). Cougar habitat encompasses about
3 59,325,200 acres (240,080 km²) in Utah, with a statewide cougar population estimate
4 somewhere between about 2,500 and 4,000 (UDWR 2009b). Cougars mostly occur in rough,
5 broken foothills and canyon country, often in association with pinyon-juniper and pine-oak brush
6 areas (CDOW 2009a; Pederson undated), avoiding areas of sagebrush and low-growing shrubs
7 or other areas without tall cover (Pederson undated). The proposed Milford Flats South SEZ
8 overlaps the cougar's overall range, but the SEZ does not occur within high-value cougar habitat
9 (UDWR 2009a). Figure 13.2.11.3-2 shows the location of the SEZ relative to areas of the
10 woodland and shrub-covered low mountain Level IV ecoregion. These ecoregion areas would
11 potentially provide suitable cougar habitat. The shortest distance from these areas to the
12 proposed Milford Flats South SEZ is 2 mi (3 km). About 1,373,300 acres (5,558 km²) of the
13 woodland and shrub-covered low mountain Level IV ecoregion occurs within the SEZ region.
14

15
16 **Elk.** Elk are common in most mountainous regions of Utah. They inhabit mountain
17 meadows and forests during the summer and foothills and valley grasslands during the winter
18 (UDWR 2009a). Elk require an available water source on all seasonal ranges and prefer to be
19 within 0.5 mi (0.8 km) of water. Elk also require cover for escape and protection
20 (UDWR 2010a). Crucial elk habitat is continuously being lost and fragmented within Utah. The
21 statewide management plan for the elk has been updated (UDWR 2010a). The management
22 objective is a statewide population of 80,000 elk. The statewide population estimate in 2009 was
23 nearly 68,000. Within the Southwest Desert, Indian Peaks Big Game Management Unit, which
24 encompasses the area that includes the proposed Milford Flats South SEZ, the population
25 estimate was 1,150 (UDWR 2010a). Figure 13.2.11.3-3 shows the location of the proposed
26 Milford Flats South SEZ relative to areas of crucial elk habitat. The shortest distance from the
27 SEZ to these areas is 7 mi (11 km). About 1,756,400 acres (7,108 km²) of crucial elk habitat
28 occur within the SEZ region.
29

30
31 **Mule Deer.** The mule deer is the most important game species in Utah. It is common
32 throughout the state, being least abundant in desert areas (UDWR 2008). A statewide
33 management plan for mule deer has been developed (UDWR 2008). Crucial mule deer habitat is
34 continuously being lost and fragmented within Utah. The statewide population has been
35 declining for over 30 years. The 2003 post-season statewide population estimate was 302,000,
36 much lower than the long-term management objective of 426,000 (UDWR 2008).
37 Figure 13.2.11.3-4 shows the location of the proposed Milford Flats South SEZ relative to areas
38 of crucial mule deer habitat. The shortest distance from the SEZ to these areas is 3 mi (5 km).
39 About 2,729,900 acres (11,048 km²) of crucial mule deer habitat occurs within the SEZ region.
40

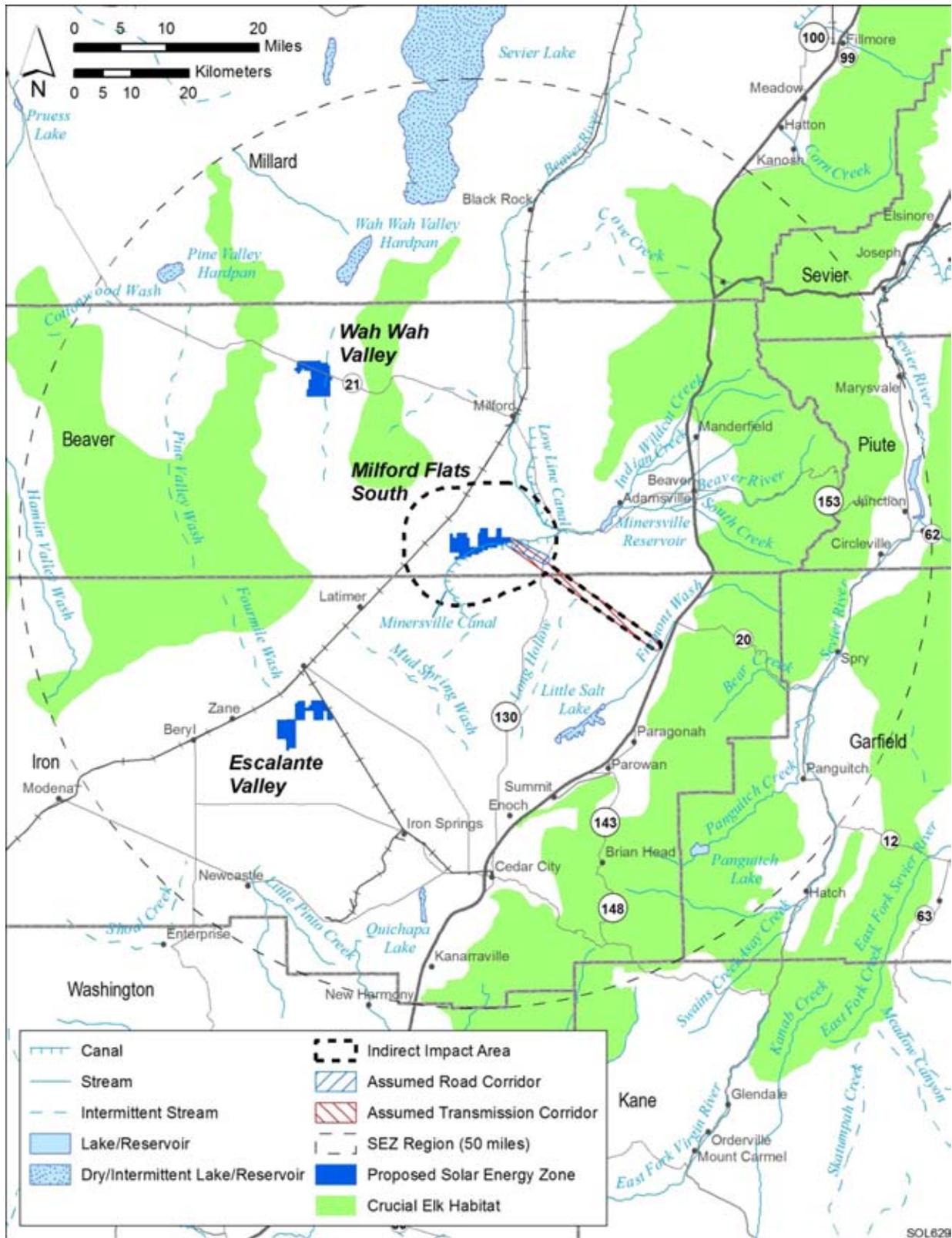
41
42 **Pronghorn.** The pronghorn is common in Utah, occurring primarily in shrubsteppe
43 habitat in large expanses of open, low-rolling or flat terrain (UDWR 2009a,c). A statewide
44 management plan for pronghorn has been developed (UDWR 2009c). The statewide population
45 of pronghorn is estimated at 12,000 to 14,000 (UDWR 2009c). Within the Southwest Desert Big
46 Game Management Unit, which encompasses the proposed Milford Flats South SEZ, the
47



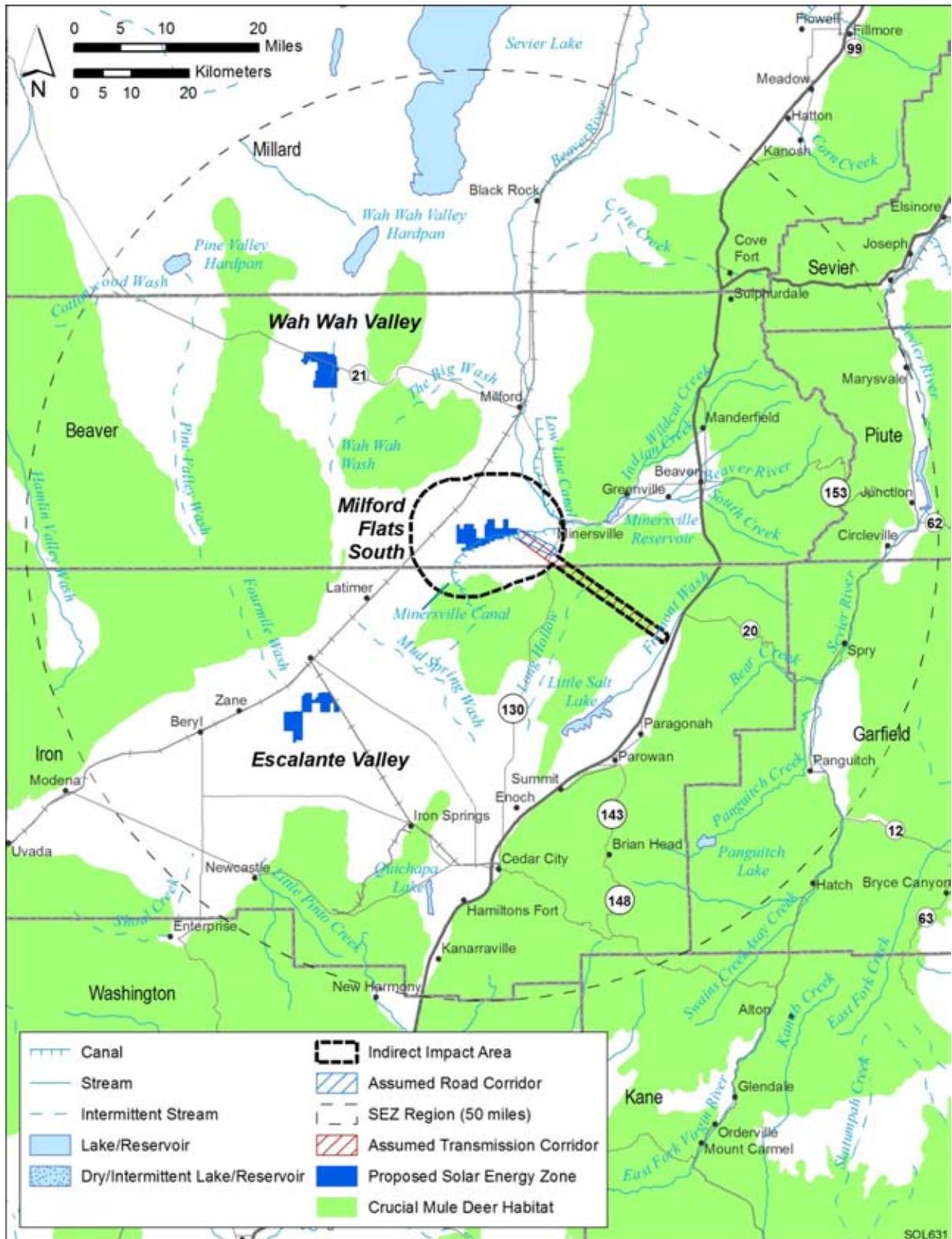
1

2 **FIGURE 13.2.11.3-2 Location of the Proposed Milford Flats South SEZ Relative to Woodland**
 3 **and Shrub-covered Low Mountains Level IV Ecoregion Areas (Cougar Habitat) (Source:**
 4 **Woods et al. 2001)**

5



1
 2 **FIGURE 13.2.11.3-3 Location of the Proposed Milford Flats South SEZ Relative to Elk Crucial**
 3 **Habitat Areas (Source: UDWR 2006a)**
 4



1
 2 **FIGURE 13.2.11.3-4 Location of the Proposed Milford Flats South SEZ Relative to Mule Deer**
 3 **Crucial Habitat Areas (Source: UDWR 2006a)**
 4

1 population estimate is 1,675 (UDWR 2009c). Figure 13.2.11.3-5 shows that the proposed
2 Milford Flats South SEZ is contained within areas of crucial pronghorn habitat. About
3 2,179,400 acres (8,820 km²) of crucial pronghorn habitat occur within the SEZ region.
4

6 **Other Mammals**

7
8 A number of small game and furbearer species occur within Beaver County. Species that
9 could occur within the area of the proposed Milford Flats South SEZ include the American
10 badger (*Taxidea taxus*, common in deserts and grasslands), black-tailed jackrabbit (*Lepus*
11 *californicus*, most abundant rabbit species in Utah), coyote (*Canis latrans*, common), and desert
12 cottontail (*Sylvilagus audubonii*, widely distributed from desert areas to lower slopes of
13 mountains) (UDWR 2009a).
14

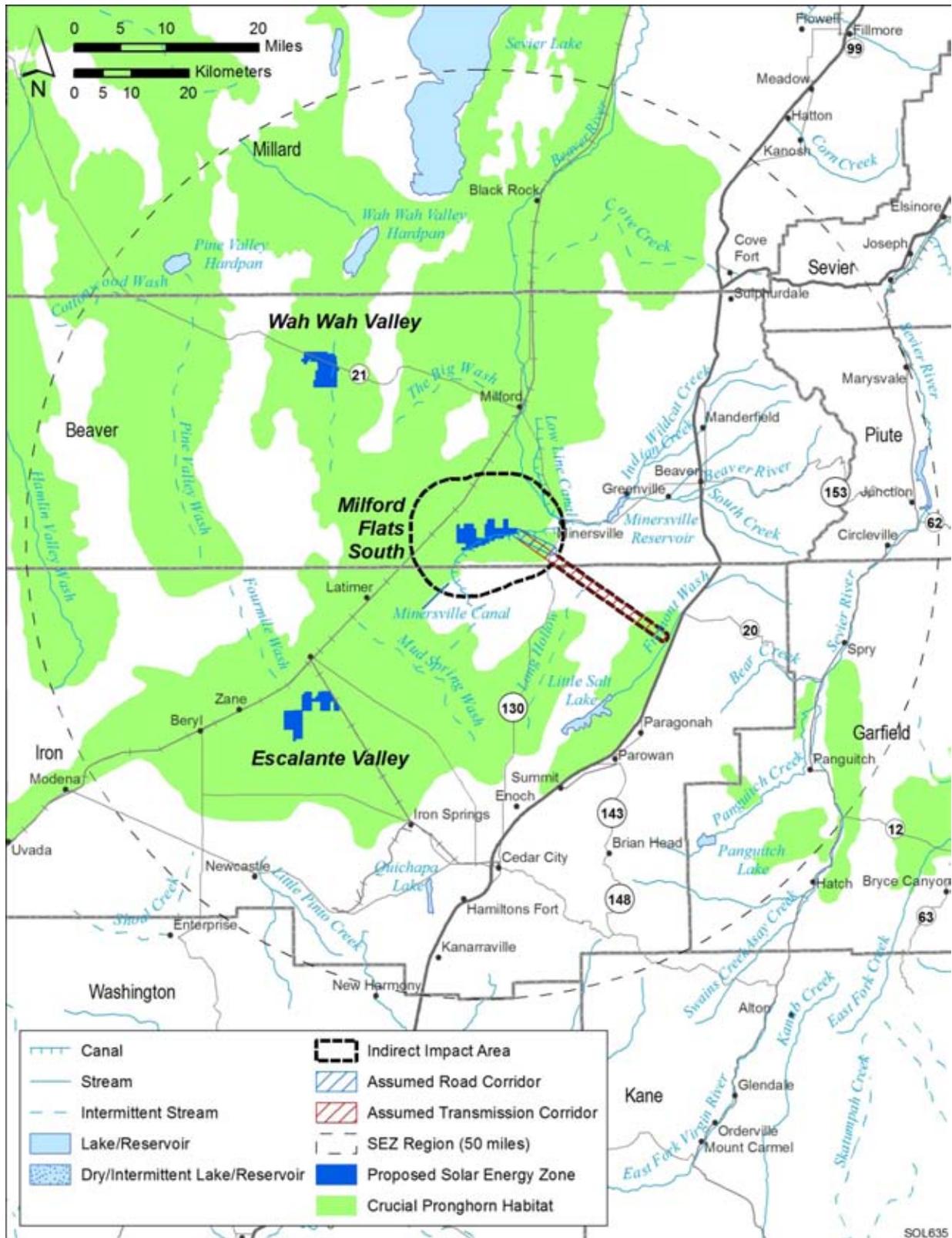
15 The nongame (small) mammal species generally include bats, mice, voles, moles, and
16 shrews. Species that could occur within the area of the proposed Milford Flats South SEZ
17 include the desert woodrat (*Neotoma lepida*, common in western Utah), Great Basin pocket
18 mouse (*Perognathus parvus*, common), least chipmunk (*Neotamias minimus*, wide-ranging in
19 many types of habitats), northern grasshopper mouse (*Onychomys leucogaster*, common),
20 sagebrush vole (*Lemmiscus curtatus*, moderately common), and white-tailed antelope squirrel
21 (*Ammospermophilus leucurus*, common) (UDWR 2009a). Bat species that may occur within the
22 area of the SEZ include the Brazilian free-tailed bat (*Tadarida brasiliensis*), little brown myotis
23 (*Myotis lucifugus*), long-legged myotis (*M. volans*), and western pipistrelle (*Parastrellus*
24 *hesperus*) (UDWR 2009a). However, roost sites for the bat species (e.g., caves, hollow trees,
25 rock crevices, or buildings) would be limited to absent within the SEZ.
26

27 Table 13.2.11.3-1 provides habitat information for representative mammal species that
28 could occur within the proposed Milford Flats South SEZ. Special status mammal species are
29 discussed in Section 13.2.12.
30

31 32 **13.2.11.3.2 Impacts**

33
34 The types of impacts mammals could incur from construction, operation, and
35 decommissioning of utility-scale solar energy facilities are discussed in Section 5.10.2.1. Any
36 such impacts would be minimized through the implementation of required programmatic design
37 features described in Appendix A, Section A.2.2, and through any additional mitigation applied.
38 Section 13.2.11.3.3, identifies design features of particular relevance to mammals for the
39 proposed Milford Flats South SEZ.
40

41 The assessment of impacts on mammal species is based on available information on
42 the presence of species in the affected area, as presented in Section 13.2.11.3.1 following the
43 analysis approach described in Appendix M. Additional NEPA assessments and coordination
44 with state natural resource agencies may be needed to address project-specific impacts more
45 thoroughly. These assessments and consultations could result in additional required actions to
46 avoid or mitigate impacts on mammals (see Section 13.2.11.3.3).
47



1
 2 **FIGURE 13.2.11.3-5 Location of the Proposed Milford Flats South SEZ Relative to Pronghorn**
 3 **Crucial Habitat Areas (Source: UDWR 2006a)**

TABLE 13.2.11.3-1 Habitats, Potential Impacts, and Potential Mitigation for Representative Mammal Species That Could Occur on or in the Affected Area of the Proposed Milford Flats South SEZ

Common Name (Scientific Name)	Habitat ^a	Maximum Area of Potential Habitat Affected ^b				Overall Impact Magnitude ^g and Species-Specific Mitigation ^h
		Within SEZ (Direct Effects) ^c	Outside SEZ (Indirect Effects) ^d	Within Road Corridor (Indirect and Direct Effects) ^e	Within Transmission Corridor (Indirect and Direct Effects) ^f	
Big Game						
American black bear (<i>Ursus americanus</i>)	Montane shrublands and forests, and subalpine forests at moderate elevations. About 3,427,000 acres ⁱ of potentially suitable habitat occurs in the SEZ region.	1,966 acres of potentially suitable habitat lost (0.06% of available potentially suitable habitat) during construction and operations	64,099 acres of potentially suitable habitat (1.9% of available potentially suitable habitat)	23 acres of potentially suitable habitat lost (<0.001% of available potentially suitable habitat) and 2,011 acres in area of indirect effect	723 acres of potentially suitable habitat lost (0.02% of available potentially suitable habitat) and 14,552 acres in area of indirect effect	Small overall impact.
Cougar (<i>Puma concolor</i>)	Most common in rough, broken foothills and canyon country, often in association with montane forests, shrublands, and pinyon-juniper woodlands. About 4,451,700 acres of potentially suitable habitat occurs in the SEZ region.	5,184 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat) during construction and operations	104,074 acres of potentially suitable habitat (2.3% of available potentially suitable habitat)	29 acres of potentially suitable habitat lost (<0.001% of available potentially suitable habitat) and 2,550 acres in area of indirect effect	790 acres of potentially suitable habitat lost (0.02% of available potentially suitable habitat) and 15,903 acres in area of indirect effect	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.

TABLE 13.2.11.3-1 (Cont.)

Common Name (Scientific Name)	Habitat ^a	Maximum Area of Potential Habitat Affected ^b				Overall Impact Magnitude ^g and Species-Specific Mitigation ^h
		Within SEZ (Direct Effects) ^c	Outside SEZ (Indirect Effects) ^d	Within Road Corridor (Indirect and Direct Effects) ^e	Within Transmission Corridor (Indirect and Direct Effects) ^f	
Big Game (Cont.)						
Elk (<i>Cervis canadensis</i>)	Semi-open forest, mountain meadows, foothills, plains, valleys, and alpine tundra. Uses open spaces such as alpine pastures, marshy meadows, river flats, brushy clean cuts, forest edges, and semidesert areas. About 2,609,000 acres of potentially suitable habitat occurs in the SEZ region.	1,966 acres of potentially suitable habitat lost (0.08% of available potentially suitable habitat) during construction and operations	62,083 acres of potentially suitable habitat (2.4% of available potentially suitable habitat)	23 acres of potentially suitable habitat lost (<0.001% of available potentially suitable habitat) and 2,005 acres in area of indirect effect	722 acres of potentially suitable habitat lost (0.03% of available potentially suitable habitat) and 14,533 acres in area of indirect effect	Small overall impact.
Mule deer (<i>Odocoileus hemionus</i>)	Most habitats including coniferous forests, desert shrub, chaparral, and grasslands with shrubs. Greatest densities in shrublands on rough, broken terrain that provides abundant browse and cover. About 3,872,300 acres of potentially suitable habitat occurs in the SEZ region.	5,184 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat) during construction and operations	119,774 acres of potentially suitable habitat (3.1% of available potentially suitable habitat)	35 acres of potentially suitable habitat lost (<0.001% of available potentially suitable habitat) and 3,033 acres in area of indirect effect	858 acres of potentially suitable habitat lost (0.02% of available potentially suitable habitat) and 17,254 acres in area of indirect effect	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.

TABLE 13.2.11.3-1 (Cont.)

Common Name (Scientific Name)	Habitat ^a	Maximum Area of Potential Habitat Affected ^b				Overall Impact Magnitude ^g and Species-Specific Mitigation ^h
		Within SEZ (Direct Effects) ^c	Outside SEZ (Indirect Effects) ^d	Within Road Corridor (Indirect and Direct Effects) ^e	Within Transmission Corridor (Indirect and Direct Effects) ^f	
Big Game (Cont.)						
Pronghorn (<i>Antilocarpa americana</i>)	Grasslands and semidesert shrublands on rolling topography that affords good visibility. Most abundant in shortgrass or midgrass prairies and least common in xeric habitats. About 1,995,400 acres of potentially suitable habitat occurs in the SEZ region.	4,413 acres of potentially suitable habitat lost (0.2% of available potentially suitable habitat) during construction and operations	89,644 acres of potentially suitable habitat (4.5% of available potentially suitable habitat)	33 acres of potentially suitable habitat lost (0.002% of available potentially suitable habitat) and 2,889 acres in area of indirect effect	566 acres of potentially suitable habitat lost (0.03% of available potentially suitable habitat) and 11,391 acres in area of indirect effect	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.
Small Game and Furbearers						
American badger (<i>Taxidea taxus</i>)	Open grasslands and deserts, meadows in subalpine and montane forests, alpine tundra. Digs burrows in friable soils. Most common in areas with abundant populations of ground squirrels, prairie dogs, and pocket gophers. About 4,424,400 acres of potentially suitable habitat occurs in the SEZ region.	5,184 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat) during construction and operations	110,870 acres of potentially suitable habitat (2.5% of available potentially suitable habitat)	29 acres of potentially suitable habitat lost (<0.001% of available potentially suitable habitat) and 2,562 acres in area of indirect effect	790 acres of potentially suitable habitat lost (0.02% of available potentially suitable habitat) and 15,897 acres in area of indirect effect	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.

TABLE 13.2.11.3-1 (Cont.)

Common Name (Scientific Name)	Habitat ^a	Maximum Area of Potential Habitat Affected ^b				Overall Impact Magnitude ^g and Species-Specific Mitigation ^h
		Within SEZ (Direct Effects) ^c	Outside SEZ (Indirect Effects) ^d	Within Road Corridor (Indirect and Direct Effects) ^e	Within Transmission Corridor (Indirect and Direct Effects) ^f	
<i>Small Game and Furbearers (Cont.)</i>						
Black-tailed jackrabbit (<i>Lepus californicus</i>)	Open plains, fields, and deserts with scattered thickets or patches of shrubs. Also open, early stages of forests and chaparral habitats. Rests during the day in shallow depressions, and uses shrubs for cover. About 4,423,700 acres of potentially suitable habitat occurs in the SEZ region.	5,184 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat) during construction and operations	121,580 acres of potentially suitable habitat (2.7% of available potentially suitable habitat)	35 acres of potentially suitable habitat lost (<0.001% of available potentially suitable habitat) and 3,035 acres in area of indirect effect	856 acres of potentially suitable habitat lost (0.02% of available potentially suitable habitat) and 17,232 acres in area of indirect effect	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.
Coyote (<i>Canis latrans</i>)	All habitats at all elevations. Least common in dense coniferous forest. Where human control efforts occur, they are restricted to broken, rough country with abundant shrub cover and a good supply of rabbits or rodents. About 5,002,800 acres of potentially suitable habitat occurs in the SEZ region.	5,184 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat) during construction and operations	123,185 acres of potentially suitable habitat (2.5% of available potentially suitable habitat)	35 acres of potentially suitable habitat lost (<0.001% of available potentially suitable habitat) and 3,037 acres in area of indirect effect	859 acres of potentially suitable habitat lost (0.02% of available potentially suitable habitat) and 17,285 acres in area of indirect effect	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.

TABLE 13.2.11.3-1 (Cont.)

Common Name (Scientific Name)	Habitat ^a	Maximum Area of Potential Habitat Affected ^b			Overall Impact Magnitude ^g and Species-Specific Mitigation ^h	
		Within SEZ (Direct Effects) ^c	Outside SEZ (Indirect Effects) ^d	Within Road Corridor (Indirect and Direct Effects) ^e		Within Transmission Corridor (Indirect and Direct Effects) ^f
<i>Small Game and Furbearers (Cont.)</i>						
Desert cottontail (<i>Sylvilagus audubonii</i>)	Abundant to common in grasslands, open forests, and desert shrub habitats. Can occur in areas with minimal vegetation as long as adequate cover (e.g., rock piles, fallen logs, fence rows) is present. Thickets and patches of shrubs, vines, and brush also used as cover. About 4,317,800 acres of potentially suitable habitat occurs in the SEZ region.	5,184 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat) during construction and operations	121,286 acres of potentially suitable habitat (2.8% of available potentially suitable habitat)	35 acres of potentially suitable habitat lost (<0.001% of available potentially suitable habitat) and 3,035 acres in area of indirect effect	856 acres of potentially suitable habitat lost (0.02% of available potentially suitable habitat) and 17,223 acres in area of indirect effect	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.

TABLE 13.2.11.3-1 (Cont.)

Common Name (Scientific Name)	Habitat ^a	Maximum Area of Potential Habitat Affected ^b				Overall Impact Magnitude ^g and Species-Specific Mitigation ^h
		Within SEZ (Direct Effects) ^c	Outside SEZ (Indirect Effects) ^d	Within Road Corridor (Indirect and Direct Effects) ^e	Within Transmission Corridor (Indirect and Direct Effects) ^f	
<i>Nongame (small)</i>						
<i>Mammals</i>						
Brazilian free-tailed bat (<i>Tadarida brasiliensis</i>)	Cliffs, deserts, grasslands, old fields, savannas, shrublands, woodlands, suburban and urban areas. Roosts in buildings, caves, and hollow trees. May roost in rock crevices, bridges, signs, or cliff swallow nests during migration. Large maternity colonies inhabit caves, buildings, culverts, and bridges. About 4,417,500 acres of potentially suitable habitat occurs in the SEZ region.	5,184 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat) during construction and operations	121,061 acres of potentially suitable habitat (2.7% of available potentially suitable habitat)	35 acres of potentially suitable habitat lost (<0.001% of available potentially suitable habitat) and 3,023 acres in area of indirect effect	856 acres of potentially suitable habitat lost (0.02% of available potentially suitable habitat) and 17,228 acres in area of indirect effect	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.

TABLE 13.2.11.3-1 (Cont.)

Common Name (Scientific Name)	Habitat ^a	Maximum Area of Potential Habitat Affected ^b				Overall Impact Magnitude ^g and Species-Specific Mitigation ^h
		Within SEZ (Direct Effects) ^c	Outside SEZ (Indirect Effects) ^d	Within Road Corridor (Indirect and Direct Effects) ^e	Within Transmission Corridor (Indirect and Direct Effects) ^f	
<i>Nongame (small)</i>						
<i>Mammals (Cont.)</i>						
Desert woodrat (<i>Neotoma lepida</i>)	Sagebrush scrub; chaparral; deserts and rocky slopes with scattered cactus, yucca, pine-juniper, or other low vegetation; creosotebush desert; Joshua tree woodlands; scrub oak woodlands, pinyon-juniper woodlands; and riparian zones. Most abundant in rocky areas with Joshua trees. At elevations to 8,500 ft (1,524 m). Dens built of debris on ground, among cacti or yucca, along cliffs, among rocks, or occasionally in trees. About 4,044,500 acres of potentially suitable habitat occurs in the SEZ region.	5,184 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat) during construction and operations	63,435 acres of potentially suitable habitat (1.6% of available potentially suitable habitat)	29 acres of potentially suitable habitat lost (<0.001% of available potentially suitable habitat) and 2,554 acres in area of indirect effect	788 acres of potentially suitable habitat lost (0.02% of available potentially suitable habitat) and 15,857 acres in area of indirect effect	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.

TABLE 13.2.11.3-1 (Cont.)

Common Name (Scientific Name)	Habitat ^a	Maximum Area of Potential Habitat Affected ^b				Overall Impact Magnitude ^g and Species-Specific Mitigation ^h
		Within SEZ (Direct Effects) ^c	Outside SEZ (Indirect Effects) ^d	Within Road Corridor (Indirect and Direct Effects) ^e	Within Transmission Corridor (Indirect and Direct Effects) ^f	
<i>Nongame (small)</i>						
<i>Mammals (Cont.)</i>						
Great Basin pocket mouse (<i>Perognathus parvus</i>)	Prefers arid grassland, sagebrush, and pinyon-juniper habitats with sandy soil. About 3,903,100 acres of potentially suitable habitat occurs within the SEZ region.	5,184 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat) during construction and operations	110,343 acres of potentially suitable habitat (2.8% of available potentially suitable habitat)	29 acres of potentially suitable habitat lost (<0.001% of available potentially suitable habitat) and 2,554 acres in area of indirect effect	787 acres of potentially suitable habitat lost (0.02% of available potentially suitable habitat) and 15,842 acres in area of indirect effect	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.
Least chipmunk (<i>Neotamias minimus</i>)	Low-elevation semidesert shrublands, montane shrublands and woodlands, forest edges, and alpine tundra. About 4,603,600 acres of potentially suitable habitat occurs in the SEZ region.	5,184 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat) during construction and operations	110,865 acres of potentially suitable habitat (2.4% of available potentially suitable habitat)	29 acres of potentially suitable habitat lost (<0.001% of available potentially suitable habitat) and 2,562 acres in area of indirect effect	792 acres of potentially suitable habitat lost (0.02% of available potentially suitable habitat) and 15,934 acres in area of indirect effect	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.

TABLE 13.2.11.3-1 (Cont.)

Common Name (Scientific Name)	Habitat ^a	Maximum Area of Potential Habitat Affected ^b				Overall Impact Magnitude ^g and Species-Specific Mitigation ^h
		Within SEZ (Direct Effects) ^c	Outside SEZ (Indirect Effects) ^d	Within Road Corridor (Indirect and Direct Effects) ^e	Within Transmission Corridor (Indirect and Direct Effects) ^f	
<i>Nongame (small)</i>						
<i>Mammals (Cont.)</i>						
Little brown myotis (<i>Myotis lucifugus</i>)	Various habitats including pinyon-juniper woodlands, montane shrublands, and riparian woodlands. It uses man-made structures for summer roosting, although caves and hollow trees are also utilized. Winter hibernation often occurs in caves or mines. Most foraging activity occurs in woodlands over or near water. About 4,141,100 acres of potentially suitable habitat occurs within the SEZ region.	5,184 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat) during construction and operations	13,009 acres of potentially suitable habitat (0.3% of available potentially suitable habitat)	35 acres of potentially suitable habitat lost (<0.001% of available potentially suitable habitat) and 3,015 acres in area of indirect effect	791 acres of potentially suitable habitat lost (0.02% of available potentially suitable habitat) and 15,907 acres in area of indirect effect	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.
Long-legged myotis (<i>Myotis volans</i>)	Prefers pine forest, desert, and riparian habitats. Old buildings, rock crevices, and hollow trees are used for daytime roosting and winter hibernation. It forages in open areas such as forest clearings. About 3,366,000 acres of potentially suitable habitat occurs within the SEZ region.	4,502 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat) during construction and operations	60,924 acres of potentially suitable habitat (1.8% of available potentially suitable habitat)	6 acres of potentially suitable habitat lost (<0.001% of available potentially suitable habitat) and 563 acres in area of indirect effect	343 acres of potentially suitable habitat lost (0.01% of available potentially suitable habitat) and 6,908 acres in area of indirect effect	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.

TABLE 13.2.11.3-1 (Cont.)

Common Name (Scientific Name)	Habitat ^a	Maximum Area of Potential Habitat Affected ^b				Overall Impact Magnitude ^g and Species-Specific Mitigation ^h
		Within SEZ (Direct Effects) ^c	Outside SEZ (Indirect Effects) ^d	Within Road Corridor (Indirect and Direct Effects) ^e	Within Transmission Corridor (Indirect and Direct Effects) ^f	
<i>Nongame (small)</i>						
<i>Mammals (Cont.)</i>						
Northern grasshopper mouse (<i>Onychomys leucogaster</i>)	Occurs in grasslands, sagebrush deserts, overgrazed pastures, weedy roadside ditches, sand dunes, and other habitats with sandy soil and sparse vegetation. About 3,519,000 acres of potentially suitable habitat occurs within the SEZ region.	3,888 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat) during construction and operations	85,864 acres of potentially suitable habitat (3.4% of available potentially suitable habitat)	28 acres of potentially suitable habitat lost (0.001% of available potentially suitable habitat) and 2,414 acres in area of indirect effect	770 acres of potentially suitable habitat lost (0.03% of available potentially suitable habitat) and 15,498 acres in area of indirect effect	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.
Sagebrush vole (<i>Lemmyscus curtatus</i>)	Typically associated with semiarid sagebrush and grassland areas. Burrows are often constructed near sagebrush. About 1,240,200 acres of potentially suitable habitat occurs within the SEZ region.	1,966 acres of potentially suitable habitat lost (0.2% of available potentially suitable habitat) during construction and operations	52,951 acres of potentially suitable habitat (4.3% of available potentially suitable habitat)	23 acres of potentially suitable habitat lost (0.002% of available potentially suitable habitat) and 1,992 acres in area of indirect effect	510 acres of potentially suitable habitat lost (0.04% of available potentially suitable habitat) and 10,252 acres in area of indirect effect	Small overall impact.

TABLE 13.2.11.3-1 (Cont.)

Common Name (Scientific Name)	Habitat ^a	Maximum Area of Potential Habitat Affected ^b				Overall Impact Magnitude ^g and Species-Specific Mitigation ^h
		Within SEZ (Direct Effects) ^c	Outside SEZ (Indirect Effects) ^d	Within Road Corridor (Indirect and Direct Effects) ^e	Within Transmission Corridor (Indirect and Direct Effects) ^f	
<i>Nongame (small)</i>						
<i>Mammals (Cont.)</i>						
Western pipistrelle (<i>Parastrellus esperus</i>)	Deserts and lowlands, desert mountain ranges, desert scrub flats, and rocky canyons. Roosts mostly in rock crevices, sometimes mines and caves, and rarely in buildings. Suitable roosts occur in rocky canyons and cliffs. Most abundant bat in desert regions. About 3,453,500 acres of potentially suitable habitat occurs in the SEZ region.	5,184 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat) during construction and operations	110,789 acres of potentially suitable habitat (3.2% of available potentially suitable habitat)	29 acres of potentially suitable habitat lost (<0.001% of available potentially suitable habitat) and 2,544 acres in area of indirect effect	787 acres of potentially suitable habitat lost (0.02% of available potentially suitable habitat) and 15,835 acres in area of indirect effect	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.
White-tailed antelope squirrel (<i>Ammospermophilus leucurus</i>)	Low deserts, semidesert and montane shrublands, plateaus, and foothills in areas with sparse vegetation and hard gravelly surfaces. Spends its nights and other periods of inactivity in underground burrows. About 1,863,300 acres of potentially suitable habitat occurs within the SEZ region.	4,498 acres of potentially suitable habitat lost (0.2% of available potentially suitable habitat) during construction and operations	55,711 acres of potentially suitable habitat (3.0% of available potentially suitable habitat)	6 acres of potentially suitable habitat lost (<0.001% of available potentially suitable habitat) and 552 acres in area of indirect effect	276 acres of potentially suitable habitat lost (0.01% of available potentially suitable habitat) and 5,552 acres in area of indirect effect	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effect.

Footnotes on next page.

TABLE 13.2.11.3-1 (Cont.)

-
- ^a Potentially suitable habitat was determined by using SWReGAP habitat suitability and land cover models. Area of potentially suitable habitat for each species is presented for the SEZ region, which is defined as the area within 50 mi (80 km) of the SEZ center.
- ^b Maximum area of potentially suitable habitat that could be affected relative to availability within the SEZ region. Habitat availability for each species within the region was determined by using SWReGAP habitat suitability and land cover models. This approach probably overestimates the amount of suitable habitat in the project area.
- ^c Direct effects within the SEZ consist of the ground-disturbing activities associated with construction and the maintenance of an altered environment associated with operations. A maximum of 5,184 acres of direct effect within the SEZ was assumed.
- ^d Area of indirect effects was assumed to be the area adjacent to the SEZ within 5 mi (8 km) of the SEZ boundary and within the 1-mi (1.6-km) wide transmission line corridor (less the assumed area of direct effects) that extends beyond the 5-mi (8-km) area adjacent to the SEZ boundary. Indirect effects include effects from surface runoff, dust, noise, lighting, and so on from the SEZ, but do not include ground-disturbing activities. The potential degree of indirect effects would decrease with increasing distance away from the SEZ.
- ^e For access road development, direct effects were estimated within a 5-mi (84-km) long, 60-ft (18-m) wide ROW for an assumed new road from the SEZ to the nearest state highway. Indirect effects were estimated within a 1-mi (1.6-km) wide road corridor to the state highway, less the assumed area of direct effects.
- ^f For transmission development, direct effects were estimated within a 19-mi (30.6-km) long, 250-ft (76-m) wide ROW for an assumed new transmission line connecting the SEZ to the nearest existing line. Indirect effects were estimated within a 1-mi (1.6-km) wide transmission corridor to the existing transmission line, less the assumed area of direct effects.
- ^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; (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.
- ^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.

Sources: NatureServe (2010); UDWR (2009a); USGS (2004, 2005a, 2007).

1 Table 13.2.11.3-1 summarizes the potential magnitude of impacts on representative
2 mammal species resulting from solar energy development (with the inclusion of programmatic
3 design features) in the proposed Milford Flats South SEZ.
4
5

6 **American Black Bear**

7

8 Based on land cover analyses, about 1,970 acres (8 km²) of potentially suitable American
9 black bear habitat could be directly lost by solar energy development within the proposed
10 Milford Flats South SEZ. This is 0.06% of the potentially suitable American black bear habitat
11 within the SEZ region. Based on mapped ranges, the SEZ is 6 mi (10 km) from the closest
12 substantial American black bear habitat and 19 mi (31 km) from the closest crucial American
13 black bear habitat (Figure 13.2.11.3-1). Thus, solar energy development would not directly
14 impact these habitats. The transmission line route that extends beyond the 5 mi (8 km) area of
15 indirect effect area for the SEZ would occur within both categories of American black bear
16 habitat. Direct impact would total 102 acres (0.4 km²) of crucial American black bear habitat and
17 234 acres (0.9 km²) of substantial American black bear habitat. These losses would represent
18 0.03 and 0.02% of the amount of crucial and substantial habitats within the SEZ region,
19 respectively. The area of indirect effect from this portion of the transmission route would be
20 2,045 acres (8.3 km²) of crucial American black bear habitat and 4,717 acres (19 km²) of
21 substantial American black bear habitat. Overall, impacts on the American black bear from solar
22 energy development in the SEZ would be small.
23
24

25 **Cougar**

26

27 Based on land cover analyses, up to 5,184 acres (21 km²) of potentially suitable cougar
28 habitat could be directly lost by solar energy development within the proposed Milford Flats
29 South SEZ. This is 0.1% of potentially suitable cougar habitat within the SEZ region. Based on
30 mapped ranges, the SEZ is 2 mi (3 km) from the closest preferred habitat for the cougar
31 (i.e., areas contained within the woodland and shrub-covered low mountain Level IV ecoregion;
32 Figure 13.2.11.3-2). Thus, solar energy development would not directly impact preferred cougar
33 habitat. The transmission line route for the SEZ that extends beyond the 5-mi (8-km) area of
34 indirect effects for the SEZ would occur within preferred cougar habitat. Direct impact would
35 total 399 acres (1.6 km²) of preferred cougar habitat, which represents about 0.04% of preferred
36 cougar habitat within the SEZ region. The area of indirect effect from this portion of the
37 transmission line route would be 7,943 acres (32 km²). Overall, impacts on cougar from solar
38 energy development in the SEZ would be small.
39
40

41 **Elk**

42

43 Based on land cover analyses, about 1,970 acres (8 km²) of potentially suitable elk
44 habitat could be directly lost by solar energy development within the proposed Milford Flats
45 South SEZ. This is 0.08% of potentially suitable habitat within the SEZ region. Based on
46 mapped ranges, the SEZ is 7 mi (11 km) from the closest area of crucial elk habitat

1 (Figure 13.2.11.3-3). Thus, solar energy development would not directly affect important elk
2 habitat. Neither the assumed access road nor the assumed transmission line for the SEZ would
3 cross through crucial elk habitat. Overall, impacts on elk from solar energy development in the
4 SEZ would be small.

7 **Mule Deer**

9 Based on land cover analyses, up to 5,184 acres (21 km²) of potentially suitable mule
10 deer habitat could be directly lost by solar energy development within the proposed Milford Flats
11 South SEZ. This is 0.1% of potentially suitable habitat within the SEZ region. Based on mapped
12 ranges, the SEZ is 3 mi (5 km) from the closest area of crucial mule deer habitat
13 (Figure 13.2.11.3-4). Thus, solar energy development would not directly impact crucial mule
14 deer habitat. The transmission line route for the SEZ that extends beyond the 5 mi (8 km) area of
15 indirect effect for the SEZ would occur within crucial mule deer habitat. Direct impact would
16 total 379 acres (1.5 km²) of crucial mule deer habitat, which represents about 0.01% of crucial
17 mule deer habitat within the SEZ region. The area of indirect effect from this portion of the
18 transmission line route would be 7,627 acres (31 km²). Overall, impacts on mule deer from solar
19 energy development in the SEZ would be small.

22 **Pronghorn**

24 Based on land cover analyses, more than 4,410 acres (17.8 km²) of potentially suitable
25 pronghorn habitat could be directly lost by solar energy development within the proposed
26 Milford Flats South SEZ. This is 0.2% of potentially suitable habitat within the SEZ region.
27 Based on mapped ranges, the SEZ and its assumed access road and transmission lines would be
28 located within crucial pronghorn habitat (Figure 13.2.11.3-5). This could result in the direct
29 reduction of 5,152 acres (21 km²) of crucial pronghorn habitat within the SEZ, 248 acres (1 km²)
30 for the transmission line, and 31 acres (0.1 km²) for the access road. Fencing, considered a major
31 problem on pronghorn ranges, would present a barrier or hindrance to pronghorn movement
32 (UDWR 2009c). Nevertheless, there are about 2,179,400 acres (8,820 km²) of crucial pronghorn
33 habitat within the SEZ region. Therefore, solar energy development would only have a small
34 impact on crucial pronghorn habitat, directly eliminating about 0.2% of crucial pronghorn habitat
35 that occurs within the SEZ region. Overall, impacts on pronghorn from solar energy
36 development in the SEZ would be small.

39 **Other Mammals**

41 Direct impacts on small game, furbearers, and nongame (small) mammal species would
42 be small, as 0.1 to 0.2% of potential habitats identified for these species would be lost
43 (Table 13.2.11.3-1). Larger areas of potentially suitable habitat for these species occur within the
44 area of potential indirect effects (i.e., ranging from 0.3% for the little brown myotis to 4.3% for
45 the sagebrush vole).

1 **Summary**
2

3 Overall, direct impacts on mammal species would be small for all species, as only 0.3%
4 or less of potentially suitable habitats for the mammal species would be lost (Table 13.2.11.3-1).
5 Larger areas of potentially suitable habitat for mammal species occur within the area of potential
6 indirect effects (e.g., up to 4.5% of potentially suitable habitat for the pronghorn). Other impacts
7 on mammals could result from collision with vehicles and infrastructure (e.g., fences), surface
8 water and sediment runoff from disturbed areas, fugitive dust generated by project activities,
9 noise, lighting, spread of invasive species, accidental spills, and harassment. Indirect impacts on
10 areas outside the SEZ (for example, impacts caused by dust generation, erosion, and
11 sedimentation) would be negligible with implementation of programmatic design features.
12

13 Decommissioning after operations cease could result in short-term negative impacts on
14 individuals and habitats within and adjacent to the SEZ. The negative impacts of
15 decommissioning would be reduced or eliminated as reclamation proceeds. Potentially long-term
16 benefits could accrue as habitats are restored in previously disturbed areas. Section 5.10.2.1.4
17 provides an overview of the impacts of decommissioning and reclamation on wildlife. Of
18 particular importance for mammal species would be the restoration of original ground surface
19 contours, soils, and native plant communities associated with semiarid shrublands.
20

21
22 ***13.2.11.3.3 SEZ-Specific Design Features and Design Feature Effectiveness***
23

24 The implementation of required programmatic design features described in Appendix A,
25 Section A.2.2, would greatly reduce the potential for effects on mammals. While SEZ-specific
26 design features are best established when considering specific project details, design features that
27 can be identified at this time are:
28

- 29 • The fencing around the solar energy development should not block the free
30 movement of mammals, particularly big game species.
- 31 • Development near Minersville Canal should be avoided.
32

33
34 If these SEZ-specific design features are implemented in addition to the programmatic
35 design features, impacts on mammals could be reduced. However, potentially suitable habitats
36 for a number of the mammal species occur throughout much of the SEZ; therefore, species-
37 specific mitigation of direct effects for those species would be difficult or infeasible.
38

39
40 **13.2.11.4 Aquatic Biota**
41

42
43 ***13.2.11.4.1 Affected Environment***
44

45 The proposed Milford Flats South SEZ is located in a semiarid desert valley where
46 surface waters are typically limited to intermittent washes and dry lakebeds that only contain

1 water for short periods during or following precipitation. No perennial streams, water bodies,
2 seeps, or springs are present on the proposed Milford Flats South SEZ or within the area of the
3 presumed new transmission line corridor and access road. Ephemeral streams may cross the
4 SEZ, but these drainages only contain water following rainfall and typically do not support
5 wetland or riparian habitats. Four miles (6 km) of Minersville Canal, which redirects water from
6 the Beaver River for irrigation, run through the southern portion of the proposed Milford Flats
7 South SEZ. In addition, the presumed new transmission line (250-ft [76-m] wide) and access
8 road (60 ft [18 m]) would cross over Minersville Canal. Minersville Canal is dry when not being
9 used for irrigation and no significant aquatic biota would be expected to occur. There is little
10 comprehensive information about the distribution of wetlands within the area, and there are no
11 NWI data for the region that include the proposed SEZ (USFWS 2009). However, observations
12 made during September 2009 indicated that wetlands would be unlikely or uncommon
13 (Section 13.2.9.1).

14
15 No surface water bodies are located within the area of indirect effects. Segments of
16 Minersville Canal and Low Line Canal that total approximately 16 mi (26 km) are located within
17 5 mi (8 km) of the SEZ, and a segment of Minersville Canal is located within the 1 mi (2 km)
18 area of indirect effects associated with the new transmission line and road corridor. The Beaver
19 River is the closest perennial stream to the proposed Milford Flats South SEZ; it is located about
20 4 mi (6 km) from the eastern SEZ boundary. Although 7 mi (11 km) of the Beaver River passes
21 through the area of indirect effects, these portions of Beaver River are located downstream of
22 Minersville, and are frequently dry because of irrigation withdrawals (Section 13.2.9.1.3). Such
23 ephemeral or intermittent stream reaches may contain a diverse seasonal community of fish
24 and invertebrates, with the latter potentially present in a dormant state even in dry periods
25 (Levick et al. 2008). For example, one study of intermittent desert streams and washes indicated
26 communities consisted of primarily terrestrial invertebrates, but also contained aquatic taxa from
27 *Insecta*, *Hydracarina*, *Crustacea*, *Oligochaeta*, *Hirudinea*, and *Gastropoda* groups, as well as
28 tolerant native and introduced fish species (URS Corporation 2006). Biota in ephemeral or
29 intermittent streams may also contribute to populations in perennial reaches by dispersing
30 downstream during wet periods when hydrologic connectivity is higher (Levick et al. 2008).
31 However, site-specific surveys would be necessary to characterize aquatic biota, if present.

32
33 Outside of the indirect effects area, but within 50 mi (80 km) of the proposed Milford
34 Flats South SEZ, are approximately 12 mi (19 km) of canals, 379 mi (610 km) of streams, and
35 180 mi (290 km) of intermittent streams. The presumed transmission line corridor extends 19 mi
36 (31 km) from the SEZ and passes within 528 ft (161 m) of Long Hollow (intermittent stream)
37 and stops 844 ft (257 m) from the Fremont Wash. The Minersville Reservoir, a 1,160-acre
38 (5-km²) impoundment formed by the Rocky Ford Dam on the Beaver River, is located
39 approximately 10 mi (16 km) east of the proposed Milford Flats South SEZ. Minersville
40 Reservoir has been stocked by the Utah Division of Wildlife Resources (UDWR) and currently
41 supports populations of rainbow trout (*Oncorhynchus mykiss*), cutthroat trout (*Oncorhynchus*
42 *clarki*), Utah chub (*Gila atraria*), and smallmouth bass (*Micropterus dolomieu*)
43 (UDWR 2006b). The same fish species may also occur downstream of the reservoir, as long as
44 sufficient water levels are present.

1 Also present within 50 mi (80 km) of the SEZ is an additional 3,441 acres (14 km²) of
2 lake and reservoir habitat, 1,069 acres (4 km²) of intermittent lake, and 54,026 acres (219 km²)
3 of dry lake. However, these water bodies are all more than 20 mi (32 km) from the proposed
4 Milford Flats South SEZ.
5
6

7 ***13.2.11.4.2 Impacts*** 8

9 Because surface water habitats are a unique feature in the arid landscape in the vicinity of
10 the proposed Milford Flats South SEZ, the maintenance and protection of such habitats may be
11 important to the survival of aquatic and terrestrial organisms. The types of impacts that aquatic
12 habitats and biota could incur from the development of utility-scale solar energy facilities are
13 described in Section 5.10.2.4. Aquatic habitats present on or near the locations selected for
14 construction of solar energy facilities could be affected in a number of ways, including (1) direct
15 disturbance, (2) deposition of sediments, (3) changes in water quantity, and (4) degradation of
16 water quality.
17

18 There are no permanent water bodies, streams, or wetlands present within the boundaries
19 of either the proposed Milford Flats South SEZ or the presumed new access road and
20 transmission line corridors, and consequently there would be no direct impacts on aquatic
21 habitats from solar energy development. The man-made Minersville Canal is within the area of
22 direct and indirect effects for the SEZ and the transmission line and access road. Although it may
23 contain aquatic biota when water is present, Minersville Canal is an irrigation channel and does
24 not support significant aquatic habitat or communities. Disturbance of land areas within the SEZ
25 for solar energy facilities and the construction of a new transmission line corridor and access
26 road could increase the transport of soil into the canal via waterborne and airborne pathways.
27 Overhead transmission lines could potentially be used so there would be no need to place
28 structures directly within the canal. However, road construction will likely require fill material
29 within the canal. The introduction of waterborne sediments to Minersville Canal could be
30 minimized using common mitigation measures such as settling basins, silt fences, or direction of
31 water draining from the developed areas away from the canal. Any sediment that does enter the
32 canal would be transported downstream and would not impact the Minersville Reservoir or
33 Beaver River. It is unlikely any of the sediment from surface runoff or airborne dust associated
34 with ground disturbance within the SEZ would reach aquatic habitat, given the slow to medium
35 runoff and moderately high permeability of area soils and the large distance of the SEZ to the
36 nearest stream (4 mi [6 km]). Although they are outside the area of direct and indirect effects,
37 Fremont Wash and Long Hollow are located within 0.16 mi (257 m) of the new transmission line
38 corridor. If necessary, dust and surface run off abatement measures could be used to reduce the
39 potential for sediment deposition into these surface water features.
40

41 In arid environments, reductions in the quantity of water in aquatic habitats are of
42 particular concern. Water quantity in aquatic habitats could also be affected if significant
43 amounts of surface water or groundwater are utilized for power plant cooling water, for washing
44 mirrors, or for other needs. The greatest need for water would occur if technologies employing
45 wet cooling, such as parabolic trough or power tower, were developed at the site; the associated
46 impacts would ultimately depend on the water source used (including groundwater from aquifers)

1 at various depths). There are no surface water habitats on the proposed Milford Flats South SEZ
2 that could be used to supply water needs. Water demands during normal operations would most
3 likely be met by withdrawing groundwater from wells constructed on-site, potentially affecting
4 water levels in surface water features outside of the proposed SEZ and, as a consequence,
5 potentially reducing habitat size and connectivity and creating more adverse environmental
6 conditions for aquatic organisms in those habitats (Section 13.2.9.2). Additional details regarding
7 the volume of water required and the types of organisms present in potentially affected water
8 bodies would be required to further evaluate the potential for impacts from water withdrawals.
9

10 As described in Section 5.10.2.4, water quality in aquatic habitats could be affected by
11 the introduction of contaminants such as fuels, lubricants, or pesticides/herbicides during site
12 characterization, construction, operation, or decommissioning/reclamation of a solar energy
13 facility. However, because of the relatively large distance from any permanent surface water
14 features to solar development activities, transmission line corridors, and road corridors, the
15 potential for introducing contaminants into such water bodies would be small, especially if the
16 appropriate mitigation measures were used.
17
18

19 ***13.2.11.4.3 SEZ-Specific Design Features and Design Feature Effectiveness*** 20

21 No SEZ-specific design features are identified at this time. If programmatic design
22 features described in Appendix A, Section A.2.2, are implemented as needed, and if the
23 utilization of water from groundwater or surface water sources is adequately controlled to
24 maintain sufficient water levels in nearby aquatic habitats, the potential impacts on aquatic biota
25 and habitats from solar energy development at the Milford Flats South SEZ would be negligible.
26
27

1 **13.2.12 Special Status Species (Threatened, Endangered, Sensitive, and Rare Species)**
2

3 This section addresses special status species that are known to occur, or for which
4 suitable habitat occurs, on or within the potentially affected area of the proposed Milford Flats
5 South SEZ. Special status species include the following types of species⁸:
6

- 7 • Species listed as threatened or endangered under the ESA;
- 8
- 9 • Species that are proposed for listing, are under review, or are candidates for
10 listing under the ESA;
- 11
- 12 • Species that are listed by the BLM as sensitive;
- 13
- 14 • Species that are listed by the State of Utah⁹; and
- 15
- 16 • Species that have been ranked as S1 or S2 by the State of Utah or as species of
17 concern by the State of Utah or by the USFWS, hereafter referred to as “rare”
18 species.
- 19

20 Special status species known to occur within 50 mi (80 km) of the Milford Flats South
21 SEZ (i.e., the SEZ region) were determined from natural heritage records and other data
22 available through NatureServe Explorer (NatureServe 2010), Utah Division of Wildlife
23 Resources Conservation Data Center (UDWR 2009a) and UDWR Vertebrate Information
24 (UDWR 2003), *Utah Rare Plant Guide* (UNPS 2009), and the Southwest Regional Gap Analysis
25 Project (SWReGAP) (USGS 2004, 2005a, 2007). Information reviewed consisted of county-
26 level occurrences as determined from NatureServe, USGS 7.5-minute quad-level occurrences, as
27 well as modeled land cover types and predicted suitable habitats for the species within the 50-mi
28 (80-km) region as determined from SWReGAP. The 50-mi (80-km) SEZ region intersects
29 Beaver, Garfield, Iron, Kane, Millard, Piute, Sevier, and Washington Counties, in Utah.
30 However, the affected area occurs only in Beaver and Iron Counties (Figure 13.2.12.1-1). See
31 Appendix M for additional information on the approach used to identify species that could be
32 affected by development within the SEZ.
33

34
35 **13.2.12.1 Affected Environment**
36

37 The affected area considered in the assessment included the areas of direct and indirect
38 effects. The area of direct effects was defined as the area that would be physically modified
39 during project development (i.e., where ground-disturbing activities would occur). For the
40 Milford Flats South SEZ, the area of direct effects included the SEZ and the areas within the

⁸ See Section 4.6.4 for definitions of these species categories. Note that some of the categories of species included here do not fit BLM’s definition of special status species as defined in BLM Manual 6840 (BLM 2008). These species are included here to ensure broad consideration of species that may be most vulnerable to impacts.

⁹ According to Utah Administrative Rule R657-48, as described in the *Utah Sensitive Species List* (UDWR 2010), there are no species that receive a separate regulatory designation from the UDWR or the State of Utah.

1 transmission line and road corridors where ground-disturbing activities are assumed to occur.
2 The area of indirect effects was defined as the area within 5 mi (8 km) of the SEZ boundary and
3 the portion of the 1-mi (1.6-km) wide transmission line and road corridors where ground-
4 disturbing activities would not occur but that could be indirectly affected by activities in the area
5 of direct effects. Indirect effects considered in the assessment included effects from surface
6 runoff, dust, noise, lighting, and accidental spills from the SEZ, but did not include ground-
7 disturbing activities. The potential magnitude of indirect effects would decrease with increasing
8 distance from the SEZ. The area of indirect effects was identified on the basis of professional
9 judgment and was considered sufficiently large to bound the area that would potentially be
10 subject to indirect effects. The affected area includes both the direct and indirect effects areas.
11

12 The primary vegetation community types within the affected area are mixed salt desert
13 scrub and sagebrush (*Artemisia* spp.) (see Section 13.2.10). Potentially unique habitats in the
14 affected area in which special status species may reside include desert playas, rocky cliffs and
15 outcrops, and woodlands. The only aquatic or riparian habitats in the affected area occur within
16 and along the Beaver River and a canal from the Beaver River. The Beaver River occurs about
17 4 mi (6.5 km) east of the SEZ; a canal from the Beaver River intersects the southern portion of
18 the SEZ (Figure 13.2.12.1-1). There are also playa habitats and man-made earthen livestock-
19 watering areas throughout the area of indirect effects (Section 13.2.9).
20

21 All special status species known to occur within the Milford Flats South SEZ region
22 (i.e., within 50 mi [80 km] of the center of the SEZ) are listed, with their status, nearest recorded
23 occurrence, and habitats in Appendix J. Of these species, 20 could occur in the affected area of
24 the SEZ, based on recorded occurrences or the presence of potentially suitable habitat in the area.
25 These species, their status, and their habitats are presented in Table 13.2.12.1-1. For many of the
26 species listed in the table, their predicted potential occurrence in the affected area is based only
27 on a general correspondence between mapped SWReGAP land cover types and descriptions of
28 species habitat preferences. This overall approach to identifying species in the affected area
29 probably overestimates the number of species that actually occur in the affected area. For many
30 of the species identified as having potentially suitable habitat in the affected area, the nearest
31 known occurrence is more than 20 mi (32 m) from the SEZ.
32

33 Based on information provided by the UDWR, quad-level occurrences for eight species
34 intersect the Milford Flats South SEZ affected area (Table 13.2.12.1-1): the ferruginous hawk,
35 greater sage-grouse, short-eared owl, western burrowing owl, dark kangaroo mouse, kit fox,
36 Townsend's big-eared bat, and Utah prairie dog. There are no groundwater-dependent species in
37 the vicinity of the SEZ based upon UDWR records, information provided by the USFWS (Stout
38 2009), and the evaluation of groundwater resources in the Milford Flats South SEZ region
39 (Section 13.2.9).
40
41

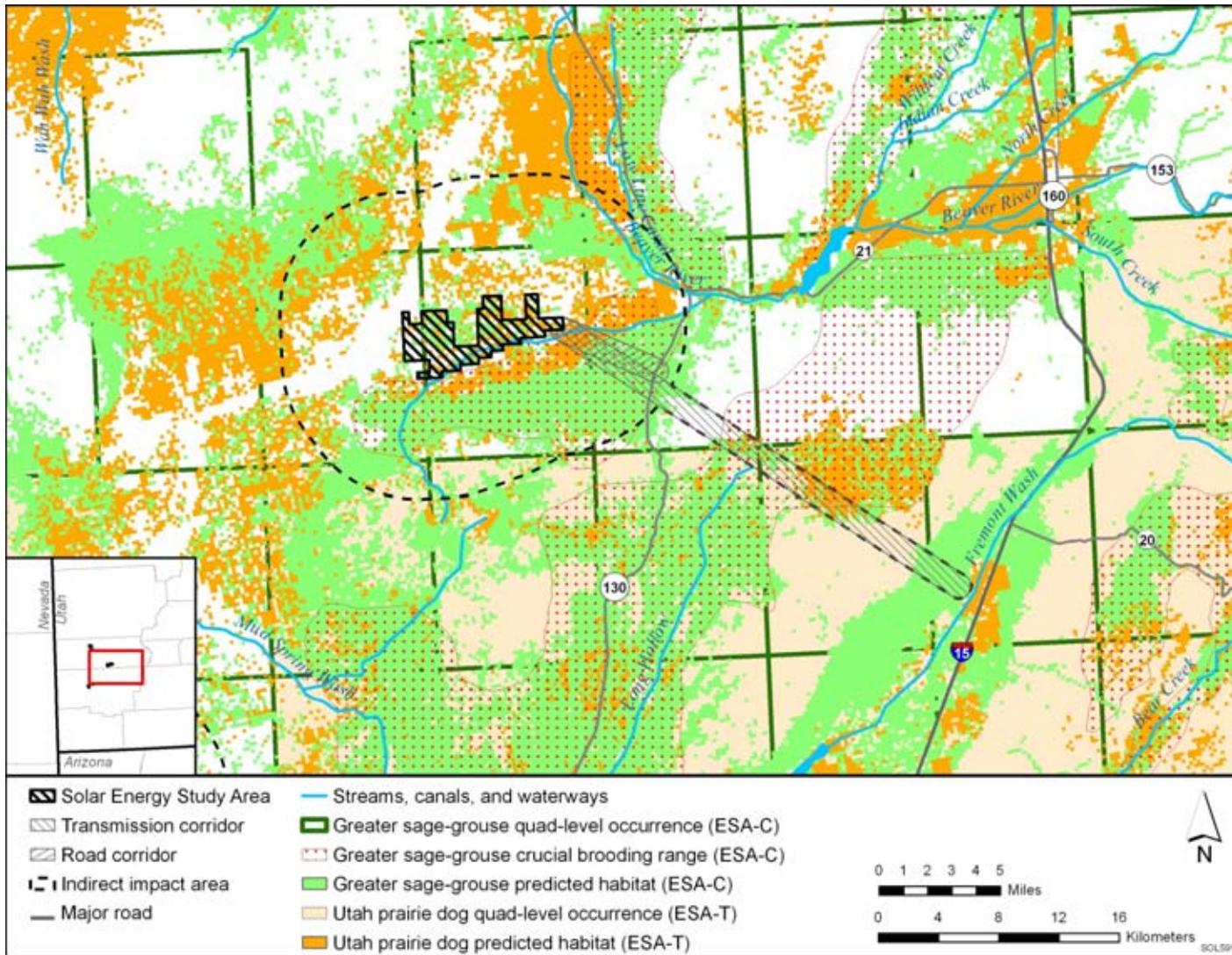


FIGURE 13.2.12.1-1 Known or Potential Occurrences of Species Listed as Endangered, Threatened, or Candidates for Listing under the ESA That May Occur in the Proposed Milford Flats South SEZ Affected Area (Sources: USGS 2007; UDWR 2009a)

TABLE 13.2.12.1-1 Habitats, Potential Impacts, and Potential Mitigation for Special Status Species That Could Occur on or in the Affected Area of the Proposed Milford Flats South SEZ

Common Name	Scientific Name	Listing Status ^a	Habitat ^b	Maximum Area of Potential Habitat Affected ^c				Overall Impact Magnitude ^h and Species-Specific Mitigation ⁱ
				Within SEZ (Direct Effects) ^d	Access Road (Direct Effects) ^e	Transmission Line (Direct Effects) ^f	Indirect Effects (Outside SEZ) ^g	
Plants								
Compact cat's-eye	<i>Cryptantha compacta</i>	BLM-S; FWS-SC; UT-S2	Salt desert shrub and mixed shrub communities at elevations between 5,000 and 8,400 ft. ^j Known from southwestern Millard County and northwestern Beaver County, Utah, and eastern Nevada. Nearest recorded occurrence is 45 mi ^k northwest of the SEZ. About 2,430,377 acres ^l of potentially suitable habitat occurs within the SEZ region.	5,899 acres of potentially suitable habitat lost (0.2% of available potentially suitable habitat)	89 acres of potentially suitable habitat lost (0.4% of available potentially suitable habitat)	56 acres of potentially suitable habitat lost (0.2% of available potentially suitable habitat)	88,250 acres of potentially suitable habitat (3.6% of available potentially suitable habitat)	Small overall impact. Pre-disturbance surveys and avoiding or minimizing disturbance to occupied habitats in the areas of direct effect; translocation of individuals from areas of direct effects; or compensatory mitigation of direct effects on occupied habitats could reduce impacts. Note that these same potential mitigations apply to all special status plants.
Jone's globemallow	<i>Sphaeralcea caespitosa</i>	BLM-S; FWS-SC; UT-S2	Known from at least four occurrences in western Utah and six occurrences in eastern Nevada on federal and state lands on dolomite calcareous soils in association with mixed shrub, pinyon-juniper, and grassland communities at elevations between 5,000 and 6,500 ft. Nearest recorded occurrence is 27 mi northwest of the SEZ. About 4,077,164 acres of potentially suitable habitat occurs within the SEZ region.	5,900 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat)	89 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	87 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	99,600 acres of potentially suitable habitat (2.4% of available potentially suitable habitat)	Small overall impact. See compact cat's-eye for a list of potential mitigations applicable to all special status plant species.

TABLE 13.2.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status ^a	Habitat ^b	Maximum Area of Potential Habitat Affected ^c				Overall Impact Magnitude ^h and Species-Specific Mitigation ⁱ
				Within SEZ (Direct Effects) ^d	Access Road (Direct Effects) ^e	Transmission Line (Direct Effects) ^f	Indirect Effects (Outside SEZ) ^g	
Plants (Cont.)								
Long-calyx milkvetch	<i>Astragalus oophorus lonchocalyx</i>	BLM-S; FWS-SC; UT-S1	Endemic to the Great Basin in western Utah and eastern Nevada in pinyon-juniper woodlands, sagebrush, and mixed shrub communities at elevations between 5,800 and 7,500 ft. Nearest recorded occurrences are 12 mi east of the SEZ. About 3,961,336 acres of potentially suitable habitat occurs within the SEZ region.	5,899 acres of potentially suitable habitat lost (0.2% of available potentially suitable habitat)	89 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	87 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	98,300 acres of potentially suitable habitat (2.5% of available potentially suitable habitat)	Small overall impact. See compact cat's-eye for a list of potential mitigations applicable to all special status plant species.
Money wild buckwheat	<i>Eriogonum nummulare</i>	BLM-S	Western Utah and eastern Nevada on gravelly washes, flats, and slopes in saltbush and sagebrush communities and pinyon-juniper woodlands. Nearest recorded occurrence is 40 mi northwest of the SEZ. About 3,468,227 acres of potentially suitable habitat occurs within the SEZ region.	4,505 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat)	75 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	84 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	83,450 acres of potentially suitable habitat (2.4% of available potentially suitable habitat)	Small overall impact. See compact cat's-eye for a list of potential mitigations applicable to all special status plant species.
Birds								
American white pelican	<i>Pelecanus erythrorhynchos</i>	BLM-S; FWS-SC; UT-SC; UT-S1	May occur as a summer resident and migrant in large reservoirs within the SEZ region. Species is likely to be a transient only in the vicinity of the SEZ. Nearest recorded occurrence is from the Minersville Reservoir, approximately 11 mi east of the SEZ. About 81,437 acres of potentially suitable habitat occurs within the SEZ region.	0 acres	0 acres	0 acres	100 acres of potentially suitable habitat (0.1% of available potentially suitable habitat)	Small overall impact; no direct effects. No species-specific mitigation needed. Only transient individuals are expected in the affected area.

TABLE 13.2.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status ^a	Habitat ^b	Maximum Area of Potential Habitat Affected ^c				Overall Impact Magnitude ^h and Species-Specific Mitigation ⁱ
				Within SEZ (Direct Effects) ^d	Access Road (Direct Effects) ^e	Transmission Line (Direct Effects) ^f	Indirect Effects (Outside SEZ) ^g	
Birds (Cont.)								
Bald eagle	<i>Haliaeetus leucocephalus</i>	BLM-S; UT-SC; UT-S1	Known as a winter resident throughout the SEZ region, most commonly along large bodies of water where fish and waterfowl prey are available. Wintering areas are associated with open water. May occasionally forage in arid shrubland habitats. Nearest recorded occurrences are from the Beaver River within 10 mi east of the SEZ. About 2,540,607 acres of potentially suitable habitat occurs within the SEZ region.	1,889 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat)	11 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	81 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	43,530 acres of potentially suitable habitat (1.7% of available potentially suitable habitat)	Small overall impact on foraging habitat only. Avoidance of direct impacts on all foraging habitat is not feasible because suitable foraging habitat is widespread in the area of direct effect.
Ferruginous hawk ^m	<i>Buteo regalis</i>	BLM-S; UT-SC; UT-S2	A year-round resident in the SEZ affected area. Grasslands, shrublands, agricultural lands, and the periphery of pinyon-juniper forests throughout the SEZ region. Quad-level occurrences intersect the SEZ and other portions of the affected area. About 1,761,837 acres of potentially suitable habitat occurs within the SEZ region.	2,500 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat)	30 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	93 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	63,700 acres of potentially suitable habitat (3.6% of available potentially suitable habitat)	Small overall impact on foraging and nesting habitat. Pre-disturbance surveys and avoiding or minimizing disturbance of occupied nests and habitats in the area of direct effect or compensatory mitigation of direct effects on occupied habitats could reduce impacts.

TABLE 13.2.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status ^a	Habitat ^b	Maximum Area of Potential Habitat Affected ^c				Overall Impact Magnitude ^h and Species-Specific Mitigation ⁱ
				Within SEZ (Direct Effects) ^d	Access Road (Direct Effects) ^e	Transmission Line (Direct Effects) ^f	Indirect Effects (Outside SEZ) ^g	
Birds (Cont.)								
Greater sage-grouse	<i>Centrocercus urophasianus</i>	ESA-C; BLM-S; UT-SC; UT-S2	A year-round resident in the SEZ region. Plains, foothills, and mountain valleys dominated by sagebrush throughout the SEZ region. Lek sites are located in relatively open areas surrounded by sagebrush or in areas where sagebrush density is low. Nesting usually occurs on the ground where sagebrush density is higher. Quad-level occurrences intersect the affected area east of the SEZ. Crucial brooding habitat for the species exists about 1 mi south of the SEZ and intersects the transmission corridor. About 1,646,504 acres of potentially suitable habitat occurs within the SEZ region.	3,905 acres of potentially suitable habitat lost (0.2% of available potentially suitable habitat)	34 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	96 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	77,300 acres of potentially suitable habitat (4.7% of available potentially suitable habitat)	Small overall impact. Pre-disturbance surveys and avoiding or minimizing disturbance of occupied habitats, especially leks and nesting sites in the areas of direct effects; or compensatory mitigation of direct effects on occupied habitats could reduce impacts. Mitigation should be developed in coordination with the USFWS and the UDWR.
Lewis's woodpecker	<i>Melanerpes lewis</i>	UT-SC; UT-S2	A year-round resident throughout the SEZ region, but only winter (nonbreeding) habitat is expected to occur in the affected area. Open ponderosa pine, Douglas-fir, pinyon-juniper, mixed conifer, and oak forests. Areas with under-story grasses and shrubs to support insect prey populations are preferred. Nests in cavities of dead or dying trees and stumps. Nearest recorded occurrence is approximately 35 mi south of the SEZ. About 351,500 acres of potentially suitable habitat occurs within the SEZ region.	14 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	6 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	6 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	9,300 acres of potentially suitable habitat (2.6% of available potentially suitable habitat)	Small overall impact on foraging habitat only. Avoidance of direct impacts on all foraging habitat is not feasible because suitable foraging habitat is widespread in the area of direct effect.

TABLE 13.2.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status ^a	Habitat ^b	Maximum Area of Potential Habitat Affected ^c				Overall Impact Magnitude ^h and Species-Specific Mitigation ⁱ
				Within SEZ (Direct Effects) ^d	Access Road (Direct Effects) ^e	Transmission Line (Direct Effects) ^f	Indirect Effects (Outside SEZ) ^g	
Birds (Cont.)								
Long-billed curlew	<i>Numenius americanus</i>	BLM-S; UT-SC; UT-S2	Summer resident and migrant throughout the SEZ region in short-grass grasslands near standing water. Species is likely to be transient only in the vicinity of the SEZ. Nearest recorded occurrences are from the Beaver River, approximately 10 mi east of the SEZ. About 285,000 acres of potentially suitable habitat occurs within the SEZ region.	0 acres	6 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	6 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	8,565 acres of potentially suitable habitat (3.0% of available potentially suitable habitat)	Small overall impact. No species-specific mitigation needed. Only transient individuals are expected in the affected area.
Northern goshawk	<i>Accipiter gentilis</i>	BLM-S	A year-round resident in the SEZ region. Mature mountain forest and riparian zone habitats throughout the SEZ region. Nests in trees in mature deciduous, coniferous, and mixed forests. Forages in both heavily forested and relatively open shrubland habitats. Nearest recorded occurrences are approximately 18 mi southeast of the SEZ. About 704,300 acres of potentially suitable habitat occurs within the SEZ region.	0 acres	0 acres	29 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	7,000 acres of potentially suitable habitat (1.0% of available potentially suitable habitat)	Small overall impact on foraging and nesting habitat. Pre-disturbance surveys and avoiding or minimizing disturbance of occupied nesting habitats (woodlands) in the area of direct effects or compensatory mitigation of direct effects on occupied nesting habitats could reduce impacts.

TABLE 13.2.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status ^a	Habitat ^b	Maximum Area of Potential Habitat Affected ^c				Overall Impact Magnitude ^h and Species-Specific Mitigation ⁱ
				Within SEZ (Direct Effects) ^d	Access Road (Direct Effects) ^e	Transmission Line (Direct Effects) ^f	Indirect Effects (Outside SEZ) ^g	
Birds (Cont.)								
Short-eared owl	<i>Asio flammeus</i>	BLM-S; UT-SC; UT-S2	A year-round resident in portions of the SEZ region, although only winter (nonbreeding) habitat is expected to occur in the affected area. Grasslands, shrublands, and other open habitats throughout the SEZ region. Quad-level occurrences intersect the SEZ and other portions of the affected area. About 3,938,700 acres of potentially suitable habitat occurs within the SEZ region.	5,950 acres of potentially suitable habitat lost (0.2% of available potentially suitable habitat)	36 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	151 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	106,150 acres of potentially suitable habitat (2.7% of available potentially suitable habitat)	Small overall impact on foraging habitat only. Avoidance of direct impacts on all foraging habitat is not feasible because suitable foraging habitat is widespread in the area of direct effect.
Western burrowing owl	<i>Athene cunicularia hypugaea</i>	BLM-S; FWS-SC; UT-SC	A year-round resident in the SEZ region. Open grasslands and prairies, as well as disturbed sites such as golf courses, cemeteries, and airports throughout the SEZ region. Nests in burrows constructed by mammals (prairie dog, badger, etc.). Quad-level occurrences intersect the SEZ and other portions of the affected area. About 2,432,600 acres of potentially suitable habitat occurs within the SEZ region.	5,964 acres of potentially suitable habitat lost (0.2% of available potentially suitable habitat)	36 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	81 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	96,300 acres of potentially suitable habitat (4.0% of available potentially suitable habitat)	Small overall impact on foraging and nesting habitat. Pre-disturbance surveys and avoiding or minimizing disturbance of occupied burrows and habitats in the area of direct effects or compensatory mitigation of direct effects on occupied habitats could reduce impacts.

TABLE 13.2.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status ^a	Habitat ^b	Maximum Area of Potential Habitat Affected ^c				Overall Impact Magnitude ^h and Species-Specific Mitigation ⁱ
				Within SEZ (Direct Effects) ^d	Access Road (Direct Effects) ^e	Transmission Line (Direct Effects) ^f	Indirect Effects (Outside SEZ) ^g	
Mammals								
Dark kangaroo mouse	<i>Microdiposops megacephalus</i>	BLM-S; UT-SC; UT-S2	Occurs in the Great Basin region in sagebrush-dominated areas with sandy soils. Nocturnally active during warm weather, the species remains in underground burrows during the day and cold winter months. Quad-level occurrences intersect the SEZ and other portions of the affected area. About 620,100 acres of potentially suitable habitat occurs within the SEZ region.	2,712 acres of potentially suitable habitat lost (0.4% of available potentially suitable habitat)	0 acres	2 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	42,100 acres of potentially suitable habitat (6.8% of available potentially suitable habitat)	Small overall impact. Pre-disturbance surveys and avoiding or minimizing disturbance of occupied habitats in the areas of direct effects; or compensatory mitigation of direct effects on occupied habitats could reduce impacts.
Fringed myotis	<i>Myotis thysanodes</i>	BLM-S; FWS-SC; UT-SC	Wide range of habitats including lowland riparian, desert shrub, pinyon-juniper, and sagebrush habitats. Roost sites have been reported in buildings and caves. Nearest recorded occurrences are 40 mi southeast of the SEZ. About 4,555,400 acres of potentially suitable habitat occurs within the SEZ region.	6,433 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat)	36 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	152 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	114,600 acres of potentially suitable habitat (2.5% of available potentially suitable habitat)	Small overall impact on potentially suitable foraging and roosting habitat. Pre-disturbance surveys and avoiding or minimizing disturbance of occupied roosting habitats in the area of direct effect or compensatory mitigation of direct effects on occupied roosting habitats could reduce impacts.

TABLE 13.2.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status ^a	Habitat ^b	Maximum Area of Potential Habitat Affected ^c				Overall Impact Magnitude ^h and Species-Specific Mitigation ⁱ
				Within SEZ (Direct Effects) ^d	Access Road (Direct Effects) ^e	Transmission Line (Direct Effects) ^f	Indirect Effects (Outside SEZ) ^g	
Mammals (Cont.)								
Kit fox	<i>Vulpes macrotis</i>	BLM-S; UT-SC	Open prairie, plains, and desert habitats where it inhabits burrows and preys on rodents, rabbits, hares, and small birds. Quad-level occurrences intersect the affected area north of the SEZ. About 1,960,500 acres of potentially suitable habitat occurs within the SEZ region.	5,950 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat)	30 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	57 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	85,400 acres of potentially suitable habitat (4.4% of available potentially suitable habitat)	Small overall impact. Pre-disturbance surveys and avoiding or minimizing disturbance of occupied habitats in the areas of direct effects; translocation of individuals from areas of direct effects; or compensatory mitigation of direct effects on occupied habitats could reduce impacts.
Pygmy rabbit	<i>Brachylagus idahoensis</i>	BLM-S; UT-SC; UT-S2	Sagebrush-shrubland habitats throughout the SEZ region. Prefers loose soils to dig burrows. Nearest recorded occurrences are about 10 mi southeast of the SEZ. About 967,900 acres of potentially suitable habitat occurs within the SEZ region.	2,031 acres of potentially suitable habitat lost (0.2% of available potentially suitable habitat)	24 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	49 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	42,800 acres of potentially suitable habitat (4.4% of available potentially suitable habitat)	Small overall impact. Pre-disturbance surveys and avoiding or minimizing disturbance of occupied habitats in the areas of direct effects; translocation of individuals from areas of direct effect; or compensatory mitigation of direct effects on occupied habitats could reduce impacts.

TABLE 13.2.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status ^a	Habitat ^b	Maximum Area of Potential Habitat Affected ^c				Overall Impact Magnitude ^h and Species-Specific Mitigation ⁱ
				Within SEZ (Direct Effects) ^d	Access Road (Direct Effects) ^e	Transmission Line (Direct Effects) ^f	Indirect Effects (Outside SEZ) ^g	
Mammals (Cont.)								
Spotted bat	<i>Euderma maculatum</i>	BLM-S; FWS-SC; UT-SC; UT-S2	Near forests and shrubland habitats throughout the SEZ region. Uses caves and rock crevices for day roosting and winter hibernation. Nearest recorded occurrences are 15 mi north of the SEZ. About 3,269,200 acres of potentially suitable habitat occurs within the SEZ region.	4,544 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat)	25 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	124 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	81,500 acres of potentially suitable habitat (2.5% of available potentially suitable habitat)	Small overall impact on potentially suitable foraging and roosting habitat. Pre-disturbance surveys and avoiding or minimizing disturbance of occupied roosting habitats in the area of direct effect or compensatory mitigation of direct effects on occupied roosting habitats could reduce impacts.
Townsend's big-eared bat	<i>Corynorhinus townsendii</i>	BLM-S; FWS-SC; UT-SC	Near forests and shrubland habitats below 9,000 ft elevation throughout the SEZ region. The species may use caves, mines, and buildings for day roosting and winter hibernation. Quad-level occurrences intersect the affected area north of the SEZ. About 3,111,000 acres of potentially suitable habitat occurs within the SEZ region.	3,933 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat)	12 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	66 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	59,400 acres of potentially suitable habitat (1.9% of available potentially suitable habitat)	Small overall impact on potentially suitable foraging and roosting habitat. Pre-disturbance surveys and avoiding or minimizing disturbance of occupied roosting habitats in the area of direct effect or compensatory mitigation of direct effects on occupied roosting habitats could reduce impacts.

TABLE 13.2.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status ^a	Habitat ^b	Maximum Area of Potential Habitat Affected ^c				Overall Impact Magnitude ^h and Species-Specific Mitigation ⁱ
				Within SEZ (Direct Effects) ^d	Access Road (Direct Effects) ^e	Transmission Line (Direct Effects) ^f	Indirect Effects (Outside SEZ) ^g	
Mammals (Cont.)								
Utah prairie dog	<i>Cynomys parvidens</i>	ESA-T; UT-S1	Endemic to southwestern Utah in grasslands in level mountain valleys and areas with deep, well-drained soils. Colonies reside in underground burrow systems, which are dynamic in size and location. Quad-level occurrences intersect the affected area south of the SEZ. Colonies are known to occur outside of the affected area within 10 mi south of the SEZ. About 825,000 acres of potentially suitable habitat occurs within the SEZ region.	1,874 acres of potentially suitable habitat lost (0.2% of available potentially suitable habitat)	11 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	27 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	30,600 acres of potentially suitable habitat (3.7% of available potentially suitable habitat)	Small overall impact. Pre-disturbance surveys and avoiding or minimizing disturbance of occupied habitats in the areas of direct effects; translocation of individuals from areas of direct effects; or compensatory mitigation of direct effects on occupied habitats could reduce impacts. Mitigation should be developed in consultation with the USFWS and the UDWR.

^a BLM-S = listed as a sensitive species by the BLM; ESA-C = candidate for listing under the ESA; ESA-T = listed as threatened under the ESA; ESA-UR = under review for listing under the ESA; FWS-SC = USFWS species of concern; UT-S1 = ranked as S1 in the state of Utah; UT-S2 = ranked as S2 in the state of Utah; UT-SC = Utah species of concern.

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

^c Maximum area of potentially suitable habitat that could be affected relative to availability within the SEZ region. Habitat availability for each species within the region was determined by using SWReGAP habitat suitability and land cover models. This approach probably overestimates the amount of suitable habitat in the project area.

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

Footnotes continued on next page.

TABLE 13.2.12.1-1 (Cont.)

-
- ^e For access road development, direct effects were estimated within a 5-mi (8-km) long, 60-ft (18-m) wide road ROW 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.
- ^f For transmission line development, direct effects were estimated within a 19-mi (30-km) long, 250-ft (76-m) wide transmission ROW from the SEZ to the nearest existing line. Direct impacts within this area were determined from the proportion of potentially suitable habitat within the 1-mi (1.6-km) wide transmission 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 portions of the road and transmission line corridors where ground-disturbing activities would not occur. Indirect effects include effects from surface runoff, dust, noise, lighting, and so on from project development. The potential degree of indirect effects would decrease with increasing distance away from the SEZ.
- ^h Overall impact magnitude categories were based on professional judgment and are as follows: (1) *small*: $\leq 1\%$ of the population or its habitat would be lost and the activity would not result in a measurable change in carrying capacity or population size in the affected area; (2) *moderate*: >1 but $\leq 10\%$ of the population or its habitat would be lost and the activity would result in a measurable but moderate (not destabilizing) change in carrying capacity or population size in the affected area; (3) *large*: $>10\%$ of a population or its habitat would be lost and the activity would result in a large, measurable, and destabilizing change in carrying capacity or population size in the affected area. Note that much greater weight was given to the magnitude of direct effects because those effects would be difficult to mitigate. Programmatic design features would reduce most indirect effects to negligible levels.
- 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 ft to m, multiply by 0.3048.
- ^k To convert mi to km, multiply by 1.609.
- ^l To convert acres to km², multiply by 0.004047.
- ^m Species in bold text have been recorded or have designated critical habitat in the affected area.

1 ***13.2.12.1.1 Species Listed under the ESA That Could Occur in the Affected Area***
2

3 In scoping comments on the proposed Milford Flats South SEZ (Stout 2009), the USFWS
4 expressed concern for impacts of project development on the Utah prairie dog, a species listed as
5 threatened under the ESA. This species has the potential to occur within the SEZ on the basis of
6 observed occurrences near the SEZ and the presence of potentially suitable habitat in the SEZ
7 (Figure 13.2.12.1-1; Table 13.2.12.1-1). Appendix J provides basic information on life history,
8 habitat needs, and threats to populations of this species. No other species currently listed under
9 the ESA is known to occur within the Milford Flats South SEZ affected area.

10
11 The Utah prairie dog occurs in grasslands, level mountain valleys, and areas with deep,
12 well-drained soils and low-growing vegetation that allows for good visibility. The Utah prairie
13 dog is one of three prairie dog species in the state of Utah and the only prairie dog species to
14 occur in the SEZ region (UDWR 2009a). The USFWS indicated that suitable habitat for the
15 species may occur on the SEZ (Stout 2009). Potential habitat for the Utah prairie dog within the
16 SEZ region is described by SWReGAP as year-round known or probable habitat.

17
18 Quad-level occurrences for this species intersect the area of indirect effects for the
19 Milford Flats South SEZ. SWReGAP predicts the presence of potentially suitable habitat for the
20 species on the SEZ and throughout other portions of the affected area (Figure 13.2.12.1-1;
21 Table 13.2.12.1-1). Data provided by the Utah prairie dog colony tracking database¹⁰ also
22 indicates the presence of active Utah prairie dog colonies outside the affected area but within
23 10 mi (16 km) south of the SEZ. Critical habitat for this species has not been designated.

24
25
26 ***13.2.12.1.2 Species That Are Candidates for Listing under the ESA***
27

28 The greater sage-grouse is the only species that is a candidate for listing as threatened or
29 endangered under the ESA that may occur in the affected area of the proposed Milford Flats
30 South SEZ. This species is known to occur in plains, foothills, and mountain valleys dominated
31 by sagebrush. In its scoping comments on the SEZ (Stout 2009), the USFWS indicated that
32 suitable sage-grouse habitat occurs throughout the Milford Flats South SEZ region. Potential
33 habitat for the greater sage-grouse within the SEZ region is described by SWReGAP as year-
34 round known or probable habitat.

35
36 Quad-level occurrences for this species intersect the affected area east of the SEZ.
37 SWReGAP predicts the presence of potentially suitable habitat for the species on the SEZ and
38 throughout other portions of the affected area. The UDWR has also identified crucial brooding
39 habitat for this species within 1 mi (1.6 km) south of the SEZ. This crucial brooding habitat also
40 intersects the transmission corridor (Figure 13.2.12.1-1; Table 13.2.12.1-1).

41
42

¹⁰ The Utah prairie dog colony tracking database contains sensitive data provided by the UDWR, for official use only. These data were used for the analyses in this PEIS, but the distributions were not displayed on figures in this PEIS.

1 **13.2.12.1.3 BLM-Designated Sensitive Species**
2

3 There are 18 BLM-designated sensitive species that may occur in the affected area of the
4 Milford Flats South SEZ (Table 13.2.12.1-1). These BLM-designated sensitive species include
5 the following: (1) plants—compact cat’s-eye, Jone’s globemallow, long-calyx milkvetch, and
6 money wild buckwheat; (2) birds—American white pelican, bald eagle, ferruginous hawk,
7 greater sage-grouse, long-billed curlew, northern goshawk, short-eared owl, and western
8 burrowing owl; and (3) mammals—dark kangaroo mouse, fringed myotis, kit fox, pygmy rabbit,
9 spotted bat, and Townsend’s big-eared bat. Quad-level occurrences intersect the SEZ affected
10 area for the following BLM-designated species: ferruginous hawk, short-eared owl, western
11 burrowing owl, dark kangaroo mouse, kit fox, and Townsend’s big-eared bat. Habitats in which
12 these species are found, the amount of potentially suitable habitat in the affected area, and known
13 locations of the species relative to the SEZ are presented in Table 13.2.12.1-1. One species
14 (greater sage-grouse) was discussed in Section 13.2.12.1.2 because of its status under the ESA.
15 All other BLM-designated species as related to the SEZ are described in the remainder of this
16 section. Additional life history information for these species is provided in Appendix J.
17
18

19 **Compact Cat’s-Eye**
20

21 The compact cat’s eye is a perennial herb endemic to the Great Basin of southwestern
22 Utah. It occurs in scattered locations throughout the Milford Flats South SEZ region. Suitable
23 habitat includes salt desert shrub-scrub. The species is known to occur about 45 mi (72 km)
24 northwest of the SEZ. Potentially suitable habitat for the species may occur on the SEZ and in
25 other portions of the affected area (Table 13.2.12.1-1).
26

27 **Jone’s Globemallow**
28

29 The Jone’s globemallow is a perennial herb endemic to the Great Basin of southwestern
30 Utah. It inhabits mixed shrublands, pinyon-juniper woodlands, and grassland communities. The
31 species is known to occur about 27 mi (43 km) northwest of the SEZ. Potentially suitable habitat
32 for the species may occur on the SEZ and in other portions of the affected area
33 (Table 13.2.12.1-1).
34
35

36 **Long-Calyx Milkvetch**
37

38 The long-calyx milkvetch is a perennial herb endemic to the Great Basin of southwestern
39 Utah. It inhabits mixed shrublands, pinyon-juniper woodlands, and grassland communities. The
40 species is known to occur about 12 mi (19 km) east of the SEZ. Potentially suitable habitat for
41 the species may occur on the SEZ and in other portions of the affected area (Table 13.2.12.1-1).
42
43
44
45

1 **Money Wild Buckwheat**

2
3 The money wild buckwheat is a perennial shrub from the southwestern United States. It
4 inhabits saltbush, sagebrush, and pinyon-juniper woodland communities on gravelly substrates.
5 The species is known to occur about 40 mi (64 km) northwest of the SEZ. Potentially suitable
6 habitat for the species may occur on the SEZ and in other portions of the affected area
7 (Table 13.2.12.1-1).

8
9
10 **American White Pelican**

11
12 The American white pelican is known to occur in the SEZ region where it is a summer
13 resident and migrant in large reservoirs and other bodies of water. The species has been recorded
14 near the Minersville Reservoir, approximately 11 mi (18 km) east of the SEZ. According to the
15 SWReGAP habitat suitability model, suitable habitat for this species does not exist in the area of
16 direct effects, but potentially suitable nonbreeding migratory habitat exists in the area of indirect
17 effects. Suitable nesting habitat does not occur in the affected area, but the species may be
18 observed as a transient in portions of the affected area (Table 13.2.12.1-1).

19
20
21 **Bald Eagle**

22
23 The bald eagle is known to occur in the SEZ region, primarily associated with larger
24 waterbodies. The species has been recorded in the vicinity of the Beaver River, approximately
25 10 mi (16 km) east of the SEZ. According to the SWReGAP habitat suitability model, only
26 potentially suitable nonbreeding winter habitat occurs in the SEZ affected area. Suitable nesting
27 habitat does not occur in the affected area, but shrubland habitats suitable for foraging may occur
28 on the SEZ and throughout the affected area (Table 13.2.12.1-1).

29
30
31 **Ferruginous Hawk**

32
33 The ferruginous hawk is known to occur in the SEZ region where it forages in shrubland
34 habitats. Quad-level occurrences for this species intersect the Milford Flats South SEZ and other
35 portions of the affected area. According to the SWReGAP habitat suitability model, potentially
36 suitable breeding and nonbreeding year-round habitat may occur in the SEZ affected area
37 (Table 13.2.12.1-1). Most of this suitable habitat in the affected area is represented by foraging
38 habitat (shrublands); however, potentially suitable nesting habitat (woodlands and rocky cliffs
39 and outcrops) may occur in portions of the affected area. On the basis of an evaluation of
40 SWReGAP land cover types, there are no forested habitats or rocky cliffs and outcrops on the
41 SEZ that may be potentially suitable nesting habitat for the ferruginous hawk. However,
42 approximately 7 acres (<0.1 km²) of forested habitat within the access road corridor and
43 4,475 acres (18 km²) of forested habitat within the transmission corridor may provide potentially
44 suitable nesting habitat for this species. In addition, approximately 10,150 acres (41 km²) of
45 forested habitat occurs throughout other portions of the area of indirect effects outside the SEZ
46 and the access road and transmission corridors. Approximately 30 acres (0.1 km²) of rocky cliffs

1 and outcrops may occur in the transmission corridor; an additional 70 acres (0.3 km²) of this
2 potentially suitable nesting habitat occurs in the area of indirect effects outside the SEZ and the
3 access road and transmission corridors.
4

6 **Long-Billed Curlew**

7
8 The long-billed curlew is known to occur in the SEZ region as a summer resident and
9 migrant in short-grass grasslands near standing water. The species has been recorded near the
10 Beaver River, approximately 10 mi (16 km) east of the SEZ. According to the SWReGAP
11 habitat suitability model, suitable habitat for this species does not occur on the SEZ. However,
12 potentially suitable nonbreeding migratory habitat is expected to occur in the assumed road and
13 transmission line corridors and other portions of the affected area. Suitable nesting habitat does
14 not occur in the affected area, but the species may be observed as a transient in grassland habitats
15 throughout the affected area (Table 13.2.12.1-1).
16

18 **Northern Goshawk**

19
20 The northern goshawk is known to occur in the SEZ region where it forages in montane
21 forests and valley shrubland habitats. Populations are known to occur approximately 18 mi
22 (29 km) southeast of the SEZ. According to the SWReGAP habitat suitability model, year-round
23 breeding and nonbreeding potential habitat does not occur on the SEZ or within the access road
24 corridor; however, potentially suitable habitat may occur in the transmission corridor and within
25 the area of indirect effects (Table 13.2.12.1-1). Most of this suitable habitat in the affected area is
26 represented by foraging habitat (shrublands); however, potentially suitable nesting habitat
27 (woodlands) may occur in portions of the affected area. On the basis of an evaluation of
28 SWReGAP land cover types, approximately 7 acres (<0.1 km²) of woodland habitat that may be
29 potentially suitable nesting habitat occurs in the transmission corridor. Approximately
30 4,475 acres (18 km²) of this habitat occurs in the area of indirect effects.
31

33 **Short-Eared Owl**

34
35 The short-eared owl is known to occur in the SEZ region where it forages in grasslands,
36 shrublands, and other open habitats. Quad-level occurrences for this species intersect the Milford
37 Flats South SEZ and other portions of the affected area. According to the SWReGAP habitat
38 suitability model, potentially suitable year-round habitat occurs in the SEZ region, although only
39 winter nonbreeding habitat is predicted to occur in the affected area. Suitable nesting habitat is
40 not expected to occur in the affected area, but grassland and shrubland habitats suitable for
41 foraging may occur throughout the affected area (Table 13.2.12.1-1).
42
43
44

1 **Western Burrowing Owl**

2
3 The western burrowing owl is known to occur in the SEZ region where it forages in
4 grasslands, shrublands, and open disturbed areas. This species typically nests in burrows
5 constructed by mammals such as prairie dogs. Quad-level occurrences for this species intersect
6 the Milford Flats South SEZ and other portions of the affected area. According to the SWReGAP
7 habitat suitability model, only potentially suitable summer breeding habitat is expected to occur
8 in the SEZ affected area (Table 13.2.12.1-1). The availability of nest sites (burrows) within the
9 affected area has not been determined, but grassland and shrubland habitat that may be suitable
10 for either foraging or nesting occurs throughout the affected area.
11

12
13 **Dark Kangaroo Mouse**

14
15 The dark kangaroo mouse occurs in the Great Basin region in areas dominated by
16 sagebrush and is known to occur within the Milford Flats South SEZ region. Quad-level
17 occurrences for this species intersect the SEZ and other portions of the affected area. According
18 to the SWReGAP habitat suitability model, year-round habitat is expected to occur throughout
19 the SEZ and other portions of the affected area (Table 13.2.12.1-1).
20

21
22 **Fringed Myotis**

23
24 The fringed myotis is known to occur in the SEZ region in a variety of habitats including
25 riparian, shrubland, sagebrush, and pinyon-juniper woodlands. The species roosts in buildings
26 and caves. The species is known to occur in the Dixie National Forest, approximately 40 mi
27 (64 km) southeast of the SEZ. According to the SWReGAP habitat suitability model, potentially
28 suitable year-round habitat may be present within the affected area (Table 13.2.12.1-1). On the
29 basis of an evaluation of SWReGAP land cover types, there is no potentially suitable roosting
30 habitat (rocky cliffs and outcrops) on the SEZ or within the access road corridor. However,
31 approximately 30 acres (0.1 km²) of this potentially suitable roosting habitat may occur in the
32 transmission corridor; an additional 70 acres (0.3 km²) of this potentially suitable roosting
33 habitat occurs in the area of indirect effects outside the SEZ and the access road and transmission
34 corridors.
35

36
37 **Kit Fox**

38
39 The kit fox is widely distributed throughout western North America. Within the Milford
40 Flats South SEZ region, this species is known to occur in open grassland and shrubland habitats
41 where it uses burrows for resting and breeding. Quad-level occurrences for this species intersect
42 the affected area north of the SEZ. According to the SWReGAP habitat suitability model,
43 potentially suitable year-round shrubland habitat for the species may occur on the SEZ and in
44 other portions of the affected area (Table 13.2.12.1-1).
45
46

1 **Pygmy Rabbit**

2
3 The pygmy rabbit is widely distributed throughout the Great Basin and intermountain
4 regions of western North America. This species is known to occur in western Utah where it
5 prefers areas with tall, dense sagebrush and loose soils. The species is known to occur
6 approximately 10 mi (16 km) southeast of the Milford Flats South SEZ. According to the
7 SWReGAP habitat suitability model, potentially suitable year-round sagebrush-shrubland habitat
8 for the species may occur on the SEZ and in other portions of the affected area
9 (Table 13.2.12.1-1).

10
11
12 **Spotted Bat**

13
14 The spotted bat is known to occur in the SEZ region where it inhabits forest and
15 shrubland habitats and roosts in caves and rock crevices. The species has been recorded about
16 15 mi (24 km) north of the SEZ. According to the SWReGAP habitat suitability model,
17 potentially suitable year-round habitat may be present within the affected area
18 (Table 13.2.12.1-1). On the basis of an evaluation of SWReGAP land cover types, there is no
19 potentially suitable roosting habitat (rocky cliffs and outcrops) on the SEZ or within the access
20 road corridor. However, approximately 30 acres (0.1 km²) of this potentially suitable roosting
21 habitat may occur in the transmission corridor; an additional 70 acres (0.3 km²) of this
22 potentially suitable roosting habitat occurs in the area of indirect effects outside the SEZ and the
23 access road and transmission corridors.

24
25
26 **Townsend’s Big-Eared Bat**

27
28 The Townsend’s big-eared bat is known to occur in the SEZ region where it inhabits
29 forest and shrubland habitats and roosts in caves, mines, and buildings. Quad-level occurrences
30 for this species intersect the affected area north of the SEZ. According to the SWReGAP habitat
31 suitability model, potentially suitable year-round habitat may be present within the affected area
32 (Table 13.2.12.1-1). On the basis of an evaluation of SWReGAP land cover types, there is no
33 potentially suitable roosting habitat (rocky cliffs and outcrops) on the SEZ or within the access
34 road corridor. However, approximately 30 acres (0.1 km²) of this potentially suitable roosting
35 habitat may occur in the transmission corridor; an additional 70 acres (0.3 km²) of this
36 potentially suitable roosting habitat occurs in the area of indirect effects outside the SEZ and the
37 access road and transmission corridors.

38
39
40 **13.2.12.1.4 State-Listed Species**

41
42 According to Utah Administrative Rule R657-48, as described in the *Utah Sensitive*
43 *Species List* (UDWR 2010b), there are no species that receive a separate regulatory designation
44 from the UDWR or the State of Utah.

1 **13.2.12.1.5 Rare Species**
2

3 There are 18 species with a state status of S1 or S2 in Utah or considered species of
4 concern by the State of Utah or the USFWS that may occur in the affected area of the Milford
5 Flats South SEZ (Table 13.2.12.1-1). Only the Lewis’s woodpecker has not been previously
6 discussed as ESA-listed (Section 13.2.12.1.1), an ESA candidate (Section 13.2.12.1.2), or
7 BLM-designated sensitive (Section 13.2.12.1.3).
8
9

10 **13.2.12.2 Impacts**
11

12 The potential for impacts on special status species from utility-scale solar energy
13 development within the proposed Milford Flats South SEZ is discussed in this section. The types
14 of impacts that special status species could incur from construction and operation of utility-scale
15 solar energy facilities are discussed in Section 5.10.4.
16

17 The assessment of impacts on special status species is based on available information
18 on the presence of species in the affected area, as presented in Section 13.2.12.1, following the
19 analysis approach described in Appendix M. It is assumed that, prior to development, surveys
20 would be conducted to determine the presence of special status species and their habitats in and
21 near areas where ground-disturbing activities would occur. Additional NEPA assessments, ESA
22 consultations, and coordination with state natural resource agencies may be needed to address
23 project-specific impacts more thoroughly. These assessments and consultations could result in
24 additional required actions to avoid, minimize, or mitigate impacts on special status species
25 (see Section 13.2.12.3).
26

27 Solar energy development within the Milford Flats South SEZ could affect a variety of
28 habitats (see Sections 13.2.9 and 13.2.10). Impacts on these habitats could in turn affect special
29 status species dependent on those habitats. Based on UDWR records, quad-level occurrences of
30 the following eight special status species intersect the affected area of the Milford Flats South
31 SEZ: ferruginous hawk, greater sage-grouse, short-eared owl, western burrowing owl, dark
32 kangaroo mouse, kit fox, Townsend’s big-eared bat, and Utah prairie dog. Other special status
33 species may occur on the SEZ or within the affected area based upon the presence of potentially
34 suitable habitat. As discussed in Section 13.2.12.1, this approach to identifying the species that
35 could occur in the affected area probably overestimates the number of species that actually occur
36 in the affected area and may therefore overestimate impacts on some special status species.
37

38 Potential direct and indirect impacts on special status species within the SEZ and in
39 the area of indirect effects outside the SEZ are presented in Table 13.2.12.1-1. In addition, the
40 overall potential magnitude of impacts on each species (assuming programmatic design features
41 are in place) is presented, along with any potential species-specific mitigation measures that
42 could further reduce impacts.
43

44 Impacts on special status species could occur during all phases of development
45 (construction, operation, and decommissioning/reclamation) of a utility-scale solar energy
46 project within the SEZ. Construction and operation activities could result in short- or long-term

1 impacts on individuals and their habitats, especially if these activities were sited in areas where
2 special status species are known to or could occur. As presented in Section 13.2.1.2, a 5-mi
3 (8-km) long road corridor and a 19-mi (30-km) long transmission line corridor are assumed to be
4 needed to serve solar facilities within this SEZ.

5
6 Direct impacts would result from habitat destruction or modification. It is assumed that
7 direct impacts would occur only within the SEZ and assumed road and transmission corridors
8 where ground-disturbing activities are expected to occur. Indirect impacts could result from
9 surface water and sediment runoff from disturbed areas, fugitive dust generated by project
10 activities, accidental spills, harassment, and lighting. No ground-disturbing activities associated
11 with project development are anticipated to occur within the area of indirect effects.
12 Decommissioning of facilities and reclamation of disturbed areas after operations cease could
13 result in short-term negative impacts on individuals and habitats adjacent to project areas, but
14 long-term benefits would accrue if original land contours and native plant communities were
15 restored in previously disturbed areas.

16
17 The successful implementation of programmatic design features (discussed in
18 Appendix A, Section A.2.2) would reduce direct impacts on some special status species,
19 especially those that depend on habitat types that can be easily avoided (e.g., pinyon-juniper
20 woodlands). Indirect impacts on special status species could be reduced to negligible levels by
21 implementing programmatic design features, especially those engineering controls that would
22 reduce runoff, sedimentation, spills, and fugitive dust.

23 24 25 ***13.2.12.2.1 Impacts on Species Listed under the ESA***

26
27 The Utah prairie dog is the only species listed under the ESA that has the potential to
28 occur in the affected area of the proposed Milford Flats South SEZ and is the only ESA-listed
29 species that the USFWS identified as potentially affected by solar energy development on the
30 SEZ (Stout 2009). Quad-level occurrences for this species intersect the affected area south of the
31 SEZ, and potentially suitable shrubland habitat occurs throughout the affected area
32 (Figure 13.2.12.1-1). Furthermore, information provided by the Utah prairie dog colony tracking
33 database indicates the presence of Utah prairie dog colonies outside the affected area within
34 10 mi (16 km) south of the SEZ. According to SWReGAP, about 1,874 acres (8 km²) of
35 potentially suitable habitat on the SEZ, 11 acres (<0.1 km²) in the road corridor, and 27 acres
36 (<0.1 km²) in the transmission line corridor could be directly affected by construction and
37 operations (Table 13.2.12.1-1). This direct effects area represents about 0.2% of available
38 suitable habitat of the Utah prairie dog in the SEZ region. About 30,600 acres (124 km²) of
39 suitable habitat occurs in the area of potential indirect effects; this area represents about 3.7% of
40 the available suitable habitat in the SEZ region (Table 13.2.12.1-1).

41
42 The overall impact on the Utah prairie dog from construction, operation, and
43 decommissioning of utility-scale solar energy facilities within the Milford Flats South SEZ is
44 considered small because the amount of potentially suitable habitat for this species in the area of
45 direct effects represents less than 1% of potentially suitable habitat in the SEZ region.

1 The implementation of programmatic design features and complete avoidance of all
2 suitable habitats could reduce impacts to negligible levels. Impacts could also be reduced by
3 conducting pre-disturbance surveys, buffering the locations of known prairie dog colonies, and
4 avoiding or minimizing disturbances within those areas, as recommended by the USFWS
5 (Stout 2009). Formal consultation with the USFWS under Section 7 of the ESA is required for
6 any federal action that may adversely affect an ESA-listed species. Therefore, prior to
7 development, consultation with the USFWS would be necessary to discuss potential impacts on
8 the Utah prairie dog, develop an approved pre-disturbance survey protocol, develop site-specific
9 mitigation, authorize incidental take statements, and develop a Utah prairie dog translocation and
10 monitoring program (if necessary).

11
12 To offset impacts of solar development on the SEZ, compensatory mitigation may be
13 needed to balance the acreage of habitat lost with acquisition of lands that would be improved
14 and protected for Utah prairie dog populations. Compensation can be accomplished by
15 improving the carrying capacity for the Utah prairie dog on the acquired lands. As for other
16 mitigation actions, consultations with the USFWS and the UDWR would be necessary to
17 determine the appropriate mitigation ratio to acquire, enhance, and preserve these lands.

18 19 20 ***13.2.12.2 Impacts on Species That Are Candidates for Listing under the ESA***

21
22 The greater sage-grouse is the only species that is a candidate for listing under the ESA
23 that could occur in the affected area of the proposed Milford Flats South SEZ. Quad-level
24 occurrences for this species intersect the affected area east of the SEZ, and potentially suitable
25 sagebrush habitat occurs throughout the affected area (Figure 13.2.12.1-1). In its scoping
26 comments on the SEZ, the USFWS identified a potential impact on greater sage-grouse habitat
27 resulting from solar energy development on the SEZ (Stout 2009). According to SWReGAP,
28 about 3,905 acres (16 km²) of potentially suitable habitat on the SEZ, 34 acres (0.1 km²) in the
29 road corridor, and 96 acres (0.4 km²) in the transmission line corridor could be directly affected
30 by construction and operations (Table 13.2.12.1-1). This direct effects area represents about
31 0.2% of available suitable habitat for the greater sage-grouse in the SEZ region. About
32 77,300 acres (313 km²) of suitable habitat occurs in the area of potential indirect effects; this
33 area represents about 4.7% of the available suitable habitat in the SEZ region
34 (Table 13.2.12.1-1).

35
36 The overall impact on the greater sage-grouse from construction, operation, and
37 decommissioning of utility-scale solar energy facilities within the Milford Flats South SEZ is
38 considered small because the amount of potentially suitable habitat for this species in the area of
39 direct effects represents less than 1% of potentially suitable habitat in the SEZ region. The
40 implementation of programmatic design features alone may not be sufficient to reduce impacts to
41 negligible levels because potentially suitable sagebrush habitats are widespread throughout the
42 area of direct effects.

43
44 Efforts to mitigate the impacts of solar energy development in the Milford Flats South
45 SEZ on the greater sage-grouse should be developed in consultation with the USFWS and
46 UDWR following the *Strategic Plan for Management of Sage Grouse* (UDWR 2009d) and

1 *Guidelines to Manage Sage Grouse Populations and Their Habitats* (Connelly et al. 2000).
2 Impacts could be reduced by conducting pre-disturbance surveys and avoiding or minimizing
3 disturbance to occupied habitats in the area of direct effects, especially leks and nesting areas. If
4 avoidance or minimization is not a feasible option, a compensatory mitigation plan could be
5 developed and implemented to mitigate direct effects on occupied habitats. Compensation could
6 involve the protection and enhancement of existing occupied or suitable habitats to compensate
7 for habitats lost to development. Any mitigation plans should be developed in coordination with
8 the USFWS and the UDWR.

11 ***13.2.12.2.3 Impacts on BLM-Designated Sensitive Species***

12
13 Of the 17 BLM-designated sensitive species that could occur in the affected area of the
14 proposed Milford Flats South SEZ, one species, greater sage-grouse, was discussed in
15 Section 13.2.12.2.2 because of its status under the ESA. Impacts on all other BLM-designated
16 sensitive species that have potentially suitable habitat within the SEZ, road corridor, or
17 transmission line corridor (i.e., the area of direct effects) are discussed below.

19 **Compact Cat's-Eye**

20
21
22 The compact cat's-eye is not known to occur in the affected area of the Milford Flats
23 South SEZ; however, approximately 5,899 acres (24 km²) of potentially suitable habitat on the
24 SEZ, 89 acres (0.4 km²) in the road corridor, and 56 acres (0.2 km²) in the transmission line
25 corridor could be directly affected by construction and operations (Table 13.2.12.1-1). This
26 direct effects area represents about 0.2% of available suitable habitat in the SEZ region. About
27 88,250 acres (357 km²) of potentially suitable habitat occurs in the area of potential indirect
28 effects; this area represents about 3.6% of the available suitable habitat in the SEZ region
29 (Table 13.2.12.1-1).

30
31 The overall impact on the compact cat's-eye from construction, operation, and
32 decommissioning of utility-scale solar energy facilities within the Milford Flats South SEZ is
33 considered small because the amount of potentially suitable habitat for this species in the area of
34 direct effects represents less than 1% of potentially suitable habitat in the SEZ region. The
35 implementation of programmatic design features may be sufficient to reduce indirect impacts to
36 negligible levels.

37
38 Avoidance of all potentially suitable habitats to mitigate impacts on the compact cat's-
39 eye is not feasible because potentially suitable shrubland habitats are widespread throughout the
40 area of direct effects. For this species and other special status plants, impacts could be reduced
41 by conducting pre-disturbance surveys and avoiding or minimizing disturbance to occupied
42 habitats in the area of direct effect. If avoidance or minimization is not a feasible option, plants
43 could be translocated from areas of direct effects to protected areas that would not be affected
44 directly or indirectly by future development. Alternatively, or in combination with translocation,
45 a compensatory mitigation plan could be developed and implemented to mitigate direct effects
46 on occupied habitats. Compensation could involve the protection and enhancement of existing

1 occupied or suitable habitats to compensate for habitats lost to development. A comprehensive
2 mitigation strategy that uses one or more of these options could be designed to completely offset
3 the impacts of development.
4

6 **Jone's Globemallow**

7
8 The Jone's globemallow is not known to occur in the affected area of the Milford Flats
9 South SEZ; however, approximately 5,900 acres (24 km²) of potentially suitable habitat on
10 the SEZ, 89 acres (0.4 km²) in the road corridor, and 87 acres (0.4 km²) in the transmission line
11 corridor could be directly affected by construction and operations (Table 13.2.12.1-1). This
12 direct effects area represents about 0.1% of available suitable habitat in the SEZ region. About
13 99,600 acres (403 km²) of potentially suitable habitat occurs in the area of potential indirect
14 effects; this area represents about 2.4% of the available suitable habitat in the SEZ region
15 (Table 13.2.12.1-1).
16

17 The overall impact on the Jone's globemallow from construction, operation, and
18 decommissioning of utility-scale solar energy facilities within the Milford Flats South SEZ is
19 considered small because the amount of potentially suitable habitat for this species in the area of
20 direct effects represents less than 1% of potentially suitable habitat in the SEZ region. The
21 implementation of programmatic design features may be sufficient to reduce indirect impacts to
22 negligible levels.
23

24 Avoidance of all potentially suitable habitats to mitigate impacts on the Jone's
25 globemallow is not feasible because these habitats (i.e., shrublands) are widespread throughout
26 the area of direct effects. However, impacts could be reduced to negligible levels with the
27 implementation of programmatic design features and the mitigation options described previously
28 for the compact cat's-eye. The need for mitigation should first be determined by conducting
29 preconstruction surveys for the species and its habitat in the area of direct effects.
30
31

32 **Long-Calyx Milkvetch**

33
34 The long-calyx milkvetch is not known to occur in the affected area of the Milford Flats
35 South SEZ; however, approximately 5,899 acres (24 km²) of potentially suitable habitat on
36 the SEZ, 89 acres (0.4 km²) in the road corridor, and 87 acres (0.4 km²) in the transmission line
37 corridor could be directly affected by construction and operations (Table 13.2.12.1-1). This
38 direct impact area represents about 0.2% of available suitable habitat in the SEZ region. About
39 98,300 acres (398 km²) of potentially suitable habitat occurs in the area of potential indirect
40 effects; this area represents about 2.5% of the available suitable habitat in the SEZ region
41 (Table 13.2.12.1-1).
42

43 The overall impact on the long-calyx milkvetch from construction, operation, and
44 decommissioning of utility-scale solar energy facilities within the Milford Flats South SEZ is
45 considered small because the amount of potentially suitable habitat for this species in the area of
46 direct effects represents less than 1% of potentially suitable habitat in the SEZ region. The

1 implementation of programmatic design features may be sufficient to reduce indirect impacts to
2 negligible levels.

3
4 Avoidance of all potentially suitable habitats to mitigate impacts on the long-calyx
5 milkvetch is not feasible because these habitats (i.e., sagebrush and shrublands) are widespread
6 throughout the area of direct effects. However, impacts could be reduced to negligible levels
7 with the implementation of programmatic design features and the mitigation options described
8 previously for the compact cat's-eye. The need for mitigation should first be determined by
9 conducting preconstruction surveys for the species and its habitat in the area of direct effects.

10 11 12 **Money Wild Buckwheat**

13
14 The money wild buckwheat is not known to occur in the affected area of the Milford
15 Flats South SEZ; however, approximately 4,505 acres (18 km²) of potentially suitable habitat on
16 the SEZ, 75 acres (0.3 km²) in the road corridor, and 84 acres (0.3 km²) in the transmission line
17 corridor could be directly affected by construction and operations (Table 13.2.12.1-1). This
18 direct effects area represents about 0.1% of available suitable habitat in the SEZ region. About
19 83,450 acres (338 km²) of potentially suitable habitat occurs in the area of potential indirect
20 effects; this area represents about 2.4% of the available suitable habitat in the SEZ region
21 (Table 13.2.12.1-1).

22
23 The overall impact on the money wild buckwheat from construction, operation, and
24 decommissioning of utility-scale solar energy facilities within the Milford Flats South SEZ is
25 considered small because the amount of potentially suitable habitat for this species in the area of
26 direct effects represents less than 1% of potentially suitable habitat in the SEZ region. The
27 implementation of programmatic design features may be sufficient to reduce indirect impacts to
28 negligible levels.

29
30 Avoidance of all potentially suitable habitats to mitigate impacts on the money wild
31 buckwheat is not feasible because these habitats (i.e., sagebrush and shrublands) are widespread
32 throughout the area of direct effects. However, impacts could be reduced to negligible levels
33 with the implementation of programmatic design features and the mitigation options described
34 previously for the compact cat's-eye. The need for mitigation should first be determined by
35 conducting preconstruction surveys for the species and its habitat in the area of direct effects.

36 37 38 **American White Pelican**

39
40 The American white pelican is known to occur in the SEZ region where it is a summer
41 resident and migrant in large reservoirs and other bodies of water. According to the SWReGAP
42 habitat suitability model, suitable habitat for this species does not exist in the area of direct
43 effects. However, approximately 100 acres (0.4 km²) of potentially suitable habitat occurs in the
44 area of potential indirect effects; this area represents about 0.1% of the available suitable habitat
45 in the SEZ region (Table 13.2.12.1-1). This habitat represents potentially suitable nonbreeding

1 migratory habitat; suitable nesting habitat does not occur in the affected area, but the species may
2 be observed as a transient in portions of the affected area (Table 13.2.12.1-1).

3
4 Because potentially suitable habitat does not exist in the area of direct effects, it is
5 expected that the implementation of programmatic design features would be sufficient to reduce
6 impacts on this species to negligible levels. No species-specific mitigation of direct effects is
7 warranted because the species occurs only as a transient in the affected area and the affected area
8 represents a very small proportion of potentially suitable habitat in the SEZ region.

10 **Bald Eagle**

11
12
13 The bald eagle is a winter resident within the proposed Milford Flats South SEZ region.
14 Approximately 1,889 acres (8 km²) of potentially suitable foraging habitat on the SEZ, 11 acres
15 (<0.1 km²) of potentially suitable foraging habitat in the road corridor, and 81 acres (0.3 km²) of
16 potentially suitable foraging habitat in the transmission line corridor could be directly affected by
17 construction and operations (Table 13.2.12.1-1). This direct effects area represents about 0.1% of
18 available suitable foraging habitat in the SEZ region. About 43,530 acres (176 km²) of
19 potentially suitable habitat occurs in the area of potential indirect effects; this area represents
20 about 1.7% of the available suitable habitat in the SEZ region (Table 13.2.12.1-1).

21
22 The overall impact on the bald eagle from construction, operation, and decommissioning
23 of utility-scale solar energy facilities within the Milford Flats South SEZ is considered small
24 because direct effects would only occur on potentially suitable foraging habitat, and the amount
25 of this habitat in the area of direct effects represents less than 1% of potentially suitable habitat
26 in the SEZ region. The implementation of programmatic design features is expected to reduce
27 indirect impacts to negligible levels. Avoidance of direct impacts on all potentially suitable
28 foraging habitat is not a feasible way to mitigate impacts on the bald eagle because potentially
29 suitable shrubland is widespread throughout the area of direct effects and readily available in
30 other portions of the affected area.

31 32 **Ferruginous Hawk**

33
34
35 The ferruginous hawk is a year-round resident within the proposed Milford Flats South
36 SEZ region and potentially suitable breeding and nonbreeding habitat may occur in the affected
37 area. Approximately 2,500 acres (10 km²) of potentially suitable habitat on the SEZ, 30 acres
38 (0.1 km²) in the road corridor, and 93 acres (0.4 km²) in the transmission line corridor could be
39 directly affected by construction and operations (Table 13.2.12.1-1). This direct effects area
40 represents about 0.1% of available suitable habitat in the SEZ region. About 63,700 acres
41 (256 km²) of potentially suitable habitat occurs in the area of potential indirect effects; this area
42 represents about 3.6% of the available suitable habitat in the SEZ region (Table 13.2.12.1-1).
43 Most of this suitable habitat in the affected area is represented by foraging habitat (shrublands);
44 however, potentially suitable nesting habitat (woodlands and rocky cliffs and outcrops) may
45 occur in portions of the affected area. On the basis of an evaluation of SWReGAP land cover
46 types, there are no forested habitats or rocky cliffs and outcrops on the SEZ that may be

1 potentially suitable nesting habitat for the ferruginous hawk. However, approximately 7 acres
2 (<0.1 km²) of forested habitat within the access road corridor and 4,475 acres (18 km²) of
3 forested habitat within the transmission corridor may provide potentially suitable nesting habitat
4 for this species. In addition, approximately 10,150 acres (41 km²) of forested habitat occurs
5 throughout other portions of the area of indirect effects outside the SEZ and the access road and
6 transmission corridors. Approximately 30 acres (0.1 km²) of rocky cliffs and outcrops may occur
7 in the transmission corridor; an additional 70 acres (0.3 km²) of this potentially suitable nesting
8 habitat occurs in the area of indirect effects outside the SEZ and the access road and transmission
9 corridors.

10
11 The overall impact on the ferruginous hawk from construction, operation, and
12 decommissioning of utility-scale solar energy facilities within the Milford Flats South SEZ is
13 considered small because the amount of potentially suitable habitat for this species in the area of
14 direct effects represents less than 1% of potentially suitable foraging habitat in the SEZ region.
15 The implementation of programmatic design features may be sufficient to reduce indirect
16 impacts on this species to negligible levels.

17
18 Avoidance of direct impacts on all foraging habitat is not feasible because suitable
19 foraging habitat (shrublands) is widespread in the area of direct effect and may be readily
20 available in other portions of the affected area. However, avoiding or minimizing disturbance of
21 all occupied or potential nesting habitat (woodlands and rocky cliffs and outcrops) in the area of
22 direct effects is feasible, and could reduce impacts. If avoiding or minimizing disturbance of all
23 occupied or potential nesting habitat is not a feasible option, a compensatory mitigation plan
24 could be developed and implemented to mitigate direct effects. Compensation could involve the
25 protection and enhancement of existing occupied or suitable habitats to compensate for habitats
26 lost to development. A comprehensive mitigation strategy that used one or both of these options
27 could be designed to completely offset the impacts of development. The need for mitigation,
28 other than programmatic design features, should be determined by conducting pre-disturbance
29 surveys for the species and its habitat within the area of direct effects.

30 31 32 **Long-Billed Curlew**

33
34 The long-billed curlew is a summer resident and migrant within the proposed Milford
35 Flats South SEZ region and individuals may occur as migratory transients in grassland and
36 wetland habitats (playas) in the affected area. Although suitable habitat does not occur on the
37 SEZ, approximately 6 acres (<0.1 km²) of potentially suitable habitat in the road corridor and
38 6 acres (<0.1 km²) in the transmission line corridor could be directly affected by construction
39 and operations (Table 13.2.12.1-1). This direct effects area represents <0.1% of available
40 suitable habitat in the SEZ region. About 8,565 acres (35 km²) of potentially suitable habitat
41 occurs in the area of potential indirect effects; this area represents about 3.0% of the available
42 suitable habitat in the SEZ region (Table 13.2.12.1-1). Most of this area could serve as foraging
43 habitat (i.e., grasslands); the species is not expected to nest in the affected area.

44
45 The overall impact on the long-billed curlew from construction, operation, and
46 decommissioning of utility-scale solar energy facilities within the Milford Flats South SEZ is

1 considered small because the amount of potentially suitable habitat for this species in the area of
2 direct effects represents less than 1% of potentially suitable habitat in the SEZ region. The
3 implementation of programmatic design features may be sufficient to reduce indirect impacts on
4 this species to negligible levels. No species-specific mitigation of direct effects is warranted
5 because the species occurs only as a transient in the affected area and the affected area represents
6 a very small proportion of potentially suitable foraging habitat in the SEZ region.

9 **Northern Goshawk**

10
11 The northern goshawk is considered to be a year-round resident within the proposed
12 Milford Flats South SEZ region where it occurs in montane forests and shrubland habitats.
13 According to the SWReGAP habitat suitability model, potentially suitable habitat does not exist
14 on the SEZ or within the road corridor. However, approximately 29 acres (<0.1 km²) of
15 potentially suitable habitat in the transmission line corridor could be directly affected
16 (Table 13.2.12.1-1). This direct effects area represents about <0.1% of available suitable habitat
17 in the SEZ region. About 7,000 acres (28 km²) of potentially suitable habitat occurs in the area
18 of potential indirect effects; this area represents about 1.0 % of the available suitable habitat in
19 the SEZ region (Table 13.2.12.1-1). Most of this suitable habitat in the affected area is
20 represented by foraging habitat (shrublands); however, potentially suitable nesting habitat
21 (woodlands) may occur in portions of the affected area. On the basis of an evaluation of
22 SWReGAP land cover types, approximately 7 acres (<0.1 km²) of woodland habitat that may be
23 potentially suitable nesting habitat occurs in the transmission corridor. Approximately
24 4,475 acres (18 km²) of this habitat occurs in the area of indirect effects.

25
26 The overall impact on the northern goshawk from construction, operation, and
27 decommissioning of utility-scale solar energy facilities within the Milford Flats South SEZ is
28 considered small because the amount of potentially suitable habitat for this species in the area of
29 direct effects represents less than 1% of potentially suitable habitat in the SEZ region. The
30 implementation of programmatic design features may be sufficient to reduce indirect impacts on
31 this species to negligible levels.

32
33 Avoidance of direct impacts on all foraging habitat (shrublands) is not feasible because
34 suitable foraging habitat (shrublands) is widespread in the area of direct effect and may be
35 readily available in other portions of the affected area. However, avoiding or minimizing
36 disturbance of all occupied or potential nesting habitat (woodlands) within the transmission
37 corridor is feasible, and could reduce impacts. If avoiding or minimizing disturbance of all
38 occupied or potential nesting habitat is not feasible, a compensatory mitigation plan could be
39 developed and implemented to mitigate direct effects. Compensation could involve the
40 protection and enhancement of existing occupied or suitable habitats to compensate for habitats
41 lost to development. A comprehensive mitigation strategy that used one or both of these options
42 could be designed to completely offset the impacts of development. The need for mitigation,
43 other than programmatic design features, should be determined by conducting pre-disturbance
44 surveys for the species and its habitat within the area of direct effects.

1 **Short-Eared Owl**
2

3 The short-eared owl is considered to be a year-round resident within the proposed
4 Milford Flats South SEZ region, although it may only occur as a winter resident in the affected
5 area. It is known to occur in open grasslands and shrublands. Approximately 5,950 acres
6 (24 km²) of potentially suitable habitat on the SEZ, 36 acres (0.1 km²) in the road corridor, and
7 151 acres (0.6 km²) in the transmission line corridor could be directly affected by construction
8 and operations (Table 13.2.12.1-1). This direct effects area represents about 0.2% of available
9 suitable habitat in the SEZ region. About 106,150 acres (430 km²) of potentially suitable habitat
10 occurs in the area of potential indirect effects; this area represents about 2.7% of the available
11 suitable habitat in the SEZ region (Table 13.2.12.1-1).
12

13 The overall impact on the short-eared owl from construction, operation, and
14 decommissioning of utility-scale solar energy facilities within the Milford Flats South SEZ is
15 considered small because direct effects would only occur on potentially suitable foraging habitat,
16 and the amount of this habitat in the area of direct effects represents less than 1% of potentially
17 suitable habitat in the SEZ region. The implementation of programmatic design features is
18 expected to reduce indirect impacts to negligible levels. Avoidance of direct impacts on all
19 potentially suitable foraging habitat is not a feasible way to mitigate impacts on the short-eared
20 owl because potentially suitable shrubland is widespread throughout the area of direct effects and
21 readily available in other portions of the affected area.
22

23
24 **Western Burrowing Owl**
25

26 The western burrowing owl is considered to be a summer resident within the proposed
27 Milford Flats South SEZ region where it is known to forage in grasslands and shrublands. Within
28 the SEZ region, the species nests in burrows constructed by mammals such as prairie dogs.
29 Approximately 5,964 acres (24 km²) of potentially suitable habitat on the SEZ, 36 acres
30 (0.1 km²) in the road corridor, and 81 acres (0.3 km²) in the transmission line corridor could be
31 directly affected by construction and operations (Table 13.2.12.1-1). This direct effects area
32 represents about 0.2% of available suitable habitat in the SEZ region. About 96,300 acres
33 (390 km²) of potentially suitable habitat occurs in the area of potential indirect effects; this area
34 represents about 4.0% of the available suitable habitat in the SEZ region (Table 13.2.12.1-1).
35 Most of this area could serve as foraging and nesting habitat (shrublands). The abundance of
36 burrows suitable for nesting on the SEZ and in the area of indirect effects has not been
37 determined.
38

39 The overall impact on the western burrowing owl from construction, operation, and
40 decommissioning of utility-scale solar energy facilities within the Milford Flats South SEZ is
41 considered small because the amount of potentially suitable habitat for this species in the area of
42 direct effects represents less than 1% of potentially suitable habitat in the SEZ region. The
43 implementation of programmatic design features may be sufficient to reduce indirect impacts on
44 this species to negligible levels.
45

1 Avoidance of all potentially suitable habitats is not feasible to mitigate impacts on the
2 western burrowing owl because potentially suitable shrubland habitats are widespread
3 throughout the area of direct effect and may be readily available in other portions of the SEZ
4 region. However, impacts on the western burrowing owl could be reduced by avoiding or
5 minimizing disturbance to occupied burrows and habitat in the area of direct effects. If avoiding
6 or minimizing disturbance of all occupied habitat are not feasible options, a compensatory
7 mitigation plan could be developed and implemented to mitigate direct effects. Compensation
8 could involve the protection and enhancement of existing occupied or suitable habitats to
9 compensate for habitats lost to development. A comprehensive mitigation strategy that used one
10 or both of these options could be designed to completely offset the impacts of development. The
11 need for mitigation, other than programmatic design features, should be determined by
12 conducting pre-disturbance surveys for the species and its habitat within the area of direct
13 effects.
14

16 **Dark Kangaroo Mouse**

17
18 The dark kangaroo mouse is considered to be a year-round resident within the proposed
19 Milford Flats SEZ region where it is known to occur in sandy regions dominated by sagebrush.
20 Approximately 2,712 acres (11 km²) of potentially suitable habitat on the SEZ and 2 acres
21 (<0.1 km²) of potentially suitable foraging habitat in the transmission line corridor could be
22 directly affected by construction and operations (Table 13.2.12.1-1). This direct effects area
23 represents about 0.4% of available suitable foraging habitat in the SEZ region. About
24 42,100 acres (170 km²) of potentially suitable foraging habitat occurs in the area of potential
25 indirect effects; this area represents about 6.8% of the available suitable foraging habitat in the
26 SEZ region (Table 13.2.12.1-1).
27

28 The overall impact on the dark kangaroo mouse from construction, operation, and
29 decommissioning of utility-scale solar energy facilities within the Milford Flats South SEZ is
30 considered small because the amount of potentially suitable habitat for this species in the area of
31 direct effects represents less than 1% of potentially suitable habitat in the SEZ region. The
32 implementation of programmatic design features may be sufficient to reduce indirect impacts on
33 this species to negligible levels.
34

35 The avoidance of all potentially suitable habitats is not feasible to mitigate impacts on the
36 dark kangaroo mouse because potentially suitable sagebrush habitats are widespread throughout
37 the area of direct effects. However, pre-disturbance surveys and avoiding or minimizing
38 disturbance of occupied habitats in the area of direct effects could reduce impacts. If avoidance is
39 not a feasible option, a compensatory mitigation plan could be developed and implemented to
40 mitigate direct effects on occupied habitats. Compensation could involve the protection and
41 enhancement of existing occupied or suitable habitats to compensate for habitats lost to
42 development. A comprehensive mitigation strategy that uses one or both of these options could
43 be designed to completely offset the impacts of development.
44
45
46

1 **Fringed Myotis**
2

3 The fringed myotis is considered to be a year-round resident within the proposed Milford
4 Flats South SEZ region where it is known to forage in riparian, shrubland, and forested habitats.
5 Approximately 6,433 acres (26 km²) of potentially suitable foraging habitat on the SEZ, 36 acres
6 (0.1 km²) in the road corridor, and 152 acres (0.6 km²) in the transmission line corridor could be
7 directly affected by construction and operations (Table 13.2.12.1-1). This direct effects area
8 represents about 0.1% of available suitable foraging habitat in the SEZ region. About
9 114,600 acres (464 km²) of potentially suitable foraging habitat occurs in the area of potential
10 indirect effects; this area represents about 2.5% of the available suitable foraging habitat in the
11 SEZ region (Table 13.2.12.1-1). On the basis of an evaluation of SWReGAP land cover types,
12 there is no potentially suitable roosting habitat (rocky cliffs and outcrops) on the SEZ or within
13 the access road corridor. However, approximately 30 acres (0.1 km²) of this potentially suitable
14 roosting habitat may occur in the transmission corridor; an additional 70 acres (0.3 km²) of this
15 potentially suitable roosting habitat occurs in the area of indirect effects outside the SEZ and the
16 access road and transmission corridors.
17

18 The overall impact on the fringed myotis from construction, operation, and
19 decommissioning of utility-scale solar energy facilities within the Milford Flats South SEZ is
20 considered small because the amount of potentially suitable habitat for this species in the area of
21 direct effects represents less than 1% of potentially suitable habitat in the SEZ region. The
22 implementation of programmatic design features may be sufficient to reduce indirect impacts on
23 this species to negligible levels.
24

25 Avoidance of direct impacts on all foraging habitat is not feasible because suitable
26 foraging habitat (shrublands) is widespread in the area of direct effect and may be readily
27 available in other portions of the affected area. However, avoiding or minimizing disturbance of
28 all occupied or potential roosting habitat (rocky cliffs and outcrops) within the transmission
29 corridor is feasible, and could reduce impacts. If avoiding or minimizing disturbance of all
30 occupied or potential roosting habitat is not feasible, a compensatory mitigation plan could be
31 developed and implemented to mitigate direct effects. Compensation could involve the
32 protection and enhancement of existing occupied or suitable habitats to compensate for habitats
33 lost to development. A comprehensive mitigation strategy that used one or both of these options
34 could be designed to completely offset the impacts of development. The need for mitigation,
35 other than programmatic design features, should be determined by conducting pre-disturbance
36 surveys for the species and its habitat within the area of direct effects.
37
38

39 **Kit Fox**
40

41 The kit fox is considered to be a year-round resident within the proposed Milford Flats
42 South SEZ region where it is known to occur in grassland and shrubland habitats. Approximately
43 5,950 acres (24 km²) of potentially suitable habitat on the SEZ, 30 acres (0.1 km²) in the road
44 corridor, and 57 acres (0.2 km²) in the transmission line corridor could be directly affected by
45 construction and operations (Table 13.2.12.1-1). This direct effects area represents about 0.3% of
46 available suitable habitat in the SEZ region. About 85,400 acres (346 km²) of potentially suitable

1 habitat occurs in the area of potential indirect effects; this area represents about 4.4% of the
2 available suitable habitat in the SEZ region (Table 13.2.12.1-1).

3
4 The overall impact on the kit fox from construction, operation, and decommissioning of
5 utility-scale solar energy facilities within the Milford Flats South SEZ is considered small
6 because the amount of potentially suitable habitat for this species in the area of direct effects
7 represents less than 1% of potentially suitable habitat in the SEZ region. The implementation of
8 programmatic design features may be sufficient to reduce indirect impacts on this species to
9 negligible levels.

10
11 The avoidance of all potentially suitable habitats is not feasible to mitigate impacts on the
12 kit fox because potentially suitable shrubland habitats are widespread throughout the area of
13 direct effects. However, pre-disturbance surveys and avoiding or minimizing disturbance of
14 occupied habitats in the area of direct effects could reduce impacts. If avoidance or minimization
15 is not a feasible option, a translocation and compensatory mitigation plan could be developed
16 and implemented to mitigate direct effects on occupied habitats. Coordination with the
17 appropriate federal and state agencies should be required for the development of any
18 translocation and compensatory mitigation plans. Compensation could involve the protection and
19 enhancement of existing occupied or suitable habitats to compensate for habitats lost to
20 development. A comprehensive mitigation strategy that uses one or both of these options could
21 be designed to completely offset the impacts of development.

22 23 24 **Pygmy Rabbit**

25
26 The pygmy rabbit is considered to be a year-round resident within the proposed Milford
27 Flats South SEZ region where it is known to occur in sagebrush habitats. Approximately
28 2,031 acres (8 km²) of potentially suitable habitat on the SEZ, 24 acres (0.1 km²) in the road
29 corridor, and 49 acres (0.2 km²) in the transmission line corridor could be directly affected by
30 construction and operations (Table 13.2.12.1-1). This direct effects area represents about 0.2% of
31 available suitable habitat in the SEZ region. About 42,800 acres (173 km²) of potentially suitable
32 habitat occurs in the area of potential indirect effects; this area represents about 4.4% of the
33 available suitable habitat in the SEZ region (Table 13.2.12.1-1).

34
35 The overall impact on the pygmy rabbit from construction, operation, and
36 decommissioning of utility-scale solar energy facilities within the Milford Flats South SEZ is
37 considered small because the amount of potentially suitable habitat for this species in the area of
38 direct effects represents less than 1% of potentially suitable habitat in the SEZ region. The
39 implementation of programmatic design features may be sufficient to reduce indirect impacts on
40 this species to negligible levels.

41
42 The avoidance of all potentially suitable habitats is not feasible to mitigate impacts on the
43 pygmy rabbit because potentially suitable sagebrush habitats are widespread throughout the area
44 of direct effects. However, pre-disturbance surveys and avoiding or minimizing disturbance of
45 occupied habitats in the area of direct effects could reduce impacts. If avoidance or minimization
46 is not a feasible option, a translocation and compensatory mitigation plan could be developed

1 and implemented to mitigate direct effects on occupied habitats. Coordination with the
2 appropriate federal and state agencies should be required for the development of any
3 translocation and compensatory mitigation plans. Compensation could involve the protection and
4 enhancement of existing occupied or suitable habitats to compensate for habitats lost to
5 development. A comprehensive mitigation strategy that uses one or both of these options could
6 be designed to completely offset the impacts of development.
7
8

9 **Spotted Bat**

10
11 The spotted bat is considered to be a year-round resident within the proposed Milford
12 Flats South SEZ region where it is known to forage in shrubland and forested habitats.
13 Approximately 4,544 acres (18 km²) of potentially suitable foraging habitat on the SEZ, 25 acres
14 (0.1 km²) in the road corridor, and 124 acres (0.5 km²) in the transmission line corridor could be
15 directly affected by construction and operations (Table 13.2.12.1-1). This direct effects area
16 represents about 0.1% of available suitable foraging habitat in the SEZ region. About
17 81,500 acres (330 km²) of potentially suitable foraging habitat occurs in the area of potential
18 indirect effects; this area represents about 2.5% of the available suitable foraging habitat in the
19 SEZ region (Table 13.2.12.1-1). On the basis of an evaluation of SWReGAP land cover types,
20 there is no potentially suitable roosting habitat (rocky cliffs and outcrops) on the SEZ or within
21 the access road corridor. However, approximately 30 acres (0.1 km²) of this potentially suitable
22 roosting habitat may occur in the transmission corridor; an additional 70 acres (0.3 km²) of this
23 potentially suitable roosting habitat occurs in the area of indirect effects outside the SEZ and the
24 access road and transmission corridors.
25

26 The overall impact on the spotted bat from construction, operation, and decommissioning
27 of utility-scale solar energy facilities within the Milford Flats South SEZ is considered small
28 because the amount of potentially suitable habitat for this species in the area of direct effects
29 represents less than 1% of potentially suitable habitat in the SEZ region. The implementation of
30 programmatic design features may be sufficient to reduce indirect impacts on this species to
31 negligible levels.
32

33 Avoidance of direct impacts on all foraging habitat is not feasible because suitable
34 foraging habitat (shrublands) is widespread in the area of direct effect and may be readily
35 available in other portions of the affected area. However, avoiding or minimizing disturbance of
36 all occupied or potential roosting habitat (rocky cliffs and outcrops) within the transmission
37 corridor is feasible, and could reduce impacts. If avoiding or minimizing disturbance of all
38 occupied or potential roosting habitat is not feasible, a compensatory mitigation plan could be
39 developed and implemented to mitigate direct effects. Compensation could involve the
40 protection and enhancement of existing occupied or suitable habitats to compensate for habitats
41 lost to development. A comprehensive mitigation strategy that used one or both of these options
42 could be designed to completely offset the impacts of development. The need for mitigation,
43 other than programmatic design features, should be determined by conducting pre-disturbance
44 surveys for the species and its habitat within the area of direct effects.
45
46

1 **Townsend’s Big-Eared Bat**
2

3 The Townsend’s big-eared bat is considered to be a year-round resident within the
4 proposed Milford Flats South SEZ region where it is known to forage in shrubland and forested
5 habitats. Approximately 3,933 acres (16 km²) of potentially suitable foraging habitat on the SEZ,
6 12 acres (<0.1 km²) in the road corridor, and 66 acres (0.3 km²) in the transmission line corridor
7 could be directly affected by construction and operations (Table 13.2.12.1-1). This direct effects
8 area represents about 0.1% of available suitable foraging habitat in the SEZ region. About
9 59,400 acres (240 km²) of potentially suitable foraging habitat occurs in the area of potential
10 indirect effects; this area represents about 1.9% of the available suitable foraging habitat in the
11 SEZ region (Table 13.2.12.1-1). On the basis of an evaluation of SWReGAP land cover types,
12 there is no potentially suitable roosting habitat (rocky cliffs and outcrops) on the SEZ or within
13 the access road corridor. However, approximately 30 acres (0.1 km²) of this potentially suitable
14 roosting habitat may occur in the transmission corridor; an additional 70 acres (0.3 km²) of this
15 potentially suitable roosting habitat occurs in the area of indirect effects outside the SEZ and the
16 access road and transmission corridors.
17

18 The overall impact on the Townsend’s big-eared bat from construction, operation, and
19 decommissioning of utility-scale solar energy facilities within the Milford Flats South SEZ is
20 considered small because the amount of potentially suitable habitat for this species in the area of
21 direct effects represents less than 1% of potentially suitable habitat in the SEZ region. The
22 implementation of programmatic design features may be sufficient to reduce indirect impacts on
23 this species to negligible levels.
24

25 Avoidance of direct impacts on all foraging habitat is not feasible because suitable
26 foraging habitat (shrublands) is widespread in the area of direct effect and may be readily
27 available in other portions of the affected area. However, avoiding or minimizing disturbance of
28 all occupied or potential roosting habitat (rocky cliffs and outcrops) within the transmission
29 corridor is feasible, and could reduce impacts. If avoiding or minimizing disturbance of all
30 occupied or potential roosting habitat is not feasible, a compensatory mitigation plan could be
31 developed and implemented to mitigate direct effects. Compensation could involve the
32 protection and enhancement of existing occupied or suitable habitats to compensate for habitats
33 lost to development. A comprehensive mitigation strategy that used one or both of these options
34 could be designed to completely offset the impacts of development. The need for mitigation,
35 other than programmatic design features, should be determined by conducting pre-disturbance
36 surveys for the species and its habitat within the area of direct effects.
37
38

39 **13.2.12.2.4 Impacts on State-Listed Species**
40

41 According to Utah Administrative Rule R657-48, as described in the *Utah Sensitive*
42 *Species List* (UDWR 2010b), there are no species that receive a separate regulatory designation
43 from the UDWR or the State of Utah.
44
45
46

1 **13.2.12.2.5 Impacts on Rare Species**
2

3 There are 18 species with a state status of S1 or S2 in Utah or considered species
4 of concern by the State of Utah or the USFWS that may occur in the affected area of the Milford
5 Flats South SEZ. Impacts have been previously discussed for 17 of these species that are also
6 ESA-listed (Section 13.2.12.2.1), ESA candidates (Section 13.2.12.2.2), or BLM-designated
7 sensitive (Section 13.2.12.2.3). Potential impacts on the Lewis’s woodpecker are presented in
8 Table 13.2.12.1-1.
9

10 **13.2.12.3 SEZ-Specific Design Features and Design Feature Effectiveness**
11

12 The implementation of required programmatic design features described in Appendix A,
13 Section A.2.2, would greatly reduce or eliminate the potential for effects of utility-scale solar
14 energy development on special status species. While some SEZ-specific design features are best
15 established when specific project details are being considered, some design features can be
16 identified at this time, including the following:
17

- 18 • Pre-disturbance surveys should be conducted to determine the presence and
19 abundance of special status species, including those identified in
20 Table 13.2.12.1-1; disturbance to occupied habitats for these species should be
21 avoided or impacts on occupied habitats minimized to the extent practicable.
22 If avoiding or minimizing impacts on occupied habitats is not possible,
23 translocation of individuals from areas of direct effect, or compensatory
24 mitigation of direct effects on occupied habitats could reduce impacts. A
25 comprehensive mitigation strategy for special status species that used one or
26 more of these options to offset the impacts of development should be
27 developed in coordination with the appropriate federal and state agencies.
28
- 29 • Avoiding or minimizing disturbance of woodland habitats (e.g., pinyon-
30 juniper, mixed conifer, oak) in the area of direct effects could reduce impacts
31 on the ferruginous hawk (nesting), Lewis’s woodpecker, and northern
32 goshawk (nesting).
33
- 34 • Avoiding or minimizing disturbance of rocky cliffs and outcrops in the area of
35 direct effects, particularly within the transmission corridor, could reduce
36 impacts on the fringed myotis, spotted bat, and Townsend’s big-eared bat.
37
- 38 • Consultations with the USFWS and the UDWR should be conducted to
39 address the potential for impacts on the Utah prairie dog, a species listed as
40 threatened under the ESA. Consultation would identify an appropriate survey
41 protocol, avoidance measures, and, if appropriate, reasonable and prudent
42 alternatives, reasonable and prudent measures, and terms and conditions for
43 incidental take statements.
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- Coordination with the USFWS and UDWR should be conducted to address the potential for impacts on the greater sage-grouse—a candidate species for listing under the ESA. Coordination would identify an appropriate pre-disturbance survey protocol, avoidance measures, and any potential compensatory mitigation actions.
- Harassment or disturbance of special status species and their habitats in the affected area should be mitigated. This can be accomplished by identifying any additional sensitive areas and implementing necessary protection measures based upon consultation with the USFWS and the UDWR.

If these SEZ-specific design features are implemented in addition to required programmatic design features, impacts on the special status and rare species would be reduced, as indicated in Table 13.2.12.1-1.

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1 **13.2.13 Air Quality and Climate**

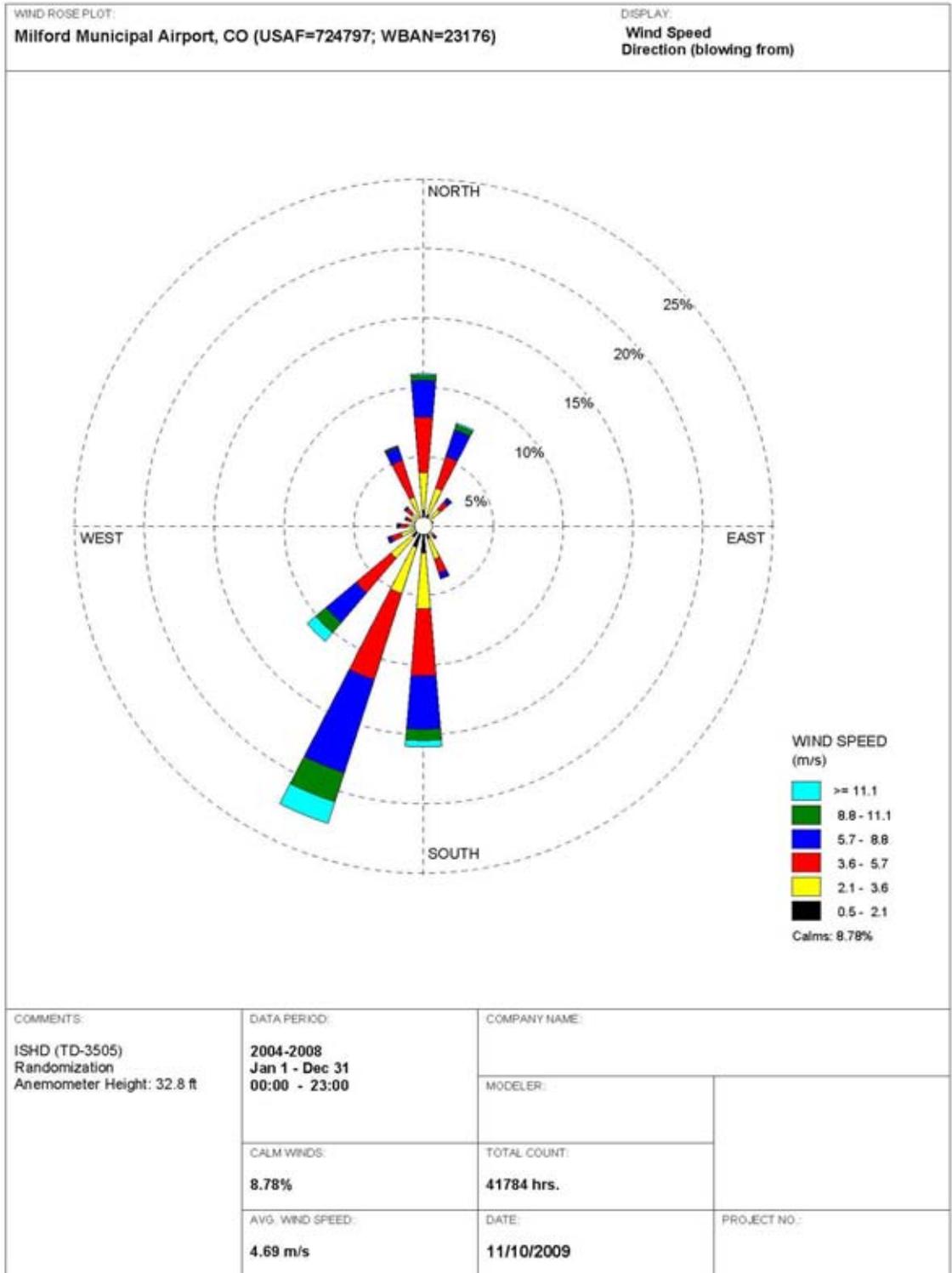
2
3
4 **13.2.13.1 Affected Environment**

5
6
7 **13.2.13.1.1 Climate**

8
9 The proposed Milford Flats South SEZ is located in southwestern Utah, in the south
10 central portion of Beaver County. The SEZ is at an elevation of about 5,060 ft (1,542 m); and
11 thus, experiences lower air temperatures than lower elevations of comparable latitude. Pacific
12 storms along with prevailing westerly winds lose moisture as they ascend the Cascade and Sierra
13 Nevada Ranges. As a consequence, air masses reaching Utah are relatively dry, resulting in light
14 precipitation over the state (NCDC 2009a). Subzero temperatures and prolonged cold spells
15 during the winter months are rare over most parts of the state because mountain ranges to the
16 east and north block Arctic air masses. Utah experiences relatively strong insolation (solar
17 radiation) during the day and rapid nocturnal cooling because of its relatively thin atmosphere,
18 resulting in wide ranges in daily temperature. In general, the climate around the proposed SEZ is
19 temperate and dry (NCDC 1989). Meteorological data collected at the Milford Municipal Airport
20 and Milford, which are located about 14 mi (22 km) and 12 mi (19 km) north-northeast of the
21 proposed Milford Flats South SEZ, respectively, are summarized below.

22
23 A wind rose from the Milford Municipal Airport for the five-year period 2004 to 2008
24 (taken at a level of 33 ft [10 m]) is presented in Figure 13.2.13.1-1 (NCDC 2009b). During this
25 period, the annual average wind speed at the airport was about 10.5 mph (4.7 m/s), with a
26 prevailing wind direction from the south-southwest (about 22.4% of the time) and secondarily
27 from the south (about 15.9% of the time), parallel to nearby mountain ranges. About half of the
28 time, winds blew from directions ranging from south to southwest inclusive. Winds blew
29 predominantly from the south-southwest every month except March, when they blew
30 predominantly from the north. Wind speeds categorized as calm (less than 1.1 mph [0.5 m/s])
31 occurred frequently (almost 9% of the time). Average wind speeds were relatively uniform by
32 season, with the highest in fall at 11.1 mph (5.0 m/s); lower in spring and winter at 10.4 mph
33 (4.6 m/s); and lowest in summer at 10.1 mph (4.5 m/s).

34
35 For the 1906 to 2010 period, the annual average temperature at Milford was 49.4°F
36 (9.7°C) (WRCC 2010c). January was the coldest month, with an average minimum temperature
37 of 13.6°F (-10.2°C), and July was the warmest with an average maximum of 92.1°F (33.4°C). In
38 summer, daytime maximum temperatures were frequently above 90°F (32.2°F) and minimums
39 were in the mid-40s or higher. On most days of colder months (November through March), the
40 minimum temperatures recorded were below freezing ($\leq 32^{\circ}\text{F}$ [0°C]); subzero temperatures also
41 occurred about five days in January and four days in December. During the same period, the
42 highest temperature, 107°F (41.7°C), was recorded in July 1998, and the lowest, -35°F
43 (-37.2°C), occurred in December 1990. Each year, about 54 days had a maximum temperature of
44 $\geq 90^{\circ}\text{F}$ (32.2°C), while about 178 days had minimum temperatures at or below freezing.



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FIGURE 13.2.13.1-1 Wind Rose at 33-ft (10-m) Height at Milford Municipal Airport, Milford, Utah, 2004–2008 (Source: NCDC 2009b)

1 For the 1906 to 2010 period, annual precipitation at Milford averaged about 9.05 in.
2 (23.0 cm) (WRCC 2010c). On average, 62 days each year have measurable precipitation
3 (0.01 in. [0.025 cm] or higher). Precipitation is rather evenly distributed by season. During
4 summer months, low-pressure storm systems in the area are rare, and precipitation during this
5 period occurs as showers and thundershowers in widely varying amounts (NCDC 1989). Snow is
6 usually light and powdery with below-average moisture content, starts as early as September,
7 and continues as late as May. Most of the snow falls from November through April. The annual
8 average snowfall at Milford is about 34.1 in. (86.6 cm) (WRCC 2010c).

9
10 Because the area surrounding the proposed SEZ is so far from major water bodies
11 (e.g., about 410 mi [660 km] to the Pacific Ocean) and because surrounding mountain ranges
12 block air masses, severe weather events, such as thunderstorms and tornadoes, are rare.

13
14 No floods and high winds were reported in Beaver County (NCDC 2010).

15
16 In Beaver County, two hail storms in total have been reported since 1981, which caused
17 no damage. Hail measuring 1.00 in. (2.5 cm) in diameter was reported in 1981. Since 1956,
18 22 thunderstorm wind events up to a maximum wind speed of 79 mph (35 m/s) occurred mostly
19 during the summer months on occasion but caused minimal damage (NCDC 2010).

20
21 During a fall 2009 site visit, windblown dusts were observed in Beaver County.
22 However, no dust storm events were reported in Beaver County (NCDC 2010). The ground
23 surface of the SEZ is covered predominantly with silt loams, which have relatively moderate
24 dust storm potential. Occasional dust storms can deteriorate air quality and visibility and have
25 adverse respiratory health effects. High winds in combination with dry soil conditions result in
26 blowing dust in Utah (UDEQ 2009), typically during the spring through fall months.

27
28 Complex terrain typically disrupts the mesocyclones associated with tornado-producing
29 thunderstorms, and thus tornadoes in Beaver County, which encompasses the proposed Milford
30 Flats South SEZ, occur infrequently. In the period from 1950 to July 2010, a total of six
31 tornadoes (0.1 per year) were reported in Beaver County (NCDC 2010). However, all tornadoes
32 occurring in Beaver County were relatively weak (i.e., all were F0 on the Fujita tornado scale).
33 None of these tornadoes caused deaths, injuries, or property damage or occurred in the area near
34 the proposed Milford Flats South SEZ (more than 11 mi [18 km] from the SEZ).

35 36 37 ***13.2.13.1.2 Existing Air Emissions***

38
39 Beaver County has only a few industrial emission sources, and the amount of their
40 emissions is relatively low. Mobile source emissions, primarily from I-15, account for substantial
41 portions of total NO_x and CO emissions in Beaver County.

42
43 Data from 2002 on annual emissions of criteria pollutants and VOCs in Beaver County
44 are presented in Table 13.2.13.1-1 (WRAP 2009). Emission data are classified into six source
45 categories: point, area (including fugitive dust), onroad mobile, nonroad mobile, biogenic, and
46 fire (e.g., wildfires, prescribed fires, agricultural fires, structural fires). In Beaver County, area

1 sources were the major contributors of SO₂, PM₁₀, and
 2 PM_{2.5}¹¹—about 58%, 83%, and 57%, respectively, of total
 3 county emissions. Onroad sources were major contributors of
 4 NO_x and CO emissions (48% and 60%, respectively). Biogenic
 5 sources (e.g., naturally occurring emissions from vegetation,
 6 including trees, plants, and crops) accounted for most of the VOC
 7 emissions (about 98%) and were a secondary contributor of CO
 8 emissions (about 34%). Nonroad sources were secondary
 9 contributors of SO₂, NO_x, and PM_{2.5} (about 32%, 38%, and 26%,
 10 respectively, of total county emissions), while point sources were
 11 minor sources of criteria pollutants and VOCs. (Fire emissions
 12 were not estimated in Beaver County in 2002.)

14 Information on GHG emissions was not available at the
 15 county level in Utah. In 2005, the state as a whole produced about
 16 69 million metric tons (MMt) of *gross*¹² carbon dioxide
 17 equivalent (CO_{2e}) emissions¹³ (Roe et al. 2007). Gross GHG
 18 emissions in Utah increased by about 40% from 1990 to 2005,
 19 which was more than twice as fast as the national rate (about
 20 16%). In 2005, electricity production (37.2%) was the primary
 21 contributor of gross GHG emissions in Utah, followed by
 22 transportation (24.6%). Fossil fuel use (in the residential,
 23 commercial, and nonfossil industrial sectors) accounted for about
 24 17.7% of total state emissions, while fossil fuel production and
 25 agriculture accounted for about 6% each. Utah’s *net* CO_{2e}
 26 emissions were about 31 MMt, considering carbon sinks from
 27 forestry activities and agricultural soils throughout the state. The
 28 EPA (2009a) also estimated that in 2005, CO₂ emissions from
 29 fossil fuel combustion were 66 MMt, which is comparable to the
 30 state’s estimate. The electric power generation (53%) and
 31 transportation (25%) sectors accounted for more than three-
 32 fourths of the CO₂ emission total, and the residential, commercial, and industrial sectors
 33 accounted for the remainder.

TABLE 13.2.13.1-1 Annual Emissions of Criteria Pollutants and VOCs in Beaver County, Utah, Encompassing the Proposed Milford Flats South SEZ, 2002^a

Pollutant ^b	Emissions (tons/yr)
SO ₂	238
NO _x	2,294
CO	17,633
VOCs	43,589
PM ₁₀	755
PM _{2.5}	164

^a Includes point, area (including fugitive dust), onroad and nonroad mobile, biogenic, and fire emissions.

^b Notation: CO = carbon monoxide; NO_x = nitrogen oxides; PM_{2.5} = particulate matter with a diameter of ≤2.5 μm; PM₁₀ = particulate matter with a diameter of ≤10 μm; SO₂ = sulfur dioxide; and VOCs = volatile organic compounds.

Source: WRAP (2009).

¹¹ Particulate matter (PM) is dust, smoke, and other solid particles and liquid droplets in the air. The size of the particulate is important and is measured in micrometers (μm). A micrometer is 1 millionth of a meter (0.000039 in.). PM₁₀ is PM with an aerodynamic diameter less than or equal to 10 μm, and PM_{2.5} is PM with an aerodynamic diameter less than or equal to 2.5 μm.

¹² Excluding GHG emissions removed as a result of forestry and other land uses and excluding GHG emissions associated with exported electricity.

¹³ A measure used to compare the emissions from various GHGs on the basis of their global warming potential, defined as the cumulative radiative forcing effects of a gas over a specified time horizon resulting from the emission of a unit mass of gas relative to a reference gas, CO₂. The CO_{2e} for a gas is derived by multiplying the mass of the gas by the associated global warming potential.

1 **13.2.13.1.3 Air Quality**
2

3 The State of Utah has adopted NAAQS for six criteria pollutants: SO₂, NO₂, CO, O₃,
4 particulate matter (PM; PM₁₀ and PM_{2.5}), and Pb (EPA 2010; Prey 2009). The NAAQS for
5 criteria pollutants are presented in Table 13.2.13.1-2.
6

7 Beaver County, which encompasses the proposed Milford Flats South SEZ, is located
8 administratively within the Utah Intrastate AQCR, along with the remaining 15 counties in Utah,
9 except Wasatch Front Intrastate AQCR (including Salt Lake City) and Four Corners Interstate
10 AQCR (including southern and east-central counties in Utah). Currently, Beaver County is
11 designated as being in unclassifiable/attainment for all criteria pollutants (40 CFR 81.345).
12

13 Because of low population density, little industrial activity (except for agricultural and
14 hog production activities), and low traffic volumes (except on I-15), anthropogenic emissions in
15 Beaver County are small, and thus ambient air quality is relatively good. The primary air quality
16 concern for the lower elevations in Beaver County (e.g., around the proposed Milford Flats
17 South SEZ) is soil erosion (NRCS 2005). High winds, coupled with soils that are susceptible to
18 wind erosion, cause dust storms that can damage human health, livestock, and crops and degrade
19 the environmental stability of the area. Many farming and ranching operations have to deepen
20 wells and increase pump capacities to obtain access to the available well waters. Larger engines
21 and motors to drive the higher capacity pumps have increased energy consumption and
22 associated air emissions. Another occasional problem in the area is objectionable odor, primarily
23 from feedlots.
24

25 No measurement data are available for criteria pollutants in Beaver County (EPA 2009b).
26 Background concentrations of SO₂, NO₂, CO, PM₁₀, and PM_{2.5} representative of Beaver County
27 have been developed by the Utah Division of Air Quality for air-quality-modeling purposes and
28 are presented in Table 13.2.13.1-2 (Prey 2009). Ambient air quality in Beaver County is
29 relatively good, considering that background levels representative of Beaver County were lower
30 than their respective standards (up to 55%), except O₃. The background O₃ concentration
31 presented in the table taken at Zion NP from 2004 to 2008 exceeds the NAAQS. Albeit in a
32 remote area, both local and distant point and mobile emission sources, including power plants,
33 refineries, and lime kilns, would affect air quality at Zion NP.
34

35 The PSD regulations (see 40 CFR 52.21), which are designed to limit the growth of air
36 pollution in clean areas, apply to a major new source or modification of an existing major source
37 within an attainment or unclassified area (see Section 4.11.2.3). As a matter of policy, the EPA
38 recommends that the permitting authority notify the Federal Land Managers when a proposed
39 PSD source would locate within 62 mi (100 km) of a sensitive Class I area. There are several
40 Class I areas around the proposed Milford Flats South SEZ, two of which are situated within
41 62 mi (100 km). The nearest Class I area is Zion NP (40 CFR 81.430), about 47 mi (75 km)
42 south of the SEZ; the other Class I area is Bryce Canyon NP, about 59 mi (95 km) southeast of
43 the SEZ. These Class I areas are not located directly downwind of prevailing winds at the SEZ
44 (Figure 13.2.13.1-1). The next nearest Class I areas are located beyond 62 mi (100 km): the
45 Capital Reef NP and Grand Canyon NP in Arizona are located about 87 mi (140 km) east and
46 120 mi (193 km) south of the proposed Milford Flats South SEZ, respectively.

TABLE 13.2.13.1-2 NAAQS and Background Concentration Levels Representative of the Proposed Milford Flats South SEZ

Pollutant ^a	Averaging Time	NAAQS ^b	Background Concentration Level ^{c,d}	
			Concentration	Data Source
SO ₂	1-hour	0.075 ppm ^e	NA ^f	NA
SO ₂	3-hour	0.5 ppm	0.008 ppm (1.6%)	Estimate
	24-hour	0.14 ppm	0.004 ppm (2.9%)	Estimate
	Annual	0.03 ppm	0.002 ppm (6.7%)	Estimate
NO ₂	1-hour	0.100 ppm ^g	NA	NA
	Annual	0.053 ppm	0.005 ppm (9.4%)	Estimate
CO	1-hour	35 ppm	1 ppm (2.9%)	Estimate
	8-hour	9 ppm	1 ppm (11%)	Estimate
O ₃	1-hour	0.12 ppm ^h	NA	NA
	8-hour	0.075 ppm	0.091 ppm (121%)	Zion NP, Washington County, 2005; highest of 4th highest daily maximum during 2004–2008
PM ₁₀	24-hour	150 µg/m ³	83 µg/m ³ (55%)	Graymont Lime Kiln, about 17 mi (27 km) north–northeast of Black Rock in Millard County
	Annual	50 µg/m ³ ⁱ	21.8 µg/m ³ (44%)	
PM _{2.5}	24-hour	35 µg/m ³	18 µg/m ³ (51%)	St. George, Washington County, 2005
	Annual	15.0 µg/m ³	8 µg/m ³ (53%)	Estimate, 2006
Pb	Calendar quarter	1.5 µg/m ³	0.08 µg/m ³ (5.3%)	Magna, Salt Lake County, 2005
	Rolling 3-month	0.15 µg/m ³ ^j	NA	NA

^a Notation: CO = carbon monoxide; NO₂ = nitrogen dioxide; O₃ = ozone; Pb = lead; PM_{2.5} = particulate matter with a diameter of ≤ 2.5 µm; PM₁₀ = particulate matter with a diameter of ≤ 10 µm; and SO₂ = sulfur dioxide.

^b The State of Utah has adopted NAAQS for all criteria pollutants.

^c Background concentrations for SO₂, NO₂, CO, PM₁₀, and PM_{2.5} are developed for the Beaver County by Utah Division of Air Quality for NAAQS and/or PSD modeling purposes.

^d Values in parentheses are background concentration levels as a percentage of NAAQS. Calculation of 1-hour SO₂, 1-hour NO₂, and rolling 3-month Pb to NAAQS was not made because no measurement data based on new NAAQS are available. Although not representative of the Beaver County, highest monitored value of Pb in Utah is presented to show that Pb is not an issue in the State of Utah.

^e Effective August 23, 2010.

^f NA = not applicable or not available.

^g Effective April 12, 2010.

Footnotes continued on next page.

TABLE 13.2.13.1-2 (Cont.)

- h The EPA revoked the 1-hour O₃ standard in all areas, although some areas have continuing obligations under that standard (“anti-backsliding”).
- i Effective December 18, 2006, the EPA revoked the annual PM₁₀ standard of 50 µg/m³ but annual PM₁₀ concentrations are presented for comparison purposes.
- j Effective January 12, 2009.

Sources: EPA (2009b, 2010); Prey (2009).

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13.2.13.2 Impacts

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

Air quality impacts shared by all solar technologies are discussed in detail in Section 5.11.1, and technology-specific impacts are discussed in Section 5.11.2. Impacts specific to the proposed Milford Flats South SEZ are presented in the following sections. Any such impacts would be minimized through the implementation of required programmatic design features described in Appendix A, Section A.2.2, and through any additional mitigation applied. Section 13.2.13.3 identifies SEZ-specific design features of particular relevance to the proposed Milford Flats South SEZ.

13.2.13.2.1 Construction

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

1 **Methods and Assumptions**

2
3 Air quality modeling for PM₁₀ and PM_{2.5} emissions associated with construction
4 activities was performed using the EPA-recommended AERMOD model (EPA 2009c). Details
5 for emissions estimation, the description of AERMOD, input data processing procedures, and
6 modeling assumption are described in Section M.13 of Appendix M. Estimated air
7 concentrations were compared with the applicable NAAQS levels at the site boundaries and
8 nearby communities and with PSD increment levels at nearby Class I areas.^{14,15} However, no
9 receptors were modeled for PSD analysis at the nearest Class I area, Zion NP, because it is about
10 47 mi (75 km) from the SEZ, which is over the maximum modeling distance of 31 mi (50 km)
11 for the AERMOD. Rather, several regularly spaced receptors in the direction of the Zion NP
12 were selected as surrogates for the PSD analysis. For the Milford Flats South SEZ, the modeling
13 was conducted based on the following assumptions and input:

- 14 • Uniformly distributed emissions over the 3,000 acres (12.1 km²), and in the
15 eastern portion of the SEZ, close to the nearest residences and nearby
16 communities,
17
- 18 • Surface hourly meteorological data from the Milford Municipal Airport and
19 upper air sounding data from Salt Lake City for the 2004 to 2008 period, and
20
- 21 • A regularly spaced receptor grid over a modeling domain of 62 × 62 mi
22 (100 km × 100 km) centered on the proposed SEZ, and additional discrete
23 receptors at the SEZ boundaries.
24
25
26

27 **Results**

28
29 The modeling results for both PM₁₀ and PM_{2.5} concentration increments and total
30 concentrations (modeled concentrations plus background concentrations) that would result from
31 construction-related fugitive emissions are summarized in Table 13.2.13.2-1. The maximum
32 24-hour PM₁₀ concentration increment modeled at the site boundaries is 515 µg/m³, which far
33 exceeds the relevant standard level of 150 µg/m³. The total 24-hour PM₁₀ concentration
34 (increment plus background) of 598 µg/m³ would further exceed this standard level at the SEZ
35 boundary. However, high PM₁₀ concentrations would be limited to the immediate area

14 To provide a quantitative assessment, the modeled air impacts of construction were compared to the NAAQS levels and the PSD Class I increment levels. Although the Clean Air Act exempts construction activities from PSD requirements, a comparison with the Class I increment levels was used to quantify potential impacts. Only monitored data can be used to determine the attainment status. Modeled data are used to assess potential problems and as a consideration in the permitting process.

15 In Utah, construction lasting less than 180 days might be considered temporary and not require modeling (Maung 2009). For a longer development time, modeling would be required if PM₁₀ emissions exceeded 5 tons/yr. However, for a staged development in which different areas were being developed at different times, the decision to require modeling would depend upon the details of the development plan. In all situations, the state must be informed of development plans and must be presented with a written fugitive dust control plan.

TABLE 13.2.13.2-1 Maximum Air Quality Impacts from Emissions Associated with Construction Activities for the Proposed Milford Flats South SEZ

Pollutant ^a	Averaging Time	Rank ^b	Concentration ($\mu\text{g}/\text{m}^3$)				Percentage of NAAQS	
			Maximum Increment ^b	Background ^c	Total	NAAQS	Increment	Total
PM ₁₀	24 hour	H6H	515	83	598	150	343	398
	Annual ^d	NA ^e	101	21.8	123	50	202	246
PM _{2.5}	24 hour	H8H	37.1	18	55.1	35	106	157
	Annual	NA ^e	10.1	8	18.1	15.0	67	121

^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 See Table 13.2.13.1-2 (source: Prey [2009]).

^d Effective December 18, 2006, the EPA revoked the annual PM₁₀ standard of $50 \mu\text{g}/\text{m}^3$ but annual PM₁₀ concentrations are presented for comparison purposes.

^e NA = not applicable.

1
2
3 surrounding the SEZ boundary and would decrease quickly with distance. Predicted maximum
4 24-hour PM₁₀ concentration increments would be about $82 \mu\text{g}/\text{m}^3$ at the second nearest
5 residence (about 2.8 mi [4.5 km] north of the SEZ), about $65 \mu\text{g}/\text{m}^3$ at the nearest residence
6 (about 1.1 mi [1.8 km] south of the SEZ), about $29 \mu\text{g}/\text{m}^3$ at Milford, about $16 \mu\text{g}/\text{m}^3$ at
7 Minersville, and less than $4 \mu\text{g}/\text{m}^3$ at more distant communities. Annual modeled PM₁₀
8 concentration increment and total PM₁₀ at the SEZ boundary are $101 \mu\text{g}/\text{m}^3$ and $123 \mu\text{g}/\text{m}^3$,
9 respectively. These concentrations are higher than the standard level of $50 \mu\text{g}/\text{m}^3$, which was
10 revoked by the EPA in 2006. Annual PM₁₀ increments would be much lower; about $4.7 \mu\text{g}/\text{m}^3$ at
11 the second nearest residence, about $1.5 \mu\text{g}/\text{m}^3$ at the nearest residence, about $1.3 \mu\text{g}/\text{m}^3$ at
12 Milford, and less than $0.1 \mu\text{g}/\text{m}^3$ at the aforementioned communities.

13
14 The total 24-hour PM_{2.5} concentration at the SEZ boundary would be $55.1 \mu\text{g}/\text{m}^3$, which
15 is higher than the NAAQS of $35 \mu\text{g}/\text{m}^3$. The background level near the SEZ is $18 \mu\text{g}/\text{m}^3$. The
16 total annual average PM_{2.5} concentration would be $18.1 \mu\text{g}/\text{m}^3$, which is above the standard
17 level of $15.0 \mu\text{g}/\text{m}^3$. At the second nearest residence, predicted maximum 24-hour and annual
18 PM_{2.5} concentration increments of about 4.2 and $0.45 \mu\text{g}/\text{m}^3$, respectively, are higher than those
19 of about 2.0 and $0.15 \mu\text{g}/\text{m}^3$, respectively, at the nearest residence.
20

1 Predicted 24-hour and annual PM₁₀ concentration increments at the surrogate receptors
2 for the nearest Class I Area—Zion NP—would be about 6.6 and 0.23 µg/m³, or 83 and 5.7% of
3 the PSD increments for Class I area. These surrogate receptors are more than 15 mi (24 km) from
4 Zion NP, and thus predicted concentrations in the NP would be lower than those values (about
5 55% of the PSD increments for 24-hour PM₁₀), considering the same decay ratio with distance.
6

7 In conclusion, predicted 24-hour and annual PM₁₀ and PM_{2.5} concentration levels could
8 exceed the standard levels at the SEZ boundaries and in the immediate surrounding areas during
9 the construction of solar facilities. To reduce potential impacts on ambient air quality and in
10 compliance with programmatic design features, aggressive dust control measures would be used.
11 Potential air quality impacts on nearby residences and communities would be lower. Modeling
12 indicates that emissions from construction activities are not anticipated to exceed Class I PSD
13 PM₁₀ increments at the nearest federal Class I area (Zion NP). Construction activities are not
14 subject to the PSD program and the comparison provides only a screen to gauge the size of the
15 impact. Accordingly, it is anticipated that impacts of construction activities on ambient air
16 quality would be moderate and temporary.
17

18 Construction emissions from the engine exhaust from heavy equipment and vehicles
19 could cause impacts on air quality-related values (AQRVs) (e.g., visibility and acid deposition)
20 at the nearest federal Class I area, Zion NP, which is not located directly downwind of prevailing
21 winds. SO_x emissions from engine exhaust would be very low, because programmatic design
22 features would require that ultra-low-sulfur fuel with a sulfur content of 15 ppm be used. NO_x
23 emissions from engine exhaust would be primary contributors to potential impacts on AQRVs.
24 Construction-related emissions are temporary in nature and thus would cause some unavoidable
25 but short-term impacts.
26

27 Transmission lines within a designated ROW would be constructed to connect to the
28 nearest regional grid. A regional 345-kV transmission lines is located about 19 mi (31 km)
29 southeast of the proposed Milford Flats South SEZ; thus, construction of a transmission line over
30 this relatively long distance would likely be needed. Construction activities would result in
31 fugitive dust emissions from soil disturbance and engine exhaust emissions from heavy
32 equipment and vehicles. Construction time for the transmission line could be about two years.
33 However, the site of construction along the transmission line ROW would move continuously;
34 thus, no particular area would be exposed to air emissions for a prolonged period. Therefore,
35 potential air quality impacts on nearby residences along the transmission line ROW, if any,
36 would be minor and temporary in nature.
37
38

39 ***13.2.13.2.2 Operations***

40
41 Emission sources associated with the operation of a solar facility would include auxiliary
42 boilers; vehicle (commuter, visitor, support, and delivery) traffic; maintenance (e.g., mirror
43 cleaning and repair and replacement of damaged mirrors); and drift from cooling towers for the
44 parabolic trough or power tower technology if wet cooling were implemented (drift comprises
45 low-level PM emissions).
46

1 The type of emission sources caused by and offset by operation of a solar facility are
2 discussed in Section M.13.4 of Appendix M.
3

4 Estimates of potential air emissions displaced by the solar project development at the
5 proposed Milford Flats South SEZ are presented in Table 13.2.13.2-2. Total power generation
6 capacity ranging from 576 to 1,037 MW is estimated for the proposed Milford Flats South SEZ
7 for various solar technologies (see Section 13.2.1.2.). The estimated amount of emissions
8 avoided for the solar technologies evaluated depends only on the megawatts of conventional
9 fossil fuel–power displaced, because a composite emission factor per megawatt-hour of power
10 by conventional technologies is assumed (EPA 2009d). If the proposed Milford Flats South SEZ
11 becomes fully developed, it is expected that emissions avoided would be substantial.
12 Development of solar power in the SEZ would result in avoided air emissions ranging from
13 2.7% to 4.9% of total emissions of SO₂, NO_x, Hg, and CO₂ from electric power systems in the
14 state of Utah (EPA 2009d). Avoided emissions would be up to 0.9% of total emissions from
15 electric power systems in the six-state study area. When compared with all source categories,
16 power production from the same solar facilities would displace up to 3.3% of SO₂, 1.4% of NO_x,
17 and 2.7% of CO₂ emissions in the state of Utah (EPA 2009a; WRAP 2009). These emissions
18 would be up to 0.4% of total emissions from all source categories in the six-state study area.
19 Power generation from fossil fuel–fired power plants accounts for about 97.5% of the total
20 electric power generation in Utah, most of which is from coal combustion (more than 94%).
21 Thus, solar facilities to be built in the proposed Milford Flats South SEZ could displace
22 relatively more fossil-fuel emissions than those built in other states that rely less on fossil fuel–
23 generated power.
24

25 As discussed in Section 5.11.1.5, the operation of associated transmission lines would
26 generate some air pollutants from such activities as periodic site inspections and maintenance.
27 However, these activities would occur infrequently, and the amount of emissions would be small.
28 In addition, transmission lines could produce minute amounts of O₃ and its precursor NO_x
29 associated with corona discharge (i.e., the breakdown of air near high-voltage conductors), which
30 is most noticeable for higher voltage lines during rain or very humid conditions. Since the
31 proposed SEZ in Utah is located in an arid desert environment, these emissions would be small,
32 and potential impacts on ambient air quality associated with transmission lines would be
33 negligible, considering the infrequent occurrences and small amount of emissions from corona
34 discharges.
35
36

37 ***13.2.13.2.3 Decommissioning/Reclamation*** 38

39 As discussed in Section 5.11.1.4, decommissioning/reclamation activities are similar to
40 construction activities but are on a more limited scale and of shorter duration. Potential impacts
41 on ambient air quality would be correspondingly less than those from construction activities.
42 Decommissioning activities would last for a short period, and their potential impacts would be
43 moderate and temporary. The same mitigation measures adopted during the construction phase
44 would also be implemented during the decommissioning phase (Section 5.11.3).
45

TABLE 13.2.13.2-2 Annual Emissions from Combustion-Related Power Generation Displaced by Full Solar Development of the Proposed Milford Flats South SEZ

Area Size (acres)	Capacity (MW) ^a	Power Generation (GWh/yr) ^b	Emission Rates (tons/yr; 10 ³ tons/yr for CO ₂) ^c			
			SO ₂	NO _x	Hg	CO ₂
6,480	576–1,037	1,009–1,817	1,004–1,808	1,921–3,457	0.004-0.007	1,089–1,960
Percentage of total emissions from electric power systems in Utah ^d			2.7–4.9%	2.7–4.9%	2.7–4.9%	2.7–4.9%
Percentage of total emissions from all source categories in Utah ^e			1.8–3.3%	0.79–1.4%	NA ^f	1.5–2.7%
Percentage of total emissions from electric power systems in the six-state study area ^d			0.40–0.72%	0.52–0.93%	0.13–0.24%	0.42–0.75%
Percentage of total emissions from all source categories in the six-state study area ^e			0.21–0.38%	0.07-0.13%	NA	0.13–0.23%

^a It is assumed that the SEZ would eventually have development on 80% of the lands and that a range of 5 acres (0.020 km²) per MW (for parabolic trough technology) to 9 acres (0.04 km²) per MW (power tower, dish engine, and PV technologies) of land would be required.

^b A capacity factor of 20% is assumed.

^c Composite combustion-related emission factors for SO₂, NO_x, Hg, and CO₂ of 1.99, 3.81, 7.8 × 10⁻⁶, and 2,158 lb/MWh, respectively, were used for the state of Utah.

^d Emission data for all air pollutants are for 2005.

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

^f NA = not estimated.

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

13.2.13.3 SEZ-Specific Design Features and Design Feature Effectiveness

No SEZ-specific design features are required. Limiting dust generation during construction and operations at the proposed Milford Flats South SEZ (such as increased watering frequency or road paving or treatment) is a required design feature under BLM’s Solar Energy Program. These extensive fugitive dust control measures would keep off-site PM levels as low as possible during construction.

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1 **13.2.14 Visual Resources**

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4 **13.2.14.1 Affected Environment**

5
6 As shown in Figure 13.2.14.1-1, the proposed Milford Flats South SEZ is located in the
7 northeastern section of the Escalante Desert, approximately 2 mi (3.2 km) north of the Black
8 Mountains and 8 mi (12.8 km) southwest of the Mineral Mountains. In the vicinity of the
9 Milford Flats South SEZ, the Escalante Desert is bounded by the Mineral Mountains to the
10 northeast, the Black Mountains to the south and southeast, the Shauntie Hills to the northwest,
11 and the Wah Wah Mountains to the west. Within the SEZ, elevation ranges from approximately
12 5,022 ft (1,531 m) in the western portion of the SEZ, sloping gently upward to 5,120 ft (1,561 m)
13 in the eastern portion. No large water bodies or large urban areas are located near the SEZ.
14

15 The SEZ is within a flat treeless plain, with the strong horizon line being the dominant
16 visual feature. Vegetation consists primarily of low shrubs (generally less than 3 ft [1 m] in
17 height but in some parts of the site generally less than 1 ft [0.3 m] in height), with some areas of
18 bare, generally tan soil and gravel. During a September 2009 site visit, the vegetation presented
19 a range of mostly light greens, light browns, and gray bare wood, with minimal banding and
20 other variation sufficient to add slight visual interest. Bands or patches of light tan bare soil or
21 gray gravel are interspersed with the vegetation in some areas. Some or all of the vegetation
22 might be snow-covered in winter, which might significantly affect the visual qualities of the
23 area by changing the color contrasts associated with the vegetation, which could in turn change
24 the contrasts associated with the introduction of solar facilities into the landscape. No permanent
25 water features are present on the site. This landscape type is common within the region.
26 Panoramic views of the site are shown in Figures 13.2.14.1-2, 13.2.14.1-3, and 13.2.14.1-4.
27

28 No paved roads pass through or near the SEZ; however, a well-traveled, unpaved road
29 passes through the northwestern corner of the site, and a number of other unpaved roads cross
30 the site. No electric transmission lines occur within the SEZ. Other than normally dry livestock
31 ponds, cattle trails, and wire fences, there is little evidence of cultural modifications that detract
32 from the site's scenic quality. In general, the SEZ itself is natural appearing; however, there are
33 numerous cultural disturbances on adjacent lands that significantly detract from the scenic
34 quality of the SEZ (see below).
35

36 Off-site views include mountains to the north, east, west, and south, with more open
37 views to the northeast and southwest. In general, the nearby mountains add to the scenic quality
38 of the SEZ, particularly the Black Mountains, about 2 mi (3.2 km) south of the SEZ.
39

40 Numerous off-site cultural disturbances are visible from the SEZ; most prominent is a
41 series of commercial confined hog-rearing facilities immediately north of much of the SEZ.
42 These facilities include large confinement buildings, ponds, roads, and other structures, and are
43 prominent in views from the northern and central portions of the SEZ. The confinement
44 structures are large, low, white sheet-metal buildings that while mimicking the horizontal
45 character of the surrounding landscape, contrast significantly with the surroundings in form,
46 color, and texture. In some locations within the SEZ, many of these facilities are visible at once.

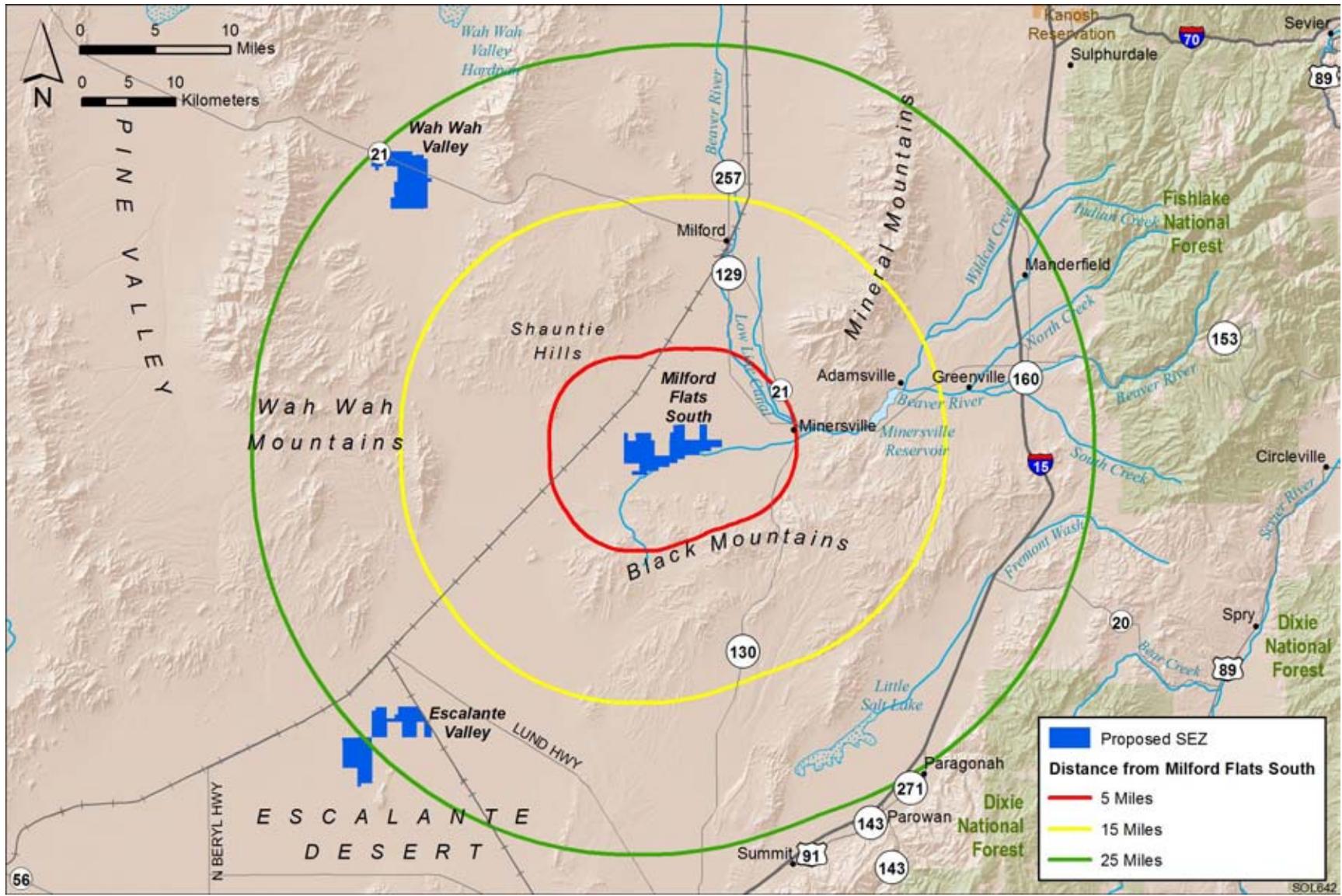


FIGURE 13.2.14.1-1 Proposed Milford Flats South SEZ and Surrounding Lands

1



2 **FIGURE 13.2.14.1-2** Approximately 180° Panoramic View of the Proposed Milford Flats South SEZ, Looking East from Western
3 **Boundary of the Proposed SEZ**

4

5

6



7 **FIGURE 13.2.14.1-3** Approximately 90° Panoramic View of the Proposed Milford Flats South SEZ, Looking East-Southeast from
8 **Northwest Portion of the Proposed SEZ, with the Confinement Hog-Rearing Facilities Visible at Left Center**

9

10

11



12 **FIGURE 13.2.14.1-4** Approximately 120° Panoramic View of the Proposed Milford Flats South SEZ, Looking South from Northern
13 **Boundary of Eastern Section of the Proposed SEZ**

1 Utility poles and other structures associated with the hog farms also add vertical line contrasts,
2 and some facilities have adjacent trees that add color, form, and texture contrasts. The Union
3 Pacific railroad is visible less than 2 mi (3.2 km) northwest of the SEZ. Irrigated cropland and
4 associated structures (some with surrounding trees) are visible just southeast of the SEZ and
5 contrast in color and texture with the surrounding landscape. Large and small transmission lines
6 are visible from numerous locations within the SEZ, particularly the western and northern
7 portions. Traffic is often visible on the road in the northwestern corner of the site and another
8 road along the northern boundary of the site. In general, the off-site cultural modifications noted
9 here detract significantly from the scenic quality of the SEZ, especially in its northern portions.

10
11 Current land uses within the SEZ include grazing, general outdoor recreation,
12 backcountry and OHV driving, and hunting for both small and big game. The land is used mostly
13 by local residents, but usage levels are low. Because the SEZ location is remote with few people
14 living nearby, and few visitors, the number of viewers is relatively low.

15
16 The BLM conducted a VRI for the SEZ and surrounding lands in 2009-2010
17 (BLM 2010a). The VRI evaluates BLM-administered lands based on *scenic quality*; *sensitivity*
18 *level*, in terms of public concern for preservation of scenic values in the evaluated lands; and
19 *distance* from travel routes or key observation points. Based on these three factors, BLM-
20 administered lands are placed into one of four Visual Resource Inventory Classes, which
21 represent the relative value of the visual resources. Class I and II are the most valued; Class III
22 represents a moderate value; and Class IV represents the least value. Class I is reserved for
23 specially designated areas, such as national wildernesses and other congressionally and
24 administratively designated areas where decisions have been made to preserve a natural
25 landscape. Class II is the highest rating for lands without special designation. More information
26 about VRI methodology is available in Section 5.12 and in *Visual Resource Inventory*,
27 BLM Manual Handbook 8410-1 (BLM 1986a).

28
29 The VRI values for the SEZ and immediate surroundings are VRI Class IV, indicating
30 low relative visual values. The inventory indicates low scenic quality for the SEZ and its
31 immediate surroundings, based primarily on the lack of topographic relief and water features,
32 presence of cultural disturbances, and the relative commonness of the landscape type within the
33 region. The SEZ also received relatively low scores for variety in vegetation types and color.
34 A positive visual attribute noted in the inventory was the attractive off-site views; however, this
35 positive attribute was insufficient to raise the scenic quality to the moderate level. The inventory
36 indicates low sensitivity for most of the SEZ and its immediate surroundings, due in part to
37 relatively low levels of use and public interest; however, the far western portion of the SEZ
38 received a sensitivity designation of “Moderate” because of its proximity to Thermo Hot Springs,
39 an historic site associated with the Escalante Expedition of 1776.

40
41 Lands within the 25-mi (40-km), 650-ft (198-m) viewshed of the SEZ contain
42 58,988 acres (238.72 km²) of VRI Class II areas, primarily east and southeast of the SEZ;
43 15,284 acres (61.852 km²) of Class III areas, primarily south and east of the SEZ; and
44 412,101 acres (1,667.7 km²) of VRI Class IV areas, concentrated primarily in the Escalante
45 Desert and nearby mountain ranges. The VRI map for the SEZ and surrounding lands is shown
46 in Figure 13.2.14.1-5.

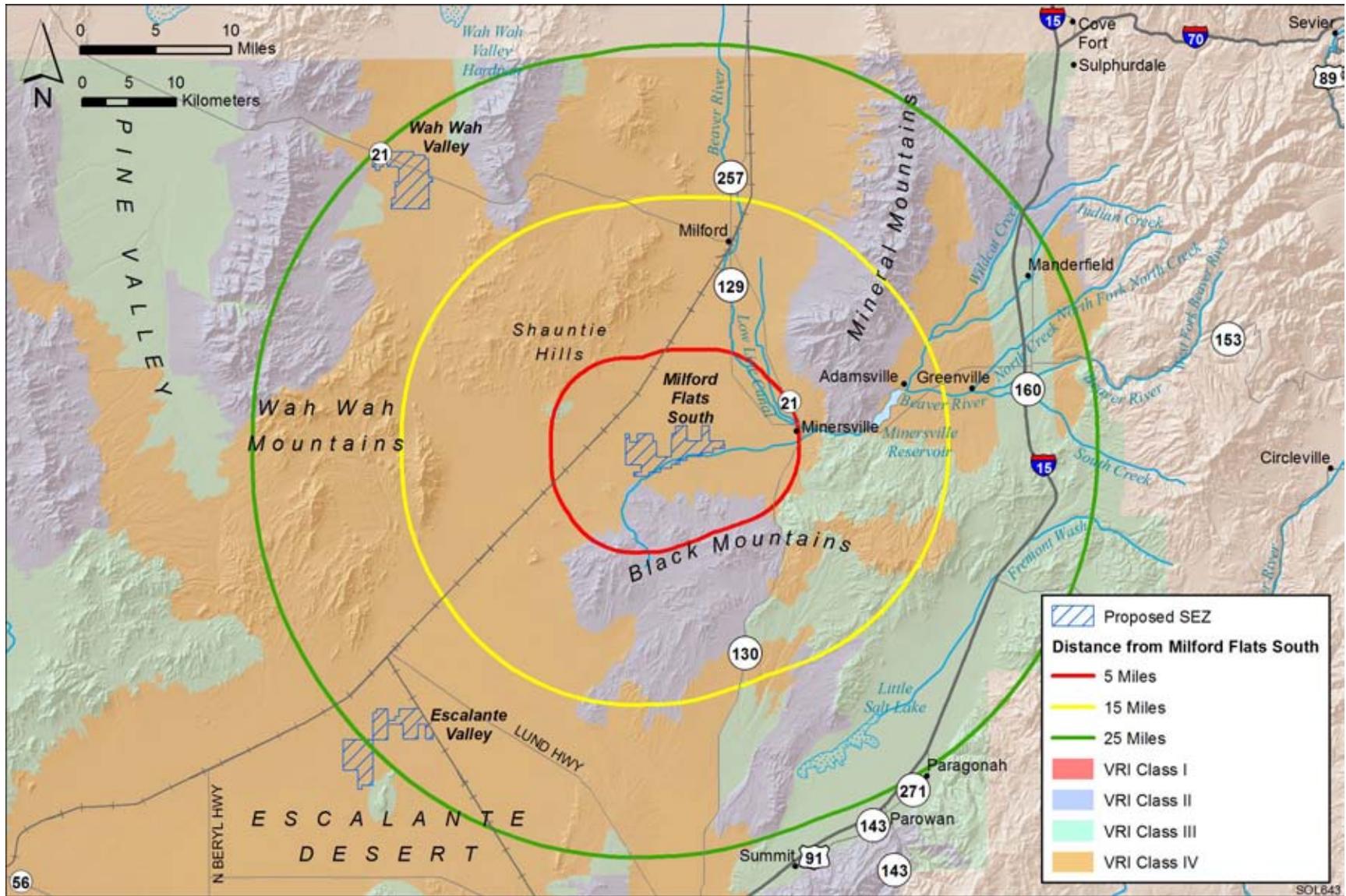


FIGURE 13.2.14.1-5 Visual Resource Inventory Values for the Proposed Milford Flats South SEZ and Surrounding Lands

1 The Pinyon Management Framework Plan (BLM 1983b) indicates that the entire SEZ is
2 managed as VRM Class IV, which permits major modification of the existing character of the
3 landscape. The VRM map for the SEZ and surrounding lands is shown in Figure 13.2.14.1-6.
4 More information about the BLM VRM program is available in Section 5.12 and in *Visual*
5 *Resource Management*, BLM Manual Handbook 8400 (BLM 1984).
6
7

8 **13.2.14.2 Impacts**

9

10 The potential for impacts from utility-scale solar energy development on visual resources
11 within the proposed Milford Flats South SEZ and surrounding lands, as well as the impacts of
12 related developments (e.g., access roads and transmission lines) outside of the SEZ, is presented
13 in this section, as are potential SEZ-specific design features.
14

15 Site-specific impact assessment is needed to systematically and thoroughly assess visual
16 impact levels for a particular project. Without precise information about the location of a project,
17 as well as a relatively complete and accurate description of its major components and their
18 layout, it is not possible to assess precisely the visual impacts associated with the facility.
19 However, if the general nature and location of a facility are known, a more generalized
20 assessment of potential visual impacts can be made by describing the range of expected visual
21 changes and discussing contrasts typically associated with these changes. In addition, a general
22 analysis can identify sensitive resources that may be at risk if a future project is sited in a
23 particular area. Detailed information about the methodology employed for the visual impact
24 assessment used in this PEIS, including assumptions and limitations, is presented in
25 Appendix M.
26
27

28 *Potential Glint and Glare Impacts.* Similarly, the nature and magnitude of potential glint-
29 and glare-related visual impacts for a given solar facility is highly dependent on viewer position,
30 sun angle, the nature of the reflective surface and its orientation relative to the sun and the
31 viewer, atmospheric conditions, and other variables. The determination of potential impacts from
32 glint and glare from solar facilities within a given proposed SEZ would require precise
33 knowledge of these variables and is not possible given the scope of the PEIS. Therefore, the
34 following analysis does not describe or suggest potential contrast levels arising from glint and
35 glare for facilities that might be developed within the SEZ; however, it should be assumed that
36 glint and glare are possible visual impacts from *any* utility-scale solar facility, regardless of size,
37 landscape setting, or technology type. The occurrence of glint and glare at solar facilities could
38 potentially cause large, though temporary, increases in brightness and visibility of the facilities.
39 The visual contrast levels projected for sensitive visual resource areas discussed in the following
40 analysis do not account for potential glint and glare effects; however, these effects would be
41 incorporated into a future site-and project-specific assessment that would be conducted for
42 specific proposed utility-scale solar energy projects. For more information about potential glint
43 and glare impacts associated with utility-scale solar energy facilities, see Section 5.12 of this
44 PEIS.
45

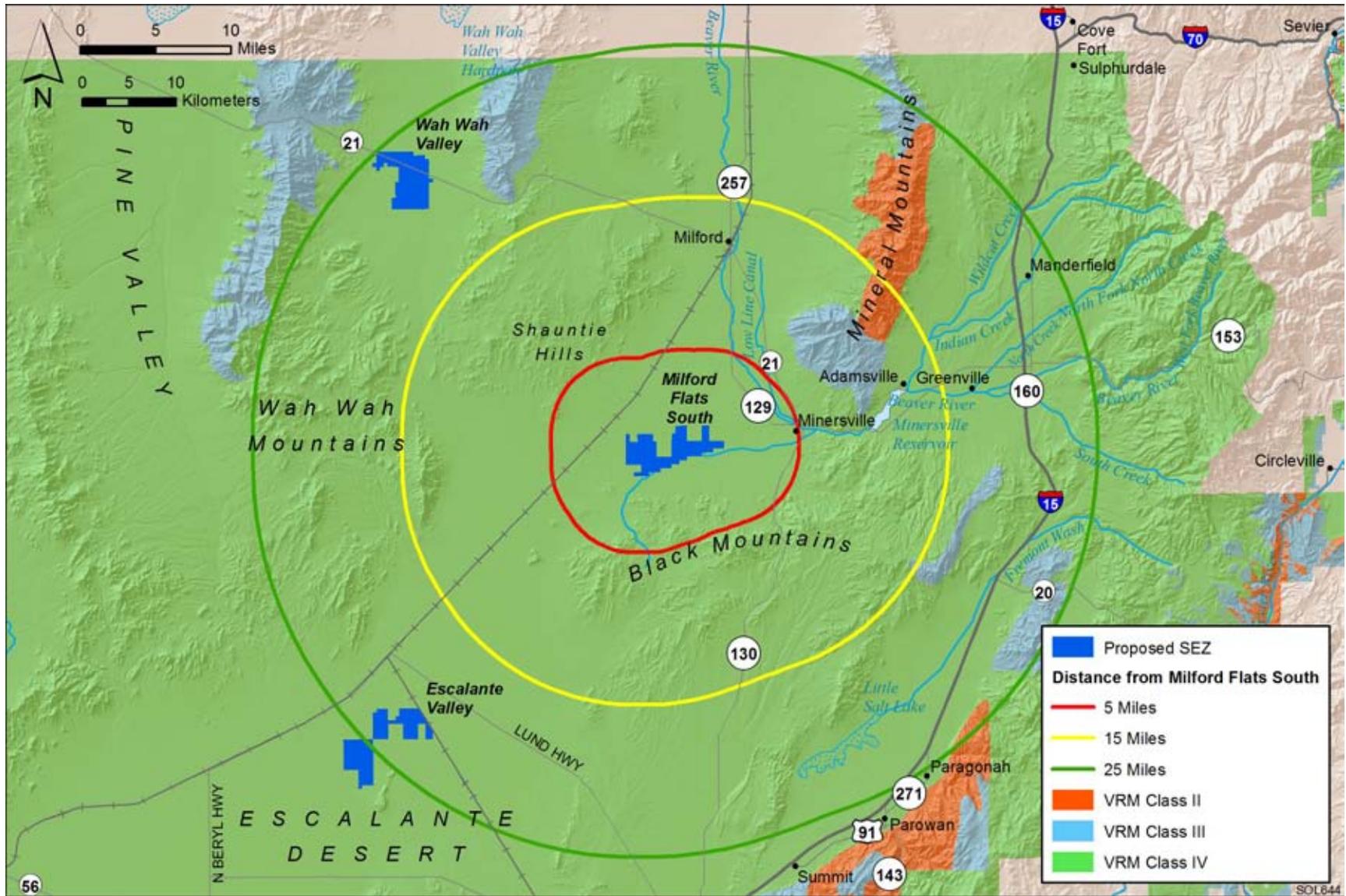


FIGURE 13.2.14.1-6 Visual Resource Management Classes for the Proposed Milford Flats South SEZ and Surrounding Lands

1 **13.2.14.2.1 Impacts on the Proposed Milford Flats South SEZ**
2

3 Some or all of the SEZ could be developed for one or more utility-scale solar energy
4 projects, utilizing one or more of the solar energy technologies described in Appendix F.
5 Because of the industrial nature and large size of utility-scale solar energy facilities, large visual
6 impacts on the SEZ would occur as a result of the construction, operation, and decommissioning
7 of such projects. In addition, large impacts could occur at solar facilities utilizing highly
8 reflective surfaces or major light-emitting facility components (solar dish, parabolic trough, and
9 power tower technologies), with lesser impacts associated with reflective surfaces expected from
10 PV facilities. These impacts would be expected to involve major modification of the existing
11 character of the landscape and would likely dominate the views nearby. Additional, and
12 potentially large, impacts would occur as a result of the construction, operation, and
13 decommissioning of related facilities, such as access roads and electric transmission lines. While
14 the primary visual impacts associated with solar energy development within the SEZ would
15 occur during daylight hours, lighting required for utility-scale solar energy facilities would be a
16 potential source of visual impacts at night, both within the SEZ and in surrounding areas.
17

18 Common and technology-specific visual impacts from utility-scale solar energy
19 development, as well as impacts associated with electric transmission lines, are discussed in
20 Section 5.12 of this PEIS. Impacts would last throughout construction, operation, and
21 decommissioning, and some impacts could continue after project decommissioning. Visual
22 impacts resulting from solar energy development in the SEZ would be in addition to impacts
23 from solar energy development and other development that may occur on other public or private
24 lands within the SEZ viewshed and are subject to cumulative effects. For discussion of
25 cumulative impacts, see Section 6.5 of the PEIS.
26

27 The changes described above would be expected to be consistent with BLM VRM
28 objectives for VRM Class IV. More information about impact determination using the
29 BLM VRM program is available in Section 5.12 and in *Visual Resource Contrast Rating*,
30 BLM Manual Handbook 8431-1 (BLM 1986b).
31

32 Implementation of the programmatic design features intended to reduce visual impacts
33 (described in Appendix A, Section A.2.2) would be expected to reduce visual impacts associated
34 with utility-scale solar energy development within the SEZ; however, the degree of effectiveness
35 of these design features could be assessed only at the site- and project-specific level. Given the
36 large-scale, reflective surfaces, and strong regular geometry of utility-scale solar energy facilities
37 and the lack of screening vegetation and landforms within the SEZ viewshed, siting the facilities
38 away from sensitive visual resource areas and other sensitive viewing areas would be the primary
39 means of mitigating visual impacts. The effectiveness of other visual impact mitigation measures
40 would generally be limited.
41
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43

1 **13.2.14.2.2 Impacts on Lands Surrounding the Proposed Milford Flats South SEZ**

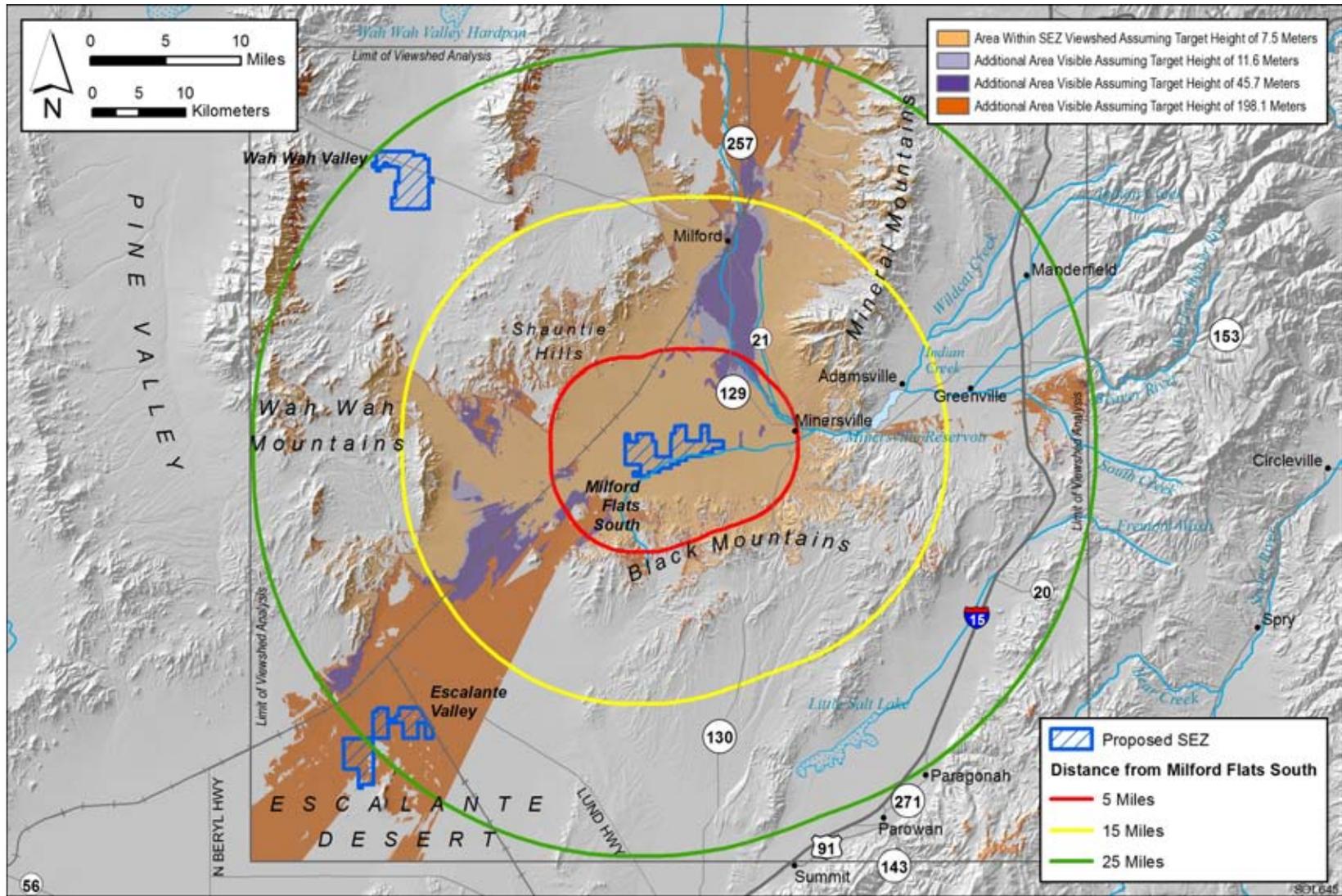
2
3
4 **Impacts on Selected Sensitive Visual Resource Areas**

5
6 Because of the large size of utility-scale solar energy facilities and the generally flat,
7 open nature of the proposed SEZ, lands outside the SEZ would be subjected to visual impacts
8 related to construction, operation, and decommissioning of utility-scale solar energy facilities.
9 The affected areas and extent of impacts would depend on a number of visibility factors and
10 viewer distance. (For a detailed discussion of visibility and related factors, see Section 5.7.)
11 A key component in determining impact levels is the intervisibility between the project and
12 potentially affected lands. If topography, vegetation, or structures screen the project from viewer
13 locations, there is no impact.

14
15 Preliminary viewshed analyses were conducted to identify which lands surrounding the
16 proposed SEZ could have views of solar facilities in at least some portion of the SEZ
17 (see Appendix M for important information on assumptions and limitations of the methods used).
18 Four viewshed analyses were conducted—one each for four different heights representative of
19 project elements associated with potential solar energy technologies: PV and parabolic trough
20 arrays (24.6 ft [7.5 m]), solar dishes and power blocks for CSP technologies (38 ft [11.6 m]),
21 transmission towers and short solar power towers (150 ft [45.7 m]), and tall solar power towers
22 (650 ft [198.1 m]). Viewshed maps for the SEZ for all four solar technology heights are available
23 in Appendix N.

24
25 Figure 13.2.14.2-1 shows the combined results of the viewshed analyses for all four solar
26 technologies. The colored segments indicate areas with clear lines of sight to one or more areas
27 within the SEZ and from which solar facilities within these areas of the SEZ would be expected
28 to be visible, assuming the absence of screening vegetation or structures and the presence of
29 adequate lighting and other atmospheric conditions. The light brown areas are locations from
30 which PV and parabolic trough arrays located in the SEZ could be visible. Solar dishes and
31 power blocks for CSP technologies would be visible from the areas shaded in light brown and
32 the additional areas shaded in light purple. Transmission towers and short solar power towers
33 would be visible from the areas shaded light brown, light purple, and the additional areas shaded
34 in dark purple. Power tower facilities located in the SEZ could be visible from areas shaded light
35 brown, light purple, dark purple, and for at least the upper portions of power tower receivers,
36 could be visible from the additional areas shaded in medium brown.

37
38 For the following visual impact discussion, the tall solar power tower (650 ft [198.1 m])
39 and PV and parabolic trough array (24.6 ft [7.5 m]) viewsheds are shown in figures and
40 discussed in the text. These heights represent the maximum and minimum landscape visibility
41 for solar energy technologies analyzed in the PEIS. Viewsheds for solar dish and CSP
42 technology power blocks (38 ft [11.6 m]), and transmission towers and short solar power towers
43 (150 ft [45.7 m]) are presented in Appendix N. The visibility of these facilities would fall
44 between that for tall power towers and PV and parabolic trough arrays.



1
2 **FIGURE 13.2.14.2-1 Viewshed Analyses for the Proposed Milford Flats South SEZ and Surrounding Lands, Assuming Solar**
3 **Technology Heights of 24.6 ft (7.5 m), 38 ft (11.6 m), 150 ft (45.7 m), and 650 ft (198.1 m) (shaded areas indicate lands from which**
4 **solar development within the SEZ could be visible)**

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

3
4 A GIS analysis was conducted that overlaid selected federal, state, and BLM-designated
5 sensitive visual resource areas onto the combined viewsheds for the four solar technologies, in
6 order to illustrate which of these sensitive visual resource areas could have views of solar
7 facilities within the SEZ and could therefore be subject to visual impacts from those facilities.
8

9 The scenic resources included in the analysis were as follows:

- 10
11 • National Parks, National Monuments, National Recreation Areas, National
12 Preserves, National Wildlife Refuges, National Reserves, National
13 Conservation Areas, National Historic Sites;
14
15 • Congressionally authorized Wilderness Areas;
16
17 • Wilderness Study Areas;
18
19 • National Wild and Scenic Rivers;
20
21 • Congressionally authorized Wild and Scenic Study Rivers;
22
23 • National Scenic Trails and National Historic Trails;
24
25 • National Historic Landmarks and National Natural Landmarks;
26
27 • All-American Roads, National Scenic Byways, State Scenic Highways; and
28 BLM- and USFS-designated scenic highways/byways;
29
30 • BLM-designated Special Recreation Management Areas; and
31
32 • ACECs designated because of outstanding scenic qualities.
33

34 The analysis indicated that no selected sensitive visual resource areas are within the
35 25-mi (40-km) viewsheds of the Milford Flats South SEZ; however, additional scenic resources
36 may exist at the national, state, and local levels, and impacts may occur on both federal and
37 nonfederal lands, including sensitive traditional cultural properties important to Tribes. Note that
38 in addition to the resource types and specific resources analyzed in this PEIS, future site-specific
39 NEPA analyses would include state and local parks, recreation areas, other nonfederal sensitive
40 visual resources, and communities close enough to the proposed project to be affected by visual
41 impacts. Selected nonfederal lands and resources are included in the discussion below.
42

43 In addition to impacts associated with the solar energy facilities themselves, sensitive
44 visual resources could be affected by facilities that would be built and operated in conjunction
45 with the solar facilities. With respect to visual impacts, the most important associated facilities
46 would be access roads and transmission lines, the precise location of which cannot be determined

1 until a specific solar energy project is proposed. Currently, there are no suitable transmission
2 lines within the proposed SEZ; thus, construction and operation of a transmission line both inside
3 and outside the proposed SEZ would be required. Depending on project- and site-specific
4 conditions, visual impacts associated with access roads and (particularly) transmission lines
5 could be large. Detailed information about visual impacts associated with transmission lines is
6 presented in Section 5.7.1. A detailed site-specific NEPA analysis would be required to
7 determine visibility and associated impacts precisely for any future solar projects, based on more
8 precise knowledge of facility location and characteristics.

11 **Impacts on Selected Other Lands and Resources**

13 The following visual impact analysis describes *visual contrast levels* rather than *visual*
14 *impact levels*. *Visual contrasts* are changes in the landscape as seen by viewers, including
15 changes in the forms, lines, colors, and textures of objects in the landscape. A measure of *visual*
16 *impact* includes potential human reactions to the visual contrasts arising from a development
17 activity, based on viewer characteristics, including attitudes and values, expectations, and other
18 characteristics that are viewer- and situation-specific. Accurate assessment of visual impacts
19 requires knowledge of the potential types and numbers of viewers for a given development and
20 their characteristics and expectations; specific locations from where the project might be viewed;
21 and other variables that were not available or not feasible to incorporate in the PEIS analysis.
22 These variables would be incorporated into a future site-and project-specific assessment that
23 would be conducted for specific proposed utility-scale solar energy projects. For more discussion
24 of visual contrasts and impacts, see Section 5.12 of the PEIS.

27 ***Communities of Milford and Minersville.*** The viewshed analyses indicate visibility of
28 the SEZ from the communities of Milford (approximately 12 mi [19 km] north of the SEZ) and
29 Minersville (approximately 5 mi [8 km] east). Milford is approximately 70 ft (21 m) lower in
30 elevation than the closest boundary of the SEZ, while Minersville is approximately 215 ft (66 m)
31 higher in elevation than the closest boundary of the SEZ.

33 Screening by small undulations in topography, vegetation, buildings or other structures
34 would likely restrict or eliminate visibility of the SEZ and associated solar facilities within these
35 communities, but a detailed future site-specific NEPA analysis is required to determine visibility
36 precisely.

38 Because of the long distance from Milford to the SEZ, and because Milford is slightly
39 lower in elevation than the SEZ, the angle of view to the SEZ from Milford is quite low, and
40 where screening from nearby vegetation or structures was absent, the SEZ would occupy a very
41 small portion of the field of view. Much of Milford is outside the 24.6-ft (7.5-m) viewshed of the
42 SEZ, indicating that within these areas, solar trough and PV arrays would be unlikely to be
43 visible. There are parts of the community outside the 38-ft (11.6-m) viewshed, indicating that
44 solar dish engine arrays would not be visible. Higher solar and ancillary facilities such as
45 transmission towers, could be visible from anywhere within Milford, but would be very low on
46 the horizon and, except for power tower receivers, might not be noticeable against the backdrop

1 landforms. Power tower receivers within parts of the SEZ might be visible as lights on the
2 southern horizon. At night, if sufficiently tall, power tower receivers could have required hazard
3 flashing red or white hazard navigation lighting that could be visible from Milford. Visual
4 contrasts resulting from solar development within the SEZ would be expected to be minimal, as
5 seen from Milford.
6

7 The SEZ would occupy a larger portion of the field of view from Minersville, at 5 mi
8 (8 km) distance from the SEZ. However, the view from Minersville is aligned with the relatively
9 narrow east-west axis of the SEZ, and, therefore, the SEZ would occupy a small portion of the
10 field of view as seen from Minersville. Furthermore, the angle of view is sufficiently low that
11 any solar collector/reflector arrays and other low-height facilities within the SEZ would be seen
12 nearly on edge, which would reduce their visibility and visual contrast.
13

14 Taller ancillary facilities, such as buildings, transmission structures, and cooling towers;
15 and plumes (if present) could be visible projecting above the collector/reflector arrays. The
16 ancillary facilities could create form and line contrasts with the strongly horizontal, regular, and
17 repeating forms and lines of the collector/reflector arrays.
18

19 Operating power tower receivers within the SEZ would likely be visible as bright lights
20 on the western horizon and could be conspicuous if located in the closest portions of the SEZ. At
21 night, if sufficiently tall, power tower receivers could have required hazard flashing red or white
22 hazard navigation lighting that would likely be visible from Minersville, though there would be
23 other lights visible in the vicinity of the SEZ.
24

25 It should be noted that as discussed in Section 13.2.14.1, numerous confinement hog
26 farms are located between Minersville and most of the SEZ. These farms include large, white
27 (and therefore highly noticeable) hog sheds that represent significant cultural modifications that
28 detract markedly from scenic quality as viewed from Minersville. Associated facilities, such as
29 transmission lines and roads, detract further from the view from Minersville in the direction of
30 the SEZ. Visual contrasts resulting from solar development within the SEZ would be expected to
31 be weak, as seen from Minersville, and the associated visual impact would be lowered by the
32 numerous visual intrusions already visible in the area.
33

34
35 **Area Roads.** In addition to the potential visual impacts on the local communities,
36 residents, workers, and visitors to the area also would likely experience visual impacts from solar
37 energy facilities located within the SEZ (as well as any associated access roads and transmission
38 lines) as they travel area roads, including State Routes 21, 129, 130, and 257. Except for State
39 Routes 21 and 129, visual contrasts resulting from solar development within the SEZ would be
40 expected to be minimal to weak as viewed from these roads. State Route 21 approaches to within
41 5 mi (8 km) of the SEZ, and State Route 129 approaches to within 3.2 mi (5.1 km) of the SEZ.
42 Near the points of closest approach, travelers on these two roads might be subjected to moderate
43 visual contrasts, depending on viewer location on the roads; solar facility type, size, and location
44 within the SEZ; and other visibility factors.
45
46

1 **13.2.14.2.3 Summary of Visual Resource Impacts for the Proposed Milford Flats**
2 **South SEZ**
3

4 Under the 80% development scenario analyzed in this PEIS, there could be multiple solar
5 facilities within the Milford Flats South SEZ, a variety of technologies employed, and a range of
6 supporting facilities that would contribute to visual impacts, such as transmission towers and
7 lines, substations, power block components, and roads. The resulting visually complex landscape
8 would be essentially industrial in appearance and would contrast strongly with the surrounding
9 mostly natural-appearing landscape. Large visual impacts on the SEZ and surrounding lands
10 within the SEZ viewshed would be associated with solar energy development due to major
11 modification of the character of the existing landscape. There is the potential for additional
12 impacts from construction and operation of transmission lines and access roads within the SEZ.
13

14 The SEZ is in an area of low scenic quality, with numerous cultural disturbances already
15 present. Residents, workers, and visitors to the area may experience visual impacts from solar
16 energy facilities located within the SEZ (as well as any associated access roads and transmission
17 lines) as they travel area roads. The residents nearest to the SEZ could be subjected to large
18 visual impacts from solar energy development within the SEZ.
19

20 Utility-scale solar energy development within the proposed Milford Flats South SEZ is
21 unlikely to cause even moderate visual impacts on highly sensitive visual resource areas, the
22 closest of which is more than 25 mi (40 km) from the SEZ. The closest community (Minersville)
23 is approximately 5 mi (8 km) from the SEZ, and weak visual contrasts from solar development
24 within the SEZ are expected where the SEZ is visible within the community.
25
26

27 **13.2.14.3 SEZ-Specific Design Features and Design Feature Effectiveness**
28

29 No SEZ-specific design features have been identified to protect visual resources for the
30 proposed Milford Flats South SEZ. As noted in Section 5.12, the presence and operation of
31 large-scale solar energy facilities and equipment would introduce major visual changes into non-
32 industrialized landscapes and could create strong visual contrasts in line, form, color, and texture
33 that could not easily be mitigated substantially. Implementation of the programmatic design
34 features intended to reduce visual impacts (described in Appendix A, Section A.2.2) would be
35 expected to reduce visual impacts associated with utility-scale solar energy development within
36 the SEZ; however, the degree of effectiveness of these design features could be assessed only at
37 the site- and project-specific level. Given the large-scale, reflective surfaces, and strong regular
38 geometry of utility-scale solar energy facilities and the lack of screening vegetation and
39 landforms within the SEZ viewshed, siting the facilities away from sensitive visual resource
40 areas and other sensitive viewing areas would be the primary means of mitigating visual impacts.
41 The effectiveness of other visual impact mitigation measures would generally be limited.
42
43

1 **13.2.15 Acoustic Environment**

2
3
4 **13.2.15.1 Affected Environment**

5
6 The proposed Milford Flats South SEZ is located in southwestern Utah, in the south
7 central portion of Beaver County. The State of Utah and Beaver County have no applicable
8 quantitative noise-level regulations; however, neighboring Iron County has quantitative noise
9 limits applicable to solar power plants that have been used for comparative purposes in this
10 analysis. Under the Iron County regulations, no solar power plant should exceed 65 dBA as
11 measured at the property line, or 50 dBA as measured at the nearest neighboring inhabitable
12 building (Iron County 2009).

13
14 The nearest major roads are State Route 21/130, about 5 mi (8 km) east in Minersville,
15 and a smaller spur of State Route 129 about 3 mi (5 km) northeast of the SEZ. Beryl Milford
16 Road runs as close as about 3 mi (5 km) to the northwest. The Union Pacific Railroad is about
17 1.3 mi (2.1 km) west. The nearest airport is Milford Municipal Airport, about 14 mi (22 km)
18 north-northeast of the SEZ. Large-scale irrigated agricultural lands are situated to the east,
19 starting from 0.25 mi (0.4 km) from the SEZ and extending to Minersville, and to the north,
20 starting about 2 mi (3 km) from the SEZ and continuing up to Milford. Commercial hog
21 production facilities exist on private lands adjacent to the northern boundary of the SEZ and
22 farther to the west. No sensitive receptors (e.g., residences, hospitals, schools, or nursing homes)
23 exist on or in the immediate vicinity of the SEZ. The nearest residence from the boundary of the
24 SEZ is located more than 1.1 mi (1.8 km) to the southeast. The nearby population centers with
25 schools are Minersville, about 5 mi (8 km) east, and Milford, about 12 mi (19 km) north-
26 northeast. Accordingly, noise sources around the SEZ include road traffic, railroad traffic,
27 aircraft flyover, agricultural activities, commercial hog production facilities, and occasional
28 community activities and events. Other noise sources are associated with current land use around
29 the SEZ, including grazing, outdoor recreation, backcountry and OHV use, and hunting. The
30 proposed Milford Flats South SEZ is in a remote and undeveloped area with an overall rural
31 character. To date, no environmental noise survey has been conducted around the proposed
32 Milford Flats South SEZ. On the basis of the population density, the day-night sound level (L_{dn}
33 or DNL) is estimated to be 26 dBA for Beaver County, lower than the level typical of a rural
34 area, which is in the range of 33 to 47 dBA L_{dn} ¹⁶ (Eldred 1982; Miller 2002).

35
36
37 **13.2.15.2 Impacts**

38
39 Potential noise impacts associated with solar projects in the Milford Flats South SEZ
40 would occur during all phases of the projects. During the construction phase, potential noise
41 impacts associated with operation of heavy equipment and vehicular traffic would be anticipated
42 at the nearest residence (within 1.1 mi [1.8 km]), albeit of short duration. Potential impacts also

¹⁶ Rural and undeveloped areas have sound levels in the range of 33 to 47 dBA as L_{dn} (Eldred 1982). Typically, the nighttime level is 10 dBA lower than daytime level, and it can be interpreted as 33 to 47 dBA (mean 40 dBA) during the daytime hours and 23 to 37 dBA (mean 30 dBA) during nighttime hours.

1 would be anticipated at the nearest residence during the operations phase, depending on the solar
2 technologies employed. Noise impacts shared by all solar technologies are discussed in detail in
3 Section 5.13.1, and technology-specific impacts are presented in Section 5.13.2. Impacts specific
4 to the proposed Milford Flats South SEZ are presented in this section. Any such impacts would
5 be minimized through the implementation of required programmatic design features described in
6 Appendix A, Section A.2.2, and through any additional SEZ-specific design features applied
7 (see Section 13.2.15.3). This section primarily addresses noise impacts on humans, although
8 potential noise impacts on wildlife at nearby sensitive areas are discussed. Additional discussion
9 on potential noise impacts on wildlife is presented in Section 5.10.2.

13.2.15.2.1 Construction

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

18
19 For the parabolic trough and power tower technologies, the highest construction noise
20 levels would occur at the power block area where key components (e.g., steam turbine/generator)
21 needed to generate electricity would be located. A maximum of 95 dBA at a distance of 50 ft
22 (15 m) is assumed if impact equipment such as pile drivers or rock drills is not being used.
23 Typically, the power block area is located in the center of the solar facility, at a distance of more
24 than 0.5 mi (0.8 km) from the facility boundary. Noise levels from construction of the solar array
25 would be lower than 95 dBA. When geometric spreading and ground effects are considered, as
26 explained in Section 4.13.1, noise levels would attenuate to about 50 dBA at a distance of 0.5 mi
27 (0.8 km) from the power block area. This noise level is the same as the Iron County regulation of
28 50 dBA for a solar facility. In addition, mid- and high-frequency noise from construction
29 activities is significantly attenuated by atmospheric absorption under the low-humidity
30 conditions typical of an arid desert environment and by temperature lapse conditions typical of
31 daytime hours; thus, noise attenuation to the Iron County regulation level would occur at
32 distances somewhat shorter than 0.5 mi (0.8 km). For a 10-hour daytime work schedule, the EPA
33 guideline level of 55 dBA L_{dn} for residential areas (EPA 1974) would occur at about 1,200 ft
34 (370 m) from the power block area, which would be well within the facility boundary. For
35 construction activities occurring near the eastern SEZ boundary (the boundary closest to the
36 nearest residence), estimated noise levels at the nearest residence would be about 41 dBA, which
37 is below the Iron County regulation of 50 dBA for a solar facility and comparable to a typical
38 daytime mean rural background level of 40 dBA. In addition, an estimated 42 dBA L_{dn} ¹⁷ at this
39 residence is well below the EPA guideline of 55 dBA L_{dn} for residential areas.

¹⁷ For this analysis, background levels of 40 and 30 dBA for daytime and nighttime hours, respectively, were assumed, which resulted in a day-night average noise level (L_{dn}) of 40 dBA.

1 There are no specially designated areas within a 5-mi (8-km) range from the Milford
2 Flats South SEZ, which is the farthest distance that noise, except extremely loud noise, can be
3 discernable. Thus, no noise impact analysis for nearby specially designated areas was made.
4

5 Depending on the soil conditions, pile driving might be required for installation of
6 solar dish engines. However, the pile drivers used would be relatively small and quiet, such as
7 vibratory or sonic drivers, rather than the impulsive impact pile drivers frequently seen at large-
8 scale construction sites. Potential impacts on the nearest residence would be anticipated to be
9 minor, considering the distance to the nearest residence (about 1.1 mi [1.8 km] from the eastern
10 SEZ boundary).
11

12 It is assumed that most construction activities would occur during the day when noise is
13 better tolerated than at night, because of the masking effects of background noise. In addition,
14 construction activities for a utility-scale facility are temporary in nature (typically a few years).
15 Construction would cause some unavoidable but localized short-term noise impacts on
16 neighboring communities, particularly for activities occurring near the eastern SEZ boundary,
17 close to the nearest residence.
18

19 Construction activities could result in various degrees of ground vibration, depending on
20 the equipment and construction methods used. All construction equipment causes ground
21 vibration to some degree, but activities that typically generate the most severe vibrations are
22 high-explosive detonations and impact pile driving. As is the case for noise, vibration would
23 diminish in strength with distance. For example, vibration levels at receptors beyond 140 ft
24 (43 m) from a large bulldozer (87 VdB at 25 ft [7.6 m]) would diminish below the threshold of
25 perception for humans, which is about 65 VdB (Hanson et al. 2006). No major construction
26 equipment that can cause ground vibration would be used during the construction phase, and no
27 residences or sensitive structures are located in close proximity. Therefore, no adverse vibration
28 impacts are anticipated from construction activities, including from pile driving for dish engines.
29

30 Transmission lines would be constructed within a designated ROW to connect to the
31 nearest regional power grid. A regional 345-kV transmission line is located about 19 mi (31 km)
32 southeast of the proposed Milford Flats South SEZ; thus, construction of a transmission line over
33 this relatively long distance would be needed to connect to the regional grid. For construction of
34 transmission lines, noise sources and their noise levels might be similar to construction noise
35 sources at an industrial facility of a comparable size. Transmission line construction for the
36 proposed Milford Flats South SEZ could be performed over about two years. However, the area
37 under construction along the transmission line ROW would move continuously, and no particular
38 area would be exposed to noise for a prolonged period. Therefore, potential noise impacts on
39 nearby residences along the transmission line ROW, if any, would be minor and temporary in
40 nature.
41

42 43 ***13.2.15.2.2 Operations*** 44

45 Noise sources common to all or most types of solar technologies include equipment
46 motion from solar tracking; maintenance and repair activities (e.g., washing mirrors or replacing

1 broken mirrors) at the solar array area; commuter/visitor/support/delivery traffic within and
2 around the solar facility; and activities at control/administrative buildings, warehouses, and other
3 auxiliary buildings and structures. Diesel-fired emergency power generators and firewater pump
4 engines would be additional sources of noise, but their operations would be limited to several
5 hours per month (for preventive maintenance testing).
6

7 With respect to the main solar energy technologies, noise-generating activities in the
8 PV solar array area would be minimal, related mainly to solar tracking, if used. On the other
9 hand, dish engine technology, which employs collector and converter devices in a single unit,
10 generally has the strongest noise sources.
11

12 For the parabolic trough and power tower technologies, most noise sources during
13 operations would be in the power block area, including the turbine generator (typically in an
14 enclosure), pumps, boilers, and dry- or wet-cooling systems. The power block is typically
15 located in the center of the facility. On the basis of a 250-MW parabolic trough facility with a
16 cooling tower (Beacon Solar, LLC 2008), simple noise modeling indicates that noise levels
17 would be more than 85 dBA immediately around the power block, but would decrease to about
18 51 dBA at the facility boundary, about 0.5 mi (0.8 km) from the power block area. For a facility
19 located near the eastern corner of the SEZ, the predicted noise level would be about 40 dBA at
20 the nearest residence, which is lower than the Iron County regulation of 50 dBA and the same as
21 typical daytime mean rural background level of 40 dBA. If TES were not used (i.e., if the
22 operation was limited to daytime, 12 hours only¹⁸), the EPA guideline level of 55 dBA (as L_{dn}
23 for residential areas) would occur at about 1,370 ft (420 m) from the power block area and thus
24 would not be exceeded outside of the proposed SEZ boundary. At the nearest residence, about
25 42 dBA L_{dn} would be estimated, which is well below the EPA guideline of 55 dBA L_{dn} for
26 residential areas. However, day-night average sound levels higher than those estimated above by
27 using the simple noise modeling would be anticipated if TES were used during nighttime hours,
28 as explained below and in Section 4.13.1.
29

30 On a calm, clear night, typical of the proposed Milford Flats South SEZ setting, the air
31 temperature would likely increase with height (temperature inversion) because of strong
32 radiative cooling. Such a temperature profile tends to focus noise downward toward the ground.
33 There would be little, if any, shadow zone¹⁹ within 1 or 2 mi (2 or 3 km) of the noise source in
34 the presence of a strong temperature inversion (Beranek 1988). In particular, such conditions add
35 to the effect of noise being more discernable during nighttime hours, when the background noise
36 levels are the lowest. To estimate the L_{dn} , 6-hour nighttime generation with TES is assumed after
37 12-hour daytime generation. For nighttime hours under temperature inversion, 10 dB is added to
38 sound levels estimated from the uniform atmosphere (see Section 4.13.1). On the basis of these
39 assumptions, the estimated nighttime noise level at the nearest residence (about 1.1 mi [1.8 km]
40 from the eastern SEZ boundary) would be 50 dBA, which is the same as the Iron County
41 regulation level of 50 dBA but is much higher than typical nighttime mean rural background

¹⁸ Maximum possible operating hours at the summer solstice, but limited to seven to eight hours at the winter solstice.

¹⁹ A shadow zone is defined as the region in which direct sound does not penetrate because of upward diffraction.

1 level of 30 dBA. The day-night average noise level is estimated to be about 52 dBA L_{dn} , which
2 is lower than the EPA guideline of 55 dBA L_{dn} for residential areas. The assumptions are
3 conservative in terms of operating hours, and no credit is given to other attenuation mechanisms,
4 so it is likely that sound levels would be lower than 52 dBA L_{dn} at the nearest residence, even if
5 TES were used at a solar facility. In consequence, operating parabolic trough or power tower
6 facilities using TES and located near the eastern SEZ boundary could result in adverse noise
7 impacts at the nearest residence, depending on background noise levels and meteorological
8 conditions. In the permitting process, refined noise propagation modeling would be warranted
9 along with measurement of background noise levels.

10
11 The solar dish engine is unique among CSP technologies, because it generates electricity
12 directly and does not require a power block. A single, large solar dish engine has relatively low
13 noise levels, but a solar facility might employ tens of thousands of dish engines, which would
14 cause high noise levels around such a facility. For example, the proposed 750-MW SES Solar
15 Two dish engine facility in California would employ as many as 30,000 dish engines (SES Solar
16 Two, LLC 2008). At the proposed Milford Flats South SEZ, on the basis of the assumption of
17 dish engine facilities of up to 576-MW total capacity (covering 80% of the total area, or
18 5,184 acres [21.0 km²]), up to 23,040 25-kW dish engines could be employed. Also, for a large
19 dish engine facility, several hundred step-up transformers would be embedded in the dish engine
20 solar field, along with a substation; however, the noise from those sources would be masked by
21 dish engine noise.

22
23 The composite noise level of a single dish engine would be about 88 dBA at a distance of
24 3 ft (0.9 m) (SES Solar Two, LLC 2008). This noise level would be attenuated to about 40 dBA
25 (typical of the mean rural daytime environment) within 330 ft (100 m). However, the combined
26 noise level from tens of thousands of dish engines operating simultaneously would be high in the
27 immediate vicinity of the facility, for example, about 49 dBA at 1.0 mi (1.6 km) and 44 dBA at
28 2 mi (3 km) from the boundary of the squarely shaped dish engine solar field. Both of these noise
29 levels are lower than the Iron County regulation of 50 dBA for a solar facility but higher than
30 typical daytime mean rural background level of 40 dBA. Noise levels would be higher than the
31 Iron County regulation up to 0.8 mi (1.3 km) from a dish engine facility. However, the 50-dBA
32 level would occur at somewhat shorter distance than the aforementioned 0.8-mi (1.3-km)
33 distance, considering noise attenuation by atmospheric absorption and temperature lapse during
34 daytime hours.

35
36 To estimate noise levels at the nearest residence, it was assumed that dish engines were
37 placed over 80% of the Milford Flats South SEZ at intervals of 98 ft (30 m). Under this
38 assumption, the estimated noise level at the nearest residence about a 1.1-mi (1.8-km) from the
39 SEZ boundary would be about 44 dBA, which is lower than the Iron County regulation of
40 50 dBA for a solar facility but is higher than typical daytime mean rural background level of
41 40 dBA. For a 12-hour daytime operation, the estimated 44 dBA L_{dn} at this residence is well
42 below the EPA guideline of 55 dBA L_{dn} for residential areas. However, depending on
43 background noise levels and meteorological conditions, noise from dish engines could have
44 adverse impacts on the nearest residence. Thus, consideration of minimizing noise impacts is
45 very important during the siting of dish engine facilities. Direct mitigation of dish engine noise
46 through noise control engineering could also limit noise impacts.

1 During operations, no major ground-vibrating equipment would be used. In addition, no
2 sensitive structures are located close enough to the Milford Flats South SEZ to experience
3 physical damage from vibration. Therefore, during operation of any solar facility potential
4 vibration impacts on surrounding communities and vibration-sensitive structures would be
5 minimal.
6

7 Transformer-generated humming noise and switchyard impulsive noises would be
8 generated during the operation of solar facilities. These noise sources would be located near the
9 power block area, typically near the center of a solar facility. Noise from these sources would
10 generally be limited to within the facility boundary and not be heard at the nearest residence,
11 assuming a 1.6-mi (2.6-km) distance (at least 0.5 mi [0.8 km] to the facility boundary and 1.1 mi
12 [1.8 km] to the nearest residence). Accordingly, potential impacts of these noise sources on the
13 nearest residence would be minimal.
14

15 For impacts from transmission line corona discharge noise (Section 5.13.1.5)
16 during rainfall, the noise level at 50 ft (15 m) and 300 ft (91 m) from the center of a 230-kV
17 transmission line tower would be about 39 and 31 dBA (Lee et al. 1996), respectively, typical of
18 daytime and nighttime mean background noise levels in rural environments. The noise levels at
19 65 ft (20 m) and 300 ft (91 m) from the center of 500-kV transmission line towers would be
20 about 49 and 42 dBA, typical of high-end and mean, respectively, daytime background noise
21 levels in rural environments. Corona noise includes high-frequency components, which may be
22 judged to be more annoying than other environmental noises. However, corona noise would not
23 likely cause impacts, unless a residence was located close to the source (e.g., within 500 ft
24 [152 m] of a 230-kV transmission line and 0.5 mi [0.8 km] of a 500-kV transmission line). The
25 proposed Milford Flats South SEZ is located in an arid desert environment, and incidents of
26 corona discharge would be infrequent. Therefore, potential impacts on nearby residents along the
27 transmission line ROW would be negligible.
28
29

30 ***13.2.15.2.3 Decommissioning/Reclamation*** 31

32 Activities for decommissioning/reclamation would be similar to those for construction
33 (but more limited) and would require many of the same procedures and equipment used in
34 construction. Decommissioning/reclamation would include dismantling of solar facilities and
35 support facilities, such as structures and mechanical or electrical installations; disposal of debris;
36 grading; and revegetation as needed. Potential noise impacts at surrounding communities would
37 be correspondingly lower than those for construction activities. Decommissioning activities
38 would be of short duration, and their potential noise impacts would be minor and temporary in
39 nature. The same mitigation measures used during the construction phase could also be
40 implemented during the decommissioning phase.
41

42 Similarly, potential vibration impacts on surrounding communities and vibration-
43 sensitive structures during decommissioning of any solar facility would be lower than those
44 during construction; and thus, would be minimal.
45
46

1 **13.2.15.3 SEZ-Specific Design Features and Design Feature Effectiveness**
2

3 The implementation of required programmatic design features described in Appendix A,
4 Section A.2.2, would greatly reduce or eliminate the potential for noise impacts from
5 development and operation of solar energy facilities. While some SEZ-specific design features
6 are best established when specific project details are being considered, measures that can be
7 identified at this time include the following:
8

- 9 • Noise levels from cooling systems equipped with TES should be managed
10 so levels at the nearest residence to the southeast of the SEZ are kept within
11 applicable guidelines. This could be accomplished in several ways; for
12 example, through placing the power block approximately 1 to 2 mi (1.6 to
13 3 km) or more from residences, limiting operations to a few hours after sunset,
14 and/or installing fan silencers.
15
- 16 • Dish engine facilities within the Milford Flats South SEZ should be located
17 more than 1 to 2 mi (1.6 to 3 km) from the nearest residence around the SEZ
18 (i.e., the facilities should be located in the central or western area of the
19 proposed SEZ). Direct noise control measures applied to individual dish
20 engine systems could also be used to reduce noise impacts at nearby
21 residences.
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1 **13.2.16 Paleontological Resources**

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4 **13.2.16.1 Affected Environment**

5
6 The Milford Flats South SEZ is 100% covered in Quaternary alluvium (classified as Qa
7 on geological maps). This Quaternary deposit is classified as PFYC Class 2 on the basis of the
8 PFYC map from the Utah State Office (see Murphey and Daitch 2007). Class 2 indicates that the
9 potential for occurrence of significant fossil material is low (see Section 4.14 for a discussion of
10 the PFYC system).

11
12
13 **13.2.16.2 Impacts**

14
15 Few, if any, impacts on significant paleontological resources are likely to occur in the
16 proposed Milford Flats South SEZ. Vertebrate paleontological resources have been found in
17 ancient lacustrine deposits associated with Lake Bonneville, particularly in caves
18 (Madsen 2000). Therefore, a more detailed look at the geological deposits of the SEZ is needed
19 to determine whether a paleontological survey is warranted. If the geological deposits are
20 determined to be as described above and remain classified as PFYC Class 2, further assessment
21 of paleontological resources is not likely to be necessary. Important resources could exist; if
22 identified, they would need to be managed on a case-by-case basis. Section 5.14 discusses the
23 types of impacts that could occur on any significant paleontological resources found to be
24 present within the Milford Flats South SEZ. Impacts will be minimized through the
25 implementation of applicable general mitigation measures listed in Section 5.14, as well as
26 required programmatic design features described in Appendix A, Section A.2.2.

27
28 Indirect impacts on paleontological resources, such as looting or vandalism, are not likely
29 for a PFYC Class 2 area. Programmatic design features for controlling water runoff and
30 sedimentation would prevent erosion-related impacts on buried deposits outside of the SEZ.

31
32 The nearest state or U.S. route is 5 mi (8 km) from the SEZ (State Route 21/130); thus,
33 a new road is anticipated to be needed to access the proposed Milford Flats South SEZ, which
34 would result in approximately 36 acres (0.15 km²) of disturbance to PFYC Class 2 deposits.
35 Approximately 19 mi (31 km) of transmission line is anticipated to be needed to connect to the
36 nearest existing line, which would result in approximately 576 acres (2.3 km²) of disturbance in
37 areas classified as PFYC Class 2, as well as in PFYC Class 1 areas (Murphey and Daitch 2007).
38 Class 1 indicates that the occurrence of significant fossils is nonexistent or extremely rare. Few,
39 if any, impacts on paleontological resources are anticipated in areas of PFYC Class 1 and 2
40 deposits related to these additional ROWs. However, similar to the SEZ footprint, important
41 resources could exist; if identified, they would need to be managed on a case-by-case basis.
42 Impacts on paleontological resources related to the creation of new corridors not assessed in this
43 PEIS would be evaluated at the project-specific level if new road or transmission construction or
44 line upgrades are to occur.

1 **13.2.16.3 SEZ-Specific Design Features and Design Feature Effectiveness**
2

3 Impacts would be minimized through the implementation of required programmatic
4 design features, as described in Appendix A, Section A.2.2. If the geological deposits are
5 determined to be as described above and remain classified as PFYC Class 2 or Class 1, SEZ-
6 specific design features for mitigating impacts on paleontological resources within the proposed
7 Milford Flats South SEZ and associated ROWs are not likely to be necessary.
8
9
10

1 **13.2.17 Cultural Resources**

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3
4 **13.2.17.1 Affected Environment**

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6
7 **13.2.17.1.1 Prehistory**

8
9 The proposed Milford Flats South SEZ is located in the Escalante Desert of southwest
10 Utah and follows the same prehistoric sequence as presented for the Escalante Valley SEZ in
11 Section 13.1.17.1.1. Of particular note for the Milford Flats South SEZ, several Fremont sites
12 have been recorded just south of the SEZ at higher elevations (Dalley 2009).
13

14
15 **13.2.17.1.2 Ethnohistory**

16
17 Before the arrival of Euro-Americans, the Escalante Valley fell primarily within the
18 traditional use area of the Numic-speaking Southern Paiute, although their linguistically related
19 neighbors, the Utes and Western Shoshone, probably traversed the area as well. The proposed
20 Milford Flats South SEZ falls within *Yanawant*, the traditional eastern subdivision of the
21 Southern Paiute (Stoffle et al. 1997). Situated in the Escalante Desert, it is located in a little-used
22 no-man’s-land, nominally in the territory of the Southern Paiute Beaver group (Kelly 1934). The
23 traditional use area of the Beaver group overlaps with that of the Pahvant Band of the Utes, who
24 from their core territory around Sevier Lake ranged almost to the present Nevada border
25 (Callaway et al. 1986; Duncan 2010). The Western Shoshone and Goshute core territories were
26 to the northwest (Crum 1994; Defa 2010). The Escalante Valley is within the area that the Indian
27 Claims Commission ruled was the traditional territory of the Southern Paiutes (Royster 2008).
28 The ethnohistory of these Tribes is discussed in Section 13.1.17.1.2.
29

30
31 **13.2.17.1.3 History**

32
33 The historic framework for the proposed Milford Flats South SEZ follows closely with
34 that of all of the Utah SEZs and is summarized in Section 13.1.17.1.3 for the Escalante Valley
35 SEZ. Items of particular relevance to the Milford Flats South SEZ are added below, including a
36 summary of Beaver County history as relevant for both the Milford Flats South and Wah Wah
37 Valley proposed SEZs (only Iron County history is summarized for the Escalante Valley SEZ).
38

39 The area of Beaver County was explored by the Mormon Albert Carrington. Beaver
40 County growth was based on a blend of agriculture, livestock, mining, transportation, and trade.
41 The Lincoln Mine, 5 mi (8 km) outside of Minersville, was the first lead mine to open in Utah
42 (1858); it produced lead that was shipped to Salt Lake to make ammunition (University of
43 Utah 2009). The Horn Silver Mine was discovered in 1875. The mining camp/boomtown of
44 Frisco was established to support it in 1876. The mine was an important producer of both silver
45 and lead. Between 1875 and 1910, it produced more than \$74 million worth of materials
46 (Carr 1972). By 1920, Frisco was deserted. The charcoal kilns that supported the mine smelter

1 are still standing and are listed in the NRHP. The town of Milford was established in 1870
2 predominantly for mining and cattle raising; by 1880, when the Utah Southern Railroad arrived,
3 it had become a regional transportation center for shipping ore and livestock. When the railroad
4 line was extended to Frisco, Milford also became a supply center and shipping station for local
5 mines (University of Utah 2009). Another town, Newhouse, was established in 1905 just west of
6 Frisco to support the Cactus Mine, which produced gold, silver, copper, and other minerals.
7 However, within five years of being settled, the Cactus Mine gave out and Newhouse was
8 abandoned. Many of the Newhouse buildings were relocated to Milford (Carr 1972).

9
10 Railroad lines are discussed in Section 13.1.17.1.3; the UP Railroad line passes just west
11 of the proposed Milford Flats South SEZ.

12 13 14 ***13.2.17.1.4 Traditional Cultural Properties***

15
16 The Southern Paiute see themselves as persisting in a cultural landscape composed of
17 many culturally significant places bound together into the land called *Puaxant Tuvip* (sacred land
18 or power land), created by a supernatural being who established a birthright relationship between
19 them and the land upon which they were created. Significant sites, such as the mountain
20 *Nuvagntu* (Mount Charleston in southwestern Nevada), have meaning for all Southern Paiutes
21 (Stoffle et al. 1997). Traditional cultural properties of significance to the Southern Paiute could
22 be present in the valleys. Government-to-government consultation is ongoing with these Native
23 American Tribes so their concerns, including any potential impacts on traditional cultural
24 properties, can be adequately addressed (see Section 13.2.18 on Native American Concerns and
25 Chapter 14 and Appendix K for a summary of government-to-government consultation for this
26 PEIS). Identification of traditional cultural properties may be considered sensitive, and therefore,
27 may not be fully described or disclosed in this PEIS.

28
29 As of yet, no traditional cultural properties have been identified within the proposed
30 Milford Flats South SEZ, nor have concerns been raised to date for traditional cultural properties
31 or sacred areas located in the vicinity of the SEZ; however, in the past the Southern Paiutes have
32 identified mountains, springs, clay and rock sources, burial sites, rock art, trails, shrines,
33 ceremonial areas, and former habitation sites as sites of cultural importance (Stoffle and
34 Dobyms 1983) (see Section 13.2.18).

35 36 37 ***13.2.17.1.5 Cultural Surveys and Known Archaeological and Historic Resources***

38
39 Nine archaeological surveys have been conducted either entirely within the proposed
40 Milford Flats South SEZ or passed through the SEZ (Dalley 2009; Utah SHPO 2009). Most of
41 these surveys have been linear and consequently have not covered a large number of acres. No
42 sites have been recorded as a result of these surveys. One linear survey that was conducted just
43 north of the SEZ boundary for a county road recorded two sites, neither of which was considered
44 eligible for listing in the NRHP. One of the sites is a historic trash scatter of numerous cans, jars,
45 and ceramics, and the other is a lithic scatter of obsidian and chert flakes that does not include
46 any tools. One large block survey (4,550 acres [18 km²]) was conducted just south of the SEZ

1 for a wildland fire rehabilitation project. In the valley areas closest to the SEZ (within 2 mi
2 [3 km]), only one site was recorded. The site is a lithic scatter (mostly flakes with no tools) with
3 a historic component; the site is not eligible for the NRHP. No historic structures were observed
4 within the proposed SEZ. Nearly 100 sites have been recorded within 5 mi (8 km) of the SEZ.
5 Approximately three-quarters of those are located south of the SEZ, near higher elevations and
6 along linear features, such as the UP Railroad line and State Route 130.
7

8 The SEZ has the potential to contain significant cultural resources, although the potential
9 is relatively low. Several historic period artifacts were found in the SEZ during a preliminary
10 site visit, including a number of broken glass insulators; additional artifacts are likely to be
11 encountered in the area. The route of the circa-1935 Bell System Telephone Line between Salt
12 Lake City and Las Vegas probably cuts across the SEZ and would explain the presence of broken
13 insulators. The line is a NRHP-eligible telephone line that was documented in 2003 as mitigation
14 for a gas pipeline expansion project.
15

16 ***National Register of Historic Places*** 17

18
19 Within Beaver and Iron Counties, 134 properties (including a couple of districts) are
20 listed in the NRHP (115 in Beaver County and 19 in Iron County). The SEZ is located in Beaver
21 County, less than 2 mi (3 km) from the Iron County line. Most of these properties are houses
22 (73%) or are related to town (courthouses, meeting halls, schools, stores, and hotels) and
23 industrial (railroad depots, flour mills, mining sites, and power plants) development. Other
24 property types include cabins, homesteads/ranches, forts, and archaeological sites. None of these
25 properties are located within or adjacent to the SEZs. The Rollins-Eyre House in Minersville is
26 the nearest NRHP-listed property located approximately 5 mi (8 km) east of the SEZ. The
27 Jenner-Griffiths House and the Minersville City Hall are also located in Minersville, a short
28 distance farther east. No other NRHP-listed properties are located within 15 mi (24 km) of the
29 proposed SEZ. Three of the sites listed in the NRHP are located on BLM-administered lands:
30 Parowan Gap, Wild Horse Obsidian Quarry, and Gold Spring Historic Site. Parowan Gap is a
31 Fremont rock art site in Iron County that is important to the Paiute Indians and is located
32 approximately 15 to 20 mi (24 to 32 km) south of the proposed Milford Flats South SEZ. The
33 Wild Horse Obsidian Quarry is about 20 mi (32 km) northwest of the SEZ in the Mineral
34 Mountains. The Gold Spring Historic Site is a mining town located southwest of the SEZ in Iron
35 County near the Nevada border.
36

37 38 **13.2.17.2 Impacts** 39

40 No adverse impacts are currently anticipated at the proposed Milford Flats South SEZ,
41 but such could be possible if significant cultural resources are found in the area during survey.
42 A cultural resource survey of the entire area of potential effect, including consultation with
43 affected Native American Tribes, would first need to be conducted to identify archaeological
44 sites, historic structures and features, and traditional cultural properties, and an evaluation would
45 need to follow to determine whether any are eligible for listing in the NRHP as historic
46 properties. Section 5.15 discusses the types of impacts that could occur on any significant

1 cultural resources found to be present within the proposed Milford Flats South SEZ. Impacts
2 would be minimized through the implementation of applicable general mitigation measures listed
3 in Section 5.15, as well as required programmatic design features described in Appendix A,
4 Section A.2.2. Programmatic design features assume that the necessary surveys, evaluations, and
5 consultations will occur. No traditional cultural properties have been identified to date within the
6 vicinity of the SEZ. The low density of sites recorded in basin interiors in this region suggests
7 that the possibility of significant sites within the SEZ is low (Dalley 2009).
8

9 Indirect impacts on cultural resources that result from erosion outside of the SEZ
10 boundary (including along ROWs) are unlikely, assuming programmatic design features to
11 reduce water runoff and sedimentation are implemented (as described in Appendix A,
12 Section A.2.2).
13

14 The nearest state or U.S. route is 5 mi (8 km) from the SEZ (State Route 130/21); thus,
15 a new road is anticipated to be needed to access the proposed Milford Flats South SEZ, the
16 creation of which would result in approximately 36 acres (0.15 km²) of disturbance.
17 Approximately 19 mi (31 km) of transmission line is anticipated to be needed to connect to the
18 nearest existing line, which would result in approximately 576 acres (2.3 km²) of disturbance.
19 Impacts on cultural resources are possible in areas related to these associated ROWs, as new
20 areas of potential cultural significance could be directly impacted by construction or opened to
21 increased access due to road and transmission ROW construction and use. Indirect impacts are
22 also possible from unauthorized surface collection, depending on the proximity of the ROW to
23 potential archaeological sites. Impacts on cultural resources related to the creation of new
24 corridors not assessed in this PEIS would be evaluated at the project-specific level if new road or
25 transmission construction or line upgrades were to occur. Programmatic design features assume
26 that the necessary surveys, evaluations, and consultations will occur with the ROWs, as with the
27 SEZ footprint.
28
29

30 **13.2.17.3 SEZ-Specific Design Features and Design Feature Effectiveness**

31

32 Programmatic design features to mitigate adverse effects on significant cultural
33 resources, such as avoidance of significant sites and features, are provided in Appendix A,
34 Section A.2.2.
35

36 SEZ-specific design features would be determined during consultations with the Utah
37 SHPO and affected Tribes and would depend on the findings of cultural surveys.
38
39
40

1 **13.2.18 Native American Concerns**
2

3 Native Americans share many environmental and socioeconomic concerns with other
4 ethnic groups. For a discussion of issues of possible Native American concern shared with the
5 population as a whole, several sections in this PEIS should be consulted. General topics of
6 concern are addressed in Section 4.16. Specifically for the proposed Milford Flats South SEZ,
7 Section 13.2.17 discusses archaeological sites, structures, landscapes, and traditional cultural
8 properties; Section 13.2.8 discusses mineral resources; Section 13.2.9.1.3 discusses water rights
9 and water use; Section 13.2.10 discusses plant species; Section 13.2.11 discusses wildlife
10 species, including wildlife migration patterns; Section 13.2.13 discusses air quality;
11 Section 13.2.14 discusses visual resources; Sections 13.2.19 and 13.2.20 discuss socioeconomics
12 and environmental justice, respectively; and issues of human health and safety are discussed in
13 Section 5.21. This section focuses on concerns that are specific to Native Americans and to
14 which Native Americans bring a distinct perspective.
15

16
17 **13.2.18.1 Affected Environment**
18

19 The three Utah SEZs are clustered in the valleys and deserts of west-central Utah. They
20 fall within a Tribal traditional use area generally attributed to the Southern Paiute. The proposed
21 Milford Flats South SEZ is within the area so recognized by the courts (Royster 2008), but is
22 close to the traditional ranges of the Western Shoshone and the Utes, with whom the Southern
23 Paiute interacted. It is likely that members of all three Tribes were present from time to time in
24 this area. All federally recognized Tribes with Southern Paiute roots or possible associations with
25 the Utah SEZs have been contacted and provided an opportunity to comment or consult
26 regarding this PEIS. They are listed in Table 13.2.18.1-1. A listing of all federally recognized
27 Tribes contacted for this PEIS is found in Appendix K.
28
29

30 ***13.2.18.1.1 Territorial Boundaries***
31

32 The traditional territorial boundaries of the Southern Paiutes, the Western Shoshone
33 (including Goshutes), and the Utes are discussed in Section 13.1.18.1.1.
34
35

36 ***13.2.18.1.2 Plant Resources***
37

38 The vegetation present at the proposed Milford Flats South SEZ is described in
39 Section 13.2.10. The cover types present at the SEZ are from the Inter-Mountain Basins series.
40 They are mostly Mixed Salt Desert Scrub and Big Sagebrush Shrubland. There are smaller areas
41 of Greasewood Flat and Semi-Desert Shrub-Steppe. Greasewood and sagebrush are the dominant
42 species. Native Americans made use of these plants for medicinal purposes, and greasewood
43 seeds were harvested for food. As shown in Table 13.2.18.1-2, very few of the many other
44 known plant species traditionally used by Native Americans for food (Stoffle et al. 1999; Stoffle
45 and Dobyns 1983) are likely to be present in the SEZ.
46

TABLE 13.2.18.1-1 Federally Recognized Tribes with Traditional Ties to the Utah SEZs

Tribe	Location	State
Chemehuevi Indian Tribe	Havasu Lake	California
Colorado River Indian Tribes	Parker	Arizona
Confederated Tribes of the Goshute Reservation	Ibapah	Utah
Ely Shoshone Tribe	Ely	Nevada
Hopi Tribe	Kykotsmovi	Arizona
Kaibab Paiute Tribe	Fredonia	Arizona
Las Vegas Paiute Tribe	Las Vegas	Nevada
Moapa Band of Paiutes	Moapa	Nevada
Pahrump Paiute Tribe	Pahrump	Nevada
Paiute Indian Tribe of Utah	Cedar City	Utah
Cedar Band	Cedar City	Utah
Indian Peak Band	Cedar City	Utah
Kanosh Band	Kanosh	Utah
Koosharem Band	Cedar City	Utah
Shivwits Band	Ivins	Utah
San Juan Southern Paiute Tribe	Tuba City	Arizona
Skull Valley Band of Goshute Indians	Grantsville	Utah
Ute Indian Tribe	Fort Duchesne	Utah
Ute Mountain Ute Tribe	Towaoc	Colorado

1
2

TABLE 13.2.18.1-2 Plant Species Important to Native Americans Observed or Likely To Be Present in the Proposed Milford Flats South SEZ

Common Name	Scientific Name	Status
Food		
Dropseed	<i>Sporobolus</i> spp.	Possible
Greasewood	<i>Sarcobatus vermiculatus</i>	Observed
Indian ricegrass	<i>Achnatherum hymenoides</i>	Observed
Saltbush	<i>Atriplex</i> spp.	Possible
Saltgrass	<i>Distichlis spicata</i>	Possible
Wolfberry	<i>Lycium andersonii</i>	Possible
Medicine		
Greasewood	<i>Sarcobatus vermiculatus</i>	Observed
Mormon Tea	<i>Ephedra nevadensis</i>	Possible
Rabbitbrush	<i>Ericameria nauseosa</i>	Possible
Sagebrush	<i>Artemisia tridentata</i>	Observed

Sources: Field visit and USGS (2005b).

3
4

1 **13.2.18.1.3 Other Resources**
2

3 Wildlife likely to be found in the proposed Milford Flats South SEZ is described in
4 Section 13.2.11. This SEZ is generally arid, but is located only 4 mi (6 km) from the Beaver
5 River. In the arid flats, there are few game species traditionally important to Native Americans.
6 The most important are the black-tailed jackrabbit (*Lepus californicus*) and the pronghorn
7 antelope (*Antilocapra Americana*) (Stoffle and Dobyns 1983; Kelly and Fowler 1986).
8 Pronghorn tracks were observed at the SEZ during a field visit. Of the large game species, mule
9 deer (*Odocoileus hemionus*) occur in the surrounding mountains but are less common on the
10 desert floor. Smaller game that are important to Native Americans and found in the SEZ include
11 cottontails (*Sylvilagus audubonii*), chipmunks (*Neotamias minimus*), and woodrats (*Neotoma*
12 *lepida*). Migrating waterfowl traditionally have been an important seasonal resource. They are
13 uncommon in the SEZ and are more likely to be present near the Beaver River and the
14 Minersville Canal when it contains water.
15

16 Other animals traditionally important to the Southern Paiute include lizards; seven
17 species of which are likely to occur in the SEZ, and the golden eagle (*Aquila chrysaetoi*). The
18 SEZ falls within the range of the wide-ranging eagle. A representative list of animal species
19 important to Native Americans whose range includes the proposed Milford Flats South SEZ is
20 presented in Table 13.2.18.1-3.
21

22 Other natural resources traditionally important to the Southern Paiute include salt, clay
23 for pottery, and naturally occurring mineral pigments for the decoration and protection of the
24 skin (Stoffle and Dobyns 1983). There is some potential for clay deposits in the eastern end of
25 the SEZ.
26

27
28 **13.2.18.2 Impacts**
29

30 In the past, Southern Paiutes and the Western Shoshone have expressed concern over
31 project impacts on a variety of resources. They tend to take a holistic view of their traditional
32 homeland. For them, both cultural and natural features are inextricably bound together. Effects
33 on one part have ripple effects on the whole. Western distinctions between the sacred and the
34 secular have no meaning in their traditional world view (Stoffle and Dobyns 1983). While no
35 comments specific to the proposed Milford Flats South SEZ have been received from Native
36 American Tribes to date, the Paiute Indian Tribe of Utah and the Skull Valley Band of Goshute
37 Indians have asked to be kept informed of project developments. During energy development
38 projects in adjacent areas, the Southern Paiute have expressed concern over adverse effects on a
39 wide range of resources. Geophysical features and physical cultural remains are listed in
40 Section 13.2.17.1.4. However, these places are often seen as important because they are the
41 location of, or have ready access to, a range of plant, animal, and mineral resources
42 (Stoffle et al. 1997). Resources mentioned as important include food plants, medicinal plants,
43 plants used in basketry, and plants used in construction; large game animals, small game
44 animals, and birds; and sources of clay, salt, and pigments (Stoffle and Dobyns 1983).
45 Those likely to be found within the proposed Milford Flats South SEZ are discussed in
46

**TABLE 13.2.18.1-3 Animal Species Used by Native Americans as Food
Whose Range Includes the Proposed Milford Flats South SEZ**

Common Name	Scientific Name	Status
Mammals		
Black-tailed jack rabbit	<i>Lepus californicus</i> .	All year
Chipmunks	Various species	All year
Coyote	<i>Canis latrans</i>	All year
Desert cottontail	<i>Sylvilagus audubonii</i>	All year
Great Basin Pocket mouse	<i>Perognathus parvus</i>	All year
Kangaroo rat	<i>Dipodomys ordii</i>	All year
Kit fox	<i>Vulpes macotis</i>	All year
Mule deer	<i>Odocoileus hemionus</i>	All year
Mountain cottontail	<i>Sylvilagus nuttallii</i>	All year
Mountain lion	<i>Puma concolor</i>	All year
Pocket gophers	<i>Thomomys</i> spp.	All year
Porcupine	<i>Erethizon dorsatum</i>	All year
Pronghorn	<i>Antilocarpa americana</i>	All year
Red fox	<i>Vulpes vulpes</i>	All year
Ringtail	<i>Procyon lotor</i>	All year
Rock squirrel	<i>Spermophilus variegates</i>	All year
White-tailed jackrabbit	<i>Lepus townsendii</i>	All year
Woodrats	<i>Neotoma</i> spp.	All year
Birds		
Burrowing owl	<i>Athene cunicularia</i>	Summer
Common Raven	<i>Corvus corax</i>	All year
Ferruginous hawk	<i>Buteo regalis</i>	All year
Golden eagle	<i>Aquila chrysaetos</i>	All year
Great horned owl	<i>Bubo virginianus</i>	All year
Horned Lark	<i>Eremophila alpestris</i>	All year
Mourning dove	<i>Zenaida macroura</i>	All year
Northern mockingbird	<i>Mimus polyglottos</i>	All year
Prairie falcon	<i>Falco mexicanus</i>	All year
Red-tailed hawk	<i>Buteo jamaicensis</i>	All year
Rough-legged hawk	<i>Buteo lagopus</i>	Winter
Sage grouse	<i>Centrocercus urophasianus</i>	All year
Western meadow lark	<i>Sturnella neglecta</i>	All year
Reptiles		
Horned lizard	<i>Phrynosoma platyrhinos</i>	All year
Large lizards	Various species	All year
Western rattlesnake	<i>Crotalis viridis</i>	All year

Sources USGS (2005b); Fowler (1986).

1 Section 3.2.18.1. Traditional plant knowledge is found most abundantly in Tribal elders,
2 especially female elders (Stoffle et al. 1999).

3
4 The Escalante Desert appears to have been a no-man’s-land that was not intensively used
5 by the surrounding Native American groups. While it includes some plant species traditionally
6 important to Native Americans, they appear to be relatively scant. The most important traditional
7 resources are likely to have been black-tailed jackrabbit and pronghorn antelope. Development
8 of utility-scale solar facilities within the SEZ would result in the loss of some plant species and
9 the habitat of some animal species traditionally important to Native Americans. However, as
10 discussed in Sections 13.2.10 and 13.2.11, overall impacts on plant and animal species are
11 expected to be small because of the abundance of the same species outside the SEZ. The degree
12 to which specific areas of plant and animal resources are important to Native Americans must be
13 established through project-specific consultation.

14
15 As consultation with the Tribes continues and project-specific analyses are undertaken, it
16 is possible that Native American concerns will be expressed over potential visual and other
17 effects of solar energy development within the SEZ on specific resources and any culturally
18 important landscape.

19
20 Implementation of programmatic design features, as discussed in Appendix A,
21 Section A.2.2, should eliminate impacts on Tribes’ reserved water rights and the potential for
22 groundwater contamination issues.

23
24 Whether there are any issues relative to socioeconomics, environmental justice, or health
25 and safety relative to Native American populations has yet to be determined.

26 27 28 **13.2.18.3 SEZ-Specific Design Features and Design Feature Effectiveness**

29
30 Programmatic design features to address impacts of potential concern to Native
31 Americans, such as avoidance of sacred sites, water sources, and tribally important plant and
32 animal species, are provided in Appendix A, Section A.2.2.

33
34 The need for and nature of SEZ-specific design features regarding potential issues of
35 concern would be determined during government-to-government consultation with affected
36 Tribes listed in Table 13.2.18.1-1.

37
38 Mitigation of impacts on archaeological sites and traditional cultural properties is
39 discussed in Section 13.2.17.3, in addition to design features for historic properties discussed in
40 Appendix A, Section A.2.2.

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1 **13.2.19 Socioeconomics**

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4 **13.2.19.1 Affected Environment**

5
6 This section describes current socioeconomic conditions and local community services
7 within the ROI surrounding the proposed Milford Flats South SEZ. The ROI is a two-county area
8 consisting of Beaver and Iron Counties in Utah. It encompasses the area in which workers are
9 expected to spend most of their salaries and in which a portion of site purchases and nonpayroll
10 expenditures from the construction, operation, and decommissioning phases of the proposed SEZ
11 facility is expected to take place.
12

13
14 **13.2.19.1.1 ROI Employment**

15
16 In 2008, employment in the ROI stood at 23,325 (Table 13.2.19.1-1). Over the period
17 1999 to 2008, annual average employment growth rates were higher in Iron County (3.4%) than
18 in Beaver County (2.5%). At 3.3%, the employment growth rate in the ROI as a whole was
19 higher than the average state rate for Utah (2.1%).
20

21 In 2006, the service sector provided the highest percentage (36.3%) of employment in the
22 ROI, followed by the wholesale and retail trade at 19.5% (Table 13.2.19.1-2). Smaller
23 employment shares were held by transportation and public utilities. Within the ROI, the
24 distribution of employment across sectors varied compared with the ROI as a whole, with a
25 higher percentage of employment in agriculture in Beaver County (41.7%), and a lower
26 percentage in Iron County (7.0%). Employment shares in Iron County in construction (13.8%),
27 manufacturing (13.1%), and services (38.2%) were slightly higher than in the ROI as a whole.
28
29

**TABLE 13.2.19.1-1 ROI Employment for the Proposed
Milford Flats South SEZ**

Location	1999	2008	Average Annual Growth Rate, 1999–2008 (%)
Beaver County	2,369	3,025	2.5
Iron County	14,571	20,300	3.4
ROI	16,940	23,325	3.3
Utah	1,080,441	1,336,556	2.1

Sources: U.S. Department of Labor (2009a,b).

TABLE 13.2.19.1-2 Employment, by Sector, in 2006,^a in the ROI Surrounding the Proposed Milford Flats South SEZ

Industry	Iron County		Beaver County		ROI	
	Employment	% of Total	Employment	% of Total	Employment	% of Total
Agriculture ^a	934	7.0	927	41.7	1,861	12.0
Mining	10	0.1	— ^b	NA ^c	70	0.5
Construction	1,829	13.8	60	2.7	1,889	12.2
Manufacturing	1,732	13.1	10	0.4	1,742	11.3
Transportation and public utilities	363	2.7	216	9.7	579	3.7
Wholesale and retail trade	2,650	20.0	368	16.5	3,018	19.5
Finance, insurance, and real estate	646	4.9	70	3.1	716	4.6
Services	5,068	38.2	551	24.8	5,619	36.3
Other	10	0.1	0	0.0	10	0.1
Total	13,250		2,225		15,475	

^a Agricultural employment includes 2007 data for hired farmworkers.

^b A dash indicates county not included in the ROI.

^c NA = data not available.

Sources: U.S. Bureau of the Census (2009a); USDA (2009b).

13.2.19.1.2 ROI Unemployment

Unemployment rates have varied slightly across the two counties in the ROI. Over the period 1999 to 2008, the average rate in Iron County over this period was 4.1%, with a slightly lower rate in Beaver County (3.9%) (Table 13.2.19.1-3). The average rate in the ROI over this period was 4.0%, slightly lower than the average rate for Utah (4.1%). Unemployment rates for the first five months of 2009 contrast somewhat with rates for 2008 as a whole; in Iron County the unemployment rate increased to 6.4%, while rates reached 5.5% in Beaver County. The average rates for the ROI (6.2%) and Utah (5.2%) were also higher during this period than the corresponding average rates for 2008.

13.2.19.1.3 ROI Urban Population

The population of the ROI from 2006 to 2008 was 83% urban, with a group of cities and towns centered around Cedar City in the southwestern portion of Iron County.

The largest urban area in Iron County, Cedar City, had an estimated 2008 population of 28,439; other cities in the county include Enoch (5,076) and Parowan (2,606) (Table 13.2.19.1-4). In addition, there are three other urban areas in the county—Paragonah (477), Kannaraville (314), and Brian Head (126). Most of these cities and towns are about 30 mi (48 km) from the site of the proposed SEZ. Population growth rates among these cities and

TABLE 13.2.19.1-3 ROI Unemployment Rates for the Proposed Milford Flats South SEZ

Location	1999–2008 (average)	2008	2009 ^a
Beaver County	3.9	3.4	5.5
Iron County	4.1	4.2	6.4
ROI	4.0	4.1	6.2
Utah	4.1	3.4	5.2

^a Rates for 2009 are the average for January through May.

Sources: U.S. Department of Labor (2009a–c).

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TABLE 13.2.19.1-4 ROI Urban Population and Income for the Proposed Milford Flats South SEZ

City	Population			Median Household Income (\$ 2008)		
	2000	2008	Average Annual Growth Rate, 2000–2008 (%)	1999	2006–2008	Average Annual Growth Rate, 1999 and 2006–2008 (%) ^a
Cedar City	20,527	28,439	4.2	41,719	41,318	-0.1
Enoch	3,467	5,076	4.9	48,112	NA ^b	NA
Parowan	2,565	2,606	0.2	41,749	NA	NA
Beaver City	2,454	2,604	0.7	43,320	NA	NA
Milford	1,451	1,405	-0.4	46,105	NA	NA
Minersville	817	822	0.1	47,075	NA	NA
Paragonah	470	477	0.2	43,721	NA	NA
Kannaraville	311	314	0.1	44,258	NA	NA
Brian Head	118	126	0.8	56,732	NA	NA

^a Data are averages for the period 2006 to 2008.

^b NA = data not available.

Source: U.S. Bureau of the Census (2009b-d).

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towns have varied between 2000 and 2008. Enoch grew at an annual rate of 4.9% during this period, with higher than average growth also experienced in Cedar City (4.2%). The urban areas Brian Head (0.8%), Parowan (0.2%), and Kannaraville (0.1%) experienced lower growth rates between 2000 and 2008.

In addition to Beaver City, which had a 2008 population of 2,604, there are two urban areas in Beaver County—Milford (1,405) and Minersville (822). Population growth between 2000 and 2008 was low in Beaver City (0.7%), with annual growth rates of 0.1% in Minersville and -0.4% in Milford. These urban areas are less than 20 mi (32 km) from the proposed SEZ.

13.2.19.1.4 ROI Urban Income

Median household incomes varied considerably across cities and towns in the ROI. One city in Iron County, Brian Head (\$56,732), had median incomes in 1999 that were only slightly lower than the average for the state (\$58,873), while median incomes elsewhere in the ROI were below the state average (Table 13.2.19.1-4). The cities of Parowan (\$41,749) and Cedar City (\$41,719) had relatively low median incomes in 1999.

Data on median household incomes for the period 2006 to 2008 were only available for one city in the ROI. The median incomes growth rate for the period 1999 and 2006 to 2008 for Cedar City declined slightly (-0.1%). The average median household income growth rate for the state as a whole over this period was -0.5%.

13.2.19.1.5 ROI Population

Table 13.2.19.1-5 presents recent and projected populations in the ROI surrounding the proposed SEZ and for the state as a whole for the period 2000 to 2008. Population in the ROI

TABLE 13.2.19.1-5 ROI Population for the Proposed Milford Flats South SEZ

Location	2000	2008	Average Annual Growth Rate, 2000–2008 (%)	2021	2023
Beaver County	6,005	6,182	0.4	11,770	12,213
Iron County	33,779	44,194	3.4	66,796	69,173
ROI	39,784	50,376	3.0	78,566	81,385
Utah	2,233,169	2,727,343	2.5	3,546,228	3,666,248

Sources: U.S. Bureau of the Census (2009e,f); Governor’s Office of Planning and Budget (2009).

1 stood at 50,376 in 2008, having grown at an average annual rate of 3.0% since 2000. The growth
 2 rate for the ROI was higher than the rate for Utah (2.5%) over the same period.

3
 4 Each county in the ROI has experienced growth in population since 2000. Iron County
 5 recorded a population growth rate of 3.4% between 2000 and 2008, while Beaver County grew
 6 by 0.4% over the same period. The ROI population is expected to increase to 78,566 by 2021 and
 7 to 81,385 by 2023 (Governor’s Office of Planning and Budget 2009).
 8
 9

10 **13.2.19.1.6 ROI Income**

11
 12 Personal income in the ROI stood at \$1.1 billion in 2007 and has grown at an annual
 13 average rate of 3.2% over the period 1998 to 2007 (Table 13.2.10.1-6). ROI personal income per
 14 capita also rose over the same period at a rate of 0.4%, increasing from \$21,725 to \$22,688.
 15 Per-capita incomes were slightly higher in Beaver County (\$28,154) in 2007 than in Iron County
 16 (\$21,922). Personal income growth rates were higher in Iron County (3.5%) and lower in Beaver
 17 County (2.0%) than for the state as a whole (2.9%). Personal income per capita was higher in
 18 Utah (\$30,927) in 2007 than in the ROI as a whole.
 19

20 Median household income in the ROI in 2006 to 2008 varied from \$42,687 in Iron
 21 County to \$44,476 in Beaver County (U.S. Bureau of the Census 2009d).
 22
 23

**TABLE 13.2.19.1-6 ROI Personal Income for the Proposed Milford Flats
 South SEZ**

Location	1998	2007	Annual Average Growth Rate, 1998–2007 (%)
Beaver County			
Total income ^a	0.1	0.2	2.0
Per-capita income	23,734	28,154	1.7
Iron County			
Total income ^a	0.7	0.9	3.5
Per-capita income	21,352	21,922	0.3
ROI			
Total income ^a	0.8	1.1	3.2
Per-capita income	21,725	22,688	0.4
Utah			
Total income ^a	61.9	82.4	2.9
Per-capita income	28,567	30,927	0.8

^a Unless indicated otherwise, values are reported in \$ billion 2008.

Sources: U.S. Department of Commerce (2009); U.S. Bureau of the Census (2009e,f).

24
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1 **13.2.19.1.8 Local Government Organizations**
2

3 Table 13.2.19.1-8 lists the various local and county government organizations in Beaver
4 and Iron Counties. In addition, there is one Tribal government located in the ROI, and there may
5 be members of other Tribal groups located in the ROI whose Tribal governments are located in
6 adjacent states.
7

8
9 **13.2.19.1.9 ROI Community and Social Services**

10 This section describes educational, health-care, law enforcement, and firefighting
11 resources in the ROI for the proposed Milford Flats South SEZ.
12
13

14
15 **Schools**

16
17 In 2007, the two-county ROI had a total of 24 public and private elementary, middle, and
18 high schools (NCES 2009). Table 13.2.19.1-9 provides summary statistics for enrollment,
19 educational staffing, and two indices of educational quality—student teacher ratios and levels of
20 service (number of teachers per 1,000 population). The student-teacher ratio in Beaver County
21 schools (22.3) is slightly higher than that for schools in Iron County (21.2), while the level of
22 service is higher in Beaver County (11.6).
23
24

**TABLE 13.2.19.1-8 ROI Local Government
Organizations and Social Institutions in the
Proposed Milford Flats South SEZ**

Governments	
City	
Brian Head	Parowan
Cedar City	Beaver City
Enoch	Milford
Paragonah	Minersville
County	
Beaver County	Iron County
Tribal	
Paiute Indian Tribe of Utah	

Sources: U.S. Bureau of the Census (2009b),
U.S. Department of the Interior (2010).

25
26

TABLE 13.2.19.1-9 ROI School District Data for the Proposed Milford Flats South SEZ, 2007

Location	Number of Students	Number of Teachers	Student-Teacher Ratio	Level of Service ^a
Beaver County	1,568	70	22.3	11.6
Iron County	8,522	402	21.2	9.3
ROI	10,090	472	21.4	9.6

^a Number of teachers per 1,000 population.

Source: NCES (2009).

Health Care

While it has many more physicians (55), the number of doctors per 1,000 population in Iron County (1.3) is only slightly higher than in Beaver County (1.2) (Table 13.2.19.1-10). The smaller number of health-care professionals in Beaver County may mean that residents of these counties have poorer access to specialized health care; a substantial number of county residents might also travel to Iron County for their medical care.

Public Safety

Several state, county, and local police departments provide law enforcement in the ROI. Beaver County has 16 officers and would provide law enforcement services to the SEZ (Table 13.2.19.1-11), while Iron County has 31 officers. There are currently eight professional firefighters in Iron County, and only volunteers in Beaver County (Table 13.2.19.1-11). Levels of service in police protection in Iron County (1.3) are significantly lower than for Beaver County (1.2).

13.2.19.1.10 ROI Social Structure and Social Change

Community social structures and other forms of social organization within the ROI are related to various factors, including historical development, major economic activities and sources of employment, income levels, race and ethnicity, and forms of local political organization. Although an analysis of the character of community social structures is beyond the scope of the current programmatic analysis, project-level NEPA analyses would include a description of ROI social structures, contributing factors, their uniqueness, and consequently, the susceptibility of local communities to various forms of social disruption and social change.

TABLE 13.2.19.1-10 Physicians in the ROI for the Proposed Milford Flats South SEZ, 2007

Location	Number of Primary Care Physicians	Level of Service ^a
Beaver County	7	1.2
Iron County	55	1.3
ROI	62	1.3

^a Number of physicians per 1,000 population.

Source: AMA (2009).

TABLE 13.2.19.1-11 Public Safety Employment in the ROI Surrounding the Proposed Milford Flats South SEZ

Location	Number of Police Officers ^a	Level of Service ^b	Number of Firefighters ^c	Level of Service
Beaver County	16	2.6	0	0.0
Iron County	31	0.7	8	0.2
ROI	47	1.0	8	0.2

^a 2007 data.

^b Number per 1,000 population.

^c 2008 data; number does not include volunteers.

Sources: U.S. Department of Justice (2008); Fire Departments Network (2009).

Various energy development studies have suggested that once the annual growth in population is between 5 and 15% in smaller rural communities, alcoholism, depression, suicide, social conflict, divorce, and delinquency would increase and levels of community satisfaction would deteriorate (BLM 1980, 1983a, 1996, 2007). Data on violent crime and property crime rates and on alcoholism and illicit drug use, mental health, and divorce, which might be used as indicators of social change, are presented in Tables 13.2.19.1-12 and 13.2.19.1-13, respectively.

There is some variation in the level of crime across the ROI, with slightly higher rates of violent crime in Beaver County (1.5 per 1,000 population) than in Iron County (1.3), and slightly higher rates of property crime in Iron County (24.6) than in Beaver County (12.0) (Table 13.2.19.1-12). The overall crime rate in the ROI was 24.3 offenses per 1,000 population.

TABLE 13.2.19.1-12 County and ROI Crime Rates for the Proposed Milford Flats South SEZ^a

Location	Violent Crime ^b		Property Crime ^c		All Crime	
	Offenses	Rate	Offenses	Rate	Offenses	Rate
Beaver County	9	1.5	74	12.0	83	13.4
Iron County	56	1.3	1,085	24.6	1,141	25.8
ROI	65	1.3	1,159	23.0	1,224	24.3

^a Rates are the number of crimes per 1,000 population.

^b Violent crime includes murder and non-negligent manslaughter, forcible rape, robbery, and aggravated assault.

^c Property crime includes burglary, larceny, theft, motor vehicle theft, and arson.

Sources: U.S. Department of Justice (2009a,b).

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TABLE 13.2.19.1-13 Alcoholism, Drug Use, Mental Health, and Divorce in the Proposed Milford Flats South SEZ ROI^a

Geographic Area	Alcoholism	Illicit Drug Use	Mental Health ^b	Divorce ^c
Utah Southwest Region (includes Beaver County and Iron County)	5.6	2.5	11.3	— ^d
Utah				3.6

^a Data for alcoholism and drug use represent percentage of the population over 12 years of age with dependence on or abuse of alcohol, illicit drugs. Data are averages for 2004 to 2006.

^b Data for mental health represent percentage of the population over 18 years of age suffering from serious psychological distress. Data are averages for 2002 to 2004.

^c Divorce rates are the number of divorces per 1,000 population. Data are for 2007.

^d A dash indicates data not available.

Sources: SAMHSA (2009); CDC (2009).

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4

1 Other measures of social change—alcoholism, illicit drug use, and mental health—are
2 not available at the county level and thus are presented for the SAMHSA region in which the
3 ROI is located (Table 13.2.19.1-13).

6 **13.2.19.1.11 ROI Recreation**

8 Various areas in the vicinity of the proposed SEZ are used for recreational purposes, with
9 natural, ecological, and cultural resources in the ROI attracting visitors for a range of activities,
10 including hunting, fishing, boating, canoeing, wildlife watching, camping, hiking, horseback
11 riding, mountain climbing, and sightseeing. These activities are discussed in Section 13.2.5.

13 Because the number of visitors using state and federal lands for recreational activities is
14 not available from the various administering agencies, the value of recreational resources in these
15 areas, based solely on the number of recorded visitors, is likely to be an underestimation. In
16 addition to visitation rates, the economic valuation of certain natural resources can also be
17 assessed in terms of the potential recreational destination for current and future users, that is,
18 their nonmarket value (see Section 5.17.1.1.1).

20 Another method is to estimate the economic impact of the various recreational activities
21 supported by natural resources on public land in the vicinity of the proposed solar development
22 by identifying sectors in the economy in which expenditures on recreational activities occur. Not
23 all activities in these sectors are directly related to recreation on state and federal lands, with
24 some activity occurring on private land (e.g., dude ranches, golf courses, bowling alleys, and
25 movie theaters). Expenditures associated with recreational activities form an important part of
26 the economy of the ROI. In 2007, 2,549 people were employed in the ROI in the various sectors
27 identified as recreation, constituting 10.9% of total ROI employment (Table 13.2.19.1-14).
28 Recreation spending also produced \$37.4 million in income in the ROI in 2007. The primary
29 sources of recreation-related employment were eating and drinking places.

32 **13.2.19.2 Impacts**

34 The following analysis begins with a description of the common impacts of solar
35 development, including common impacts on recreation and on social change. These impacts
36 would occur regardless of the solar technology developed in the SEZ. The impacts of
37 developments employing various solar energy technologies are analyzed in detail in subsequent
38 sections.

TABLE 13.2.19.1-14 Recreation Sector Activity in the Proposed Milford Flats South SEZ ROI, 2007

ROI	Employment ^b	Income (\$ million)
Amusement and recreation services	320	4.6
Automotive rental	7	0.3
Eating and drinking places	1,723	22.9
Hotels and lodging places	295	5.7
Museums and historic sites	0	0.0
Recreational vehicle parks and campsites	27	0.2
Scenic tours	24	1.4
Sporting goods retailers	153	2.2
Total ROI	2,549	37.4

Source: MIG, Inc. (2009).

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13.2.19.2.1 Common Impacts

Construction and operation of a solar energy facility at the proposed Milford Flats South SEZ would produce direct and indirect economic impacts. Direct impacts would occur as a result of expenditures on wages and salaries, procurement of goods and services required for project construction and operation, and the collection of state sales and income taxes. Indirect impacts would occur as project wages and salaries, procurement expenditures, and tax revenues subsequently circulate through the economy of each state, thereby creating additional employment, income, and tax revenues. Facility construction and operation would also require in-migration of workers and their families into the ROI surrounding the site, which would affect population, rental housing, health service employment, and public safety employment. Socioeconomic impacts common to all utility-scale solar energy developments are discussed in detail in Section 5.17. These impacts would be minimized through the implementation of programmatic design features described in Appendix A, Section A.2.2.

Recreation Impacts

Estimating the impact of solar facilities on recreation is problematic because it is not clear how solar development in the SEZ would affect recreational visitation and nonmarket values (i.e., the value of recreational resources for potential or future visits; see Section 5.17.1.2.3). While it is clear that some land in the ROI would no longer be accessible for recreation, the majority of popular recreational locations would be precluded from solar development. It is also possible that solar facilities in the ROI would be visible from popular recreation locations, and that construction workers residing temporarily in the ROI would occupy accommodation otherwise used for recreational visits, thus reducing visitation and consequently affecting the economy of the ROI.

1 **Social Change**
2

3 Although an extensive literature in sociology documents the most significant components
4 of social change in energy boomtowns, the nature and magnitude of the social impact of solar
5 energy developments in small rural communities are still unclear (see Section 5.17.1.1.4). While
6 some degree of social disruption is likely to accompany large-scale in-migration during the boom
7 phase, there is insufficient evidence to predict the extent to which specific communities are
8 likely to be affected, which population groups within each community are likely to be most
9 affected, and the extent to which social disruption is likely to persist beyond the end of the boom
10 period (Smith et al. 2001). Accordingly, because of the lack of adequate social baseline data, it
11 has been suggested that social disruption is likely to occur once an arbitrary population growth
12 rate associated with solar energy development projects has been reached, with an annual rate of
13 between 5 and 10% growth in population assumed to result in a breakdown in social structures,
14 with a consequent increase in alcoholism, depression, suicide, social conflict, divorce, and
15 delinquency, and deterioration in levels of community satisfaction (BLM 1980, 1983a).
16

17 In overall terms, the in-migration of workers and their families into the ROI would
18 represent an increase of 2.3% in ROI population during construction of trough technology, with
19 smaller increases for power tower, dish engine, and PV technologies, and during the operation of
20 each technology. While it is possible that some construction and operations workers will choose
21 to locate in communities closer to the SEZ, the lack of available housing to accommodate all
22 in-migrating workers and families in smaller rural communities in the ROI and the insufficient
23 range of housing choices to suit all solar occupations make it likely that many workers will
24 commute to the SEZ from larger communities elsewhere in the ROI; thus, reducing the potential
25 impact of solar development on social change. Regardless of the pace of population growth
26 associated with the commercial development of solar resources and the likely residential location
27 of in-migrating workers and families in communities some distance from the SEZ itself, the
28 number of new residents from outside the ROI is likely to lead to some demographic and social
29 change in small rural communities in the ROI. Communities hosting solar development are likely
30 to be required to adapt to a different quality of life, with a transition away from a more
31 traditional lifestyle involving ranching and taking place in small, isolated, close-knit,
32 homogenous communities with a strong orientation toward personal and family relationships,
33 toward a more urban lifestyle, with increasing cultural and ethnic diversity and increasing
34 dependence on formal social relationships within the community.
35
36

37 **Livestock Grazing Impacts**
38

39 Cattle ranching and farming supported 82 jobs, and \$1.4 million in income in the ROI in
40 2007 (MIG, Inc. 2010). The construction and operation of solar facilities in the proposed Milford
41 Flats South SEZ could result in a decline in the amount of land available for livestock grazing,
42 resulting in total (direct plus indirect) impacts of the loss of three jobs and \$0.1 million in income
43 in the ROI. There would also be a decline in grazing fees payable to the BLM and to the USFS
44 by individual permittees based on the number of AUMs required to support livestock on public
45 land. Assuming the 2008 fee of \$1.35 per AUM, grazing fee losses would amount to
46 \$579 annually, on land dedicated to solar development in the SEZ.

1 **Transmission Line Impacts**

2
3 The impacts of transmission line construction could include the addition of 84 jobs in the
4 ROI (including direct and indirect impacts) in the peak year of construction (Table 13.2.19.2-1).
5 Construction activities in the peak year would constitute less than 1% of total ROI employment.
6 A transmission line would also produce \$3.4 million in ROI income. Direct sales taxes and direct
7 income taxes would be \$0.1 million in the peak year.
8

9 Given the likelihood of local worker availability in the required occupational categories,
10 construction of a transmission line would mean that some in-migration of workers and their
11 families from outside the ROI would be required, with 100 persons in-migrating into the
12 proposed Milford Flats South ROI during the peak construction year. Although in-migration may
13 potentially affect local housing markets, the relatively small number of in-migrants and the
14 availability of temporary accommodation (hotels, motels, and mobile home parks) would mean
15 that the impact of solar facility construction on the number of vacant rental housing units is not
16 expected to be large, with 50 rental unit expected to be occupied in the proposed Milford Flats
17 South ROI. This occupancy rate would represent less than 1% of the vacant rental units expected
18 to be available in the ROI in the peak year.
19

20 In addition to the potential impact on housing markets, in-migration would affect
21 community service (health, education, and public safety) employment. An increase in such
22 employment would be required to meet existing levels of service in the ROI. Accordingly, one
23 new teacher would be required in the ROI.
24

25 Total operations employment impacts in the ROI (including direct and indirect impacts)
26 of a transmission line would be less than one job during the first year of operation
27 (Table 13.2.19.2-1) and would also produce less than \$0.1 million in income. Direct sales taxes
28 would be less than \$0.1 million in the first year, with direct income taxes of less than
29 \$0.1 million.
30

31 Operation of a transmission line would not require the in-migration of workers and their
32 families from outside the ROI; consequently, no impacts on housing markets in the ROI would
33 be expected, and no new community service employment would be required to meet existing
34 levels of service in the ROI.
35

36
37 **Access Road Impacts**

38
39 The impacts of construction of an access road connecting the proposed Milford Flats
40 South SEZ could include the addition of 100 jobs in the ROI (including direct and indirect
41 impacts) in the peak year of construction (Table 13.2.19.2-2). Construction activities in the peak
42 year would constitute less than 1% of total ROI employment. Access road construction would
43 also produce \$2.8 million in ROI income. Direct income taxes and direct sales taxes would each
44 be \$0.1 million in the peak year.
45

TABLE 13.2.19.2-1 ROI Socioeconomic Impacts of a 230-kV Transmission Line at the Proposed Milford Flats South SEZ^a

Parameter	Construction	Operations
Employment (no.)		
Direct	39	<1
Total	84	<1
Income ^b		
Total	3.4	<0.1
Direct state taxes ^b		
Sales	0.1	<0.1
Income	0.1	<0.1
In-migrants (no.)	100	0
Vacant housing ^c no.)	50	0
Local community service employment		
Teachers (no.)	1	0
Physicians (no.)	0	0
Public safety (no.)	0	0

^a Construction impacts assume 19 mi (30 km) of transmission line are required for the Milford Flats South SEZ. Construction impacts are assessed for the peak year of construction.

^b Unless indicated otherwise, values are reported in \$ million 2008.

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

1
2
3 Given the likelihood of local worker availability in the required occupational categories,
4 construction of an access road would mean that some in-migration of workers and their families
5 from outside the ROI would be required, with 64 persons in-migrating into the Milford Flats
6 South ROI during the peak construction year. Although in-migration may potentially affect local
7 housing markets, the relatively small number of in-migrants and the availability of temporary
8 accommodation (hotels, motels, and mobile home parks) would mean that the impact of access
9 road construction on the number of vacant rental housing units is not expected to be large, with
10 32 rental units expected to be occupied in the Milford Flats South ROI. This occupancy rate
11 would represent less than 1% of the vacant rental units expected to be available in the ROI in the
12 peak year.

13
14 In addition to the potential impact on housing markets, in-migration would affect
15 community service employment (education, health, and public safety). An increase in such
16 employment would be required to meet existing levels of service in the ROI. Accordingly,

TABLE 13.2.19.2-2 ROI Socioeconomic Impacts of an Access Road Connecting the Proposed Milford Flats South SEZ^a

Parameter	Construction	Operations
Employment (no.)		
Direct	58	<1
Total	100	<1
Income ^b		
Total	2.8	<0.1
Direct state taxes ^b		
Sales	0.1	<0.1
Income	0.1	<0.1
In-migrants (no.)	64	0
Vacant housing ^c (no.)	32	0
Local community service employment		
Teachers (no.)	1	0
Physicians (no.)	0	0
Public safety (no.)	0	0

^a Construction impacts assume 5 mi (8 km) of access road are required for the Milford Flats South SEZ. Construction impacts are assessed for the peak year of construction.

^b Unless indicated otherwise, values are reported in \$ million 2008.

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

1
2
3 one new teacher would be required in the ROI. These increases would represent less than 0.1%
4 of total ROI employment expected in these occupations.

5
6 Total operations (maintenance) employment impacts in the ROI (including direct and
7 indirect impacts) of an access road would be less than one job during the first year of operation
8 (Table 13.2.19.2-2) and would also produce less than \$0.1 million in income. Direct sales taxes
9 would be less than \$0.1 million in the first year, with direct income taxes of less than
10 \$0.1 million.

11
12 Operation of an access road would not require the in-migration of workers and their
13 families from outside the ROI; consequently, no impacts on housing markets in the ROI would
14 be expected, and no new community service employment would be required to meet existing
15 levels of service in the ROI.

16
17

1 **13.2.19.2.2 Technology-Specific Impacts**
2

3 The economic impacts of solar energy development in the proposed SEZ were measured
4 in terms of employment, income, state tax revenues (sales and income), population in-migration,
5 housing, and community service employment (education, health, and public safety). More
6 information on the data and methods used in the analysis are provided in Appendix M.
7

8 The assessment of the impact of the construction and operation of each technology was
9 based on SEZ acreage, assuming 80% of the area could be developed, with one solar project
10 assumed to be constructed within a given year, and assumed to disturb up to 3,000 acres
11 (12 km²) of land. To capture a range of possible impacts, solar facility size was assessed
12 according to the land requirements of various solar technologies, assuming that 9 acres/MW
13 (0.04 km²/MW) would be required for power tower, dish engine, and PV technologies and
14 5 acres/MW (0.02 km²/MW) for solar trough technologies. Impacts of multiple facilities
15 employing a given technology at each SEZ were assumed to be the same as impacts for a single
16 facility with the same total capacity. Construction impacts were assessed for a representative
17 peak year of construction, assumed to be 2021 for each technology. For operations impacts, a
18 representative first year of operations was assumed to be 2023 for trough and power tower, 2022
19 for the minimum facility size for dish engine and PV, and 2023 for the maximum facility size for
20 these technologies. The years of construction and operations were selected as representative of
21 the entire 20-year study period because they are the approximate midpoint; construction and
22 operations could begin earlier.
23

24
25 **Solar Trough**
26

27
28 **Construction.** Total construction employment impacts in the ROI (including direct
29 and indirect impacts) from the use of solar trough technologies would be up to 2,856 jobs
30 (Table 13.2.19.2-3). Construction activities would constitute 8.3% of total ROI employment. A
31 solar facility would also produce \$148.1 million in income. Direct sales taxes would be
32 \$0.1 million, and direct income taxes, \$5.9 million.
33

34 Given the scale of construction activities and the likelihood of local worker availability
35 in the required occupational categories, construction of a solar facility would mean that some
36 in-migration of workers and their families from outside the ROI would be required, with
37 1,827 persons in-migrating into the ROI. Although in-migration may potentially affect local
38 housing markets, the relatively small number of in-migrants and the availability of temporary
39 accommodations (hotels, motels, and mobile home parks) mean that the impact of solar facility
40 construction on the number of vacant rental housing units would not be expected to be large,
41 with 914 rental units expected to be occupied in the ROI. This occupancy rate would represent
42 33.0% of the vacant rental units 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 employment (education, health, and public safety). An increase in such
46 employment would be required to meet existing levels of service in the ROI. Accordingly,

TABLE 13.2.19.2-3 ROI Socioeconomic Impacts Assuming Full Build-out of the Proposed Milford Flats South SEZ with Trough Facilities^a

Parameter	Maximum Annual Construction Impacts	Operations Impacts
Employment (no.)		
Direct	1,641	224
Total	2,856	337
Income ^b		
Total	148.1	10.2
Direct state taxes ^b		
Sales	0.1	0.1
Income	5.9	0.4
BLM payments (\$ million 2008)		
Rental	NA ^c	0.8
Capacity ^d	NA	6.8
In-migrants (no.)	1,827	143
Vacant housing ^e (no.)	914	129
Local community service employment		
Teachers (no.)	17	1
Physicians (no.)	2	0
Public safety (no.)	2	0

^a Construction impacts are based on the development at the site in a single year; it was assumed that several facilities with a combined capacity of up to 600 MW (corresponding to 3,000 acres [12 km²] of land disturbance) could be built. Operations impacts were based on full build-out of the site, producing a total output of 1,037 MW.

^b Unless indicated otherwise, values are reported in \$ million 2008.

^c NA = not applicable.

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

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

1 17 new teachers, 2 physicians, and 2 public safety employees (career firefighters and uniformed
2 police officers) would be required in the ROI. These increases would represent 2.3% of total ROI
3 employment expected in these occupations.
4
5

6 **Operations.** Total operations employment impacts in the ROI (including direct
7 and indirect impacts) of a build-out using solar trough technologies would be 337 jobs
8 (Table 13.2.19.2-3). Such a solar facility would also produce \$10.2 million in income.
9 Direct sales taxes would be \$0.1 million, and direct income taxes, \$0.4 million. Based on fees
10 established by the BLM in its Solar Energy Interim Rental Policy (BLM 2010b), acreage rental
11 payments would be \$0.8 million, and solar generating capacity payments would total at least
12 \$6.8 million.
13

14 Given the likelihood of local worker availability in the required occupational categories,
15 operation of a solar facility would mean that some in-migration of workers and their families
16 from outside the ROI would be required, with 143 persons in-migrating into the ROI. Although
17 in-migration may potentially affect local housing markets, the relatively small number of
18 in-migrants and the availability of temporary accommodations (hotels, motels, and mobile home
19 parks) mean that the impact of solar facility operation on the number of vacant owner-occupied
20 housing units would not be expected to be large, with 129 owner-occupied units expected to be
21 occupied in the ROI.
22

23 In addition to the potential impact on housing markets, in-migration would affect
24 community service (health, education, and public safety) employment. An increase in such
25 employment would be required to meet existing levels of service in the provision of these
26 services in the ROI. Accordingly, one new teacher would be required in the ROI.
27
28

29 **Power Tower**

30
31

32 **Construction.** Total construction employment impacts in the ROI (including direct
33 and indirect impacts) from the use of power tower technologies would be up to 1,137 jobs
34 (Table 13.2.19.2-4). Construction activities would constitute 3.3% of total ROI employment.
35 Such a solar facility would also produce \$59.0 million in income. Direct sales taxes would be
36 less than \$0.1 million, with direct income taxes of \$2.4 million.
37

38 Given the scale of construction activities and the likelihood of local worker availability
39 in the required occupational categories, construction of a solar facility would mean that some
40 in-migration of workers and their families from outside the ROI would be required, with
41 728 persons in-migrating into the ROI. Although in-migration may potentially affect local
42 housing markets, the relatively small number of in-migrants and the availability of temporary
43 accommodations (hotels, motels, and mobile home parks) mean that the impact of solar facility
44 construction on the number of vacant rental housing units would not be expected to be large,
45 with 364 rental units expected to be occupied in the ROI. This occupancy rate would represent
46 13.2% of the vacant rental units expected to be available in the ROI.

TABLE 13.2.19.2-4 ROI Socioeconomic Impacts Assuming Full Build-out of the Proposed Milford Flats South SEZ with Power Tower Facilities^a

Parameter	Maximum Annual Construction Impacts	Operations Impacts
Employment (no.)		
Direct	654	116
Total	1,137	156
Income ^b		
Total	59.0	4.6
Direct state taxes ^b		
Sales	<0.1	<0.1
Income	2.4	0.2
BLM payments (\$ million 2008)		
Rental	NA ^c	0.8
Capacity ^d	NA	3.8
In-migrants (no.)	728	74
Vacant housing ^e (no.)	364	66
Local community service employment		
Teachers (no.)	7	1
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 333 MW (corresponding to 3,000 acres [12 km²] of land disturbance) could be built. Operations impacts were based on full build-out of the site, producing a total output of 576 MW.

^b Unless indicated otherwise, values are reported in \$ million 2008.

^c NA = not applicable.

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

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

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,
4 seven new teachers, one physician, and one public safety employee would be required in the
5 ROI. These increases would represent less than 0.9% of total ROI employment expected in these
6 occupations.

7
8
9 **Operations.** Total operations employment impacts in the ROI (including direct and
10 indirect impacts) of a build-out using power tower technologies would be 156 jobs
11 (Table 13.2.19.2-4). Such a solar facility would also produce \$4.6 million in income. Direct
12 sales taxes would be less than \$0.1 million, and direct income taxes, \$0.2 million. Based on fees
13 established by the BLM in its Solar Energy Interim Rental Policy (BLM 2010b), acreage rental
14 payments would be \$0.8 million, and solar generating capacity payments would total at least
15 \$3.8 million.

16
17 Given the likelihood of local worker availability in the required occupational categories,
18 operation of a solar facility means that some in-migration of workers and their families from
19 outside the ROI would be required, with 74 persons in-migrating into the ROI. Although
20 in-migration may potentially affect local housing markets, the relatively small number of
21 in-migrants and the availability of temporary accommodations (hotels, motels, and mobile home
22 parks) mean that the impact of solar facility operation on the number of vacant owner-occupied
23 housing units would not be expected to be large, with 66 owner-occupied units expected to be
24 required in the ROI.

25
26 In addition to the potential impact on housing markets, in-migration would affect
27 community service (health, education, and public safety) employment. An increase in such
28 employment would be required to meet existing levels of service in the provision of these
29 services in the ROI. Accordingly, one new teacher would be required in the ROI.

30 31 32 **Dish Engine**

33
34
35 **Construction.** Total construction employment impacts in the ROI (including direct
36 and indirect impacts) from the use of dish engine technologies would be up to 462 jobs
37 (Table 13.2.19.2-5). Construction activities would constitute 1.3% of total ROI employment.
38 Such a solar facility would also produce \$24.0 million in income. Direct sales taxes would be
39 less than \$1.0 million, and direct income taxes, \$1.0 million.

40
41 Given the scale of construction activities and the likelihood of local worker availability
42 in the required occupational categories, construction of a solar facility would mean that some
43 in-migration of workers and their families from outside the ROI would be required, with
44 296 persons in-migrating into the ROI. Although in-migration may potentially affect local
45 housing markets, the relatively small number of in-migrants and the availability of temporary
46 accommodations (hotels, motels, and mobile home parks) mean that the impact of solar facility

TABLE 13.2.19.2-5 ROI Socioeconomic Impacts Assuming Full Build-out of the Proposed Milford Flats South SEZ with Dish Engine Facilities^a

Parameter	Maximum Annual Construction Impacts	Operations Impacts
Employment (no.)		
Direct	266	113
Total	462	151
Income ^b		
Total	24.0	4.5
Direct state taxes ^b		
Sales	<0.1	<0.1
Income	1.0	0.2
BLM payments (\$ million 2008)		
Rental	NA ^c	0.8
Capacity ^d	NA	3.8
In-migrants (no.)	296	72
Vacant housing ^e (no.)	148	65
Local community service employment		
Teachers (no.)	3	1
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 333 MW (corresponding to 3,000 acres [12 km²] of land disturbance) could be built. Operations impacts were based on full build-out of the site, producing a total output of 576 MW.

^b Unless indicated otherwise, values are reported in \$ million 2008.

^c NA = not applicable.

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

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

1 construction on the number of vacant rental housing units would not be expected to be large,
2 with 148 rental units expected to be occupied in the ROI. This occupancy rate would represent
3 5.3% of the vacant rental units expected to be available in the ROI.
4

5 In addition to the potential impact on housing markets, in-migration would affect
6 community service (education, health, and public safety) employment. An increase in such
7 employment would be required to meet existing levels of service in the ROI. Accordingly, three
8 new teachers would be required in the ROI. This increase would represent 0.4% of total ROI
9 employment expected in this occupation.
10

11
12 **Operations.** Total operations employment impacts in the ROI (including direct
13 and indirect impacts) of a build-out using dish engine technologies would be 151 jobs
14 (Table 13.2.19.2-5). Such a solar facility would also produce \$4.5 million in income.
15 Direct sales taxes would be less than \$0.1 million, and direct income taxes, \$0.2 million. Based
16 on fees established by the BLM in its Solar Energy Interim Rental Policy (BLM 2010b), acreage
17 rental payments would be \$0.8 million, and solar generating capacity payments would total at
18 least \$3.8 million.
19

20 Given the likelihood of local worker availability in the required occupational categories,
21 operation of a dish engine solar facility means that some in-migration of workers and their
22 families from outside the ROI would be required, with 72 persons in-migrating into the ROI.
23 Although in-migration may potentially affect local housing markets, the relatively small number
24 of in-migrants and the availability of temporary accommodations (hotels, motels, and mobile
25 home parks) mean that the impact of solar facility operation on the number of vacant owner-
26 occupied housing units would not be expected to be large, with 65 owner-occupied units
27 expected to be required in the ROI.
28

29 In addition to the potential impact on housing markets, in-migration would affect
30 community service (health, education, and public safety) employment. An increase in such
31 employment would be required to meet existing levels of service in the provision of these
32 services in the ROI. Accordingly, one new teacher would be required in the ROI.
33

34 **Photovoltaic**

35
36
37
38 **Construction.** Total construction employment impacts in the ROI (including direct and
39 indirect impacts) from the use of PV technologies would be up to 216 jobs (Table 13.2.19.2-6).
40 Construction activities would constitute 0.6 % of total ROI employment. Such a solar
41 development would also produce \$11.2 million in income. Direct sales taxes would be less than
42 \$0.1 million, and direct income taxes, \$0.4 million.
43

44 Given the scale of construction activities and the likelihood of local worker availability
45 in the required occupational categories, construction of a solar facility would mean that some
46 in-migration of workers and their families from outside the ROI would be required, with

TABLE 13.2.19.2-6 ROI Socioeconomic Impacts Assuming Full Build-out of the Proposed Milford Flats South SEZ with PV Facilities^a

Parameter	Maximum Annual Construction Impacts	Operations Impacts
Employment (no.)		
Direct	124	11
Total	216	15
Income ^b		
Total	11.2	0.5
Direct state taxes ^b		
Sales	<0.1	<0.1
Income	0.4	<0.1
BLM payments (\$ million 2008)		
Rental	NA ^c	0.8
Capacity ^d	NA	3.0
In-migrants (no.)	138	7
Vacant housing ^e (no.)	69	6
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 333 MW (corresponding to 3,000 acres [12 km²] of land disturbance) could be built. Operations impacts were based on full build-out of the site, producing a total output of 576 MW.

^b Unless indicated otherwise, values are reported in \$ million 2008.

^c NA = not applicable.

^d The BLM annual capacity payment was based on a fee of \$5,256 per MW, established by the BLM in its Solar Energy Interim Rental Policy (BLM 2010b), assuming full buildout of the site.

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

1 138 persons in-migrating into the ROI. Although in-migration may potentially affect local
2 housing markets, the relatively small number of in-migrants and the availability of temporary
3 accommodations (hotels, motels, and mobile home parks) mean that the impact of solar facility
4 construction on the number of vacant rental housing units would not be expected to be large,
5 with 69 rental units expected to be occupied in the ROI. This occupancy rate would represent
6 2.5% of the vacant rental units 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,
11 one new teacher would be required in the ROI. This increase would represent less than 0.2% of
12 total ROI employment expected in this occupation.

13
14
15 **Operations.** Total operations employment impacts in the ROI (including direct and
16 indirect impacts) of a build-out using PV technologies would be 15 jobs (Table 13.2.19.2-6).
17 Such a solar facility would also produce \$0.5 million in income. Direct sales taxes would be
18 less than \$0.1 million, and direct income taxes, less than \$0.1 million. Based on fees established
19 by the BLM in its Solar Energy Interim Rental Policy (BLM 2010b), acreage rental payments
20 would be \$0.8 million, and solar generating capacity payments would total at least \$3.0 million.

21
22 Given the likelihood of local worker availability in the required occupational categories,
23 operation of a solar facility would mean that some in-migration of workers and their families
24 from outside the ROI would be required, with seven persons in-migrating into the ROI. Although
25 in-migration may potentially affect local housing markets, the relatively small number of
26 in-migrants and the availability of temporary accommodations (hotels, motels, and mobile home
27 parks) mean that the impact of solar facility operation on the number of vacant owner-occupied
28 housing units would not be expected to be large, with six owner-occupied units expected to be
29 required in the ROI.

30
31 No new community service employment would be required to meet existing levels of
32 service in the ROI.

33 34 35 **13.2.19.3 SEZ-Specific Design Features and Design Feature Effectiveness**

36
37 No SEZ-specific design features addressing socioeconomic impacts have been identified
38 for the proposed Milford Flats South SEZ. Implementing the programmatic design features
39 described in Appendix A, Section A.2.2, as required under BLM's Solar Energy Program, would
40 reduce the potential for socioeconomic impacts during all project phases.

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1 **13.2.20 Environmental Justice**

2
3
4 **13.2.20.1 Affected Environment**

5
6 Executive Order 12898 “Federal Actions to Address Environmental Justice in Minority
7 Populations and Low-Income Populations,” formally requires federal agencies to incorporate
8 environmental justice as part of their missions (*Federal Register*, Volume 59, page 7629,
9 Feb. 11, 1994). Specifically, it directs them to address, as appropriate, any disproportionately
10 high and adverse human health or environmental effects of their actions, programs, or policies
11 on minority and low-income populations.

12
13 The analysis of the impacts of solar energy projects on environmental justice issues
14 follows guidelines described in *Environmental Justice Guidance under the National*
15 *Environmental Policy Act* (CEQ 1997). The analysis method has three parts: (1) a description of
16 the geographic distribution of low-income and minority populations in the affected area is
17 undertaken; (2) the issue of whether the impacts from construction and operation would produce
18 impacts that are high and adverse is assessed; and (3) if impacts are high and adverse, a
19 determination is made as to whether the impacts would disproportionately affect minority and
20 low-income populations.

21
22 Construction and operation of solar energy projects in the proposed Milford Flats South
23 SEZ could affect environmental justice if any adverse health and environmental impacts from
24 either phase of development are significantly high, and if these impacts would disproportionately
25 affect minority and low-income populations. If the analysis determines that health and
26 environmental impacts are not significant, there can be no disproportionate impacts on minority
27 and low-income populations. In the event impacts are significant, disproportionality would be
28 determined by comparing the proximity of any high and adverse impacts with the locations of
29 low-income and minority populations.

30
31 The analysis of environmental justice issues associated with the development of solar
32 facilities considered impacts within the proposed SEZs in Utah and an associated 50-mi (80-km)
33 radius around the facility boundary. The geographic distribution of minority and low-income
34 groups was based on demographic data from the 2000 Census (U.S. Bureau of the
35 Census 2009k,1). The following definitions were used to define minority and low-income
36 population groups:

- 37
38 • **Minority.** Persons are included in the minority category if they identify
39 themselves as belonging to any of the following racial groups: (1) Hispanic,
40 (2) Black (not of Hispanic origin) or African American, (3) American Indian
41 or Alaska Native, (4) Asian, or (5) Native Hawaiian or Other Pacific Islander.

42
43 Beginning with the 2000 Census, where appropriate, the census form allows
44 individuals to designate multiple population group categories to reflect their
45 ethnic or racial origin. In addition, persons who classify themselves as being
46 of multiple racial origins may choose up to six racial groups on the basis of

1 their racial origins. The term minority includes all persons, including those
2 classifying themselves in multiple racial categories, except those who classify
3 themselves as not of Hispanic origin and as White or “Other Race”
4 (U.S. Bureau of the Census 2009k).

5
6 The CEQ guidance proposed that minority populations should be identified
7 where either (1) the minority population of the affected area exceeds 50%, or
8 (2) the minority population percentage of the affected area is meaningfully
9 greater than the minority population percentage in the general population or
10 another appropriate unit of geographic analysis.

11
12 The PEIS applies both criteria in using the Census Bureau data for census
13 block groups, wherein consideration is given to the minority population that is
14 both greater than 50% and 20 percentage points higher than it is in the state
15 (the reference geographic unit).

- 16
17 • **Low-Income.** Individuals who fall below the poverty line. The poverty line
18 takes into account family size and age of individuals in the family. In 1999,
19 for example, the poverty line for a family of five with three children below
20 the age of 18 was \$19,882. For any given family below the poverty line, all
21 family members are considered as being below the poverty line for the
22 purposes of analysis (U.S. Bureau of the Census 2009l).

23
24 Data on the minority and low-income composition of the total population located in the
25 proposed Milford Flats South SEZ based on 2000 Census data and CEQ guidelines are shown in
26 Table 13.2.20.1-1. Individuals identifying themselves as Hispanic or Latino are included in the
27 table as a separate entry. However, because Hispanics can be of any race, this number also
28 includes individuals also identifying themselves as being part of one or more of the population
29 groups listed in the table.

30
31 A small number of minority and low-income individuals are located in the 50-mi (80-km)
32 radius surrounding the boundary of the SEZ. When census data are averaged across all the block
33 groups within the 50-mi (80-km) radius, within the Nevada portion, 13.5% of the population is
34 classified as minority, and within the Utah portion 8.5% of the population is classified as
35 minority. Because the minority population does not exceed 50% of the total population in either
36 portion of the 50-mi (80-km) radius, and because the minority population does not exceed the
37 state average by 20 percentage points in either portion of the 50-mi (80-km) radius, the 50-mi
38 (80-km) radius, in aggregate, these states do not have minority populations according to the
39 2000 Census data and CEQ guidelines. In addition, there are no minority populations within
40 individual census block groups in this area based on CEQ guidelines.

41
42 When census data are averaged across all the block groups within the 50-mi (80-km)
43 radius, within the Nevada portion, 17.2% of the population is classified as low-income, and
44 within the Utah portion 15.9% of the population is classified as low-income. Because the number
45 of low-income individuals does not exceed the state average by 20 percentage points or more,
46 and because it does not exceed 50% of the total population in either state, in aggregate, there are

TABLE 13.2.20.1-1 Minority and Low-Income Populations within the 50-mi (80-km) Radius of the Proposed Milford Flats South SEZ

Parameter	Nevada	Utah
Total population	1,039	51,966
White, non-Hispanic	899	47,574
Hispanic or Latino	67	2,212
Non-Hispanic or Latino minorities	73	2,180
One race	64	1,605
Black or African American	50	146
American Indian or Alaskan Native	13	992
Asian	1	314
Native Hawaiian or other Pacific Islander	0	102
Some other race	0	51
Two or more races	9	575
Total minority	140	4,392
Total low-income	179	8,271
Percent minority	13.5	8.5
Percent low-income	17.2	15.9
State percent minority	34.8	14.7
State percent low-income	10.5	9.4

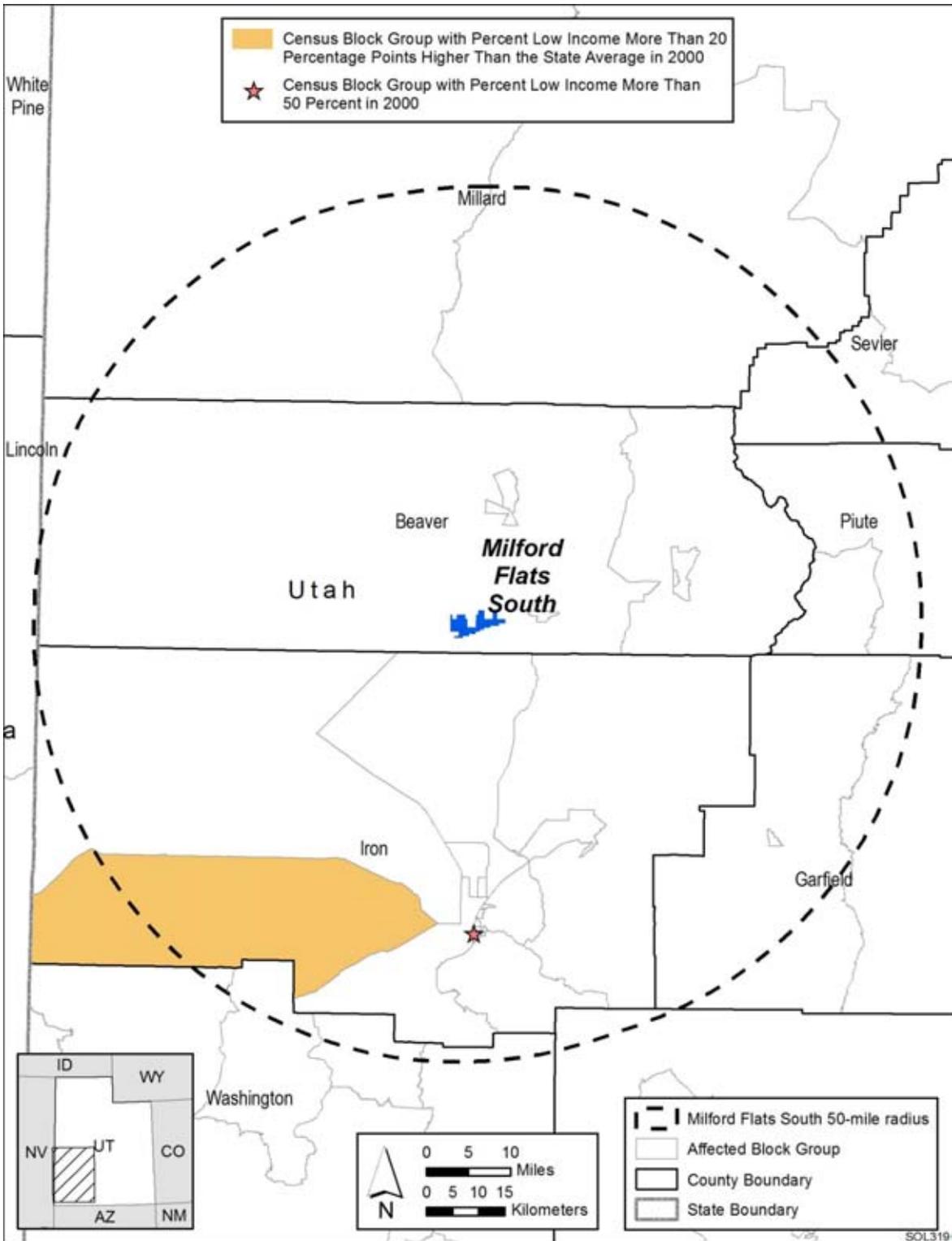
Source: U.S. Bureau of the Census (2009k,l).

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no low-income populations within the 50-mi (80-km) radius of the proposed Milford Flats South SEZ according to 2000 Census data and CEQ guidelines.

Figure 13.2.20.1-1 shows the locations of the low-income population groups within the 50-mi (80-km) radius around the boundary of the SEZ.

At the individual block group level, there are low-income populations in specific census block groups within this area as shown in Figure 13.2.20.1-1. Low-income populations are located in two block groups in Iron County. One block group in Cedar City has more than 50% of the total population below the poverty line, while one block group to the west of Cedar City, including the towns of Newcastle and Modena, has a low-income population that is more than 20 percentage points higher than the state average. There are no minority populations that exceed 50% of the total population in the block group, and the number of minority individuals does not exceed the state average by 20 percentage points or more at the individual block group level.



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FIGURE 13.2.20.1-1 Low-Income Population Groups within the 50-mi (80-km) Radius Surrounding the Proposed Milford Flats South SEZ

1 **13.2.20.2 Impacts**
2

3 Environmental justice concerns common to all utility-scale solar energy facilities are
4 described in detail in Section 5.18. These impacts would be minimized through the
5 implementation of programmatic design features described in Appendix A, Section A.2.2, which
6 address the underlying environmental impacts contributing to the concerns. The potentially
7 relevant environmental impacts associated with solar facilities within the proposed Milford Flats
8 South SEZ include noise and dust during construction; noise and EMF effects associated with
9 operations; visual impacts of solar generation and auxiliary facilities, including transmission
10 lines; access to land used for economic, cultural, or religious purposes; and effects on property
11 values as areas of concern that might potentially affect minority and low-income populations.
12

13 Potential impacts on low-income and minority populations could be incurred as a result
14 of the construction and operation of solar facilities involving each of the four technologies.
15 Although impacts are likely to be small, and therefore unlikely to produce disproportionate
16 impacts, there are low-income populations defined by CEQ guidelines (Section 13.2.20.1) within
17 the 50-mi (80-km) radius around the boundary of the SEZ, meaning that any adverse impacts of
18 solar projects could disproportionately affect low-income populations. Because there are no
19 minority populations within the 50-mi (80-km) radius, according to CEQ guidelines, there would
20 be no impacts on minority populations.
21

22
23 **13.2.20.3 SEZ-Specific Design Features and Design Feature Effectiveness**
24

25 No SEZ-specific design features addressing environmental justice impacts have been
26 identified for the proposed Milford Flats South SEZ. Implementing the programmatic design
27 features described in Appendix A, Section A.2.2, as required under BLM’s Solar Energy
28 Program, would reduce the potential for environmental justice impacts during all project phases.
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1 **13.2.21 Transportation**
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3 The proposed Milford Flats South SEZ is accessible by road and by rail. Local roads
4 and one major railroad, in addition to three small airports, serve the immediate area. General
5 transportation considerations and impacts are discussed in Sections 3.4 and 5.19, respectively.
6

7
8 **13.2.21.1 Affected Environment**
9

10 Thermal Road runs east–west along portions of the northern border of the proposed
11 Milford Flats South SEZ, as shown in Figure 13.2.21.1-1. The small town of Minersville is
12 approximately 5 mi (8 km) to the east of the SEZ along Thermal Road. Approximately 5 mi
13 (8 km) to the west, Thermal Road connects with Beryl Milford Road, which parallels the
14 UP Railroad tracks running from the southwest to the northeast between Beryl and Milford.
15 Several unimproved dirt roads from Thermal Road to the north and Beryl Milford Road to the
16 west pass through the western sections of the proposed Milford Flats South SEZ. The SEZ area
17 has not been designated for vehicle travel in a BLM land use plan but will be considered in the
18 upcoming revision of the land use plans in the Cedar City Field Office. As listed in
19 Table 13.2.21.1-1, the three closest state highways in the area, State Routes 21, 129, and 130,
20 carry average traffic volumes of about 1,440, 600, and 900 vehicles per day, respectively.
21

22 The UP Railroad serves the area. The main line connecting Las Vegas and Salt Lake City
23 passes within 2 mi (3 km) west of the SEZ. The rail stop in Lund is approximately 20 mi (32 km)
24 southwest of the SEZ along Beryl Milford Road. The Milford rail stop is approximately 15 mi
25 (24 km) to the northeast of the SEZ.
26

27 The nearest public airport is the Milford Municipal Airport, about a 20-mi (32-km) drive
28 to the north–northeast of the SEZ. The airport has a 1,524-m (5,000-ft) asphalt runway in good
29 condition that is equipped with landing lights (FAA 2009). There is no control tower, but the
30 airport is staffed during daylight hours. An average of approximately 125 aircraft operations
31 (takeoffs/landings) occur on a weekly basis (Milford 2009).
32

33 The other public airports in the area are in Beaver and Cedar City, about 23 mi (37 km)
34 and 45 mi (72 km) to the east–northeast and south, respectively. The Beaver Municipal Airport
35 has two runways—a 4,984-ft (1,519-m) asphalt runway in fair condition with landing lights and
36 a 2,150-ft (655-m) dirt runway in fair condition without landing lights (FAA 2009). This latter
37 airport is unattended (Beaver 2009). Cedar City Regional Airport has two runways, one in good
38 condition with a length of 4,822 ft (1,470 m), and the other in fair condition with a length of
39 8,653 ft (2,637 m) (FAA 2009). The airport is served by one regional carrier, Skywest Airlines,
40 with scheduled service between Cedar City and Salt Lake City (Cedar City 2009). In 2008,
41 approximately 7,800 passengers departed from Cedar City and 1,900 passengers arrived at Cedar
42 City. About 133,000 lb (60,300 kg) of freight departed and 159,000 lb (72,100 kg) arrived at the
43 airport in 2008 (BTS 2008).

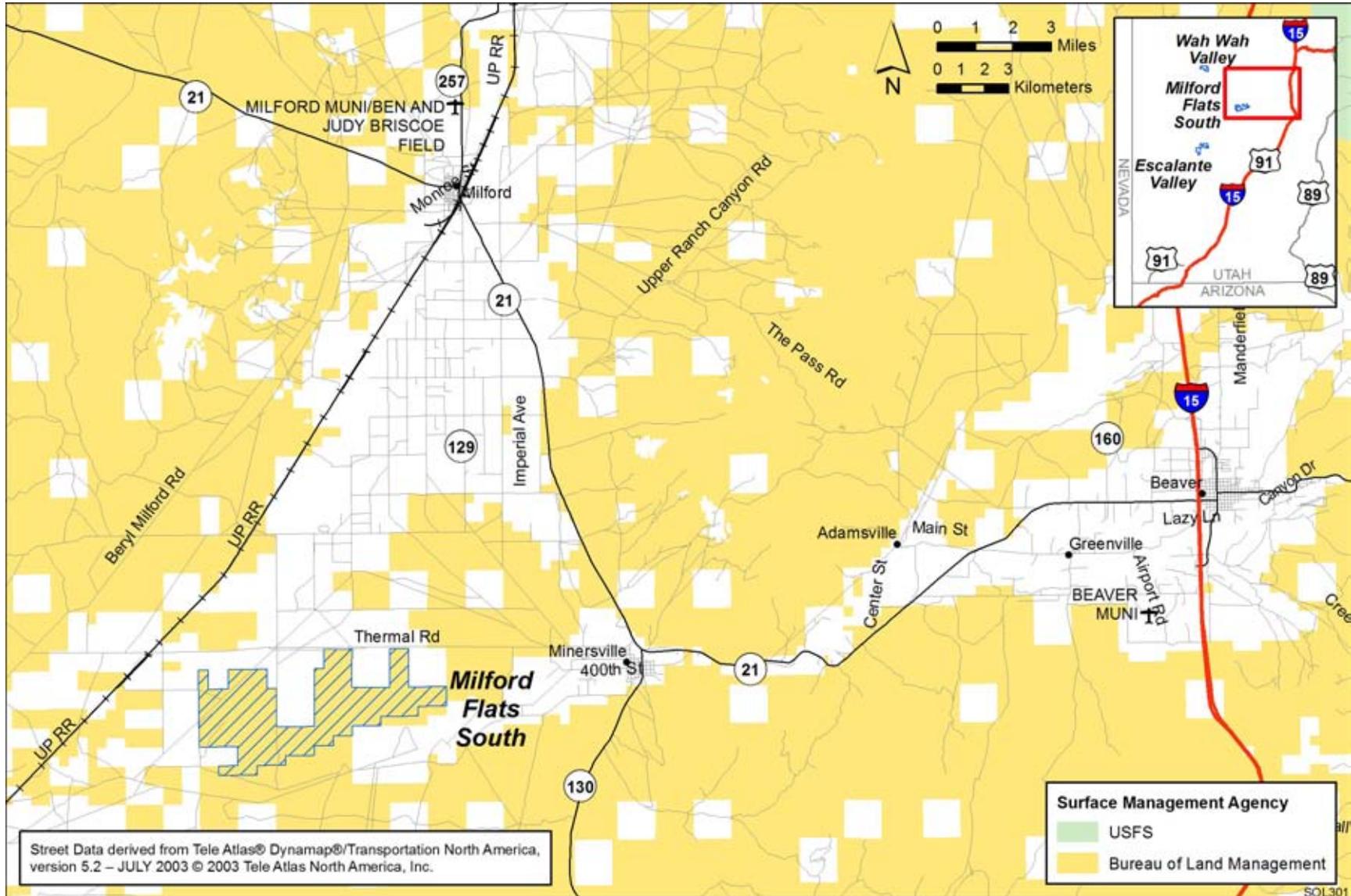


FIGURE 13.2.21.1-1 Local Transportation Network Serving the Proposed Milford Flats South SEZ

TABLE 13.2.21.1-1 AADT on Major Roads near the Proposed Milford Flats South SEZ for 2008

Road	General Direction	Location	AADT (Vehicles)
I-15	North-South	Junction with I-70	11,885
		South of Beaver	15,395
		Junction with State Route 130 North of Cedar City	18,255
		Intersection with State Route 56 in Cedar City	25,140
State Route 21	North-South/East-West	South of Garrison	85
		West of Wah Wah Valley SEZ	245
		West side of Milford	2,485
		Junction with State Route 257	2,590
		South of Milford	1,760
		North of Minersville	1,440
		East of Minersville	1,435
State Route 129	North-South	South of Milford	515
		West of junction with State Route 130	690
State Route 130	North-South	Between Minersville and Cedar City	900

Source: UDOT (2009).

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13.2.21.2 Impacts

As discussed in Section 5.19, the primary transportation impacts are anticipated to be from commuting worker traffic. Single projects could involve up to 1,000 workers each day, with an additional 2,000 vehicle trips per day (maximum). The volumes of traffic on regional corridors would be more than double the current values in most cases. As seen above, Beryl Milford Road and State Routes 21, 129, and 130 provide regional traffic corridors near the proposed Milford Flats South SEZ. Local road improvements would be necessary on any portion of these roads that might be developed so as not to overwhelm the local access roads near any site access point(s). Thermal Road would also require upgrades. Potential existing site access roads would require improvements, including asphalt pavement.

Solar development within the SEZ would affect public access along OHV routes designated open and available for public use. If there are any routes designated as open within the proposed SEZ, such routes crossing areas granted ROWs for solar facilities would be re-designated as closed (see Section 5.5.1 for more details on how routes coinciding with proposed solar facilities would be treated).

1 **13.2.21.3 SEZ-Specific Design Features and Design Feature Effectiveness**
2

3 No SEZ-specific design features have been identified related to impacts on transportation
4 systems around the proposed Milford Flats South SEZ. The programmatic design features
5 described in Appendix A, Section A.2.2, including local road improvements, multiple site access
6 locations, staggered work schedules, and ride-sharing, would all provide some relief to traffic
7 congestion on local roads leading to the site. Depending on the location of solar facilities within
8 the SEZ, more specific access locations and local road improvements could be implemented.
9

10
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1 **13.2.22 Cumulative Impacts**
2

3 The analysis presented in this section addresses the potential cumulative impacts in the
4 vicinity of the proposed Milford Flats South SEZ in Beaver County in southwestern Utah. The
5 CEQ guidelines for implementing NEPA define cumulative impacts as environmental impacts
6 resulting from the incremental effects of an action when added to other past, present, and
7 reasonably foreseeable future actions (40 CFR 1508.7). The impacts of other actions are
8 considered without regard to the agency (federal or nonfederal), organization, or person that
9 undertakes them. The time frame of this cumulative impacts assessment could appropriately
10 include activities that would occur up to 20 years in the future (the general time frame for PEIS
11 analyses), but little or no information is available for projects that could occur more than 5 to
12 10 years in the future.
13

14 The largest nearby town is Cedar City, located about 35 mi (56 km) south of the SEZ.
15 Several small towns lie closer to the SEZ; Minersville is located about 5 mi (8 km) east and
16 Milford is about 13 mi (21 km) north. The surrounding land is rural. A commercial hog-rearing
17 operation is located on private land adjacent to the northern border of the SEZ. Irrigated farms
18 are located to the east of the area. Farther away, the Fishlake National Forest is 25 mi (40 km) to
19 the northeast and there are two sections of the Dixie National Forest, one about 30 mi (48 km)
20 southwest and one about 40 mi (64 km) southwest. Tribal lands are 35 mi (56 km) and 40 mi
21 (64 km) to the south. In addition, the Milford Flats South SEZ is located close to both the
22 Escalante Valley SEZ and the Wah Wah Valley SEZ; and in some areas, impacts from the
23 three SEZs would overlap.
24

25 The geographic extent of the cumulative impacts analysis for potentially affected
26 resources near the proposed Milford Flats South SEZ is identified in Section 13.2.22.1. An
27 overview of ongoing and reasonably foreseeable future actions is presented in Section 13.2.22.2.
28 General trends in population growth, energy demand, water availability, and climate change are
29 discussed in Section 13.2.22.3. Cumulative impacts for each resource area are discussed in
30 Section 13.2.22.4.
31
32

33 **13.2.22.1 Geographic Extent of the Cumulative Impacts Analysis**
34

35 Table 13.2.22.1-1 presents the geographic extent of the cumulative impacts analysis for
36 potentially affected resources near the proposed Milford Flats South SEZ. These geographic
37 areas define the boundaries encompassing potentially affected resources. Their extent varies on
38 the basis of the nature of the resource being evaluated and the distance at which an impact may
39 occur (thus, for example, the evaluation of air quality may have a greater regional extent of
40 impact than visual resources). Lands around the SEZ are state or privately owned, administered
41 by the USFS, or administered by the BLM. The BLM administers about 54% of the lands within
42 a 50-mi (80-km) radius of the SEZ.
43
44

TABLE 13.2.22.1-1 Geographic Extent of the Cumulative Impacts Analysis by Resource Area: Proposed Milford Flats South SEZ

Resource Area	Geographic Extent
Lands and Realty	Northeastern Escalante Desert Valley
Specially Designated Areas and Lands with Wilderness Characteristics	Northeastern Escalante Desert Valley
Rangeland Resources	Northeastern Escalante Desert Valley
Recreation	Northeastern Escalante Desert Valley
Military and Civilian Aviation	Northeastern Escalante Desert Valley
Soil Resources	Areas within and adjacent to the Milford Flats South SEZ
Minerals	Northeastern Escalante Desert Valley
Water Resources Surface Water Groundwater	Minersville Canal, Utopia Ditch, Beaver River Milford area basin
Vegetation, Wildlife and Aquatic Biota, Special Status Species	Known or potential occurrences within a 50-mi (80-km) radius of the Milford Flats South SEZ
Air Quality and Climate	Northeastern Escalante Desert Valley and beyond
Visual Resources	Viewshed within a 25-mi (40-km) radius of the Milford Flats South SEZ
Acoustic Environment (noise)	Areas adjacent to the Milford Flats South SEZ
Paleontological Resources	Areas within and adjacent to the Milford Flats South SEZ
Cultural Resources	Areas within and adjacent to the Milford Flats South SEZ for archaeological sites; viewshed within a 25-mi (40-km) radius of the Milford Flats South SEZ for other properties, such as historic trails and traditional cultural properties
Native American Concerns	Escalante Desert Valley; viewshed within a 25-mi (40-km) radius of the Milford Flats South SEZ
Socioeconomics	Beaver and Iron Counties
Environmental Justice	Beaver and Iron Counties
Transportation	Local roads (e.g., Thermal Road), and State Routes 21, 129, and 130

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1 **13.2.22.2 Overview of Ongoing and Reasonably Foreseeable Future Actions**
2

3 The future actions described below are those that are “reasonably foreseeable;” that is,
4 they have already occurred, are ongoing, are funded for future implementation, or are included in
5 firm near-term plans. Types of proposals with firm near-term plans are as follows:
6

- 7 • Proposals for which NEPA documents are in preparation or finalized;
- 8
- 9 • Proposals in a detailed design phase;
- 10
- 11 • Proposals listed in formal NOIs published in the *Federal Register* or state
12 publications;
- 13
- 14 • Proposals for which enabling legislation has been passed; and
- 15
- 16 • Proposals that have been submitted to federal, state, or county regulators to
17 begin a permitting process.
18

19 Projects in the bidding or research phases or that have been put on hold were not included
20 in the cumulative impacts analysis.
21

22 The ongoing and reasonably foreseeable future actions described below are grouped into
23 two categories: (1) actions that relate to energy production and distribution, including potential
24 solar energy projects under the proposed action (Section 13.2.22.2.1) and (2) other ongoing and
25 reasonably foreseeable actions, including those related to mining and mineral processing, grazing
26 management, transportation, recreation, water management, and conservation
27 (Section 13.2.22.2.2). Together, these actions have the potential to affect human and
28 environmental receptors within the geographic range of potential impacts over the next 20 years.
29
30

31 **13.2.22.2.1 Energy Production and Distribution**
32

33 Recent developments in the state of Utah have emphasized more future reliance on
34 renewable sources for energy production. In 2008, Utah enacted the Energy Resource and
35 Carbon Emission Reduction Initiative (Senate Bill 202), which established a voluntary RPG of
36 20% by 2025. This bill is similar to those in other states that have adopted RPSs; however, the
37 Utah bill requires that utilities pursue renewable energy only to the extent that it is “cost-
38 effective” to do so. The voluntary renewable goals are being addressed by companies that intend
39 to be energy producers, possibly resulting in several projects being sited in the same geographic
40 areas of southwestern Utah during the same time frame.
41

42 Reasonably foreseeable future actions related to energy development and distribution
43 within the proposed Milford Flats South SEZ are identified in Table 13.2.22.2-1 and described
44 in the following sections. Renewable energy projects identified include wind and geothermal
45 projects, but no foreseeable solar energy projects have been identified. Other energy-related
46 projects include transmission lines and oil and gas leasing.

TABLE 13.2.22.2-1 Reasonably Foreseeable Future Actions Related to Energy Development and Distribution near the Proposed Milford Flats South SEZ

Description	Status	Resources Affected	Primary Impact Location
<i>Renewable Energy Development</i>			
Milford Wind (UTU 82972)	Ongoing	Land use, ecological resources, visual	About 25 mi (40 km) northeast of Milford Flats South SEZ (Beaver and Millard Counties)
Milford Wind Phase II (UTU 83073)	Underway	Land use, ecological resources, visual	About 25 mi (40 km) northeast of Milford Flats South SEZ (Beaver and Millard Counties)
Milford Wind Phases III–V (UTU 8307301)	Planned	Land use, ecological resources, visual	About 25 mi (40 km) northeast of Milford Flats South SEZ (Beaver and Millard Counties)
Geothermal Energy Project UTU 66583O	Authorized	Land use, terrestrial habitats, visual	About 20 mi (32 km) northeast of Milford Flats South SEZ (Beaver County)
Geothermal Energy Project UTU 66583X	Authorized	Land use, terrestrial habitats, visual	About 20 mi (32 km) northeast of Milford Flats South SEZ (Beaver County)
Geothermal projects: Several geothermal projects in the vicinity of the SEZ on both BLM-administered lands and state lands are either in the planning stages or under construction (see text).	Planned and Ongoing	Land use, water resources, ecological resources, socioeconomics, transportation	General vicinity of SEZ and north of Milford
<i>Transmission and Distribution Systems</i>			
Milford Wind Corridor Project	Ongoing	Land use, ecological resources, visual	Wah Wah Valley
Sigurd to Red Butte No. 2 345-kV Transmission Project	Planned	Land use, ecological resources, visual	East of Milford Flats South and Escalante Valley SEZs
Energy Gateway South 500 kV AC Transmission Line Project	Planned	Land use, ecological resources, visual	About 5 mi (8 km) southeast of the Escalante Valley SEZ and 3 mi (5 km) west of the Milford Flats South SEZ
TransWest Express 600 kV DC Transmission Line Project	Planned	Land use, ecological resources, visual	About 5 mi (8 km) southeast of the Escalante Valley SEZ and 3 mi (5 km) west of the Milford Flats South SEZ

TABLE 13.2.22.2-1 (Cont.)

Description	Status	Resources Affected	Primary Impact Location
UNEV liquid Fuel Pipeline (UTU-79766)	FEIS April 2010	Disturbed areas, terrestrial habitats along pipeline ROW	About 5 mi (8 km) southeast of the Escalante Valley SEZ and 3 mi (5 km) west of the Milford Flats South SEZ
<i>Oil and Gas Leasing</i> Oil and gas leasing	Planned	Land use, ecological resources, visual	Eastern portions of Iron and Beaver Counties.

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2
3 **Solar Energy Development**
4

5 There are no existing solar energy facilities in the state of Utah. No applications have
6 been filed for new solar energy facilities proposed to be located on BLM-administered lands.
7

8
9 **Wind Energy Development**
10

11 The Milford Wind Corridor Project, Phases I–V, which are either planned, under way, or
12 ongoing, are currently the only reasonably foreseeable wind energy development within a 50-mi
13 (80 km) radius of the proposed Milford Flats South SEZ. This development is administered
14 under three BLM ROW applications, as listed in Table 13.1.22.2-1. The footprints of these and
15 numerous other renewable energy ROW applications in various stages of authorization are
16 shown in Figure 13.2.22.2-1. The identified reasonably foreseeable energy development and
17 distribution projects are discussed in the following subsections, followed by a brief discussion of
18 pending wind applications, also shown in the figure, which are considered to represent potential,
19 if not foreseeable projects at this time.
20

- 21 • *Milford Wind Phase I (UTU 82972)*. Phase I of the Milford Wind Corridor
22 Project, a 203.5-MW facility, began operations in October 2009. At least four
23 more phases will follow. The facility is located about 10 mi (16 km) northeast
24 of Milford, east of State Route 287, and on 40 mi² (103 km²) including land
25 in both Beaver and Millard Counties. The facility has 97 wind turbines,
26 including 58 Clipper Liberty 2.5-MW wind turbines and 39 GE 1.5-MW
27 wind turbines. Power from this facility is being purchased by the Southern
28 California Public Power Authority. The project also includes a new
29 transmission line connecting the facility to the existing Intermountain
30 Power Project substation near Delta, Utah. The Milford Wind Corridor
31 Project is the first wind energy facility permitted under the BLM Wind
32 Energy Programmatic Environmental Impact Statement for western states
33 (First Wind 2009).
34

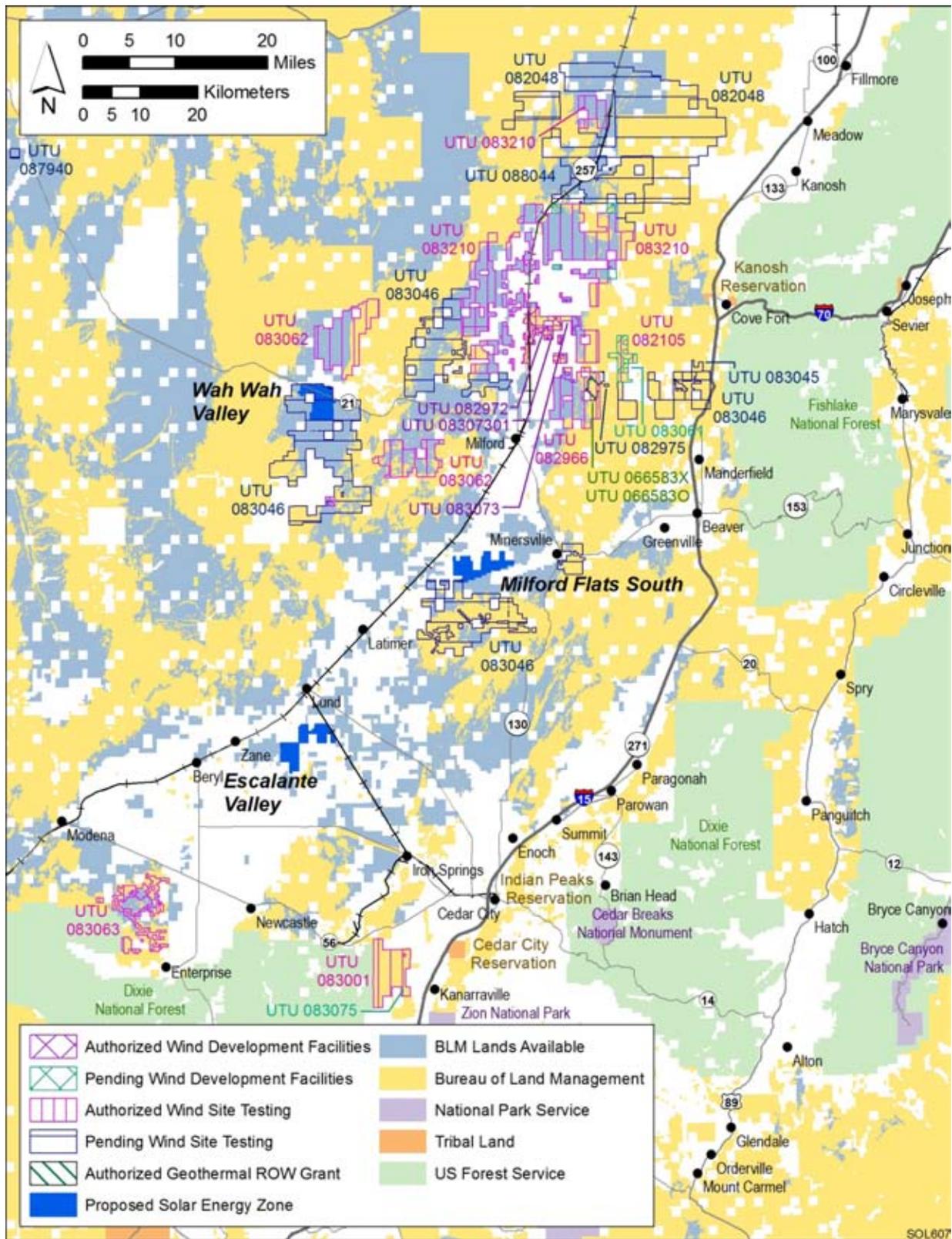
- *Milford Wind Phases II, III, IV, and V.* Four additional phases of the Milford Wind Corridor Project, adjacent to Milford Wind Phase I, are in development. Construction of Milford Wind II (UTU 83073) is under way. Each of the four projects will be a 200-MW wind energy facility (First Wind undated).

Pending Wind ROW Applications on BLM-Administered Lands. Applications for right-of-way grants that have been submitted to the BLM include six pending authorizations for wind site testing, six authorized for wind testing, and three pending authorization for development of wind facilities that would be located within 50 mi (80 km) of the SEZ as of May 14, 2010 (BLM and USFS 2010b). Table 13.2.22.2-2 lists these applications and Figure 13.2.22.2-1 shows their locations.

TABLE 13.2.22.2-2 Pending Wind Energy Project ROW Applications on BLM-Administered Land within 50-mi (80-km) of the Milford Flats South SEZ^a

Serial No.	Technology	Status	Field Office
<i>Pending Wind Site Testing</i>			
UTU 082048	Wind	Pending	Fillmore
UTU 082975	Wind	Pending	Cedar City
UTU 083045	Wind	Pending	Cedar City
UTU 083046	Wind	Pending	Cedar City
UTU 085819	Wind	Pending	Cedar City
UTU 088044	Wind	Pending	Cedar City
<i>Authorized for Wind Site Testing</i>			
UTU 082105	Wind	Site testing	Cedar City
UTU 082966	Wind	Site testing	Cedar City, Fillmore
UTU 083001	Wind	Site testing	Cedar City, St. George
UTU 083062	Wind	Site testing	Cedar City, Fillmore
UTU 083063	Wind	Site testing	Cedar City
UTU 083210	Wind	Site testing	Cedar City, Fillmore
<i>Pending Wind Development Facilities</i>			
UTU 083061	Wind	Pending	Cedar City
UTU 083075	Wind	Pending	Cedar City
UTU 088017	Wind	Pending	Cedar City

^a Pending wind applications information downloaded from GeoCommunicator (BLM and USFS 2010b)



1
 2 **FIGURE 13.2.22.2-1 Locations of Reasonably Foreseeable Energy Projects in the Vicinity of the**
 3 **Proposed Milford Flats South SEZ**
 4

1 The likelihood of any of the pending wind ROW application projects actually being
2 developed is uncertain, but it is generally assumed that applications authorized for wind testing
3 are closer to fruition. However, wind testing alone is not considered a sufficient basis to classify
4 these as reasonably foreseeable projects. The pending applications are listed in Table 13.2.22.2-2
5 for completeness and as an indication of the level of interest in development of wind energy in
6 the region. Some number of these applications would be expected to result in actual projects.
7 Thus, the cumulative impacts of these potential projects are analyzed in their aggregate effects.
8

9 Wind testing will involve some relatively minor activities that could have some
10 environmental effects, mainly the erection of meteorological towers and monitoring of wind
11 conditions. These towers may or may not employ guy wires and may be 200 ft (60 m) high.
12
13

14 **Geothermal Energy Development**

15

16 Two applications for the development of geothermal energy facilities within 50 mi
17 (80 km) of the proposed SEZ have geothermal agreements authorized by the BLM, as listed in
18 Table 13.2.22.2-1 and shown in Figure 13.2.22.2-1. The two applications are located in close
19 proximity of each other and are located about 20 mi (32 km) northeast of the SEZ and about
20 10 mi (16 km) northeast of Milford. These projects are considered only minimally reasonably
21 foreseeable because applications have received only authorized geothermal agreements (BLM
22 and USFS 2010b). Several other applications are under review for government approval of
23 geothermal well drilling and testing on existing federal leases within BLM-administered lands
24 and National Forest Land in Beaver County. All the applications are for geothermal projects
25 within a 40- to 50-mi (64- to 80-km) radius of the proposed Milford Flats South SEZ. One
26 operating facility, the Blundell Geothermal Power Station, lies about 20 mi (32 km) north of the
27 SEZ and has been in operation since 1984.
28

- 29 • *Cove Fort/Sulphurdale Geothermal Production Wells.* Enel Cove Fort II,
30 LLC, applied to the BLM for nine geothermal drilling permits in
31 February 2009 to drill geothermal production test wells on federal lease
32 UTU-085605 located in the Cove Fort/Sulphurdale geothermal resource area.
33 The proposed well sites are within the Fishlake National Forest in Beaver
34 County about 1 mi (1.6 km) south of Exit 1 off I-70 and 30 mi (48 km)
35 east-northeast of Milford. The application for a geothermal drilling permit
36 indicated Enel Cove Fort II, LLC, intended to start drilling in October 2009
37 subject to BLM approval (BLM 2009c).
38
- 39 • *Cove Fort/Sulphurdale Injection Well and Well Production Testing.* Enel
40 Cove Fort II, LLC, would conduct the tests at these well sites located on the
41 Fishlake National Forest, on BLM-administered land, and on private lands in
42 Beaver County. The wells are located about 30 mi (48 km) east–northeast of
43 Milford in the Cove Fort/Sulphurdale geothermal resource area on geothermal
44 lease UTU-029557. Well testing applications have been filed with the USFS
45 and the BLM for production testing to be conducted at an existing well,
46 No. 44-7, and a new well, No. 51-7, both on National Forest land. Water

1 produced from the testing will be cooled in ponds and injected into well
2 B01-1 (on private land) and well 72-12 (on BLM-administered land)
3 (BLM 2009d).

- 4
5 • *Blundell Geothermal Power Station.* Utah Power, a PacifiCorp company, has
6 operated the power station since 1984. It is located 9 mi (14 km) north of
7 Milford in Beaver County. The Blundell plant produces geothermal brine
8 from wells that tap a geothermal resource in fractured, crystalline rock. The
9 resource depths range generally between 2,100 and 6,000 ft (640 and
10 1,830 m). Resource temperatures are typically between 520 and 600°F
11 (271 and 316°C).

12
13 Wellhead separators are used to “flash” the geothermal fluid into liquid and
14 vapor phases. The liquid phase, or geothermal brine, is channeled back into
15 the reservoir through gravity-fed injection wells. The vapor phase, or steam
16 fraction, is collected from the production wells and directed into the power
17 plant at temperatures between 350 and 400°F (177 and 204°C) with steam
18 pressure approaching 109 psi (7.66 kg/cm²).

19
20 The plant produces 26 MW gross (23 MW net), which equals the energy that
21 would be produced by burning about 300,000 bbl (48,000 m³) of oil annually
22 (UGS undated).

- 23
24 • *Blundell Geothermal Plant Integration of Wells 58-3 and 71-10.* In
25 August 2009, PacifiCorp filed a request with the BLM Cedar City Field
26 Office to integrate two wells into the existing Blundell Geothermal Plant
27 Unit 1 and Unit 2 operations. The project would consist of pipelines
28 connecting wells 58-3 and 71-10 with the two geothermal plant units, the
29 trenching of a 3-in. (7.6-cm) diameter brine line between well 58-3 Pond
30 and an existing brine line, a new 4.16-kV overhead power line, and new
31 access roads. The pipelines between wells 58-3 and 71-10 would run in a
32 side-by-side configuration over a distance of about 1,150 ft (350.5 m). The
33 power line would require eight wooden poles spaced at 240-ft (73.2-m)
34 intervals over a distance of about 1,670 ft (509 m) (Lee 2009).

35 36 37 **Transmission and Distribution Systems**

38
39 Existing and proposed electric transmission lines are considered in the cumulative impact
40 analysis related to solar energy project development in the proposed Utah SEZs. Several
41 transmission line projects and a petroleum pipeline project occur or are planned within the
42 geographic extent of effects for the proposed Milford Flats South SEZ.

- 43
44 • *Milford Wind Corridor Project.* A new 88-mi (142-km) 345-kV overhead
45 transmission line was constructed to deliver power from the wind farm. It
46 connects the Milford Wind facility to the existing Intermountain Power

1 Project substation near Delta, Utah, which then connects to southern
2 California. The transmission line crosses predominantly public lands in
3 Beaver and Millard Counties.
4

- 5 • *Geotechnical Investigations for the Sigurd to Red Butte 345-kV Transmission*
6 *Line*. Rocky Mountain Power Company submitted an application in
7 September 2009 to the BLM for approval to conduct geotechnical
8 investigations on a proposed 345-kV transmission line planned to go
9 into service by 2012. The investigations will consist of drilling about
10 235 boreholes along the proposed 160-mi (257-km) route and along another
11 400 mi (644 km) of alternatives to evaluate subsurface soil and rock to a
12 maximum depth of 50 ft (15 m). Some access road construction will be
13 needed in remote areas to allow drilling equipment to reach proposed sites.
14 Information gathered from the borings will be factored into engineering
15 design of the transmission tower foundations. The BLM intends to prepare an
16 environmental assessment (EA) to address impacts of the geotechnical
17 investigations. The proposed transmission line route will traverse portions of
18 Beaver and Iron Counties and pass within 10 to 15 mi (16 to 24 km) east of
19 the Milford Flats South and Escalante Valley SEZs. However, Rocky
20 Mountain Power Company showed the proposed project study area as
21 encompassing both SEZs to cover potential alternative routes being
22 investigated (BLM 2009e).
23
- 24 • *Sigurd to Red Butte No. 2, 345-kV Transmission Line*. Rocky Mountain Power
25 submitted a preliminary ROW application form to the BLM (i.e., Form 299)
26 along with a Plan of Development for the project in December 2008. The
27 project would traverse public lands administered by the BLM and the USFS
28 and private lands over a distance of 150 to 160 mi (214 to 257 km) from the
29 Sigurd Substation in Sevier County near Richfield, Utah, to the Red Butte
30 Substation in southwestern Utah near the town of Central in Washington
31 County. Transmission towers would be steel H-frame design spaced about
32 1,000 to 1,200 ft (305 to 366 m) apart. The transmission line would need to be
33 operating by 2012 to meet the expected energy demands of southwestern Utah
34 because of population growth in the St. George area and surrounding
35 communities. The proposed route and alternative segments under
36 consideration by Rocky Mountain Power would pass about 10 to 15 mi (16 to
37 24 km) east of the Milford Flats South and the Escalante Valley SEZs
38 (BLM 2009e). The BLM plans to prepare an EIS to fulfill its NEPA
39 responsibilities on a project of this magnitude.
40
- 41 • *Energy Gateway South 500-kV AC Line*. PacifiCorp, as part of its Energy
42 Gateway Transmission Expansion Project, is planning to build a high-voltage
43 transmission line, known as the Gateway South segment, from the Aeolus
44 substation in southeastern Wyoming into the new Clover substation near
45 Mona, Utah. An additional segment would continue from the new Clover
46 substation to the existing Crystal substation north of Las Vegas. The larger

1 Gateway Transmission Expansion Project would provide a broad regional
2 expansion of transmission capacity in the West, in part to connect new
3 renewable energy sources to load centers. The Gateway South portion is in the
4 early planning, siting, and permitting stages. Rights of way and an EIS are
5 expected to be completed by 2015, while PacifiCorp projects an in-service
6 date of 2017 to 2019 (PacifiCorp 2010).

- 7
8 • *TransWest Express 600-kV DC Line.* The TransWest Express LLC is
9 proposing a 600-kV DC transmission line that would deliver 3,000 MW of
10 wind energy from Wyoming to the desert southwest by way of Las Vegas.
11 The proposed route would cover 725 mi (1,160 km) and pass through
12 southwestern Utah, about 20 mi (32 km) northwest of Cedar City in the
13 vicinity of the three proposed Utah SEZs and within or adjacent to federally
14 designated or proposed utility corridors, or parallel to existing transmission
15 lines or pipelines. The project is in the planning, permitting, and design stages.
16 Project proponents entered the project into the Western Electricity
17 Coordinating Council's rating process for grid integration in January 2008
18 jointly with PacifiCorp's Gateway South project and anticipate a path rating
19 by 2011. An EIS to be prepared by the BLM and the Western Area Power
20 Administration is expected to be completed by 2013 and the line to be in-
21 service in 2015 (TransWest 2010).
- 22
23 • *UNEV Pipeline Project.* Holly Energy Partners proposes to construct and
24 operate a 399-mi (640-km), 12-in (0.3-m) petroleum products (gasoline and
25 diesel fuel) pipeline that will originate at the Holly Corporation's Woods
26 Cross, Utah refinery near Salt Lake City and terminate near the Apex
27 Industrial Park northeast of Las Vegas, Nevada. The pipeline would run along
28 the same route as the proposed TransWest Express transmission line described
29 above, passing about 20 mi (32 km) northwest of Cedar City, Utah, and would
30 include a lateral pipeline from the main line to a pressure reduction station at a
31 terminal about 10 mi (16 km) northwest of Cedar City. Access roads would be
32 built to all aboveground infrastructures. The BLM issued a Final EIS for the
33 project in April 2010 (BLM 2010c).

34 35 36 **Oil and Gas Leasing**

37
38 The BLM Cedar City Field Office prepared an environmental assessment
39 (EA UT-040-08-036) in August 2008 that addressed the impacts of ongoing and new oil and gas
40 leases in the eastern portions of Beaver and Iron Counties. The geographical area covered in the
41 analysis extended from about 10 mi (16 km) north of Milford, south and east to New Harmony,
42 10 mi (16 km) south of Cedar City. A smaller area east of I-15, east and northeast of Cedar City,
43 was also evaluated. A total of 960,000 acres (3,885 km²) of federal mineral lands were
44 considered in the EA. About half (374,000 acres [1,513.5 km²]) have been leased or have been
45 issued a lease but await protest resolution (108,000 acres [437.1 km²]). Of the remaining land
46 (478,000 acres [1,934.4 km²]), almost one-fourth (121,000 acres [489.7 km²]) is being

1 considered for development by industry. The intent of the proposed action is for the BLM to
2 protect environmental resources in future leased areas by imposing additional resource protective
3 measures.

6 **13.2.22.2.2 Other Actions**

9 **Grazing Allotments**

10
11 Grazing is a common use of the lands in the vicinity of the proposed Milford Flats South
12 SEZ. The management authority for grazing allotments on these lands rests with BLM's Cedar
13 City Field Office. Some of the allotments currently in effect or under review by BLM in the area
14 include Milford Cattle; Minersville #1, #2, #4, #5, and #6; Shauntie; Paragonah Cattle; Parowan
15 Stake; Stewart; and Cook (BLM 2009a). While many factors could influence the level of
16 authorized use, including livestock market conditions, natural drought cycles, increasing
17 nonagricultural land development, and long-term climate change, it is anticipated that the current
18 level of use will continue in the near term. A long-term reduction in federal authorized grazing
19 use would affect the value of the private grazing lands.

22 **Other Projects**

23
24 Many projects requesting ROW grant approvals for BLM and USFS lands are under
25 review or have received recent BLM approval for locations in Beaver, Iron, and Millard
26 Counties. These projects include such initiatives as minerals mining, communication tower
27 construction or modification, habitat improvement, and vegetation removal for fire control. The
28 following is a summary of larger projects in the vicinity of the three proposed SEZs in Utah
29 (because of the close proximity of the three proposed SEZs in Utah and overlapping geographic
30 extent of boundaries for various resource areas, the projects described in this section apply to all
31 three SEZs in Utah). Three of the projects are summarized below. A list of additional projects is
32 included in Table 13.2.22.2-3. The list was derived from the BLM Web site for the state of Utah
33 on projects recently approved or under review for ROW permits (BLM 2009a).

- 34
35 • *Blawn Mountain Stewardship.* The BLM implemented a project in
36 January 2009 to improve wildlife habitat in the south end of the Wah Wah
37 Mountains located about 33 mi (53 km) southwest of Milford. The largest part
38 of the project area is dominated by pinyon-juniper stands, where understory
39 species are in decline. The objectives are to improve forage for wild horses
40 and provide good deer habitat. An estimated 1,065 acres (4.3 km²) was to be
41 improved by cutting, lopping, and scattering juniper while retaining most of
42 the pinyon pine. Riparian habitat improvement includes removing the danger
43 of crown fire in ponderosa pine, which can threaten survival of pinyon pine,
44 and improving habitat around springs and where perennial water occurs. The
45 desired condition is to have a patchy density of shrublands, forbs, and grasses
46 to support wildlife. The project also is planning to thin up to 3,180 acres

TABLE 13.2.22.2-3 Other Projects in the Vicinity of the Proposed SEZs in Utah

Project Name	Description	Status	County	Location
AirCell, LLC, Communication Site	Communication tower	Approved November 2009	Beaver	Frisco Peak, San Francisco Mountains
Utah Alunite, LLC, Potassium Prospecting Permit Applications	Request to conduct prospect mining for potassium minerals	Applications received September 2009; scoping December 2008	Iron	Vicinity of Bible, Typhoid, and Mountain Springs
Utah Copper Company Hidden Treasure Mine	Amendment to change some mine facilities, haul road change, and perimeter disturbances on BLM and private lands	Approved January 2009	Beaver	5 to 10 mi (8 to 16 km) northwest of Milford, south end of Rocky Range and Beaver Lake Mountains.
Copper Ranch Knoll Exploration Plan of Operation	Authorization requested to initiate a copper reserve delineation project on the Marguerite No. 15 and Jewel Mine patented claims	EA completed January 2009, signed January 28, 2009	Beaver	About 7 mi (11 km) northwest of Milford on and around Copper Ranch Knoll, about halfway between west side of Rocky Range and the southeast edge of Beaver Lake Mountains
Clark Livestock Pipeline ROW Renewal	Renewal of permit to transport water to livestock along 17,253-ft (5,258.7-m) long ROW across about 3,950 acres (16 km ²) of BLM lands	Approved August 7, 2008	Iron	Iron Springs/Big Hollow Wash about 10 mi (16 km) northwest of Cedar City, Utah
Highway 56 Fuels Reduction	Decrease fire hazard by removal of up to 1,000 acres (4 km ²) of standing pinyon-juniper; project would involve controlled burning, seeding, controlled grazing	Categorical Exclusion prepared in 2008	Iron	Adjacent to residential and outlying properties near Newcastle in southwestern Iron County
Bible Spring Complex Wild Horse Gather and Removal	Removal of about 380 wild horses through capture; information gained used to update Herd Management Area Plans	EA approved June 30, 2009	Beaver, Iron	Wah Wah and Peak Mountain Ranges

TABLE 13.2.22.2-3 (Cont.)

Project Name	Description	Status	County	Location
Kern River Gas Transportation Co. Apex Expansion Temporary Use Permit	Request to conduct four geotechnical borings for a proposed compressor site; borings to be conducted early June 2009	No information found	Beaver	Northwest of Minersville
Sunrise Exploration Project	Exploration to evaluate grade, depth, and thickness of in-place copper to allow delineation of mineable reserves; 100 to 200 rotary drill holes would occur over about 160 acres (0.67 km ²)	Finding of No Significant Impact and Decision Record approved September 24, 2009	Beaver	Located about 4 mi (6 km) northwest of the City of Milford at the southern extent of the Rocky Range
Mineral Mountain Communication Site	Upgrade requested for existing communication site; upgrades expand existing site from 45 ft × 35 ft to 80 ft × 35 ft; internal building modifications; new 70-ft (21-m) tall steel lattice tower	Application to the BLM received in June 2009; EA checklist received in September 2009	Beaver	Township 26S, Range 8W, Section 30
Hamlin Valley Habitat Improvement	Improve vegetation conditions in Hamlin Valley Project Area; goals include habitat improvements in sagebrush-steppe, pinyon-juniper woodlands, and riparian areas; techniques include harrowing of sagebrush and seeding, thinning of pinyon juniper	EA started in November 2005	Beaver, Iron	Project involves parts of Modena, Spanish George, Rosebud, Butcher, Stateline, Indian Peak, Atchison, South Pine Valley, North Pine Valley, and Indian Peak Grazing Allotments

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(12.9 km²) of pinyon-juniper stands that surround the Blawn Mountain Chainings. All other actions will be to improve the overall forest health and suitability for wildlife.

- *Paradise Mountain Stewardship.* The BLM initiated a NEPA review in January 2009 on 8,850 acres (35.8 km²) of montane vegetation in the Paradise Mountains near the Utah–Nevada border to evaluate the impacts of vegetation removal and selective thinning to improve wildlife habitat and reduce fire hazards in the areas. The project objectives are to improve forest health; improve wildlife habitat; improve and maintain shrub, grass, and forb habitats in meadow and riparian areas; and decrease the probability of crown fires, which would eliminate individual stands. The Paradise Mountains are 10 mi

1 (16 km) northwest of the town of Modena, about 50 mi (80 km) southwest of
2 the Wah Wah Valley SEZ and 20 mi (32 km) west of the Escalante Valley
3 SEZ.
4

- 5 • *Lake Powell Pipeline.* Washington, Kane, and Iron Counties are pursuing the
6 construction of a pipeline that would extend from Lake Powell, near Glen
7 Canyon Dam, through Kane County, to Sand Hollow Reservoir, which is
8 located about 10 mi (16 km) east of St. George. The pipeline would then
9 extend parallel to I-15 into Iron County. The pipeline would be 158-mi
10 (254-km) long and bring 70,000 ac-ft (86.3 million m³) of water to
11 Washington County, 10,000 ac-ft (12.3 million m³) to Kane County, and
12 20,000 ac-ft (24.7 million m³) to Iron County. The NEPA review could be
13 completed by 2012 on the basis of the results of technical studies currently
14 under way. Construction of the pipeline may begin as soon as 2015 and is
15 estimated to take only three years. The pipeline would be located about 30 mi
16 (48 km) south of the Milford Flats South SEZ (Utah Foundation 2008).
17
18

19 **13.2.22.3 General Trends**

20
21 General trends of population growth, energy demand, water availability, and climate
22 change are similar for all three SEZs in Utah and are presented together in this section.
23 Table 13.2.22.3-1 lists the relevant impacting factors for the trends.
24
25

26 **13.2.22.3.1 Population Growth**

27
28 Over the period 2000 to 2008, the population grew by 3.7% in the ROI for the Milford
29 Flats South SEZ (see Section 13.2.10.1). The population growth rates for the ROIs for the
30 proposed Escalante Valley and Wah Wah Valley SEZs in the same period were 5.7 and 3.2%,
31 respectively. The growth rate for the State of Utah as a whole was 2.5%. Within each ROI, each
32 county experienced growth in population since 2000, ranging from 1.4% in Millard County to
33 6.4% for Washington County. County populations are expected to continue to increase over the
34 period 2010 to 2023 (Governor's Office of Planning and Budget 2009). Most of the population
35 growth in the Milford Flats South SEZ ROI over this period will be in Cedar City.
36
37

38 **13.2.22.3.2 Energy Demand**

39
40 The growth in energy demand is related to population growth through increases in
41 housing, commercial floorspace, transportation, manufacturing, and services. Given that
42 population growth is expected in the three SEZ areas in Utah (by as much as 19% between
43 2006 and 2016), an increase in energy demand is also expected. However, the EIA projects a
44 decline in per-capita energy use through 2030, mainly because of improvements in energy
45 efficiency and the high cost of oil throughout the projection period. Primary energy consumption
46 in the United States between 2007 and 2030 is expected to grow by about 0.5% each year, with

TABLE 13.2.22.3-1 General Trends Relevant to the Proposed SEZs in Utah

General Trend	Impacting Factors
Population growth	Urbanization Increased use of roads and traffic Land use modification Employment Education and training Increased resource use (e.g., water and energy) Tax revenue
Energy demand	Increased resource use Energy development (including alternative energy sources) Energy transmission and distribution
Water availability	Drought conditions and water loss Conservation practices Changes in water distribution
Climate change	Water cycle changes Increased wildland fires Habitat changes Changes in farming production and costs

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the fastest growth projected for the commercial sector (at 1.1% each year). Transportation, residential, and industrial energy consumption are expected to grow by about 0.5, 0.4, and 0.1% each year, respectively (EIA 2009).

13.2.22.3.3 Water Availability

As described in Section 13.2.9.1.2, the proposed Milford Flats South SEZ is located within the northern Escalante Desert Valley groundwater basin. Groundwater use in the Milford area of the Escalante Desert Valley has increased in recent years. The total of estimated withdrawals in the Milford area in 2008 was about 51,000 ac-ft (62.9 million m³), which is 2,000 ac-ft (2.5 million m³) more than was reported for 2007 and 6,000 ac-ft (7.4 million m³) more than the average annual withdrawal for 1998 to 2007. The increase was due mainly to increased industrial water use. The Utah Division of Water Rights reports that 4,009 water rights have been approved in the Milford area of the Escalante Valley. Most all of the area is closed to new water appropriations (Utah DWR 2004). Groundwater extraction in the Beryl-Enterprise area located 40 mi (64 km) west of Cedar City averaged 80,000 ac-ft/yr (98.7 million m³/yr) during the period 1989 to 1998 based on well pumping data (Utah Division of Water Resources 2001). In comparison, the Cedar Valley and Parowan Valley groundwater areas had withdrawal rates of 33,000 and 29,000 ac-ft/yr (40.7 million and 35.8 million m³/yr), respectively, during this period. The groundwater withdrawal rate of 80,000 ac-ft/yr

1 (98.7 million m³/yr) in the Beryl-Enterprise area caused a lowering of the groundwater table by
2 1.2 ft (0.4 m) per year during this 11-year period. Recent information reported by the USGS
3 showed a continued increase in annual rate of groundwater withdrawal in the Beryl-Enterprise
4 area to about 93,000 ac-ft/yr (114.7 million m³/yr) in 2008, which was an increase of 1,000 ac-ft
5 (1.2 million m³) from 2007, and 8,000 ac-ft (9.9 million m³) above the average annual
6 withdrawal from 1998 to 2007. This increase was mostly the result of increased withdrawals for
7 irrigation (Burden et al. 2009).

8
9 Water usage of the total groundwater withdrawals in the Milford area groundwater basin
10 was primarily for agriculture (79%) in 2008 (Burden et al. 2009). This is slightly lower than the
11 average agricultural water usage (89%) for Beaver County in 2005; the remaining water was
12 used for domestic (2%), livestock (3%), thermoelectric energy production (6%), and industrial
13 (2%) purposes (Kenny et al. 2009). The majority of the agricultural water use occurs between the
14 towns of Milford and Minersville located east and northeast of the SEZ.

15
16 The depth to groundwater records in wells within the northern Escalante Desert Valley
17 have shown a groundwater table falling at a rate of 0.4 to 2.5 ft/yr (0.1 to 0.8 m/yr); the larger
18 rates are concentrated just to the south of the town of Milford, which is 10 mi (16 km) northwest
19 of the proposed Milford Flats South SEZ (Burden et al. 2009). Groundwater elevations have
20 been observed to drop approximately 40 ft (15 m) between 1950 and 2009 in wells within 2 mi
21 (3.2 km) of the proposed Milford Flats South SEZ (Burden et al. 2009; USGS 2010b). Fracturing
22 and land subsidence due to aquifer overdraft has been observed in the area of the highest
23 groundwater withdrawals at a rate of less than 0.6 in./yr (1.5 cm/yr) (Mower and Cordova 1974;
24 Forster 2006).

25
26 To meet future increases in water demand, Washington, Iron, and Kane Counties in
27 southwestern Utah are studying the feasibility of an agreement to obtain water from Lake Powell
28 on the Lower Colorado River via a pipeline. Despite water conservation efforts, this area of
29 Utah may begin to experience water shortfalls by 2012. Washington, Kane, and Iron Counties
30 are pursuing the construction of a pipeline that would extend from Lake Powell, near Glen
31 Canyon Dam, through Kane County, to Sand Hollow Reservoir, which is about 10 mi (16 km)
32 east of St. George. The pipeline would then extend parallel to I-15 into Iron County. The pipeline
33 would be 158 mi (254 km) long and bring 70,000 ac-ft (86.3 million m³) of water to Washington
34 County, 10,000 ac-ft (12.3 million m³) to Kane County, and 20,000 ac-ft (24.7 million m³) to
35 Iron County. It would tap into Utah's unused portion of the Upper Colorado River, which was
36 defined as belonging to Utah in the 1922 Colorado River Compact. The pipeline would cross
37 both private and BLM-administered lands in Iron County and would be about 30 mi (48 km)
38 south of the Milford Flats South SEZ. Construction could begin in 2015 and be completed in
39 three years (Utah Foundation 2008).

40 41 42 ***13.2.22.3.4 Climate Change*** 43

44 A study of climate change and its effects on Utah was conducted by the Governor's Blue
45 Ribbon Advisory Council on Climate Change (BRAC 2007). The report, generated by scientists from
46 the three major universities in Utah, summarized present scientific understanding of climate change

1 and its potential impacts on Utah and the western United States. Excerpts of researchers' findings
2 and conclusions from the report follow:

- 3
4 • *Temperature Change.* In Utah, the average temperature during the past decade
5 was higher than observed during any comparable period of the past century
6 and roughly 2°F (1°C) higher than the 100-year average. Precipitation in Utah
7 during the twentieth century was unusually high; droughts during other
8 centuries have been more severe, prolonged, and widespread. Declines in low-
9 elevation mountain snowpack have been observed over the past several
10 decades in the Pacific Northwest and California. However, clear trends in
11 snowpack levels in Utah's mountains from temperature increases cannot be
12 developed at this time based on recent historic data. Climate models suggest
13 that the earth's average surface temperature will increase between 3 and 7°F
14 (2 and 4°C). GHG emissions at current rates will continue to exacerbate
15 climate change and associated impacts. For Utah, the projected change in
16 annual mean temperature under the 2.5 times increase in CO2 concentrations
17 by the end of this century is about 8°F (5°C), which is comparable to the
18 present difference in annual mean temperature between Park City (44°F
19 [24°C]) and Salt Lake City (52°F [29°C]).
20
- 21 • *Impacts of Climate Change in Utah.* Utah is projected to warm more than the
22 average for the entire globe and more than coastal regions of the contiguous
23 United States. The expected consequences of this warming are fewer frost
24 days, longer growing seasons, and more heat waves. Agricultural impacts
25 anticipated include (1) an increase in crop productivity, assuming that water
26 use for irrigation remains relatively constant and more precipitation falls as
27 rain than as snow; (2) grazing use decreases on nonirrigated lands because
28 there is less forage for livestock; and (3) changes in insect and other animal
29 populations, which, in turn, affect pollination and crop damage.
30

31 Snowpack, water supply, and drought potential are predicted to be affected by GHG
32 emissions holding at current levels or increasing. Year-to-year variations in snowfall will
33 continue to dominate mountain snowpack, streamflow, and water supply during the next couple
34 of decades. As temperature increases, it is likely that a greater fraction of precipitation will fall as
35 rain rather than as snow, and the length of the snow accumulation season will decrease. Projected
36 trends likely to occur in the twenty-first century are as follows:

- 37
- 38 • A reduction in natural snowpack and snowfall in the early and late winter for
39 the winter recreation industry, particularly in low- to mid-elevation mountain
40 areas (trends in high-elevation areas are unclear);
- 41
- 42 • An earlier and less intense average spring runoff for reservoir recharge;
- 43
- 44 • Increased demand for agricultural and residential irrigation due to more rapid
45 drying of soils; and
46

- Warming of lakes and rivers with associated changes on aquatic life, including increased algal abundance and upstream shifts of fish.

Increasing temperatures will cause soils to dry more rapidly and likely increase soil vulnerability to wind erosion. Increased dust transport during high wind events would likely occur, particularly from salt flats and dry lakebeds such as Sevier Lake. Dust deposited on mountain snowpack would also accelerate spring snowmelt.

Forests, desert communities, and wildlife will likely be affected by increasing temperatures and associated climate change. Drier conditions would result in changes in plant distribution, quality of wildlife habitat, and increased potential for and intensity of wildfires. Plant distribution may change such that species occupy higher elevations than now.

The three proposed SEZs in Utah are in dry areas that experience drought conditions that will become worse with temperature increases and climate-induced changes on rainfall amounts and patterns. Groundwater availability for agriculture and livestock grazing on BLM-administered and private lands in southwestern Utah will likely be adversely affected by climate change.

13.2.22.4 Cumulative Impacts on Resources

This section addresses potential cumulative impacts in the proposed Milford Flats South SEZ on the basis of the following assumptions: (1) because of the relatively small size of the proposed SEZ (less than 10,000 acres [40.5 km²]), only one project would be constructed at a time, and (2) maximum total disturbance over 20 years would be about 5,184 acres (21 km²) (80% of the entire proposed SEZ). For purposes of analysis, it is also assumed that no more than 3,000 acres (12.1 km²) would be disturbed per project annually and 250 acres (1.01 km²) monthly on the basis of construction schedules planned in current applications. In addition, it is assumed that a 19-mi (31-km) long transmission line would be constructed from the proposed SEZ to the nearest available existing transmission line. The new transmission line would disturb an additional 576 acres (2.3 km²) (Table 13.2.1.2-1). Regarding site access, it may be necessary to construct a new access road to the proposed SEZ to support construction and operation of solar facilities there. The nearest major road is State Route 21, which is approximately 5 mi (8 km) from the SEZ. Currently, the SEZ is accessed by county and local roads. Access to the interior of the SEZ is by dirt roads.

Cumulative impacts in each resource area that would result from the construction, operation, and decommissioning of solar energy development projects within the proposed SEZ when added to other past, present, and reasonably foreseeable future actions described in the previous section are discussed below. At this stage of development, because of the uncertainties of the future projects in terms of location within the proposed SEZ, size, number, and the types of technology that would be employed, the impacts are discussed qualitatively or semi-quantitatively, with ranges given as appropriate. More detailed analyses of cumulative impacts in relation to all other existing and proposed projects in the geographic areas would be performed in the environmental reviews for specific projects.

1 **13.2.22.4.1 Lands and Realty**
2

3 The area covered by the proposed Milford Flats South SEZ is largely undeveloped. In
4 general, the areas surrounding the SEZ are rural. Numerous dirt/ranch roads provide access
5 throughout the SEZ.
6

7 Development of the SEZ for utility-scale solar energy production would establish a large
8 industrial area that would exclude many existing and potential uses of the land, perhaps in
9 perpetuity. Access to such areas by both the general public and much wildlife would be
10 eliminated. Traditional uses of public lands would no longer be allowed. Utility-scale solar
11 energy development would be a new and discordant land use in the area. It also is possible that
12 similar development of state and private lands located adjacent to the SEZ would be induced by
13 development on public lands and might include additional industrial or support facilities and
14 activities.
15

16 In addition, numerous wind energy projects are proposed within a 50-mi (80-km) radius
17 of the proposed Milford Flats South SEZ. As shown in Table 13.2.22.2-1 and Figure 13.2.22.2-1,
18 in addition to the ongoing Milford Wind Corridor Project, there are six pending authorization for
19 wind site testing, six authorized for wind testing, and three pending authorization for
20 development of wind facilities within this distance. The majority of these wind applications are
21 9 to 50 mi (14 to 80 km) from the SEZ; the nearest application authorized for wind site testing is
22 about 9 mi (14 km) northwest, while the nearest pending wind site testing application lies
23 immediately south. An operating geothermal facility and two authorized geothermal leases are
24 located about 20 mi (32 km) to the northeast. There are currently no solar applications within
25 50 mi (80 km) of the SEZ (Figure 13.2.22.2-1), but the proposed Wah Wah Valley SEZ is about
26 20 mi (32 km) to the northwest, and the proposed Escalante Valley SEZ is about the same
27 distance to the southwest.
28

29 The cumulative effects on land use of development of utility-scale solar projects on
30 public lands on the proposed Milford Flats South SEZ in combination with ongoing and
31 foreseeable actions within the geographic extent of effects, nominally 50 mi (80 km), would be
32 small to moderate. Most other actions outside of the proposed SEZ are wind energy projects,
33 which would allow many current land uses to continue, including farming. However, the number
34 and size of such projects could result in cumulative effects, especially if the SEZ is fully
35 developed, or all three Utah SEZs are fully developed, with solar projects.
36
37

38 **13.2.22.4.2 Specially Designated Areas and Lands with Wilderness Characteristics**
39

40 Specially designated areas exist within or within 25 mi (40 km) of the proposed Milford
41 Flats South SEZ include Granite Peak, about 12 mi (19 km) to the northeast and the Old Spanish
42 Historic Trail, about 25 mi (40 km) to the southeast. While the range of potential visual impacts
43 from the SEZ could range out to 25 mi (40 km) from the SEZ, because affected resources are
44 12 mi (19 km) or more away from the SEZ and a similar distance or farther from other
45 foreseeable development, at most, only small cumulative impacts would be expected on specially
46 designated areas from the construction of utility-scale solar energy facilities within the SEZ.
47

1 **13.2.22.4.3 Rangeland Resources**
2

3 Currently, three grazing allotments are located in the proposed Milford Flats South
4 SEZ. If utility-scale solar facilities are constructed on the SEZ, those areas occupied by the
5 solar projects would be excluded from grazing. Depending on the number and sizes of potential
6 projects, the impact on the rangers who currently utilize the same lands could be significant. If
7 water rights supporting agricultural use are purchased to support solar development, some areas
8 that are currently farmed by using that water would be converted to dryland uses. The effects
9 of other renewable energy projects within the geographic extent of effects, including the Milford
10 Wind Corridor Project, an ongoing geothermal project, and two authorized geothermal
11 applications within 50 mi (80 km) of the SEZ, could result in small to moderate cumulative
12 impacts due to the relative proximity, number, and size of authorized and pending wind
13 applications on public land, especially north of the SEZ. Wind facilities, however, are generally
14 compatible with grazing and would therefore have low impacts on grazing individually.
15 Additional pending or authorized wind applications fall within this distance, the closest lying
16 immediately south of the SEZ (Figure 13.2.22.2-1).
17

18 Because the proposed SEZ is more than 13.5 mi (21.7 km) from any wild horse and
19 burro HMA managed by the BLM and more than 50 mi (80 km) from any wild horse and burro
20 territory administered by the USFS, solar energy development within the SEZ would not
21 contribute to cumulative impacts on wild horses and burros managed by the BLM or the USFS.
22
23

24 **13.2.22.4.4 Recreation**
25

26 Limited outdoor recreation (e.g., backcountry driving, OHV use, and hunting for both
27 small and big game) occurs on or in the immediate vicinity of the SEZ. Construction of utility-
28 scale solar projects on the SEZ would preclude recreational use of the affected lands for the
29 duration of the projects. However, improvements to, or additional access roads, could increase
30 the amount of recreational use in unaffected areas of the SEZ or in the immediate vicinity. Since
31 the area of the proposed SEZ has low current recreation use and the surrounding area holds
32 similar or better opportunities for recreation, while major foreseeable actions, primarily wind
33 projects clustered to the north, would similarly affect areas of low recreational use, cumulative
34 impacts on recreation within the geographic extent of effects, would be small.
35
36

37 **13.2.22.4.5 Military and Civilian Aviation**
38

39 The proposed Milford Flats South SEZ is located more than 100 mi (161 km) away from
40 any military installation. The closest civilian municipal airports are the Milford and Beaver
41 Municipal Airports, about 17 mi (28 km) and 23 mi (37 km), respectively. Recent information
42 from DoD indicates that there are no concerns about solar development in the SEZ. Thus, solar
43 energy development in the proposed SEZ would not contribute to cumulative impacts on military
44 or civilian aviation.
45
46

1 **13.2.22.4.6 Soil Resources**

2
3 Ground-disturbing activities (e.g., grading, excavating, and drilling) during the
4 construction phase of a solar project, including any associated transmission line connections and
5 new roads, would contribute to soil loss due to wind erosion. Road use during construction,
6 operations, and decommissioning of the solar facilities would further contribute to soil loss.
7 Programmatic design features would be employed to minimize erosion and loss. Residual soil
8 losses with mitigations in place would be in addition to losses from construction of other
9 renewable energy facilities, recreational uses, and agricultural. Overall the cumulative impacts
10 on soil resources would be small, however, because of the generally low level of soil disturbance
11 associated with wind mills, the main foreseeable development within the geographic extent of
12 effects, and the distance to the authorized wind leases.

13
14 Landscaping of solar energy facility areas could alter drainage patterns and lead to
15 increased siltation of surface water streambeds, in addition to that from other development
16 activities and agriculture. However, with the required programmatic design features in place,
17 cumulative impacts would be small.

18
19
20 **13.2.22.4.7 Minerals (Fluids, Solids, and Geothermal Resources)**

21
22 As discussed in Section 13.2.8, currently oil and gas leases cover the entire SEZ;
23 however, there are no producing oil and gas facilities. There are no mining claims or proposals
24 for geothermal energy development in the SEZ. However, geothermal resources are known to
25 exist in the general vicinity of the SEZ. If the proposed SEZ is approved for solar energy
26 development, conflicts would have to be resolved with existing oil and gas lease holders and
27 potential geothermal energy developers. Because of the generally low level of mineral
28 production in the proposed SEZ and surrounding area and the expected low impact on mineral
29 accessibility of other foreseeable actions within the geographic extent of effects, mainly wind
30 facilities, cumulative impacts on mineral resources would be small.

31
32
33 **13.2.22.4.8 Water Resources**

34
35 The water requirements for various technologies, if they were to be employed on the
36 proposed SEZ to develop utility-scale solar energy facilities, are described in Sections 13.2.9.2.
37 If the SEZ was fully developed over 80% of its available land area, the amount of water needed
38 during the peak construction year for all evaluated solar technologies would be 874 to 1,244 ac-ft
39 (1.1 million to 1.5 million m³). During operations, the amount of water needed for all evaluated
40 solar technologies would range from 29 to 15,567 ac-ft/yr (36,000 to 19 million m³). The amount
41 of water needed during decommissioning would be similar to or less than the amount used
42 during construction. As discussed in Section 13.2.22.2.3, the amount of groundwater extracted
43 in the Milford area of the Escalante Valley in 2008 was 51,000 ac-ft/yr (62.9 million m³/yr).
44 Therefore, the additional water resource needed for solar facilities during operations would
45 constitute from a relatively small (0.06%) to a very large (28%) increment (the ratio of the
46 annual operations water requirement to the annual amount withdrawn in the Milford area),

1 depending on the solar technology used (PV technology at the low end and the wet-cooled
2 parabolic technology at the high end). Since the water resources in the area are fully
3 appropriated, any new uses would simply replace an existing use, and no net increase or decrease
4 would occur in the total amount of water used. However, the currently appropriated water
5 exceeds the basin safe yield, as evidenced by declining groundwater levels and supported by the
6 analysis conducted by Mower and Cordova (1974). If water is continued to be withdrawn at this
7 rate, the aquifer could incur continued permanent damage—loss of storage capacity from
8 compaction. In addition, land disturbance from agricultural and other activities in the vicinity of
9 the proposed Milford Flats South SEZ could combine with those from developments on the SEZ
10 to potentially affect natural drainage patterns and natural groundwater recharge and discharge
11 properties. Any groundwater quality impacts from activities on the SEZ could combine with any
12 caused by nearby agricultural activities, especially those from hog farms.

13
14 Sanitary wastewater generated would range from 9 to 74 ac-ft (11,000 to 91,000 m³)
15 during the peak construction year and would range from less than 1 up to 15 ac-ft/yr (1,200 up
16 to 18,000 m³/yr) during operations of utility-scale solar energy facilities. Such volumes would
17 not strain available sanitary wastewater treatment facilities in the general area of the SEZ.
18 For technologies that use conventional wet or dry-cooling systems, there would also be from
19 164 to 295 ac-ft/yr (200,000 to 360,000 m³) of blowdown water from cooling towers. This water
20 would be treated on-site (e.g., in settling ponds) and injected into the ground, released to surface
21 water bodies, or reused; and thus, would not contribute to cumulative effects on treatment
22 systems. Blowdown water would need to be either treated on-site or sent to an off-site facility.
23 Any on-site treatment of wastewater would have to ensure that treatment ponds are effectively
24 lined in order to prevent any groundwater contamination. Thus, blowdown water would not
25 contribute to cumulative effects on treatment systems or on groundwater.

26 27 28 ***13.2.22.4.9 Vegetation*** 29

30 The proposed SEZ is located mostly within the shadscale-dominated Saline Basins
31 ecoregion, which primarily supports a sparse saltbush-greasewood shrub community. Livestock
32 grazing, which has occurred in the area for a very long period, likely has affected the plant
33 communities present in the SEZ. If utility-scale solar energy projects were to be constructed
34 within the SEZ, all vegetation within the footprints of the facilities would likely be removed
35 during land-clearing and land-grading operations. Facility construction would primarily affect
36 Semi-Desert Shrub Steppe, Mixed Salt Desert Scrub, or Big Sagebrush Shrubland, which are
37 relatively common within the Escalante Desert Valley area. There are no known wetlands within
38 the proposed SEZ; however, any wetland or riparian habitats outside of the SEZ that are
39 supported by groundwater discharge could be affected by hydrologic changes resulting from
40 groundwater withdrawal or other project activities. The fugitive dust generated during the
41 construction of the solar facilities could increase the dust loading in habitats outside a solar
42 project area, in combination with that from other construction, agriculture, recreation, and
43 transportation. The cumulative dust loading could result in reduced productivity or changes in
44 plant community composition. Mitigation measures would be used to reduce the impacts on plant
45 communities from solar energy projects. Other ongoing and reasonably foreseeable future
46 actions would affect the same plant species affected by development within the SEZ. However,

1 cumulative effects would be small, due to the abundance of the affected species and the
2 relatively low impact of other major actions, mainly wind energy facilities, on vegetation. A
3 number of habitats potentially affected by development within the SEZ are relatively uncommon
4 in the region, and cumulative impacts on these habitats from other major actions could
5 potentially be large.

8 ***13.2.22.4.10 Wildlife and Aquatic Biota***

9
10 Wildlife species that can potentially be affected by the development of utility-scale solar
11 energy facilities in the proposed SEZ include amphibians, reptiles, birds, and mammals, and
12 aquatic species. The construction of utility-scale solar energy projects in the SEZ and any
13 associated transmission line connections and roads in or near the SEZ would have an impact on
14 wildlife through habitat disturbance (i.e., habitat reduction, fragmentation, and alteration),
15 wildlife disturbance, and wildlife injury or mortality. In general, impacted species with broad
16 distributions and a variety of habitats would be less affected than species with a narrowly defined
17 habitat within a limited area. Mitigation measures may include pre-disturbance biological
18 surveys to identify key habitat areas used by wildlife, followed by avoidance or minimization of
19 disturbance to those habitats (e.g., greater sage-grouse brood rearing areas and areas of crucial
20 habitat for pronghorn).

21
22 Other ongoing and reasonably foreseeable future actions within 50 mi (80 km) of the
23 proposed SEZ are dominated by wind energy projects (Section 13.2.22.2). The majority of these
24 projects are 9 to 0 mi (14 to 80 km) north (Figure 13.2.22.2-1). The Escalante Valley and Wah
25 Wah Valley SEZs are also located within this distance. Since many of the wildlife species
26 present within the proposed SEZ that could be affected by other actions have extensive available
27 habitat within the affected counties (e.g., mule deer and pronghorn) and most of the major
28 actions, wind facilities, would be at some distance from the proposed SEZ and would have low
29 to moderate impacts on most species, cumulative impacts on wildlife within the geographic
30 extent of effects would be small to moderate. Where projects are closely spaced, the cumulative
31 impact on a particular species could be moderate to large.

32
33 Surface water within the proposed Milford Flats South SEZ is typically limited to
34 intermittent washes and dry lakebeds that contain water only for short periods during or
35 following precipitation events; no perennial surface water bodies, seeps, or springs are present
36 within its boundaries. Similarly, wetlands are uncommon on the proposed SEZ
37 (Section 13.2.11.1). The closest approach of a perennial stream to the SEZ is the Beaver River,
38 about 4 mi (6 km) northeast of the SEZ. Thus, potential contributions to cumulative impacts on
39 aquatic biota and habitats resulting groundwater drawdown or soil transport to surface streams
40 from solar facilities within the SEZ would be minimal. Further, of the other foreseeable major
41 actions within the geographic extent of effects, proposed wind and geothermal facilities, only
42 geothermal facilities would possibly use groundwater for operations. Thus, cumulative impacts
43 on aquatic species would be small.

1 **13.2.22.4.11 Special Status Species (Threatened, Endangered, Sensitive, and Rare**
2 **Species)**
3

4 As many as 20 special status species could occur within the Milford Flats South SEZ
5 based on suitable habitat. Eight of these species have been recorded within or near the SEZ:
6 ferruginous hawk, greater sage-grouse, short-eared owl, western burrowing owl, dark kangaroo
7 mouse, kit fox, Townsend’s big-eared bat, and Utah prairie dog. The Utah prairie dog is listed as
8 threatened under the ESA. Numerous additional species listed as threatened or endangered by the
9 states of Utah and Nevada or listed as a sensitive species by the BLM (see Section 13.2.12.1) are
10 known to occur within 50 mi (80 km) of the proposed SEZ. Potential mitigation measures that
11 could be used to reduce or eliminate the potential for effects on these species from the
12 construction and operation of utility-scale solar energy projects in the SEZs and related
13 developments (e.g., access roads and transmission line connections) outside the SEZ include
14 avoidance of habitat and minimization of erosion, sedimentation, and dust deposition. Ongoing
15 effects on special-status species include those from roads, transmission lines, grazing, mineral
16 prospecting, agriculture, and recreational activities in the area, while foreseeable actions are
17 dominated by proposed wind projects 9 to 50 mi (14 to 80 km) to the north. Many of the special
18 status species present on the SEZ are also likely to be present at the locations of proposed wind
19 projects where the same habitats exist. Wind projects, however, would be generally less
20 disruptive to habitats than would solar projects. Thus, depending on where other projects are
21 actually built, small cumulative impacts on protected species could occur within the geographic
22 extent of effects. Projects would employ mitigation measures to limit such effects.
23
24

25 **13.2.22.4.12 Air Quality and Climate**
26

27 While solar energy generates minimal emissions compared with fossil fuels, the site
28 preparation and construction activities associated with solar energy facilities would be
29 responsible for some amount of air pollutants. Most of the emissions would be particulate matter
30 (fugitive dust) and engine exhaust emissions from vehicles and construction equipment. When
31 these emissions are combined with those from other projects near solar energy developments or
32 when they are added to natural dust generation from winds and windstorms, the air quality in the
33 general vicinity of the projects could be temporarily degraded. For example, particulate matter
34 (dust) concentration at or near the SEZ boundaries could at times exceed national ambient air
35 quality standards. Dust generation by the construction activities can be controlled by
36 implementing aggressive dust control measures, such as increased watering frequency or road
37 paving or treatment.
38

39 Because the area proposed for the SEZ is rural and undeveloped land, there are no
40 significant industrial sources of air emissions in the area. The only type of air pollutant of
41 concern is dust generated by winds. Other ongoing and reasonably foreseeable future activities
42 in the general vicinity of the SEZ are described in Section 13.2.22.2. Because the major other
43 foreseeable actions that could produce fugitive dust emissions are located 9 mi (14 km) or more
44 away from the proposed SEZ, cumulative air quality effects due to dust emissions during any
45 overlapping construction periods would be small.
46

1 Over the long term, and across the region, the development of solar energy may have
2 beneficial cumulative impacts on the air quality and AQRVs by offsetting the need for energy
3 production that results in higher levels of emissions, such as use of coal, oil, and natural gas to
4 generate electricity. As discussed in Section 13.2.13, air emissions from operating solar energy
5 facilities are relatively minor, while the displacement of criteria air pollutants, VOCs, TAPs, and
6 GHG emissions currently produced from fossil fuels could be relative large. For example, if the
7 Milford Flats South SEZ were fully developed (80% of its acreage) with solar facilities, the
8 quantity of pollutants avoided could be as large as 4.9% of all emissions from the current electric
9 power systems in Utah.

10 11 12 **13.2.22.4.13 Visual Resources** 13

14 The proposed SEZ is within a relatively flat, treeless valley floor. The SEZ is visible
15 from upper elevations of the Black Mountains to the south and the Mineral Mountains to the
16 northeast. The area is sparsely inhabited, remote, and rural in character. Other than a few dirt
17 roads and some livestock management-related modifications (such as wire fences, normally
18 dry livestock ponds, and cattle trails), there is little evidence of cultural modifications of the
19 landscape. Construction of utility-scale solar facilities on the SEZ would significantly alter the
20 natural scenic quality of the area. If other reasonably foreseeable activities as described in
21 Section 13.2.22.2 take place, they would cumulatively affect the visual resources in the area.
22 Additional impacts would occur as a result of the construction, operation, and decommissioning/
23 reclamation of related facilities, such as access roads and electric transmission line connections.
24

25 Visual impacts resulting from solar energy development within the SEZ would be in
26 addition to impacts caused by other potential projects in the area, such as the Sigurd to Red
27 Butte, Energy Gateway South, and TransWest Express transmission line projects. In addition, the
28 Milford Wind Corridor Project, an operating geothermal project, and two authorized geothermal
29 applications lie within 50 mi (80 km), while six applications pending authorization for wind site
30 testing, six authorized for wind testing, and three pending authorization for development of wind
31 facilities on public lands are within 50 mi (80 km) of the SEZ, most located 9 to 50 mi (14 to
32 80 km) north (Figure 13.2.22.2-1). The Escalante Valley and Wah Wah Valley SEZs are also
33 located within 50 mi (80 km) of the Milford Flats South SEZ. While proposed and potential
34 facilities would be some distance from the SEZ and their contribution to cumulative impacts in
35 the area would depend on the number of projects that are actually built, it may be concluded that
36 the general visual character of the landscape within this distance could be altered by the presence
37 of solar facilities and wind mills from what is currently rural desert. Because of the topography
38 of the region, solar facilities within the SEZ and wind facilities located in basin flats would be
39 visible at great distances from surrounding mountains. It is possible that two or more facilities
40 might be viewable from a single location. Also, facilities would be located near major roads; and
41 thus, would be viewable by motorists, who would also be viewing transmission line corridors,
42 towns, and other infrastructure, as well as the road system itself.
43

44 As additional facilities are added, several projects might become visible in succession, as
45 viewers move through the landscape, such as driving on local roads. In general, the new facilities
46 would not be expected to be consistent in terms of their appearance, and depending on the

1 number and type of facilities, the resulting visual disharmony could exceed the visual absorption
2 capability of the landscape and add significantly to the cumulative visual impact. Considering all
3 of the above, the overall cumulative visual impacts within the geographic extent of effects from
4 solar, wind, and other developments could be in the range of small to moderate.
5
6

7 ***13.2.22.4.14 Acoustic Environment*** 8

9 The areas around the proposed Milford Flats South SEZ are relatively quiet. The existing
10 noise sources include road traffic, railroad traffic, aircraft flyover, agricultural activities,
11 commercial hog production facilities, and occasional community activities and events. Other
12 noise sources associated with current land use around the SEZ include grazing, outdoor
13 recreation, backcountry and OHV driving, and hunting. The construction of solar energy
14 facilities could increase the noise levels periodically for up to 3 years per facility, but there
15 would be minor noise impacts during operation of solar facilities, except from solar dish engine
16 facilities and from parabolic trough or power tower facilities using TES, which could affect
17 nearby residences.
18

19 Other ongoing and reasonably foreseeable future activities in the general vicinity of the
20 SEZs are described in Section 13.2.22.2. Because proposed projects are far from the SEZ, the
21 area is sparsely populated, and noise seldom exerts its influence over several miles; cumulative
22 noise effects during the construction or operation of solar facilities are unlikely.
23
24

25 ***13.2.22.4.15 Paleontological Resources*** 26

27 The proposed Milford Flats South SEZ has low potential for the occurrence of significant
28 fossil material (Section 13.2.16). While impacts on significant paleontological resources are
29 unlikely to occur in the SEZ, the specific sites selected for future projects would be investigated
30 to determine if a paleontological survey is needed. Any paleontological resources encountered
31 would be mitigated to the extent possible as determined through consultation with the BLM. No
32 significant cumulative impacts on paleontological resources are expected.
33
34

35 ***13.2.22.4.16 Cultural Resources*** 36

37 The Escalante Desert is rich in cultural history with settlements dating as far back as
38 12,000 years. The area covered by the proposed Milford Flats South SEZ has the potential to
39 contain significant cultural resources; however, this potential is relatively low. It is possible, but
40 unlikely, that the development of utility-scale solar energy projects in the SEZ, when added to
41 other potentially projects likely to occur in the area, could contribute cumulatively to cultural
42 resource impacts occurring in the region. However, only the Milford Wind Corridor Project, one
43 operating geothermal facility, and two authorized geothermal applications lie within the 25-mi
44 (40-km) geographic extent of effects, while several pending wind applications lie within this
45 distance. The proposed Escalante Valley SEZ also lies about 25 mi (40 km) to the southwest, and
46 the proposed Wah Wah Valley SEZ lies a similar distance to the northwest, but neither currently

1 has any solar applications pending. In addition, the specific sites selected for future projects
2 would be surveyed, and historic properties encountered would be avoided or mitigated to the
3 extent possible. Through ongoing consultation with the Utah SHPO and appropriate Native
4 American governments, it is likely that most adverse effects on significant resources in the
5 region could be mitigated to some degree. In addition, given what is currently known
6 archaeologically about the valley floors in this area of Utah, it is unlikely that any sites recorded
7 in the SEZ would be of such individual significance that, if properly mitigated, development
8 would cumulatively cause an irretrievable loss of information about a significant resource type.
9

10 ***13.2.22.4.17 Native American Concerns***

11
12
13 Government-to-government consultation is under way with federally recognized Native
14 American Tribes with possible traditional ties to the Milford Flats area. All federally recognized
15 Tribes with Southern Paiute roots or possible associations with the Utah SEZs have been
16 contacted and provided an opportunity to comment or consult regarding this PEIS. To date, no
17 specific concerns regarding the proposed Milford Flats South SEZ have been raised to the BLM.
18 It is, however, possible that cumulative impacts of concern to Native Americans, such as visual
19 and acoustic impacts on landscapes, could result from combined developments in the region,
20 including solar and wind energy facilities. Continued government-to-government consultation
21 with the Tribes listed in Table 13.2.18.1-1 is necessary to effectively consider and address the
22 Tribes' concerns relative to solar energy development in the Escalante Desert Valley.
23

24 ***13.2.22.4.18 Socioeconomics***

25
26
27 Solar energy development projects in the proposed Milford Flats South SEZ could
28 cumulatively contribute to socioeconomic effects in the immediate vicinity of the SEZs and in
29 the surrounding multicounty ROI. The effects could be positive (e.g., creation of jobs and
30 generation of extra income, increased revenues to local governmental organizations through
31 additional taxes paid by the developers and workers) or negative (e.g., added strain on social
32 institutions such as schools, police protection, and health care facilities). Impacts from solar
33 development would be most intense during facility construction, but of greatest duration during
34 operations. Construction would temporarily increase the number of workers in the area needing
35 housing and services in combination with temporary workers involved in other new
36 developments in the area, including other renewable energy developments. The number of
37 workers involved in the construction of solar projects in the peak construction year could range
38 from about 120 to 1,600 depending on the technology being employed, with solar PV facilities at
39 the low end and solar trough facilities at the high end. The total number of jobs created in the
40 area could range from approximately 220 (solar PV) to as high as 3,000 (solar trough).
41 Cumulative socioeconomic effects in the ROI from construction of solar, wind, or geothermal
42 facilities would occur to the extent that multiple construction projects of any type were ongoing
43 at the same time. It is a reasonable expectation that this condition occasionally would occur
44 within a 50-mi (80-km) radius of the SEZ over the 20-year or longer period of solar
45 development.
46

1 Annual impacts during the operation of solar facilities would be less, but of 20- to
2 30-year duration, and could combine with those from other new developments in the area. The
3 number of workers needed at the solar facilities would be in the range of 11 to 220, with
4 approximately 15 to 340 total jobs created in the region (Section 13.2.19.2.2). Population
5 increases would contribute to general upward population growth trends in the region in recent
6 years. The socioeconomic impacts overall would be positive, through the creation of additional
7 jobs and income. The negative impacts, including some short-term disruption of rural community
8 quality of life, would not be considered large enough to require specific mitigation measures.
9

10 **13.2.22.4.19 Environmental Justice**

11
12
13 Low-income populations have been identified within 50 mi (80 km) of the proposed SEZ;
14 no minority populations are present. Any impacts from solar development could have cumulative
15 impacts on low-income populations in combination with other development in the area. Such
16 impacts could be both positive, such as from increased economic activity, and negative, such as
17 visual impacts, noise, and exposure to fugitive dust. Actual impacts would depend on where low-
18 income populations are located relative to solar and other proposed facilities and on the
19 geographic range of effects. Overall, effects from facilities within the SEZ are expected to be
20 small, while other major foreseeable actions are 9 mi (14 km) or more away from the proposed
21 SEZ and would not likely combine with effects from the SEZ on low-income populations. If
22 needed, mitigation measures can be employed to reduce the impacts on the population in the
23 vicinity of the SEZ, including the low-income populations. Because the overall scale and
24 environmental impacts of potential developments within the ROI are expected to be generally
25 low, it is not expected that the proposed Milford Flats South SEZ would contribute to cumulative
26 impacts on low-income populations.
27

28 **13.2.22.4.20 Transportation**

29
30
31 A major local road (Thermal Road) extends east-west along portions of the northern
32 border of the SEZ. The three closest highways are State Routes 21, 129, and 130. A major
33 railroad extends southwest–northeast to the west of the SEZ. The nearest public airports are in
34 Milford and Beaver. The annual average daily traffic (AADT) on the State Routes 21, 129, and
35 130 are currently about 1,440, 600, and 900, respectively. During construction of utility-scale
36 solar energy facilities, there could be up to 1,000 workers commuting to the construction site at
37 the SEZ, which could increase the AADT on these roads by 2,000 vehicles. This increase in
38 highway traffic from construction workers could have moderate cumulative impacts in
39 combination with existing traffic levels and increases from construction traffic from other major
40 future actions, should construction schedules overlap. Local road improvements may be
41 necessary so as not to overwhelm the local roads near site access points. Any impacts during
42 construction activities would be temporary. The impacts could also be mitigated to some degree
43 by staggering work schedules and implementing ride-sharing programs. Traffic increases during
44 operation would be relatively small because of the low number of workers needed to operate the
45 solar facilities and would have little contribution to cumulative impacts.
46

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1 **13.2.23 References**

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

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17
18

1 **13.3 WAH WAH VALLEY**

2
3
4 **13.3.1 Background and Summary of Impacts**

5
6
7 **13.3.1.1 General Information**

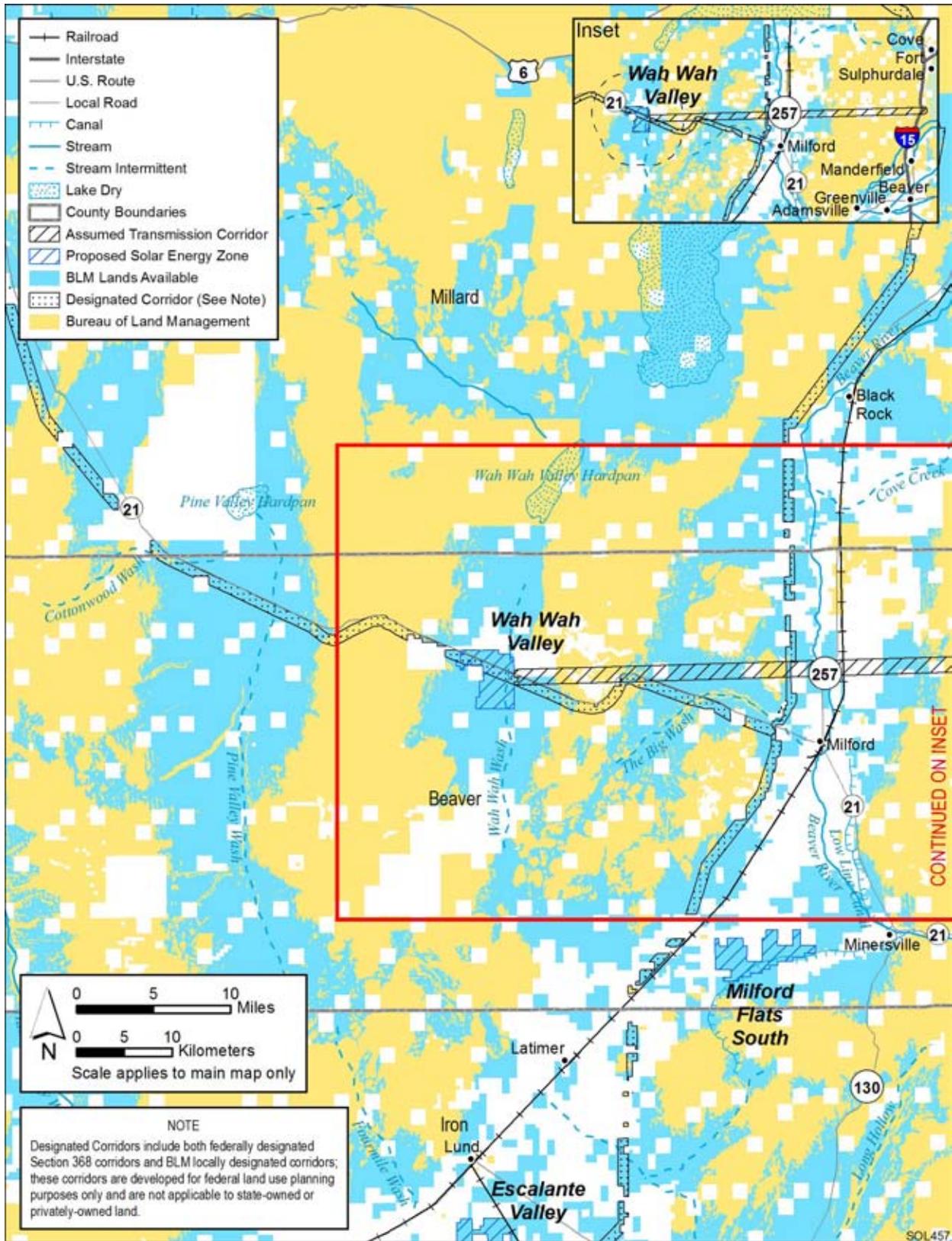
8
9 The proposed Wah Wah Valley SEZ is located in Beaver County in southwestern Utah
10 about 21 mi (34 km) northwest of the proposed Milford Flats South SEZ (Figure 13.3.1.1-1). The
11 SEZ has a total area of 6,097 acres (25 km²). In 2008, the county population was 7,265, while
12 adjacent Iron County to the south had a population of 45,833. The largest nearby town is Cedar
13 City, Utah, about 50 mi (80 km) southeast in Iron County. The town of Milford is located about
14 23 mi (37 km) east. Salt Lake City lies about 200 mi (322 km) north–northeast.

15
16 There is good access to the SEZ from State Route 21, which runs from west to east
17 through the northern half of the SEZ. Access to the interior of the SEZ is by dirt roads. The
18 nearest UP Railroad stop is 23 mi (37 km) away in Milford. The nearest airport is also in
19 Milford; the Milford Municipal Airport. Transmission access to the Wah Wah Valley SEZ
20 currently does not exist. The nearest existing transmission line is a north–south running 130-kV
21 line about 42 mi (68 km) east of the SEZ. However, a Section 368 designated energy corridor
22 on BLM lands runs east–west through the site along State Route 21; thus, access to the lands
23 required to construct transmission is available.

24
25 As of February 2010, there were no ROW applications for solar projects within the SEZ.

26
27 The proposed Wah Wah Valley SEZ is in a rural area. There is a ranch with some land
28 under irrigation on the northern boundary of the site. The SEZ is located in Wah Wah Valley, a
29 narrow, north–south trending valley northwest of the Escalante Desert across the Shauntie Hills,
30 and lying between the Wah Wah Mountains to the west and southwest, the Shauntie Hills to the
31 south and southeast, and the San Francisco Mountains to the east. Land within the SEZ is
32 undeveloped scrubland, characteristic of a high-elevation, semiarid basin.

33
34 The proposed Wah Wah Valley SEZ and other relevant information are shown in
35 Figure 13.3.1.1-1. The criteria used to identify the SEZ as an appropriate location for solar
36 energy development included proximity to existing transmission or designated corridors,
37 proximity to existing roads, a slope of generally less than 2%, and an area of more than
38 2,500 acres (11 km²). In addition, the area was identified as being relatively free of other types
39 of conflicts, such as USFWS-designated critical habitat for threatened and endangered species,
40 ACECs, SRMAs, and NLCS lands (see Section 2.2.2.2 for the complete list of exclusions).
41 Although these classes of restricted lands were excluded from the proposed Wah Wah Valley
42 SEZ, other restrictions might be appropriate. The analyses in the following sections evaluate
43 the affected environment and potential impacts associated with utility-scale solar energy
44 development in the proposed SEZ for important environmental, cultural, and socioeconomic
45 resources.



1

2 **FIGURE 13.3.1.1-1 Proposed Wah Wah Valley SEZ**

1 As initially announced in the *Federal Register* on June 30, 2009, the proposed Wah Wah
2 Valley SEZ encompasses 3,676 acres (15 km²). Subsequent to the study area scoping period,
3 2,422 acres (10 km²) were added at the south end of the study area, on the basis of further
4 observations at the BLM Cedar City Field Office indicating that this additional area met all
5 criteria for solar development.
6
7

8 **13.3.1.2 Development Assumptions for the Impact Analysis**

9

10 Maximum solar development of the Wah Wah Valley SEZ is assumed to be 80% of the
11 SEZ area over a period of 20 years; a maximum of 4,878 acres (20 km²). These values are shown
12 in Table 13.3.1.2-1, along with other development assumptions. Full development of the Wah
13 Wah Valley SEZ would allow development of facilities with an estimated total of 542 MW of
14 electrical power capacity if power tower, dish engine, or PV technologies were used, assuming
15 9 acres/MW (0.04 km²/MW) of land required, and an estimated 976 MW of power if solar
16 trough technologies were used, assuming 5 acres/MW (0.02 km²/MW) of land required.
17

18 Availability of transmission from SEZs to load centers will be an important consideration
19 for future development in SEZs. The nearest existing transmission line is a 138-kV line 42 mi
20 (68 km) east of the SEZ. It is possible that a new transmission line could be constructed from the
21 SEZ to that existing line, but the 138-kV capacity of that line would be inadequate for 542 to
22 976 MW of new capacity (a 500-kV line can accommodate approximately the load of one
23 700-MW facility). At full build-out capacity, it is clear that new transmission and/or upgrades of
24 existing transmission lines (in addition to or instead of construction of a connection to the nearest
25 existing line) would be required to bring electricity from the proposed Wah Wah Valley SEZ to
26 load centers; however, at this time the location and size of such new transmission facilities are
27 unknown. Generic impacts of transmission and associated infrastructure construction and of line
28 upgrades for various resources are discussed in Chapter 5. Project-specific analyses would need
29 to identify the specific impacts of new transmission construction and line upgrades for any
30 projects proposed within the SEZ.
31

32 For purposes of as complete an analysis of impacts of SEZ development in the SEZ as
33 possible, it was assumed that, at a minimum, a transmission line segment would be constructed
34 from the proposed Wah Wah Valley SEZ to the nearest existing transmission line to connect
35 the SEZ to the transmission grid. This assumption was made without additional information
36 on whether the nearest existing transmission line would actually be available for connection
37 of future solar facilities, and without assumptions about upgrades of the line. This was also a
38 simplifying assumption for purposes of analysis; an actual new line would likely follow the
39 route of the designated corridor where available. Establishing a connection to the line closest
40 to the Wah Wah Valley SEZ would involve the construction of about 42 mi (68 km) of new
41 transmission line outside of the SEZ. The ROW for this transmission line would occupy
42 approximately 1,273 acres (5.2 km²) of land, assuming a 250-ft (76-m) wide ROW, a typical
43 width for such a ROW. If a connecting transmission line were constructed to a different
44 offsite grid location in the future, site developers would need to determine the impacts from
45 construction and operation of that line. In addition, developers would need to determine the
46 impacts of line upgrades, if they were needed.

TABLE 13.3.1.2-1 Proposed Wah Wah Valley SEZ—Assumed Development Acreages, Solar MW Output, Access Roads, and Transmission Line ROWs

Total Acreage and Assumed Developed Acreage (80% of Total)	Assumed Maximum SEZ Output for Various Solar Technologies	Distance to Nearest State, U.S. or Interstate Highway	Distance and Capacity of Nearest Existing Transmission Line	Assumed Area of Transmission Line ROW and Road ROW	Distance to Nearest Designated Corridor ^f
6,097 acres and 4,878 acres ^a	542 MW ^b and 976 MW ^c	State Route 21: adjacent	42 mi ^d and 130 kV	1,273 acres; NA ^e	Adjacent

- ^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 To convert mi to km, multiply by 1.609.
- ^e NA = no access road construction is assumed necessary for Wah Wah Valley.
- ^f BLM-designated corridors are developed for federal land use planning purposes only and are not applicable to state-owned or privately owned land.

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Existing road access to the proposed Wah Wah Valley SEZ should be adequate to support construction and operation of solar facilities, because State Route 21 runs from west to east through the northern portion of the SEZ. Thus, no additional road construction outside of the SEZ is assumed to be required to support solar development.

13.3.1.3 Summary of Major Impacts and SEZ-Specific Design Features

In this section, the impacts and SEZ-specific design features assessed in Sections 13.3.2 through 13.3.21 for the proposed Wah Wah Valley SEZ are summarized in tabular form. Table 13.3.1.3-1 is a comprehensive list of impacts discussed in these sections; the reader may reference the applicable sections for detailed support of the impact assessment. Section 13.3.22 discusses potential cumulative impacts from solar energy development in the proposed SEZ.

Only those design features specific to the proposed Wah Wah Valley SEZ are included in Sections 13.3.2 through 13.3.21 and in the summary table. The detailed programmatic design features for each resource area to be required under the BLM Solar Energy Program are presented in Appendix A, Section A.2.2. These programmatic design features would also be required for development in this and other SEZs.

TABLE 13.3.1.3-1 Summary of Impacts of Solar Energy Development within the Proposed Wah Wah Valley SEZ and SEZ-Specific Design Features^a

Resource Area	Environmental Impacts—Proposed Wah Wah Valley SEZ	SEZ-Specific Design Features
Lands and Realty	<p>Full development of the SEZ (80% of the total area) could disturb up to 4,878 acres (20 km²). Solar development would introduce a new and discordant land use into the area.</p> <p>Establishing transmission within the designated corridor and connecting to the regional grid would involve the construction of about 42 mi (68 km) of new transmission line and would disturb about 1,273 acres (5 km²) of BLM-administered, state, and private lands.</p>	None.
Specially Designated Areas and Lands with Wilderness Characteristics	SEZ development would have varying degrees of adverse impact on the wilderness characteristics of the Wah Wah Mountains WSA and the Central and Northern Wah Wah Mountain inventory units. These impacts would not be fully mitigable.	None.
Rangeland Resources: Livestock Grazing	Up to 3,676 acres (15 km ²) of the Wah Wah Lawson grazing allotment (<3% of the allotment) could be removed from grazing with small potential impacts on one permittee.	Consideration should be given to the feasibility of replacing all or part of any lost AUMs through development of additional range improvements on public lands remaining in the allotment.
Rangeland Resources: Wild Horses and Burros	None.	None.
Recreation	Developed portions of the SEZ would become unavailable for recreational use, but the overall loss would not be significant.	None.
Military and Civilian Aviation	None.	None.

TABLE 13.3.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Wah Wah Valley SEZ	SEZ-Specific Design Features
Geologic Setting and Soil Resources	Impacts on soil resources would occur mainly as a result of ground-disturbing activities (e.g., grading, excavating, and drilling) during the construction phase. Impacts include soil compaction, soil horizon mixing, soil erosion and deposition by wind, soil erosion by water and surface runoff, sedimentation, and soil contamination. These impacts may be impacting factors for other resources (e.g., air quality, water quality, and vegetation).	None.
Minerals (fluids, solids, and geothermal resources)	None.	None.
Water Resources	<p>Ground-disturbance activities (affecting up to 49% of the total area in the peak construction year) could affect surface water quality due to surface runoff, sediment erosion, and contaminant spills.</p> <p>Water requirements for dust suppression and potable water supply during the peak construction year could be as high as 1,261 ac-ft (1.6 million m³).</p> <p>Up to 74 ac-ft (91,300 m³) of sanitary wastewater could be generated during the peak construction year.</p> <p>Assuming full development of the SEZ, the following amounts of water would be used during operations:</p> <ul style="list-style-type: none"> • For parabolic trough facilities (976-MW capacity), 697 to 1,478 ac-ft/yr (859,700 million to 1.8 million m³/yr) for dry-cooled systems; and 4,892 to 14,647 ac-ft/yr (6.0 million to 18.1 million m³/yr) for wet-cooled systems; 	<p>Wet-cooling options would not be feasible; other technologies should incorporate water conservation measures.</p> <p>During site characterization, hydrologic investigations would need to identify 100-year floodplains and potential jurisdictional water bodies subject to Clean Water Act Section 404 permitting. Siting of solar facilities and construction activities should avoid areas identified as being within a 100-year floodplain.</p> <p>Land disturbance and operations activities should avoid increasing drainage to the Wah Wah Wash to prevent further channel incisions and sedimentation issues.</p> <p>Groundwater rights must be obtained from the Utah Division of Water Rights.</p>

TABLE 13.3.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Wah Wah Valley SEZ	SEZ-Specific Design Features
<p>Water Resources <i>(Cont.)</i></p>	<ul style="list-style-type: none"> • For power tower facilities (542-MW capacity), 385 to 819 ac-ft/yr (474,900 million to 1.0 million m³/yr) for dry-cooled systems; and 2,716 to 8,135 ac-ft/yr (3.4 million to 10.0 million m³/yr) for wet-cooled systems; • For dish engine facilities (542-MW capacity), 277 ac-ft/yr (341,700 million m³/yr); and • For PV facilities, (542-MW capacity), 28 ac-ft/yr (34,500 m³/yr). <p>Assuming full development of the SEZ, operations would generate up to 14 ac-ft/yr (17,300 m³/yr) of sanitary wastewater and up to 277 ac-ft/yr (341,700 m³/yr) of blowdown water.</p> <p>High TDS values of groundwater could produce water that is non-potable.</p> <ul style="list-style-type: none"> • For PV facilities (542-MW capacity), 27 ac-ft/yr (0.03 million m³/yr). <p>Assuming full development of the SEZ, operations would generate up to 14 ac-ft/yr (0.02 million m³/yr) of sanitary wastewater and up to 277 ac-ft/yr (0.34 million m³/yr) of blowdown water.</p> <p>High TDS values of groundwater could produce water that is non-potable.</p>	<p>Groundwater monitoring and production wells should be constructed in accordance with Utah standards.</p> <p>Stormwater management plans and BMPs should comply with standards developed by the Utah Division of Water Quality.</p> <p>Water for potable uses would have to meet, or be treated to meet, Utah drinking water standards as defined by Utah Administrative Code Rule R309-200.</p>

TABLE 13.3.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Wah Wah Valley SEZ	SEZ-Specific Design Features
Vegetation ^b	<p>Up to 80% (4,878 acres [20 km²]) of the SEZ and additional acreage in the transmission line ROW would be cleared of vegetation. Re-establishment of shrub communities in temporarily disturbed areas would likely be very difficult, because of the arid conditions, and might require extended periods of time.</p> <p>Noxious weeds could become established in disturbed areas and colonize adjacent undisturbed habitats, thus reducing restoration success and potentially resulting in widespread habitat degradation.</p> <p>The deposition of fugitive dust from large areas of disturbed soil onto habitats outside a solar project area could result in reduced productivity or changes in plant community composition.</p> <p>A number of springs occur in the vicinity of the SEZ, and may support wetland or riparian communities. If these springs are hydrologically connected to the aquifer below the SEZ, groundwater depletion related to solar development projects and subsequent reductions in groundwater discharges at the springs could result in degradation of these habitats.</p> <p>Playa habitats, such as the large playas, including Wah Wah Valley Hardpan, associated with Wah Wah Wash north of the SEZ; greasewood flats communities; or other intermittently flooded areas downgradient from solar projects in the SEZ could be affected by ground-disturbing activities.</p>	<p>An Integrated Vegetation Management Plan addressing invasive species control and an Ecological Resources Mitigation and Monitoring Plan addressing habitat restoration should be approved and implemented to increase the potential for successful restoration of affected habitats and to minimize the potential for the spread of invasive species, such as those occurring in Beaver County, that could be introduced as a result of solar energy project activities. Invasive species control should focus on biological and mechanical methods, where possible, to reduce the use of herbicides.</p> <p>Appropriate engineering controls should be used to minimize impacts on dry wash, playa, and greasewood flat habitats, including downstream occurrences resulting from surface water runoff, erosion, sedimentation, altered hydrology, accidental spills, or fugitive dust deposition on these habitats. Appropriate buffers and engineering controls would be determined through agency consultation.</p> <p>All dry wash and playa habitats within the SEZ and all dry wash, wetland, and riparian habitats within the assumed transmission line corridor (e.g., Beaver Creek) should be avoided to the extent practicable, and any impacts should be minimized and mitigated. A buffer area should be maintained around wetlands, dry washes, and riparian habitats to reduce the potential for impacts.</p>

TABLE 13.3.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Wah Wah Valley SEZ	SEZ-Specific Design Features
Vegetation ^b (Cont.)		<p>Transmission line towers should be sited and constructed to minimize impacts on wetlands, dry washes, and riparian areas, such as those associated with Beaver Creek. Towers should span such areas whenever practicable.</p> <p>Groundwater studies should be conducted to evaluate the potential for indirect impacts on springs located in the vicinity of the SEZ or those in hydrologically connected basins.</p>
Wildlife: Amphibians and Reptiles ^b	<p>Direct impacts on amphibians and reptiles from development of the SEZ would be small (loss of $\leq 1.0\%$ of potentially suitable habitats identified for the species in the SEZ region). With implementation of design features, indirect impacts would be expected to be negligible.</p>	<p>Wah Wah Wash should be avoided.</p> <p>Avoid instream and nearshore disturbance of the Beaver River when constructing the transmission line.</p>
Wildlife: Birds ^b	<p>Direct impacts on bird species would be small (loss of $\leq 1.0\%$ of potentially suitable habitats identified for the species in the SEZ region).</p> <p>Other impacts on birds could result from collision with vehicles and infrastructure (e.g., buildings and fences), surface water and sediment runoff from disturbed areas, fugitive dust generated by project activities, noise, lighting, spread of invasive species, accidental spills, and harassment.</p>	<p>The requirements contained within the 2010 Memorandum of Understanding between the BLM and USFWS to promote the conservation of migratory birds will be followed.</p> <p>Take of golden eagles and other raptors should be avoided.</p> <p>The steps outlined in the <i>Utah Field Office Guidelines for Raptor Protection from Human and Land Use Disturbances</i> (Romin and Muck 1999) should be followed.</p> <p>Wah Wah Wash should be avoided.</p>

TABLE 13.3.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Wah Wah Valley SEZ	SEZ-Specific Design Features
Wildlife: Birds ^b (Cont.)		Avoid instream and nearshore disturbance of the Beaver River when constructing the transmission line.
Wildlife: Mammals ^b	<p>Direct impacts on big game, small game, furbearers, and small mammals from habitat disturbance and long-term habitat reduction/fragmentation would be small (loss of $\leq 1.0\%$ of potentially suitable habitats identified for the species in the SEZ region).</p> <p>The pronghorn is the only big game species with crucial habitat within the SEZ; however, direct impacts could occur to only about 0.2% of crucial habitat; thus, impacts on pronghorn would be expected to be small. The assumed transmission line would directly affect less than 0.04% of preferred cougar habitat, 0.05% of crucial elk habitat, and 0.03% of crucial mule deer habitat. These impacts would be considered small.</p>	<p>The fencing around the solar energy development should not block the free movement of mammals, particularly big game species.</p> <p>Wah Wah Wash should be avoided.</p> <p>Avoid instream and nearshore disturbance of the Beaver River when constructing the transmission line.</p> <p>The inter-mountain basins big sagebrush shrubland cover type in the southeastern portion of the SEZ, which is the only identified suitable land cover for the elk and sagebrush vole and about a third of the suitable habitat for the American black bear in the SEZ, should be avoided.</p>
Aquatic Biota ^b	<p>No permanent water bodies, perennial streams, or wetlands are present within the boundaries of the Wah Wah Valley SEZ, making direct impacts on aquatic habitats or aquatic biota unlikely. It is also unlikely solar energy development within the SEZ would indirectly affect aquatic habitat outside the SEZ.</p> <p>Direct effects could result from construction of transmission line corridor that would cross directly over Beaver River, a perennial stream approximately 19 mi (31 km) east of the SEZ.</p>	Transmission lines should be sited and constructed to minimize impacts on aquatic habitats whenever possible and transmission lines should span Beaver River.

TABLE 13.3.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Wah Wah Valley SEZ	SEZ-Specific Design Features
Special Status Species ^b	Potentially suitable habitat for 22 special status species occurs in the affected area of the Wah Wah Valley SEZ. For all of these special status species, less than 1% of the potentially suitable habitat in the region occurs in the area of direct effects.	<p>Pre-disturbance surveys should be conducted within the SEZ to determine the presence and abundance of special status species. Disturbance of occupied habitats for these species should be avoided or impacts on occupied habitats minimized to the extent practicable. If avoiding or minimizing impacts on occupied habitats is not possible for some species, translocation of individuals from areas of direct effect or compensatory mitigation of direct effects on occupied habitats could reduce impacts. A comprehensive mitigation strategy for special status species that uses one or more of these options to offset the impacts of development should be developed in coordination with the appropriate federal and state agencies.</p> <p>Avoiding or minimizing disturbance of woodland, rocky cliffs, and outcrops in the area of direct effects could reduce impacts on nine special status species.</p> <p>Consultations with the USFWS and the UDWR should be conducted to address the potential for impacts on the Utah prairie dog a species listed as threatened under the ESA. Consultation would identify an appropriate survey protocol, avoidance measures, and, if appropriate, reasonable and prudent alternatives, reasonable and prudent measures, and terms and conditions for incidental take statements.</p>

TABLE 13.3.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Wah Wah Valley SEZ	SEZ-Specific Design Features
Special Status Species ^b (Cont.)		<p>Coordination with the USFWS and UDWR should be conducted to address the potential for impacts on the greater sage-grouse—a candidate species for listing under the ESA. Coordination with the USFWS and UDWR should also be conducted for the following species that are under review for listing under the ESA: Frisco buckwheat, Frisco clover, and Ostler’s pepper-grass. Coordination with the USFWS and UDWR would identify an appropriate pre-disturbance survey protocol, avoidance measures, and any potential compensatory mitigation actions for each of these species.</p> <p>Harassment or disturbance of special status species and their habitats in the affected area should be mitigated. This can be accomplished by identifying any additional sensitive areas and implementing necessary protection measures based on consultation with the USFWS and UDWR.</p>
Air Quality and Climate	<p><i>Construction:</i> Temporary exceedances of AAQS for PM₁₀ and PM_{2.5} at the SEZ boundaries and the nearest residences next to the northern SEZ boundary possible during construction; higher concentrations would be limited to the immediate area surrounding the SEZ boundary and would decrease quickly with distance. In addition, construction emissions from the engine exhaust from heavy equipment and vehicles could cause some impacts on AQRVs (e.g., visibility and acid deposition) at the nearest federal Class I area, Zion NP, which is not located directly downwind of prevailing winds.</p>	None.

TABLE 13.3.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Wah Wah Valley SEZ	SEZ-Specific Design Features
Air Quality and Climate (Cont.)	<p><i>Operations:</i> Positive impact due to avoided emission of air pollutants from combustion-related power generation: 2.6 to 4.6% of total emissions of SO₂, NO_x, Hg, and CO₂ from electric power systems in the state of Utah avoided (up to 1,701 tons/yr of SO₂, 3,253 tons/yr of NO_x, 0.007 tons/yr of Hg, and 1,844,000 tons/yr of CO₂).</p>	
Visual Resources	<p>The SEZ is in an area of low scenic quality. Residents, workers, and visitors to the area may experience visual impacts from solar energy facilities located within the SEZ (as well as any associated access roads and transmission lines) as they travel area roads. Residents nearest to the SEZ could be subjected to large visual impacts from solar energy development within the SEZ.</p> <p>The SEZ and surrounding lands within the SEZ viewshed would incur large visual impacts due to major modification of the character of the existing landscape.</p> <p>The SEZ is located 5 mi (8 km) from the Wah Wah Mountains WSA. Because of the open views of the SEZ and elevated viewpoints, weak to moderate visual contrasts could be observed by WSA visitors.</p> <p>About 16 mi (26 km) of State Route 21 is within the SEZ viewshed, and about 4 mi (6 km) of State Route 21 is within the SEZ. Very strong visual contrasts could be observed within and near the SEZ by travelers on State Route 21.</p>	None.

TABLE 13.3.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Wah Wah Valley SEZ	SEZ-Specific Design Features
Acoustic Environment	<p><i>Construction.</i> For construction activities occurring near the nearest residences (just next to the northern SEZ boundary), estimated noise levels at the nearest residences would be about 74 dBA, which is well above both the Iron County regulation of 50 dBA for a solar facility and typical daytime mean rural background level of 40 dBA. In addition, an estimated 70 dBA L_{dn} at these residences is also well above the EPA guideline of 55 dBA L_{dn} for residential areas.</p> <p><i>Operations.</i> For a facility located near the northern SEZ boundary, the predicted noise level for parabolic trough or power tower technologies would be about 51 dBA at the nearest residences, located just next to the northern SEZ boundary, which is comparable to the Iron County regulation of 50 dBA, but higher than the typical rural background level of 40 dBA. In the case of six-hour TES, the estimated nighttime noise level at the nearest residences would be 61 dBA, which is higher than both the Iron County regulation of 50 dBA and typical nighttime mean rural background level of 30 dBA. The day-night average noise level is estimated to be about 63 dBA L_{dn}, which is higher than the EPA guideline of 55 dBA L_{dn} for residential areas.</p> <p>If 80% of the SEZ were developed with dish engine facilities, the estimated noise level of 58 dBA at the nearest residences would be higher than both the Iron County regulation of 50 dBA and typical daytime mean rural background level of 40 dBA. If assuming 12-hour daytime operation, the estimated 55 dBA L_{dn} at these residences would be equivalent to the EPA guideline for residential areas.</p>	<p>Noise levels from cooling systems equipped with TES should be managed so that levels at the nearest residences adjacent to the northern SEZ boundary are kept within applicable guidelines. This could be accomplished in several ways, for example, through placing the power block approximately 1 to 2 mi (1.6 to 3 km) or more from residences, limiting operations to a few hours after sunset, and/or installing fan silencers.</p> <p>Dish engine facilities within the Wah Wah Valley SEZ should be located more than 1 to 2 mi (1.6 to 3 km) from the nearest residences (i.e., the facilities should be located in the lower half of the proposed SEZ). Direct noise control measures applied to individual dish engine systems could also be used to reduce noise impacts at nearby residences.</p>
Paleontological Resources	Few, if any, impacts on significant paleontological resources are likely to occur in the proposed SEZ or along the associated transmission line ROW. However, a more detailed look at the geological deposits of the SEZ is needed to determine whether a paleontological survey is warranted.	None.

TABLE 13.3.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Wah Wah Valley SEZ	SEZ-Specific Design Features
Cultural Resources	No adverse impacts are currently anticipated in the proposed Wah Wah Valley SEZ or along the associated transmission line ROW, but such impacts could be possible if significant cultural resources are found in the area during survey. A cultural resource survey of the entire area of potential effect, including consultation with affected Native American Tribes, would first need to be conducted to identify archaeological sites, historic structures and features, and traditional cultural properties. An evaluation would need to follow to determine whether any are eligible for listing in the NRHP as historic properties.	SEZ-specific design features would be determined during consultations with the Utah SHPO and affected Tribes and would depend on the findings of cultural surveys.
Native American Concerns	While no specific concerns regarding the proposed Wah Wah Valley SEZ have been expressed, as consultation with the Tribes continues and project-specific analyses are undertaken, it is possible that Native American concerns will emerge over potential effects of solar energy development within the SEZ.	The need for and nature of SEZ-specific design features would be determined during government-to-government consultation with the affected Tribes.
Socioeconomics	<p><i>Construction of solar facilities within the SEZ:</i> 213 to 2,817 total jobs; \$11.2 million to \$148 million income in ROI for facilities in the SEZ.</p> <p><i>Operations of solar facilities within the SEZ:</i> 15 to 328 annual total jobs; \$0.4 million to \$10 million annual income in the ROI for facilities in the SEZ.</p> <p><i>Construction of new transmission line:</i> 183 total jobs; \$7.4 million income.</p>	None.
Environmental Justice	Although impacts are likely to be small, there are low-income populations, as defined by CEQ guidelines, in one census block group within the 50-mi (80-km) radius of the SEZ, meaning that any adverse impacts of solar projects could disproportionately affect low-income populations. There would be no impacts on minority populations, however, as there are no minority populations within the 50-mi (80-km) radius of the SEZ, according to CEQ guidelines.	None.

TABLE 13.3.1.3-1 (Cont.)

Resource Area	Environmental Impacts—Proposed Wah Wah Valley SEZ	SEZ-Specific Design Features
Transportation	The primary transportation impacts are anticipated to be from commuting worker traffic. Single projects could involve up to 1,000 workers each day, with an additional 2,000 vehicle trips per day (maximum). The volume of traffic on State Route 21 and other regional corridors would be more than double the current values near the Wah Wah Valley SEZ.	None.

Abbreviations: AAQS = ambient air quality standards; AQRV = air quality-related value; AUM = animal unit month; CEQ = Council on Environmental Quality; CO₂ = carbon dioxide; dBA = A-weighted decibel; EPA = U.S. Environmental Protection Agency; ESA = Endangered Species Act; Hg = mercury; L_{dn} = day-night average sound level; NO_x = nitrogen oxides; NP = National Park; NRHP = *National Register of Historic Places*; PM_{2.5} = particulate matter with an aerodynamic diameter of 2.5 μm or less; PM₁₀ = particulate matter with an aerodynamic diameter of 10 μm or less; PSD = prevention of significant deterioration; PV= photovoltaic; ROI = region of influence; ROW = right-of-way; SEZ = solar energy zone; SO₂ = sulfur dioxide; TDS = total dissolved solids; TES = thermal energy storage; UDWR = Utah Division of Wildlife Resources; USFWS = U.S. Fish and Wildlife Service; VRM = visual resource management.

- ^a The detailed programmatic design features for each resource area to be required under BLM’s Solar Energy Program are presented in Appendix A, Section A.2.2. These programmatic design features would be required for development in the proposed Wah Wah Valley SEZ.
- ^b The scientific names of all plants, wildlife, aquatic biota, and special status species are provided in Sections 13.3.10 through 13.3.12.

1 **13.3.2 Lands and Realty**

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4 **13.3.2.1 Affected Environment**

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6 The overall character of the land around the proposed Wah Wah Valley SEZ is rural
7 and undeveloped. There is a ranch/irrigated farming operation north of the SEZ, but no other
8 development is nearby. ROWs for a state highway and a telecommunications line lie within the
9 Wah Wah Valley SEZ. A Section 368 designated energy corridor passes through the SEZ but
10 is currently unoccupied. Both state and private lands abut portions of the SEZ. The SEZ also
11 encompasses a Beaver County sand and gravel free use permit and a small BLM administrative
12 site. As of February 2010, there were no applications for solar facility ROWs on BLM-
13 administered lands in the vicinity of the Wah Wah Valley SEZ or in the state of Utah.

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16 **13.3.2.2 Impacts**

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19 ***13.3.2.2.1 Construction and Operations***

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21 Full development of the proposed Wah Wah Valley SEZ could disturb up to 4,878 acres
22 (20 km²) (Table 13.3.1.2-1). Development of the SEZ for utility-scale solar energy production
23 would establish a large industrial area that would exclude many existing and potential uses of
24 the land, perhaps in perpetuity. Since the SEZ is undeveloped and rural, utility-scale solar
25 energy development would be a new and discordant land use to the area. It also is possible
26 that with landowner agreement, the state and private lands located adjacent to the SEZ would
27 be developed in the same or a complementary manner as the public lands. Development of
28 additional industrial or support activities also could be induced on additional state and private
29 lands near the SEZ.

30
31 Existing ROW authorizations on the SEZ would not be affected by solar energy
32 development because they are prior existing rights. Should the proposed SEZ be identified as
33 a SEZ in the ROD for this PEIS, the BLM would still have discretion to authorize additional
34 ROWs in the area until solar energy development was authorized, and then future ROWs would
35 be subject to the rights granted for solar energy development. Because the area currently has so
36 few ROWs and there is considerable opportunity for locating future ROWs outside the SEZ, it is
37 not anticipated that approval of solar energy development would have a significant impact on
38 ROW availability in the area. Beaver County has asserted Revised Statute 2477 Class B and D
39 road ROWs within the Wah Wah Valley SEZ.

40
41 The Section 368 designated energy corridor along State Route 21 covers about
42 1,560 acres (6 km²), which is about 25% of the SEZ and could limit future solar development
43 within the corridor. To avoid technical or operational interference between transmission and
44 solar energy facilities, solar energy facilities cannot be constructed under transmission lines
45 or over pipelines. This is an administrative conflict that can be addressed by the BLM, either
46 through amendment of the corridor or the boundary of the SEZ. There is enough

1 BLM-administered land in the area to allow for modification of either the corridor or the SEZ
2 and retain the current development capacities of both.
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5 ***13.3.2.2.2 Transmission Facilities and Other Off-Site Infrastructure*** 6

7 Delivery of energy produced in the SEZ would require establishing connection to the
8 regional grid, and for analysis it is assumed that connection would be made to the existing
9 138-kV transmission line located 42 mi (68 km) east of the SEZ, because this line might be
10 available to transport the power produced in this SEZ (See Section 13.3.1.2 for a description of
11 analysis assumptions). This connection would likely cross primarily BLM-administered public
12 land and could disturb as much as 1,273 acres (5 km²). State and privately owned lands would
13 also be affected.
14

15 At full build-out capacity, it is clear that additional new transmission lines and/or
16 upgrades of existing transmission lines would be required to bring electricity from the proposed
17 Wah Wah Valley SEZ to load centers; however, at this time, the location and size of such new
18 transmission facilities is unknown. Generic impacts of transmission and associated infrastructure
19 construction and of line upgrades for various resources are discussed in Chapter 5. Project-
20 specific analyses would need to identify the specific impacts of new transmission construction
21 and line upgrades for any solar projects requiring additional transmission capacity.
22

23 No need for constructing new roads for access to the SEZ is anticipated because State
24 Route 21 passes through the SEZ, although new roads and transmission lines within the SEZ
25 would be required to accomplish development of the site.
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28 **13.3.2.3 SEZ-Specific Design Features and Design Feature Effectiveness** 29

30 No SEZ-specific design features related to lands and realty for the proposed Wah Wah
31 Valley SEZ have been identified. Implementing the programmatic design features described in
32 Appendix A, Section A.2.2, as required under BLM's Solar Energy Program would provide
33 adequate mitigation for some identified impacts.
34

13.3.3 Specially Designated Areas and Lands with Wilderness Characteristics

13.3.3.1 Affected Environment

Figure 13.3.3.1-1 shows the locations of specially designated areas in the vicinity of the proposed Wah Wah Valley SEZ. Two WSAs, Wah Wah Mountains and King Top, are about 6 and 25 mi (10 and 40 km), respectively, from the nearest boundary of the Wah Wah Valley SEZ. The Wah Wah Mountains WSA includes about 49,000 acres (198 km²), and King Top includes about 93,000 acres (376 km²).

The latest revision to the 1999 Utah inventory for wilderness characteristics within BLM's Cedar City district office was completed in January 2005. The 2005 survey identified minor changes in an area that is less than 1 mi (1.6 km) west of the Wah Wah Valley SEZ; this is the 52,000-acre (21-km²) Central Wah Wah Mountains wilderness inventory unit that the BLM identified as possessing wilderness characteristics in 1999. This area rises in elevation to the mountain ridges to the west and provides a commanding view of the SEZ. To the northwest of the SEZ and adjacent to the Wah Wah Mountains WSA is the North Wah Wah wilderness inventory unit, consisting of several noncontiguous areas also identified as possessing wilderness characteristics (Figure 13.3.3.1-1), which total about 17,210 acres (70 km²). The southern portion of the unit that is closest to the SEZ is managed by the Cedar City Field Office, while the Fillmore Field Office manages the largest portion of the area that is farther north.

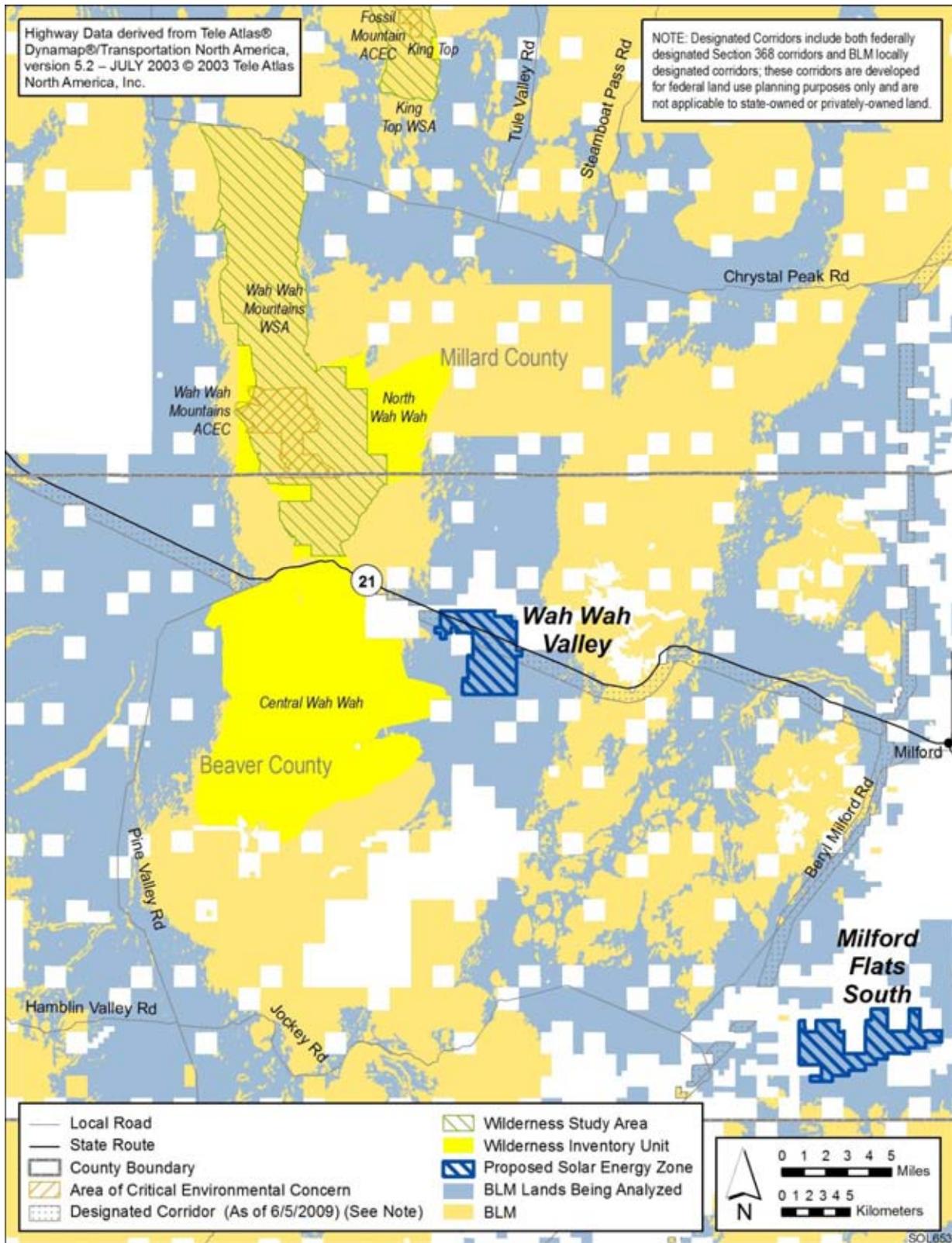
The lands having wilderness characteristics have been identified and refined through various BLM inventory efforts since 1980.¹ These lands do not receive the same protection as that received by designated wilderness and WSAs. The BLM has the authority through its land use planning system to manage these lands to protect their wilderness characteristics. At this time, however, no land use planning decisions have been made for the Central and North Wah Wah Mountains wilderness inventory units regarding management of these lands to protect their wilderness characteristics.

13.3.3.2 Impacts

13.3.3.2.1 Construction and Operations

The potential impact from solar development on specially designated areas possessing unique or sensitive visual resources is generally difficult to quantify and would vary by solar technology employed, the size of area developed for solar energy, the specific area affected (including the reasons for which it was designated), and the perception of individuals viewing the development. See Section 13.3.14 for a more thorough discussion of visual impacts associated with solar energy development.

¹ For more information on the BLM-Utah wilderness inventories, see http://www.blm.gov/ut/st/en/prog/blm_special_areas/utah_wilderness.



1

2 **FIGURE 13.3.3.1-1 Specially Designated Areas in the Vicinity of the Proposed Wah Wah**
 3 **Valley SEZ**

1 The viewing height above a solar development area also is important to perceived
2 impact levels, because higher elevation viewpoints show more of the facilities, make the regular,
3 man-made geometry of the solar arrays more apparent, and can cause increased incidence of
4 glare and other reflections from the facilities. In the case of the proposed Wah Wah Valley
5 SEZ, the low elevation of the SEZ in relation to surrounding areas would tend to highlight the
6 industrial development in the SEZ.

7
8 A visual analysis has been completed that identifies the amount of land within
9 nearby sensitive resource areas that might be affected by development in the SEZ (see also
10 Section 13.3.14).² The assessment of potential impacts follows.

11 12 13 ***Wilderness Study Areas***

- 14
15 • *Wah Wah Mountains*—This WSA is located just beyond the 5-mi (8-km)
16 distance generally considered to be the most visually sensitive zone. The
17 viewshed between the WSA and the SEZ also contains a highway and a small
18 amount of agricultural development, which generally reduces the visual
19 quality of the viewshed from within the WSA. Topographic features limit the
20 amount of area within the SEZ with a view of the SEZ to slightly less than 8%
21 of the area, or about 3,800 acres (15 km²). Because of the height above the
22 SEZ, the view of solar development in the area would likely have a moderate
23 adverse effect on wilderness characteristics in this portion of the WSA.
- 24
25 • *King Top*—This nearest border of this WSA is barely within 25 mi (40 km) of
26 the SEZ, and less than 1,000 acres (4 km²), or about 1% of the WSA has a
27 view of the SEZ within this distance. Although larger portions of the WSA
28 would have a view of development in the SEZ, because of the long distance,
29 there would likely be no impact on wilderness characteristics within the WSA.

30 31 32 ***Wilderness Inventory Units***

- 33
34 • *Central Wah Wah Mountains*—The closest boundary of this unit is within less
35 than a mile of the boundary of the SEZ. As the area rises in elevation to the
36 west, development in the SEZ would be a dominating portion of the viewshed.
37 About 13,000 acres (53 km²), or about 22% of the unit, is within 5 mi (8 km)
38 of the SEZ. As the mountains rise to the top of the ridge, about 24,000 acres
39 (97 km²), or about 40% of the unit, on the east-facing portion of the ridge is in
40 full view of the SEZ. The approximate distance from the center of the SEZ to
41 the ridgeline ranges from about 8 to 15 mi (13 to 24 km). Because of the

² The amount of land in each of the potentially sensitive areas near the SEZ has been computed by assuming the use of power tower solar energy technology. This technology likely would have the largest potential visual effect because of the height of this type of facility. The potential impacts in terms of acreage of visually sensitive areas affected would be somewhat less for smaller solar energy facilities.

1 proximity and the distance between the unit and the SEZ, there would be a
2 large adverse impact on the wilderness characteristics of the area.

- 3
4 • *North Wah Wah Mountains*—This unit consists of several noncontiguous
5 areas that surround the Wah Wah Mountains WSA. Less than 1% of this unit
6 is within 5 mi (8 km) of the SEZ. At a maximum, about 3,200 acres (53 km²),
7 or about 22% of the unit, is within about 5 to 8 mi (8 to 13 km) of the SEZ.
8 At this distance, because of the intervening road and small agricultural
9 development within the viewshed, it is anticipated that there would be only a
10 minor adverse impact on wilderness characteristics that would be limited
11 to the southern and eastern portions of the unit.

12
13
14 ***13.3.3.2 Transmission Facilities and Other Off-Site Infrastructure***

15
16 Because of the distance from the areas potentially affected, construction of the 42 mi
17 (68 km) of new transmission line, heading east from the SEZ and utilizing the existing corridor
18 where possible, is not likely to cause additional adverse impact on specially designated areas.

19
20
21 **13.3.3.3 SEZ-Specific Design Features and Design Feature Effectiveness**

22
23 No SEZ-specific design features would be required. SEZ development would have
24 various degrees of adverse impact on the wilderness characteristics of the Wah Wah Mountains
25 WSA and on the Central and Northern Wah Wah Mountains inventory units. These impacts
26 would not be fully mitigable. Implementing the programmatic design features described in
27 Appendix A, Section A.2.2, as required under BLM's Solar Energy Program would mitigate
28 some impacts for specially designated areas.

1 **13.3.4 Rangeland Resources**

2
3 Rangeland resources include livestock grazing and wild horses and burros, both of which
4 are managed by the BLM. These resources and possible impacts on them from solar
5 development within the proposed Wah Wah Valley SEZ are discussed in Sections 13.3.4.1
6 and 13.3.4.2.

7
8
9 **13.3.4.1 Livestock Grazing**

10
11
12 **13.3.4.1.1 Affected Environment**

13
14 Grazing is currently authorized on the proposed Wah Wah Valley SEZ. Table 13.3.4.1-1
15 summarizes the one perennial grazing allotment, along with the percentage of the allotment that
16 lies within the SEZ.³ The allotment is used by one permittee and supports the production of
17 8,490 AUMs of forage per year (BLM 2009b). These AUMs are allocated to cattle.

18
19
20 **13.3.4.1.2 Impacts**

21
22
23 **Construction and Operations**

24
25 Should utility-scale solar development occur in the SEZ, grazing would be excluded
26 from the areas developed, as provided for in the BLM grazing regulations (43 CFR 4100).

27
28
TABLE 13.3.4.1-1 Grazing Allotments within the Proposed Wah Wah Valley SEZ

Allotment	Total Acres ^a	Percentage of the Total in the SEZ ^b	Active BLM AUMs	Number of Permittees in the Allotment
Wah-Wah Lawson	141,180 (571 km ²)	2.6	8,490	1

^a Includes all federal, state, and private acreage in the allotment.

^b Represents the percentage of public land in the allotment within the SEZ.

Source: Data were derived from BLM (2009b) and are for the 2008 grazing year since these are the most current data available.

³ The SEZ also includes 0.2% (148 acres, 0.6 km²) of the Willow Creek allotment. There would be no significant impact on that allotment.

1 This would include reimbursement of permittees for their portion of the value for any range
2 improvements in the area removed from the grazing allotment. The impact of this change on the
3 grazing permits would depend on several factors: (1) how much of the allotment each permittee
4 might lose to the development, (2) how important the specific land lost is to each permittee's
5 overall operation, and (3) the amount of actual forage production that would be lost by each
6 permittee. On the basis of an assumed loss of AUMs comparable to the percentage of the
7 allotment included in the SEZ, a total of 221 AUMs could be lost from the allotment. However,
8 in reality, it is unlikely that there would be any loss of AUMs from the allotment, because the
9 percentage of the allotment lost would be so small (2.6%) that grazing use likely would be
10 redistributed elsewhere in the allotment to avoid the loss. Section 13.3.19 provides more
11 information on the economic impact of the loss of grazing capacity.

12
13 Defining the impacts on individual grazing permits and permittees would require a
14 specific analysis of each case on the basis of, at a minimum, the three factors identified above.
15 For this PEIS, and based on an assumed loss of 221 AUMs as described above, there would be
16 no significant impact on livestock use within the Cedar City Field Office from the designation
17 and development of the Wah Wah Valley SEZ. This conclusion was derived from comparing
18 the loss of 221 AUMs with the total BLM-authorized AUMs in the field office for grazing year
19 2008, which totaled 139,998 AUMs. The impact on the permittee in the SEZ from this loss
20 would also be minimal.

21
22 Developers of solar facilities could pay livestock operators for the loss of the portion
23 of the grazing permit to facilitate solar operations; however, this is not required by BLM
24 regulations.

25 26 27 **Transmission Facilities and Other Off-Site Infrastructure**

28
29 Construction of a new transmission line would add about 1,273 acres (5.2 km²) of surface
30 disturbance to the impact associated with the SEZ facilities and could cross up to five additional
31 grazing allotments. This disturbance would not have a significant impact on grazing operations
32 in these allotments.

33 34 35 ***13.3.4.1.3 SEZ-Specific Design Features and Design Feature Effectiveness***

36
37 Implementing the programmatic design features described in Appendix A, Section A.2.2,
38 as required under BLM's Solar Energy Program, would provide some mitigation for some
39 identified impacts. The exception would be any adverse economic impact on the grazing
40 permittees.

41
42 Proposed design features specific to the Wah Wah Valley SEZ include the following:

- 43
44 • Consideration should be given to the feasibility of replacing all or part of any
45 lost AUMs through development of additional range improvements on public
46 lands remaining in the allotment.

1 **13.3.4.2 Wild Horses and Burros**

2
3
4 **13.3.4.2.1 Affected Environment**

5
6 Section 3.4.2 discusses wild horses (*Equus caballus*) and burros (*E. asinus*) that occur
7 within the six-state study area. Nineteen wild horse and burro herd management areas occur
8 within Utah. Figure 13.3.4.2-1 shows the location of the HMAs within the proposed Wah Wah
9 Valley SEZ region. The SEZ is located 3.1 mi (5.0 km) west of the Frisco HMA. The Frisco
10 HMA contains an estimated 77 horses (17 over the appropriate management level of 60 horses)
11 (BLM 2009c).

12
13 In addition to the BLM-managed HMAs, the USFS has 51 established wild horse and
14 burro territories in Arizona, California, Nevada, New Mexico, and Utah and is the lead
15 management agency that administers 37 of the territories (Giffen 2009; USFS 2007). The closest
16 territory to the proposed Wah Wah Valley SEZ is the North Hills Territory within Dixie National
17 Forest. This territory is adjacent to the North Hills HMA, which is managed by the BLM and
18 located southwest of the SEZ (Figure 13.3.4.2-1). The proposed Wah Wah Valley SEZ is about
19 58 mi (93 km) from the North Hills Territory.

20
21
22 **13.3.4.2.2 Impacts**

23
24 Since there are no managed populations of wild horses or burros present on the proposed
25 Wah Wah Valley SEZ, there would be no direct effect on wild horses and burros from solar
26 energy development of the SEZ. The Frisco HMA is partially located within the indirect effects
27 area of the SEZ (area within 5 mi [8 km] from the SEZ border). Potential impacts on wild horses
28 within this area could result from collision with vehicles, fugitive dust generated by project
29 activities, noise, lighting, spread of invasive species, and harassment. These impacts would be
30 negligible with implementation of programmatic design features.

31
32
33 **13.3.4.2.3 SEZ-Specific Design Features and Design Feature Effectiveness**

34
35 No SEZ-specific design features would be necessary to protect or minimize impacts
36 on wild horses and burros due to solar energy development within the proposed Wah Wah
37 Valley SEZ.

1 **13.3.5 Recreation**

2
3
4 **13.3.5.1 Affected Environment**

5
6 The proposed Wah Wah Valley SEZ is flat, and its unremarkable nature offers little
7 potential for recreation use. The area would not be expected to attract recreational visitors from
8 outside the area; however, it may be used by local residents for general outdoor recreation,
9 including backcountry driving and OHV use, recreational shooting, and small and big game
10 hunting. Site visits in September 2009 showed limited signs of recent vehicle and OHV use.
11 The SEZ area has not been designated for vehicle travel in a BLM land use plan but will be
12 considered in the upcoming revision of the land use plans in the Cedar City Field Office.
13

14
15 **13.3.5.2 Impacts**

16
17 Recreational users would be excluded from any portions of the SEZ developed for
18 solar energy production. Whether recreational visitors would continue to use the remaining
19 undeveloped portions of the SEZ is unknown. Public access through areas developed for solar
20 power production could be lost unless access routes were identified and retained. It is not
21 anticipated there would be a significant loss in recreational use if the SEZ were developed,
22 but some users would be displaced.
23

24 Solar development within the SEZ would affect public access along OHV routes
25 designated open and available for public use. Data identifying open OHV routes within the
26 proposed SEZ were not available. If such routes were identified during project-specific
27 analyses, they would be re-designated as closed (see Section 5.5.1 for more details on how
28 routes coinciding with proposed solar facilities would be treated).
29

30
31 **13.3.5.3 SEZ-Specific Design Features and Design Feature Effectiveness**

32
33 No SEZ-specific design features would be necessary. Implementing the programmatic
34 design features described in Appendix A, Section A.2.2, as required under BLM's Solar Energy
35 Program would provide adequate mitigation for some identified impacts.
36

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1 **13.3.6 Military and Civilian Aviation**

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3
4 **13.3.6.1 Affected Environment**

5
6 The SEZ is not located under any MTRs or SUAs. The military installation closest to the
7 Wah Wah Valley SEZ is the Deseret Test Center, about 100 mi (160 km) north of the SEZ. The
8 Tooele Army Depot, Dugway Proving Ground, Wendover Test Range, and Camp Williams are
9 all located in the vicinity of the Deseret Test Center, but somewhat further from the SEZ.
10 Hill Air Force Base is located in Salt Lake City.

11
12 The closest civilian municipal airport to the Wah Wah Valley SEZ is the Milford
13 Municipal Airport, located 23 mi (37 km) east.

14
15
16 **13.3.6.2 Impacts**

17
18 On the basis of comments received from the military, there are no concerns with respect
19 to military aviation for the Wah Wah Valley SEZ. No comments have been received from
20 Dugway Proving Ground or from the Utah Army National Guard.

21
22 Because the municipal airport closest to the Wah Wah Valley SEZ is more than 20 mi
23 (32 km) from the SEZ, no impacts on civilian aviation from solar development within the area
24 are expected.

25
26
27 **13.3.6.3 SEZ-Specific Design Features and Design Feature Effectiveness**

28
29 No SEZ-specific design features would be necessary to protect military or civilian
30 aviation uses. The programmatic design features described in Appendix A, Section A.2.2, would
31 require early coordination with the DoD to identify and mitigate, if possible, potential impacts on
32 the use of MTRs.

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1 **13.3.7 Geologic Setting and Soil Resources**

2
3
4 **13.3.7.1 Affected Environment**

5
6
7 **13.3.7.1.1 Geologic Setting**

8
9
10 **Regional Setting**

11
12 The proposed Wah Wah Valley SEZ is located in the Wah Wah Valley, a sediment-filled
13 basin within the Basin and Range physiographic province in southwestern Utah. The valley lies
14 between the Sevier Lake Valley to the north and the Escalante Desert to the south and is bounded
15 on the west by the Wah Wah Mountains and on the east by the San Francisco Mountains
16 (Figure 13.3.7.1-1).

17
18 The Wah Wah Valley is an intermontane structural depression typical of the Basin and
19 Range physiographic province. Normal faults occur along the base of the mountains on each side
20 of the valley. Valley sediments fill the deepest part of a west-tilting half-graben that has moved
21 downward relative to the Wah Wah Mountains to the west (Ertec Western, Inc. 1981).

22
23 Exposed sediments in the Wah Wah Valley are predominantly lacustrine, associated with
24 Lake Bonneville, an ancient (Pleistocene) lake that covered most of western Utah and parts of
25 eastern Nevada and southern Idaho from 32,000 to 14,000 years ago (UGS 2010). These fine-
26 grained sediments—sandy silts, silts, sandy clays, and clays—are found in the valley center and
27 are abundant within the Wah Wah Valley Hardpan, a playa or dry lake with a hardpan surface
28 (Figure 13.3.7.1-2). The playa is an active remnant of Lake Bonneville. Alluvial fan deposits
29 (Pleistocene to recent) are prevalent along the edges of the valley, except to the north. These
30 deposits grade from cobbles and boulders at the mountain fronts surrounding the valley to silty
31 or clayey sands toward the valley center. The highest shoreline of Lake Bonneville is well
32 preserved and marks the contact between the alluvial fans along the valley margins and the
33 lacustrine deposits within the valley center (Ertec Western, Inc. 1981).

34
35 Recent fluvial and floodplain deposits occur along the small channels that empty
36 onto alluvial fans in the valley. The surrounding mountains are composed primarily of thick
37 sequences of Paleozoic limestone and dolomite with lesser amounts of Precambrian and
38 Cambrian metasediments (quartzites and phyllites). Tertiary volcanic rocks are also present
39 (Ertec Western, Inc. 1981).

40
41
42 **Topography**

43
44 The Wah Wah Valley is a north-south trending basin with an area of about 320 mi²
45 (830 km²) (Ertec Western, Inc. 1981). Elevations along the valley axis range from about 5,250 ft
46 (1,600 m) near the south end and along the valley sides to less than 4,640 ft (1,414 m) within the



1

2 **FIGURE 13.3.7.1-1 Physiographic Features of the Wah Wah Valley**

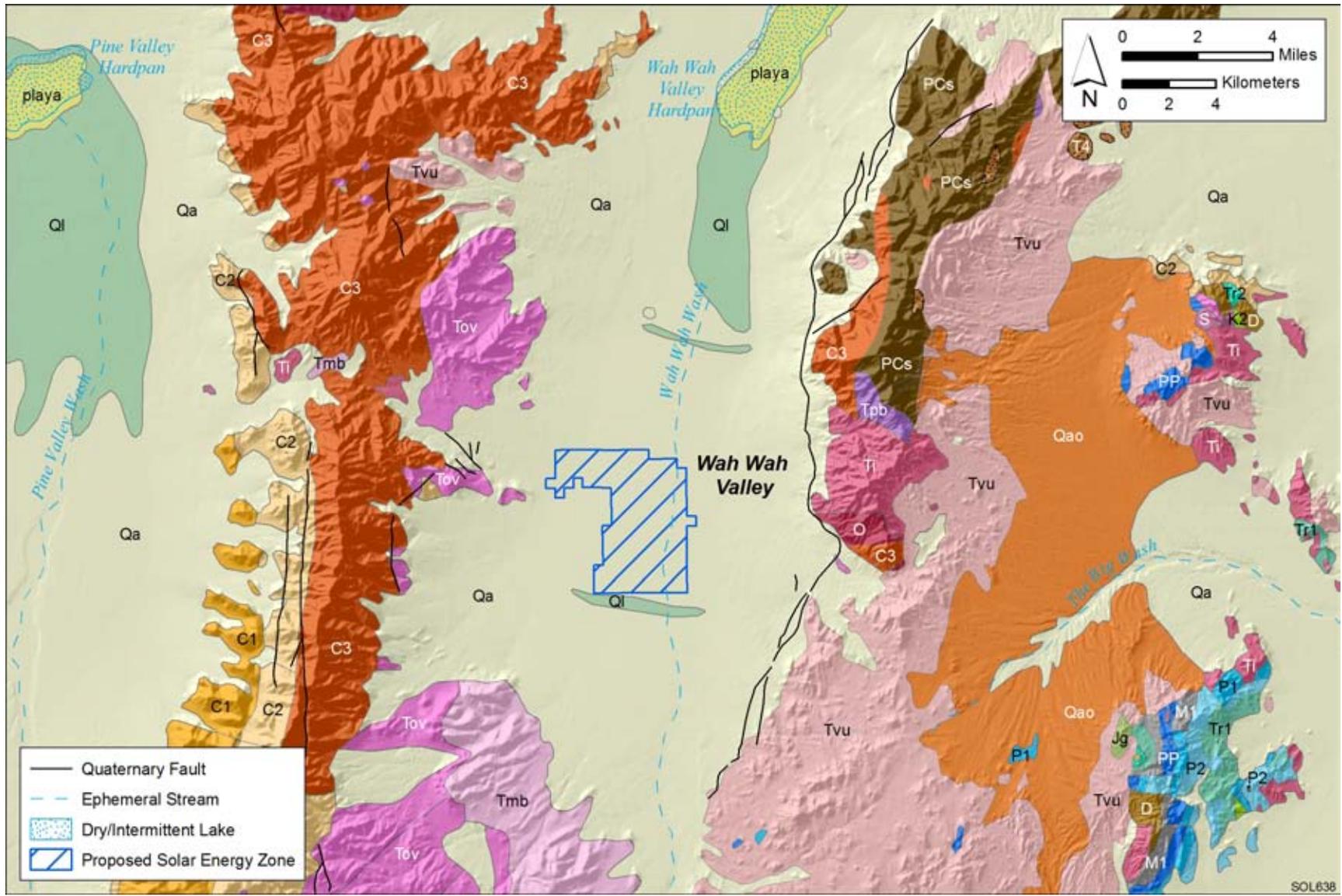
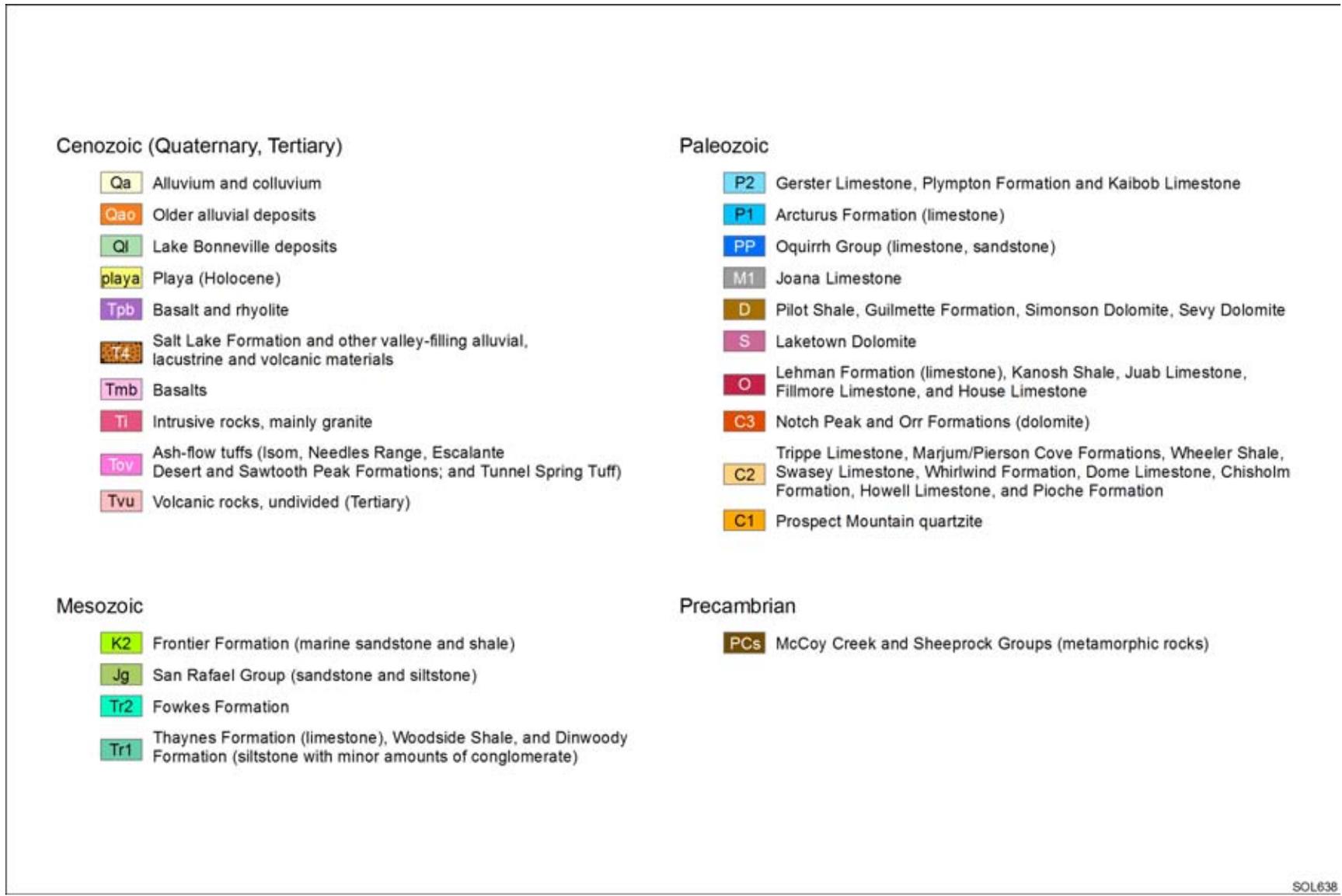


FIGURE 13.3.7.1-2 Geologic Map of the Wah Wah Valley Region (adapted from Ludington et al. 2007 and Hintze 1980)



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FIGURE 13.3.7.1-2 (Cont.)

1 Wah Wah Valley Hardpan, a playa lake with a hardpan surface, at the north end of the valley.
2 Gently sloping alluvial fan deposits occur along the valley margins (but are steeper along the
3 eastern margin). The valley is drained by Wah Wah Wash, an ephemeral stream that flows to
4 the north and discharges into the Wah Wah Valley Hardpan. The Wah Wah Valley Hardpan is
5 generally dry except for brief periods following heavy rain events (Ertec Western, Inc. 1981).
6

7 The proposed Wah Wah Valley SEZ is located in the central part of the Wah Wah
8 Valley. The terrain is relatively flat, with a gentle dip to the north (Figure 13.3.7.1-3). Elevations
9 range from 5,040 ft (1,536 m) near the site's southern border to 4,860 ft (1,481 m) at its northern
10 border. The SEZ is dissected by several ephemeral streams, including the Wah Wah Wash
11 (east side) and Quartz Creek (west side). Irrigation ditches run along the northern boundary of
12 the SEZ.
13

14 **Geologic Hazards**

15
16
17 The types of geologic hazards that could potentially affect solar project sites and their
18 mitigation are discussed in Sections 5.7.3 and 5.7.4. The following sections provide a
19 preliminary assessment of these hazards at the proposed Wah Wah Valley SEZ. Solar project
20 developers may need to conduct a geotechnical investigation to assess geologic hazards locally
21 to better identify facility design criteria and site-specific mitigation measures to minimize their
22 risk.
23

24
25 **Seismicity.** Southwestern Utah is tectonically active. The Wah Wah Valley lies within the
26 Intermountain Seismic Belt (ISB), a north-trending zone of seismic activity that coincides with
27 the eastern margin of the transitional zone between the Basin and Range and Colorado Plateau
28 provinces, stretching from northwestern Montana through Wyoming, Idaho, and Utah, to
29 southern Nevada and northern Arizona. The major active faults in southwestern Utah are located
30 within the ISB. Earthquake activity in southwestern Utah typically occurs in dense clusters or
31 swarms with magnitudes less than 4.0 (University of Utah 2009a; UGS 2009; Lund et al. 2007).
32 Historically, several earthquakes with magnitudes greater than 6.0 have occurred in southwestern
33 Utah. A 1992 earthquake in the St. George area (magnitude of 5.9), about 90 mi (145 km) south
34 of the Wah Wah Valley SEZ, caused little damage to local buildings but triggered the largest
35 landslide known for an earthquake of its magnitude (University of Utah 2009b;
36 Christensen 1995).
37

38 No known Quaternary-age faults occur within the proposed Wah Wah Valley SEZ
39 (Figure 13.3.7.1-4). The SEZ lies between two fault systems that run along the fronts of the
40 two mountain ranges that bound the Wah Wah Valley on each side: the Wah Wah Mountains
41 fault about 5.6 mi (9.0 km) west, and the San Francisco Mountains fault about 3.2 mi (5.1 km)
42 east.
43

44 The Wah Wah Mountains fault system is a north-trending zone of normal faults.
45 Movement along faults in this system is not well understood but has not likely occurred within

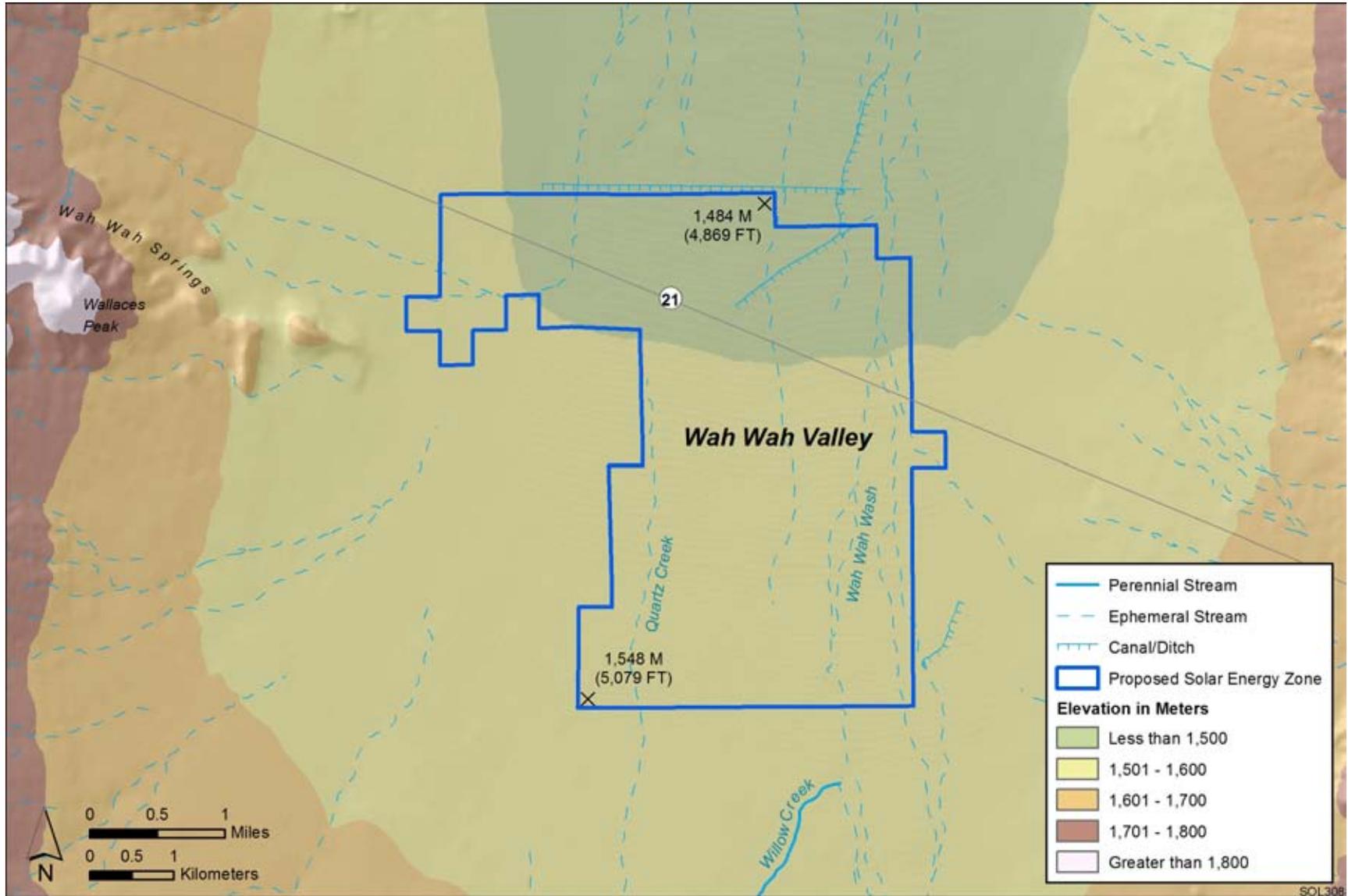
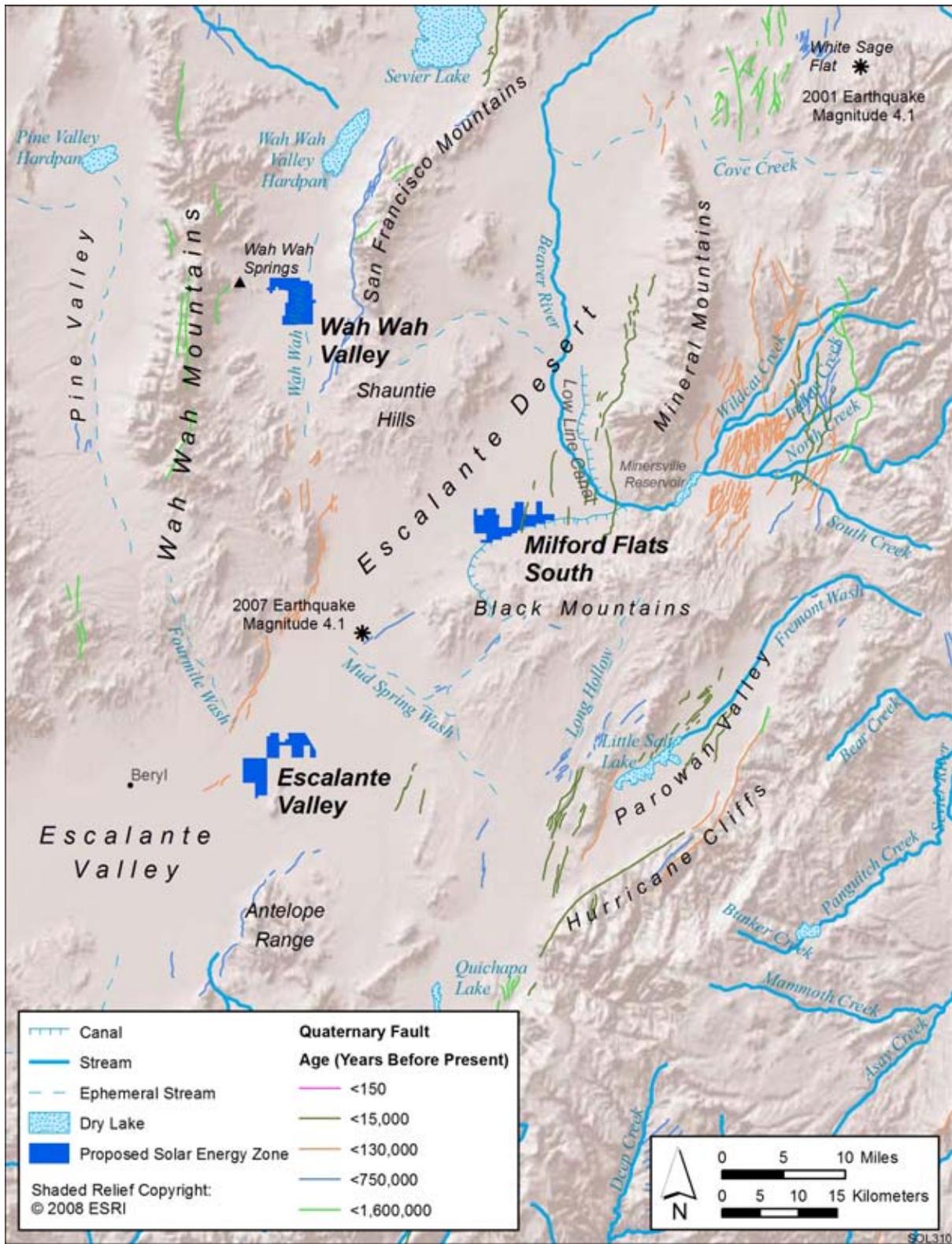


FIGURE 13.3.7.1-3 General Terrain of the Proposed Wah Wah Valley SEZ

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1
 2 **FIGURE 13.3.7.1-4 Quaternary Faults in the Wah Wah Valley Region (Sources: USGS and**
 3 **UGS 2009; USGS 2010b)**

1 the past 1.6 million years (USGS 2009a). The San Francisco Mountains fault system is a
2 north-to-northeast-trending zone of normal faults along the western side of the San Francisco
3 Mountains. Faults in this zone have produced short, discontinuous scarps (as high as 41 ft
4 [12.5 m] according to Ertec Western, Inc. 1981) and dissected old alluvial fan surfaces, but
5 have not displaced Lake Bonneville shoreline sediments. This suggests that movement has
6 not occurred in the recent past (i.e., within the past 15,000 years) (USGS 2009b; Ertec
7 Western, Inc. 1981).

8
9 Ertec Western, Inc. (1981) identified a local zone of late Quaternary faults at Wah Wah
10 Springs, on the west side of Wah Wah Valley near the mountain-valley contact. The fault zone
11 consists of several short, sub-parallel, northwest-trending scarps in alluvium with displacements
12 as high as 20 ft (6 m). Springs associated with the fault zone indicate that some of the faults may
13 form a groundwater barrier.

14
15 From June 1, 2000 to May 31, 2010, 42 earthquakes were recorded within a 61-mi
16 (100-km) radius of the proposed Wah Wah Valley SEZ. The largest earthquakes during that
17 period occurred on February 23, 2001 and August 18, 2007. The 2001 earthquake was about
18 50 mi (80 km) northeast of the SEZ near White Sage Flat and registered a Richter scale
19 magnitude⁴ (ML) of 4.1; the 2007 earthquake was about 25 mi (40 km) south-southeast of the
20 SEZ near Mud Spring Wash and registered a moment magnitude⁵ (Mw) of 4.1
21 (Figure 13.1.7.1-4). During this period, 16 (36%) of the recorded earthquakes within a 61-mi
22 (100-km) radius of the SEZ had magnitudes greater than 3.0; none was greater than 4.1
23 (USGS 2010b).

24
25
26 **Liquefaction.** The proposed Wah Wah Valley SEZ lies within an area where the peak
27 horizontal acceleration with a 10% probability of exceedance in 50 years is between 0.06 and
28 0.07 g. Shaking associated with this level of acceleration is generally perceived as moderate to
29 strong; however, the potential damage to structures is light (USGS 2008). Given the deep water
30 table (from 200 ft [61 m] near the playa to 500 ft [152 m] at the southern end of the valley [Ertec
31 Western, Inc. 1981; Bunch and Harrill 1984]) and the low intensity of ground shaking estimated
32 for the Wah Wah Valley, the potential for liquefaction in Wah Wah Valley sediments is likely to
33 be low. The Utah Geological Survey has published liquefaction susceptibility maps for several
34 Utah counties (mainly those counties encompassing portions of the Great Salt Lake shoreline and
35 other lakes and rivers); however, none has been prepared for Beaver County.

36
37

⁴ Richter scale magnitude (ML) was the original magnitude defined by Richter and Gutenberg for local earthquakes in 1935. It was based on the maximum amplitude recorded on a Wood-Anderson torsion seismograph but is currently calculated for earthquakes with magnitudes ranging from 2 to 6, using modern instruments with adjustments (USGS 2010c).

⁵ Moment magnitude (Mw) is used for earthquakes with magnitudes greater than 3.5 and is based on the moment of the earthquake, equal to the rigidity of the earth times the average amount of slip on the fault times the amount of fault area that slipped (USGS 2010c).

1 **Volcanic Hazards.** Extensive volcanic activity occurred in southwestern Utah throughout
2 the Tertiary period, shifting in composition from calc-alkaline ash flow tuff eruptions to basalt
3 and rhyolite lava flows about 23 million years ago, when extensional faulting in the eastern
4 Basin and Range province began. Although there are numerous Quaternary age volcanic (basalt
5 and lesser quantities of rhyolite) vents and flows in the region, there is little evidence of volcanic
6 activity in the past 1,000 years (Anderson and Christenson 1989; Klauk and Gourley 1983;
7 Hecker 1993).

8
9 The nearest active volcano is Mount St. Helens in the Cascade Range (Washington),
10 about 695 mi (1,120 km) northwest of Wah Wah Valley, which has shown some activity as
11 recently as 2008.

12
13 The nearest volcano that meets the criterion for an unrest episode is the Long Valley
14 Caldera in east-central California, about 305 mi (490 km) to the west, which has experienced
15 recurrent earthquake swarms, changes in thermal springs and gas emissions, and uplift since
16 1980 (Diefenbach et al. 2009). The Long Valley Caldera is part of the Mono-Inyo Craters
17 volcanic chain that extends from Mammoth Mountain (on the caldera rim) northward about
18 25 mi (40 km) to Mono Lake. Small to moderate eruptions have occurred at various sites along
19 the volcanic chain in the past 5,000 years, at intervals ranging from 250 to 700 years.
20 Windblown ash (tephra) from some of these eruptions is known to have drifted as far east as
21 Nebraska. While the probability of an eruption within the volcanic chain in any given year is
22 small (less than 1%), serious hazards could result from a future eruption. Depending on the
23 location, size, timing (season), and type of eruption, hazards could include mudflows and
24 flooding, pyroclastic flows, small to moderate volumes of tephra, and falling ash
25 (Hill et al. 1998, 2000; Miller 1989).

26
27
28 **Slope Stability and Land Subsidence.** The incidence of rock falls and slope failures can
29 be moderate to high along mountain fronts and can present a hazard to facilities on the relatively
30 flat terrain of valley floors such as Wah Wah Valley if they are located at the base of steep
31 slopes. The risk of rock falls and slope failures decreases toward the flat valley center.

32
33 The UGS has documented earth fissures along the surface due to ground subsidence near
34 Beryl Junction (in Escalante Valley south of the Wah Wah Valley). These fissures are thought to
35 result from groundwater withdrawal in the area, which has caused compaction in the Escalante
36 Valley aquifer. Lund et al. (2005) observed that between the late 1940s and 2002, water levels in
37 monitoring wells had fallen as much as 105 ft (32 m). The earth fissures tend to occur in areas
38 of high drawdown. Even if stabilized (by increased recharge or decreased pumping), residual
39 compaction may still occur at a reduced rate for several decades (Galloway et al. 1999). To date,
40 fissures related to ground subsidence have not been reported in the Wah Wah Valley.

41
42
43 **Other Hazards.** Other potential hazards at the proposed Wah Wah Valley SEZ include
44 those associated with soil compaction (restricted infiltration and increased runoff), expanding
45 clay soils (destabilization of structures), and hydro-compactable or collapsible soil (settlement).
46 Ertec Western, Inc. (1981) concluded that fine-grained materials covering the Wah Wah Valley

1 Hardpan exhibit low-strength characteristics to a depth of 6 ft (1.8 m) and are not suitable for use
2 as a base for roads. Disturbance of soil crusts and desert varnish (and pavement) on soil surfaces
3 may increase the likelihood of soil erosion by wind.
4

5 Alluvial fan surfaces, such as those found in the Wah Wah Valley, can be the sites of
6 damaging high-velocity flash floods and debris flows during periods of intense and prolonged
7 rainfall. The nature of the flooding and sedimentation processes (e.g., stream flow versus debris
8 flow) will depend on specific morphology of the fan (National Research Council 1996).
9 Section 13.3.9.1.1 provides further discussion of flood risks within the Wah Wah Valley SEZ.
10

11 **13.3.7.1.2 Soil Resources**

12
13
14 The dominant soil orders in southwestern Utah are Aridisols, Entisols, and Molisols
15 (see Table 13.3.7.1-1). They are generally very deep, loamy soils that are well drained to
16 somewhat excessively drained. Soils in the region were formed on alluvial fans and flats and on
17 lake terraces and lake plains. Parent material consists mainly of alluvium and colluvium (with
18 some eolian materials) derived from mixed igneous and sedimentary rocks and lake sediments
19 (NRCS 2009). Although mechanical and microbiotic crusts are common on Utah soils
20 (Milligan 2009), none have been reported in the soils covering the Wah Wah Valley SEZ and
21 none were observed in the field.
22

23 Soils within the Wah Wah Valley SEZ are predominantly silty clay loams, fine sandy
24 loams, and sandy clay loams of the Siltcliffe Series, the Siltcliffe-Hiko Springs-Dera complex,
25 the Siltcliffe-Thermosprings complex, the Dera-Lynndyl complex, and the Dera Series, which
26 together make up a 97% of the soil coverage at the site (Figure 13.3.7.1-5). These soils are very
27 deep and well drained, with moderate runoff potential and high permeability. Dera sandy clay
28 loams occupy relict offshore bars (shown as linear features on the map) within the southern
29 portion of the SEZ and to the north of its northern boundary. Riverwash sediments occur along
30 the east side of the SEZ on the steeper slopes (4 to 15%) of the Wah Wah Wash. The natural soil
31 surface for most soils is suitable for roads, with a slight erosion hazard when used as roads or
32 trails. The water erosion hazard is moderate for the Siltcliffe silty clay loam (covering 55% of
33 the site), but slight for most other soils. The susceptibility to wind erosion is moderate, with as
34 much as 86 tons (78 metric tons) of soil eroded by wind per acre (4,000 m²) each year
35 (NRCS 2010). Heavy clouds of windblown soil were observed in the field in September 2009.
36 Soil map units are described in Table 13.3.7.1-1. . Biological soil crusts and desert pavement
37 have not been documented within the SEZ, but may be present.
38

39 Most of the soils within the SEZ are rated as partially hydric⁶ (with riverwash soil being
40 totally hydric). Flooding is not likely for soils at the site (occurring less than once in 500 years)
41 (NRCS 2010).
42
43

⁶ A hydric soil is a soil formed under conditions of saturation, flooding, or ponding (NRCS 2010).

TABLE 13.3.7.1-1 Summary of Soil Map Units within the Proposed Wah Wah Valley SEZ

Map Unit Symbol	Map Unit Name	Water Erosion Potential ^a	Wind Erosion Potential ^b	Description	Area in Acres ^c (% of SEZ)
182	Siltcliffe silty clay loam (0 to 3% slopes)	Moderate	Moderate (WEG 6) ^d	Nearly level soils on alluvial flats. Parent material consists of alluvium from igneous and sedimentary rocks. Soils are very deep and well drained, with moderate surface runoff potential and high permeability. Available water capacity is moderate. Partially hydric. Severe rutting hazard. Used for livestock grazing and wildlife habitat.	3,363 (55)
183	Siltcliffe-Hiko Springs-Dera complex (0 to 3% slopes)	Slight	Moderate (WEG 3)	Nearly level soils (very fine sandy loams) on alluvial flats. Parent material consists of alluvium from igneous and sedimentary rocks. Soils are very deep and well drained, with moderate surface runoff potential and high permeability. Available water capacity is moderate. Moderate rutting hazard. Used for rangeland and wildlife habitat.	1,386 (23)
180	Siltcliffe-Thermosprings complex (0 to 2% slopes)	Slight	Moderate (WEG 3)	Nearly level soils (sandy loams) on alluvial flats. Parent material consists of alluvium from igneous and sedimentary rocks. Soils are very deep and well drained, with moderate surface runoff potential and high permeability. Available water capacity is moderate. Partially hydric. Moderate rutting hazard. Used for rangeland and wildlife habitat.	443 (7)
176	Dera-Lynndyl complex (0 to 3% slopes)	Slight	Moderate (WEG 4)	Nearly level soils (sandy clay loams) on alluvial fan skirts. Parent material consists of eolian material, alluvium, and colluvium from igneous and sedimentary rocks and lacustrine deposits. Soils are very deep and well drained, with moderate surface runoff potential and high permeability. Available water capacity is low. Moderate rutting hazard. Used for rangeland and wildlife habitat.	363 (6)
177	Dera sandy clay loam (0 to 5% slopes)	Slight	Moderate (WEG 4)	Nearly level soils on alluvial fan skirts and relict longshore bars. Parent material consists of alluvium from igneous and sedimentary rocks. Soils are very deep and well drained, with moderate surface runoff potential and high permeability. Available water capacity is low. Moderate rutting hazard. Used for rangeland and wildlife habitat.	260 (4)

TABLE 13.3.7.1-1 (Cont.)

Map Unit Symbol	Map Unit Name	Water Erosion Potential ^a	Wind Erosion Potential ^b	Description	Area in Acres ^c (% of SEZ)
181	Siltcliffe sandy clay loam (0 to 2% slopes)	Slight	Moderate (WEG 4)	Nearly level soils on alluvial flats. Parent material consists of alluvium from igneous and sedimentary rocks and lacustrine deposits. Soils are very deep and well drained, with moderate surface runoff potential and high permeability. Available water capacity is high. Severe rutting hazard. Used for rangeland and wildlife habitat.	143 (2)
175	Hiko Peak, dry-Lynndyl association	Slight	Moderate (WEG 5)	Nearly level soils (cobbly sandy loams) on alluvial fan skirts and relict longshore bars. Parent material consists of alluvium from igneous and sedimentary rocks. Soils are very deep and well drained, with low surface runoff potential (high infiltration rate) and high permeability. Available water capacity is low. Moderate rutting potential. Used for rangeland and wildlife habitat.	111 (2)
135	Riverwash (4 to 15% slopes)	Not rated	Not rated	Riverwash soils within streams and channels; occasional flooding. All hydric. Rutting hazard not rated.	29 (<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 (whole soil; doesn't account for the presence of rock fragments) 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 "severe" indicates that erosion is expected; loss of soil productivity and damage are likely and erosion control measures may be costly or 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.

Footnotes continued on next page.

TABLE 13.3.7.1-1 (Cont.)

^d WEG = wind erodibility group. WEGs are based on soil texture, content of organic matter, effervescence of carbonates, content of rock fragments, and mineralogy, and also take into account soil moisture, surface cover, soil surface roughness, wind velocity and direction, and the length of unsheltered distance (USDA 2004). Groups range in value from 1 (most susceptible to wind erosion) to 8 (least susceptible to wind erosion). The NRCS provides a wind erodibility index, expressed as an erosion rate in tons per acre per year, for each of the wind erodibility groups: WEGs 3 and 4, 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; and WEG 6, 48 tons (44 metric tons) per acre (4,000 m²) per year.

Source: NRCS (2010).

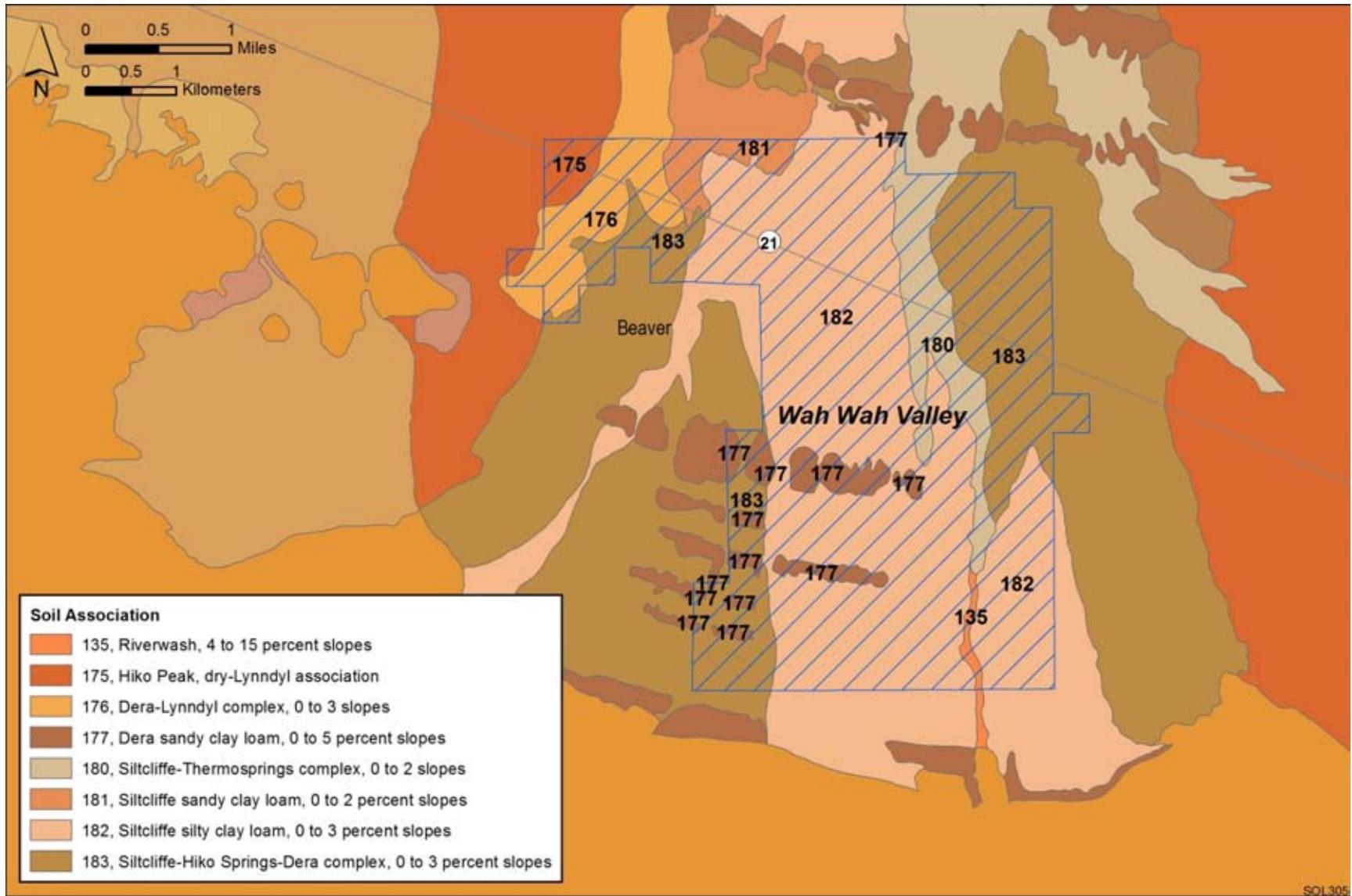


FIGURE 13.3.7.1-5 Soil Map for the Proposed Wah Wah Valley SEZ (NRCS 2008)

1 Soils in this region are used mainly as rangeland for grazing cattle and sheep,
2 pastureland, and irrigated cropland. The major crops in the region are irrigated alfalfa hay,
3 wheat, barley, potatoes, and corn (USDA 1998).
4

6 **13.3.7.2 Impacts**

7

8 Impacts on soil resources would occur mainly as a result of ground-disturbing activities
9 (e.g., grading, excavating, and drilling), especially during the construction phase of a solar
10 project. These include soil compaction, soil horizon mixing, soil erosion and deposition by wind,
11 soil erosion by water and surface runoff, sedimentation, and soil contamination. Such impacts are
12 common to all utility-scale solar energy developments in varying degrees and are described in
13 more detail for the four phases of development in Section 5.7.1.
14

15 Because impacts on soil resources result from ground-disturbing activities in the project
16 area, soil impacts would be roughly proportional to the size of a given solar facility, with larger
17 areas of disturbed soil having a greater potential for impacts than smaller areas (Section 5.7.2).
18 The magnitude of impacts would also depend on the types of components built for a given
19 facility, since some components would involve greater disturbance and disturbance would take
20 place over a longer timeframe.
21

23 **13.3.7.3 SEZ-Specific Design Features and Design Feature Effectiveness**

24

25 No SEZ-specific design features were identified for soil resources at the proposed Wah
26 Wah Valley SEZ. Implementing the programmatic design features described under both Soils
27 and Air Quality in Appendix A, Section A.2.2., as required under BLM's Solar Energy Program,
28 would reduce the potential for soil impacts during all project phases.
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1 **13.3.8 Minerals (Fluids, Solids, and Geothermal Resources)**
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3

4 **13.3.8.1 Affected Environment**
5

6 There are no locatable mining claims within the proposed Wah Wah Valley SEZ, and the
7 land of the SEZ was closed to locatable mineral entry in June 2009 pending the outcome of this
8 PEIS. The SEZ and surrounding area have been leased for oil and gas development in the past,
9 but no development occurred, and there are currently no oil or gas leases in the area. The area
10 remains open for discretionary mineral leasing for oil and gas and other leasable minerals and for
11 disposal of salable minerals. There is an approximately 10,000-acre (40-km²) area southeast of
12 the SEZ where eight geothermal leases had been issued, but those leases are now closed. No
13 geothermal development has occurred within or adjacent to the SEZ (BLM and USFS 2010).
14

15
16 **13.3.8.2 Impacts**
17

18 If the area is identified as a solar energy development zone, it would continue to be
19 closed to all incompatible forms of mineral development. Since there are no oil and gas leases in
20 the area nor has there been any development of previous leases, it is assumed there would be no
21 significant impacts on these resources if the area were developed for solar energy production.
22 Also, since the area does not contain existing mining claims, it is also assumed there would be
23 no future loss of locatable mineral production. The SEZ has had no history of development of
24 geothermal resources or leasing interest; thus, it is anticipated that solar development would not
25 adversely affect development of geothermal resources in the region.
26

27 Should the area be identified as a solar energy development zone, some mineral uses
28 might be allowed on all, or portions, of the SEZ. For example, oil and gas development that
29 involves the use of directional drilling to access resources under the area (should any be found)
30 might be allowed. It might also be possible to develop geothermal resources by using directional
31 drilling techniques to access hot water sources. The production of common minerals, such as
32 sand and gravel, and mineral materials used for road construction, might take place in areas that
33 are not directly developed for solar energy production.
34
35

36 **13.3.8.3 SEZ-Specific Design Features and Design Feature Effectiveness**
37

38 No SEZ-specific design features would be necessary to protect mineral resources.
39 Implementing the programmatic design features described in Appendix A, Section A.2.2, as
40 required under BLM's Solar Energy Program would provide adequate mitigation for locatable
41 minerals, and oil and gas resources and geothermal resources.
42

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1 **13.3.9 Water Resources**

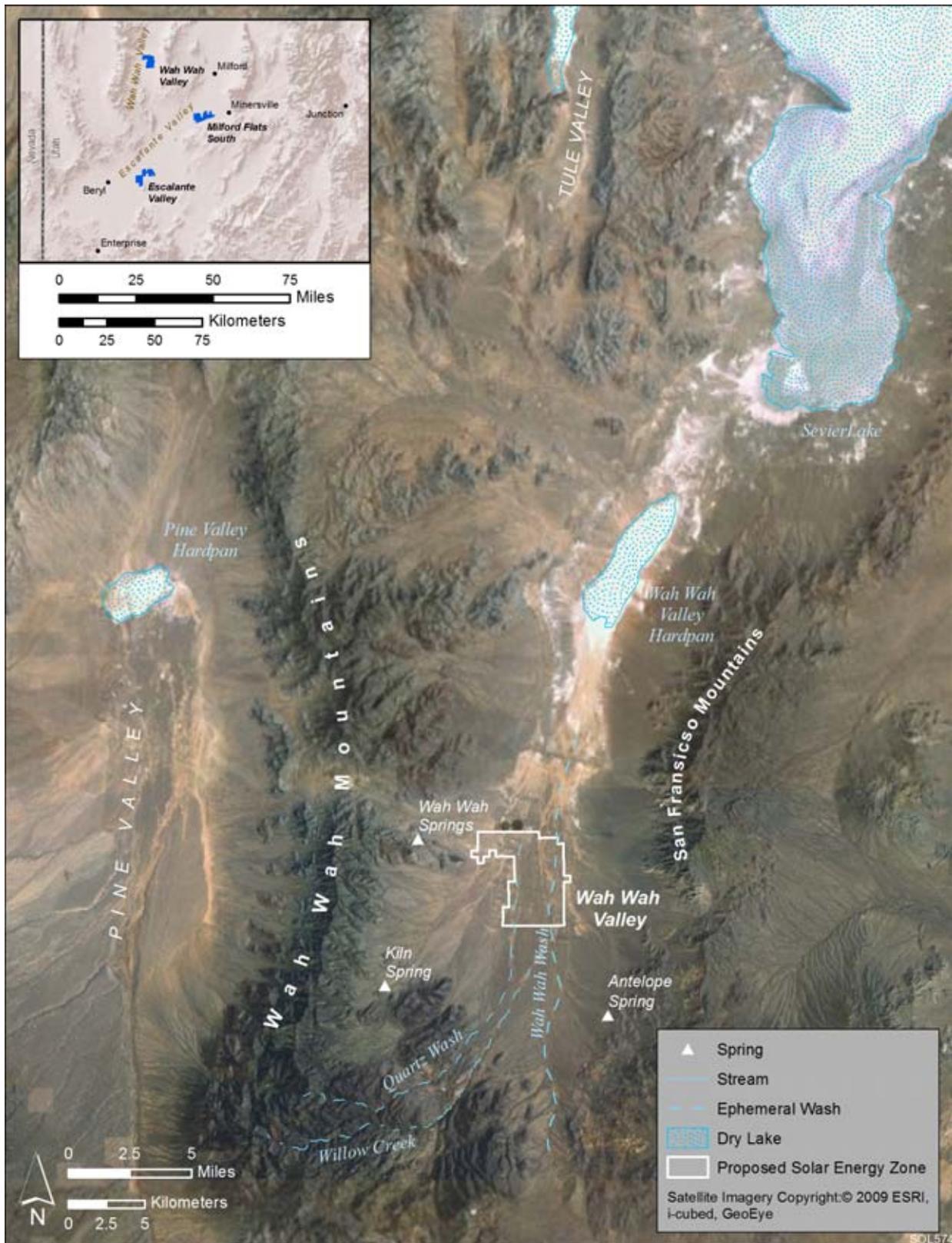
2
3
4 **13.3.9.1 Affected Environment**

5
6 The proposed Wah Wah Valley SEZ is located within the Escalante Desert–Sevier
7 Lake subregion of the Great Basin hydrologic region (USGS 2010a) and the Basin and Range
8 physiographic province characterized by small mountain ranges and intervening desert
9 valleys (Robson and Banta 1995). The Wah Wah Valley is a closed basin surrounded by the
10 Wah Wah Mountains to the west, San Francisco Mountains to the east, low-lying hills to the
11 south, and a surface drainage divide separating Wah Wah Valley from the Sevier Lake Basin
12 (Figure 13.3.9.1-1). The proposed SEZ has surface elevations ranging between 4,880 and
13 5,125 ft (1,487 and 1,562 m), with surrounding mountain elevations up to 8,500 ft (2591 m).
14 Precipitation in the higher elevations ranges from 8 to more than 25 in./yr (20 to 64 cm/yr) with
15 snowfalls typically greater than 100 in./yr (254 cm/yr), whereas the average precipitation in the
16 valley is estimated to be 7 in./yr (18 cm/yr) with snowfalls of 5 in./yr (13 cm/yr) (USDA 2007;
17 WRCC 2010a). The climate in the valley region of the proposed SEZ is arid with the average
18 annual pan evaporation rate estimated to be 71 in./yr (180 cm/yr) (Cowherd et al. 1988;
19 WRCC 2010b).

20
21
22 **13.3.9.1.1 Surface Waters (Including Drainages, Floodplains, and Wetlands)**

23
24 The Wah Wah Valley covers an area of 384,000 acres (1,550 km²) and is a part of the
25 Sevier River Basin planning area (UBWR 1999). The valley is a closed basin with a general
26 drainage pattern from south to north toward the Wah Wah Valley Hardpan and Sevier Lake
27 region (Figure 13.3.9.1-1). A surface drainage divide (approximately 25 ft [8 m] in height)
28 separates the Wah Wah Valley from the Sevier Lake basin (Stephens 1974). There are no
29 perennial surface water features in the Wah Wah Valley. Several ephemeral washes that
30 terminate shortly after entering the valley drain the Wah Wah Mountains and the San Francisco
31 Mountains. Willow Creek and Quartz Wash are two ephemeral washes that feed into the Wah
32 Wah Wash, an ephemeral wash that has a significant, incised channel running south to north
33 across the center of the valley and through the proposed SEZ (Figure 13.3.9.1-1). Several small
34 reservoirs have been constructed throughout the Wah Wah Valley to intercept surface runoff for
35 livestock grazing, but these are dry throughout most of the year (Stephens 1974). The Wah Wah
36 Valley Hardpan and Sevier Lake are dry lakebeds located 10 and 20 mi (16 and 32 km) northeast
37 of the proposed SEZ, respectively.

38
39 The proposed Wah Wah Valley SEZ is located in an area that has not been examined for
40 flood risk (Zone D) by FEMA (2009). Flooding caused by large rainfall events would be limited
41 to localized ponding and erosion. Channel incision and sedimentation patterns observed in the
42 Wah Wah Wash during the September 2009 site visit indicated substantial flows occurred during
43 past runoff events; thus, flooding could potentially occur in this limited vicinity. There is no
44 NWI data available for the Wah Wah Valley (USFWS 2009). Riparian vegetation is evident
45 along the Wah Wah Springs discharge area (Section 13.3.9.1.2) west of the proposed SEZ; it
46 is also apparent in small areas surrounding several springs near the base of the surrounding



2 **FIGURE 13.3.9.1-1 Surface Water Features near the Proposed Wah Wah Valley SEZ**

1 mountains of the Wah Wah Valley (see Section 13.3.10.1 for further information on riparian
2 vegetation pertaining to the proposed SEZ).

3 4 5 **13.3.9.1.2 Groundwater**

6
7 Groundwater resources in the Wah Wah Valley are not fully realized because of the lack
8 of historical development and exploration in the area (Stephens 1974). Most of the information
9 regarding groundwater in Wah Wah Valley is derived from large-scale analyses and models
10 developed for regional aquifer systems of Nevada and western Utah, which include (from large-
11 to small-scale) the Great Basin Regional Flow System (e.g., Harrill and Prudic 1998), the Basin
12 and Range Carbonate-Rock Aquifer System (e.g., Welch et al. 2007), and the Great Salt Lake
13 Desert System (GSLDS) (e.g., Harrill and Prudic 1998). The Wah Wah Valley is located in the
14 southern portion of the GSLDS; which, along with Pine Valley, Snake Valley, Tule Valley, and
15 Fish Springs Flat (all located to the north and west of Wah Wah Valley), forms a subregional
16 groundwater flow system (Carlton 1985) that was referred to as the Fish Springs Flow System in
17 Harrill and Prudic (1998). The conceptual models for these groundwater flow systems depict a
18 hydrogeologic framework of basin-fill aquifers with underlying consolidated-rock aquifers. The
19 basin-fill aquifers are thought to have limited connectivity between valleys, but the consolidated-
20 rock aquifers join the basins, creating regional groundwater flow patterns, and are connected
21 locally to the basin-fill aquifers (e.g., Welch et al. 2007).

22
23 The water-bearing hydrogeologic units in the region including the Wah Wah Valley
24 consist of a basin-fill aquifer with an underlying consolidated-rock aquifer comprised of volcanic
25 and carbonate rocks (Harrill and Prudic 1998; Welch et al. 2007). The basin-fill aquifer within
26 Wah Wah Valley is estimated to be on the order of 1,000 ft (305 m) to 4,000 ft (1,219 m) thick at
27 the valley center and composed of Quaternary to Tertiary age alluvium deposits, with some
28 lacustrine and colluvium deposits as well (Stephens 1974; Carlton 1985; Harrill and Prudic
29 1998). The sediments range from clays to boulders that are intermixed and interbedded to form
30 regions of unconsolidated to well-cemented layers with variable permeability (Stephens 1974).
31 The consolidated-rock aquifer in the vicinity of the Wah Wah Valley is comprised mostly of
32 carbonate rocks that are highly fractured and permeable (Stephens 1974; Carlton 1985; Welch et
33 al. 2007).

34
35 Groundwater recharge in the Wah Wah Valley is primarily derived from precipitation
36 runoff of the surrounding mountains and valley floor, and was estimated to be approximately
37 7,000 ac-ft/yr (8.6 million m³/yr) (Stephens 1974). An additional source of groundwater
38 recharge is by subsurface inflow within the carbonate-rock aquifer from Pine Valley estimated
39 to be 3,000 ac-ft/yr (3.7 million m³/yr). Groundwater flow in the carbonate-rock aquifers of
40 the GSLDS is typically discharged at regional springs and low-lying areas that allow for
41 evapotranspiration (Harrill and Prudic 1998). Several small springs are located near the base of
42 the Wah Wah Mountains that include Antelope Spring and Kiln Spring, which have discharges
43 of less than 40 ac-ft/yr (49,000 m³/yr) supplied by localized runoff (Stephens 1974). Wah Wah
44 Springs is a series of springs located 2 mi (3.2 km) west of the proposed SEZ that acts as a
45 regional spring and groundwater discharge location for the carbonate-rock aquifer. In the study
46 by Stephens (1974), the source water for the Wah Wah Springs was considered to be from runoff

1 of the Wah Wah Mountains, and the discharge of the springs was estimated at 800 ac-ft/yr
2 (987,000 m³/yr). Current investigations are underway to assess the groundwater reserves in
3 the basin-fill and carbonate-rock aquifers in the Wah Wah Valley, with preliminary evidence
4 suggesting that the source water for the Wah Wah Springs is likely to be interbasin flow
5 from Pine Valley. These studies have also estimated that the discharge of Wah Wah Springs is
6 1,530 ac-ft/yr (1.9 million m³/yr) (Egerton 2009). It is estimated that approximately 600 ac-ft/yr
7 (740,000 m³/yr) of evaporation discharge from the Wah Wah Valley occurs that is associated
8 with the Wah Wah Springs area (Stephens 1974).
9

10 The groundwater flow direction in the Wah Wah Valley typically follows the axis of the
11 valley from south to north (Stephens 1974). Subsurface discharge out of the Wah Wah Valley
12 was estimated to be 8,500 ac-ft/yr (10.5 million m³/yr) (Gates and Kuer 1981). However, given
13 the limited data on groundwater surface elevations in the region, it is not well understood which
14 basins receive this subsurface discharge (Stephens 1974; Harrill et al. 1988). Groundwater
15 modeling results indicate a region of high groundwater transmissivity from Wah Wah Valley
16 north to Fish Springs Flat basin, the downgradient basin of the Fish Springs Flow System (Prudic
17 et al. 1993; Harrill and Prudic 1998). In addition, the discharge to springs in the Fish Springs Flat
18 basin far exceeds its local recharge rate, suggesting that it receives substantial interbasin flow
19 from Pine Valley, Wah Wah Valley, Tule Valley, and Snake Valley (Harrill and Prudic 1998).
20 This evidence suggests that the majority of the subsurface discharge out of Wah Wah Valley is
21 into the Tule Valley and Snake Valley basins.
22

23 One active USGS monitoring well located 4 mi (6.5 km) south of the Wah Wah
24 Valley SEZ indicates a depth to groundwater of 660 ft (201 m) (USGS 2009c; well
25 number 382350113231901). The depth to groundwater in this well has remained fairly constant
26 since the mid-1970s. Historical groundwater samples from approximately 15 inactive wells
27 indicate that the water quality in the Wah Wah Valley is hard, with TDS concentrations ranging
28 between 100 and 4,550 mg/L; a majority of the samples had a TDS concentration of greater than
29 the 500 mg/L secondary MCL. A small portion of these wells also had sulfate concentrations
30 greater than the 250-g/L secondary MCL (Stephens 1974).
31
32

33 ***13.3.9.1.3 Water Use and Water Rights Management*** 34

35 In 2005, water withdrawals from surface waters and groundwater in Beaver County
36 were 102,350 ac-ft/yr (126 million m³/yr), of which 52% came from surface waters and
37 48% from groundwater (Kenny et al. 2009). The largest water use category was for agricultural
38 irrigation, at 89,000 ac-ft/yr (110 million m³/yr). The remaining water use categories were for
39 thermoelectric energy production (6%), livestock (3%), public supply and domestic uses (2%),
40 and industrial purposes (2%) (Kenny et al. 2009). The Wah Wah Valley is a remote area of
41 Beaver County and only contains one ranch supporting agriculture, and its water is supplied via
42 an aqueduct from Wah Wah Springs. The rest of the Wah Wah Valley is used primarily for
43 livestock grazing (Stephens 1974).
44

45 In Utah, the appropriation doctrine is the basis of water appropriation, which implies that
46 water rights are allocated on a temporal basis (BLM 2001). All waters are the property of the

1 public in the State of Utah and subject to the laws described in Utah Code, Title 73, Water and
2 Irrigation (available at <http://www.le.state.ut.us/~code/TITLE73/TITLE73.htm>). A water right
3 establishes an entity's legal ability to divert surface water or groundwater for beneficial use and
4 contains five key elements: a definition of the beneficial use, a priority date, a defined flow or
5 quantity of water to be diverted, a location of the diversion, and location of the beneficial use.
6 Water rights are administered by the Office of the State Engineer, which was renamed the Utah
7 Division of Water Rights (Utah DWR) in 1963 (Utah DWR 2005).

8
9 The Utah DWR manages both surface water and groundwater appropriations (new
10 appropriations and transfer of existing water rights). In many regions of the state, both surface
11 water and groundwater resources are fully appropriated, so new water diversions can only be
12 made through the transfer of existing water rights. The application process for obtaining a water
13 right is the same for surface water and groundwater; however, the criteria used to evaluate new
14 surface water and groundwater diversions are different and can vary by region of the state.
15 Groundwater diversions can also be subject to groundwater management plans that have been
16 established to protect existing water rights and limit overuse and degradation of water quality
17 in sensitive areas. The Utah DWR assesses a water right application based on its potential for
18 beneficial use, as well as its potential to affect existing water rights or impair water quality
19 (BLM 2001). For water right transfer applications in regions where water resources are limited,
20 the seniority of a transferred water right and its ability to not affect more senior water rights in
21 the region will determine whether it can meet project demands (Utah DWR 2005).

22
23 The Wah Wah Valley is under the jurisdiction of the southwestern regional office of the
24 Utah DWR and is located in Policy Area 69 (Wah Wah Valley and Sevier Lake). Surface waters
25 in this Policy Area are considered fully appropriated, with only new diversions of less than
26 2 ac-ft/yr (2,500 m³/yr) considered. New groundwater diversion applications are typically
27 granted for small farming applications (less than 1 acre [0.004 km²] of irrigation), and all
28 other groundwater applications are considered on a case-by-case basis (Utah DWR 2010).
29 Groundwater is not fully appropriated in the Wah Wah Valley, but there are currently two
30 pending water right applications that are seeking substantial groundwater amounts. The Central
31 Iron County Water Conservancy District (CICWCD) has applied for the use of 12,000 ac-ft/yr
32 (14.8 million m³/yr) to be extracted from 20 wells within the Wah Wah Valley that would range
33 from 100 to 2,000 ft (31 to 610 m) in depth (Utah DWR 2010; application number A76677).
34 Beaver County has applied for the use of 6,650 ac-ft/yr (8.2 million m³/yr) to be extracted from
35 17 wells within the Wah Wah Valley that range from 500 to 1,000 ft (152 to 305 m) in proposed
36 depths (Utah DWR 2010; application number A78814). Both of these groundwater applications
37 are under review by the Utah DWR, and together have the potential to withdraw groundwater
38 quantities that exceed the estimated value of groundwater recharge for the basin.

39
40 The pending water right applications in Wah Wah Valley are seeking groundwater that
41 is primarily within the basin-fill aquifer of the Wah Wah Valley. However, the connectivity
42 of the local basin-fill aquifer with the regional carbonate-rock aquifer, along with several
43 proposed groundwater extractions in the surrounding valleys of eastern Nevada and western
44 Utah (e.g., SNWA 2010), has prompted the Department of the Interior to initiate a groundwater
45 modeling project to assess the potential for new groundwater diversions to impact groundwater

1 resources. (Information on this groundwater modeling effort and provisional data can be found at
2 http://www.blm.gov/ut/st/en/prog/more/doi_groundwater_modeling.html.)
3
4

5 **13.3.9.2 Impacts**

6

7 Potential impacts on water resources related to utility-scale solar energy development
8 include direct and indirect impacts on surface waters and groundwater. Direct impacts occur at
9 the place of origin and at the time of the proposed activity, while indirect impacts occur away
10 from the place of origin or later in time. Impacts on water resources considered in this analysis
11 are the result of land disturbance activities (construction, final developed site plan, and off-site
12 activities such as road and transmission line construction) and water use requirements for solar
13 energy technologies that take place during the four project phases: site characterization,
14 construction, operations, and decommissioning/reclamation. Both land disturbance and
15 consumptive water use activities can affect groundwater and surface water flows, cause
16 drawdown of groundwater surface elevations, modify natural drainage pathways, obstruct
17 natural recharge zones, and alter surface water–wetland–groundwater connectivity. Water
18 quality can also be degraded through the generation of wastewater, chemical spills, increased
19 erosion and sedimentation, and increased salinity (e.g., by excessive withdrawal from aquifers).
20

21 **13.3.9.2.1 Land Disturbance Impacts on Water Resources**

22

23
24 Impacts related to land disturbance activities are common to all utility-scale solar
25 energy developments, which are described in more detail for the four phases of development in
26 Section 5.9.1; these impacts would be minimized through the implementation of programmatic
27 design features described in Appendix A, Section.A.2.2. Land disturbance impacts in the vicinity
28 of the proposed Wah Wah Valley SEZ could potentially affect natural drainage patterns and
29 natural groundwater recharge and discharge properties. The Wah Wah Wash conveys substantial
30 flows during storm events, as evident from channel incision and sedimentation patterns. Land
31 disturbance activities near Wah Wah Wash could potentially increase flows during storms and
32 cause further channel incision and sedimentation problems.
33

34 **13.3.9.2.2 Water Use Requirements for Solar Energy Technologies**

35

36 **Analysis Assumptions**

37

38 A detailed description of the water use assumptions for the four utility-scale solar energy
39 technologies (parabolic trough, power tower, dish engine, and PV systems) is presented in
40 Appendix M. Assumptions regarding water use calculations specific to the proposed Wah Wah
41 Valley SEZ include the following:
42
43

- 44 • On the basis of a total area less than 10,000 acres (40 km²), it is assumed that
45 one solar project could be constructed during the peak construction year;
46
47

- Water needed for making concrete would come from an off-site source;
- The maximum build-out for an individual solar facility during the peak construction year is 3,000 acres (12 km²);
- Assumptions on individual facility size and land requirements (Appendix M), along with the assumed number of projects and maximum allowable land disturbance, results in the potential to disturb approximately 49% of the SEZ total area during peak construction year; and
- Water use requirements for hybrid cooling systems are assumed to be on the same order of magnitude as those using dry cooling (see Section 5.9.2.1).

Site Characterization

During site characterization, water would be used mainly for the workforce potable water supply and controlling fugitive dust. Impacts on water resources during this phase of development are expected to be negligible since activities would be limited in area, extent, and duration; water needs could be met by trucking water in from an off-site source.

Construction

During construction, water would be used mainly for controlling fugitive dust and for providing the workforce potable water supply. Because there are no significant surface water bodies on the proposed Wah Wah Valley SEZ, the water requirements for construction activities could be met by either trucking water to the sites or by using on-site groundwater resources. Water requirements for dust suppression and potable water supply during construction are shown in Table 13.3.9.2-1 and could be as high as 1,261 ac-ft (1.6 million m³). The assumptions underlying these estimates for each solar energy technology are described in Appendix M. Groundwater wells would have to yield an estimated 781 gal/min (3,000 L/min) to meet the estimated construction water requirements. These yields are similar to average well yields of small- to medium-sized irrigated farms in Utah (USDA 2009b). The availability of groundwater and the impacts of groundwater withdrawal would need to be assessed during the site characterization phase of a solar development project. In addition, up to 74 ac-ft (91,300 m³) of sanitary wastewater would need to be either treated on-site or sent to an off-site facility.

The Utah primary drinking water standards require that TDS concentrations be less than 2,000 mg/L (*Utah Administrative Code*, Rule R309-200, Monitoring and Water Quality: Drinking Water Standards). In the Wah Wah Valley, groundwater TDS concentrations have been reported that exceed this drinking-water threshold. If the groundwater supply used for a project does not meet drinking water quality standards, potable water would need to be brought in from off-site.

TABLE 13.3.9.2-1 Estimated Water Requirements during the Peak Construction Year for the Proposed Wah Wah Valley SEZ

Activity	Parabolic Trough	Power Tower	Dish Engine	PV
Water use requirements ^a				
Fugitive dust control (ac-ft) ^{b,c}	811	1,216	1,216	1,216
Potable supply for workforce (ac-ft)	74	45	19	9
Total water use requirements (ac-ft)	885	1,261	1,235	1,225
Wastewater generated				
Sanitary wastewater (ac-ft)	74	45	19	9

^a Assumptions of water use for fugitive dust control, potable supply for workforce, and wastewater generation are presented in Table M.9-1 (Appendix M).

^b Fugitive dust control estimation assumes a local pan evaporation of 71 in./yr (180 cm/yr) (Cowherd et al. 1988; WRCC 2010b).

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

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Operations

Water would be required for mirror/panel washing, the workforce potable water supply, and cooling during operations. Cooling water is required only for the parabolic trough and power tower technologies. Water needs for cooling are a function of the type of cooling used (dry, wet, hybrid). Further refinements to water requirements for cooling would result from the percentage of time that the option was employed (30 to 60% range assumed) and the power of the system. The differences between the water requirements reported in Table 13.3.9.2-2 for the parabolic trough and power tower technologies are attributable to the assumptions of acreage per megawatt. As a result, the water usage for the more energy-dense parabolic trough technology is estimated to be almost twice as large as that for the power tower technology.

The water use requirements among the solar energy technologies are a factor of the full build-out capacity, as well as assumptions on water use and technology operations discussed in Appendix M. At full build-out capacity, the estimated total water use requirements during operations range from 28 to 277 ac-ft/yr (34,500 to 341,700 m³/yr) for the dish engine and PV technologies (no cooling required). For parabolic trough and power tower technologies, full build-out water requirements range from 385 to 1,478 ac-ft/yr (474,900 to 1.8 million m³/yr) using dry cooling and from 2,716 to 14,647 ac-ft/yr (3.4 million to 18.1 million m³/yr) using wet cooling. The water use estimates for wet cooling are approximately a factor of 10 times larger than the estimated water needs for dry cooled parabolic trough and power tower technologies. The amounts of water needed for mirror/panel washing, potable water supply, and cooling activities for each solar energy technology are listed in Table 13.3.9.2-1. Operations would generate up to 14 ac-ft/yr (17,300 m³/yr) of sanitary wastewater; in addition, for wet-cooled technologies, 154 to 277 ac-ft/yr (190,000 to 341,700 m³/yr) of cooling system blowdown water would need to be either treated on-site or sent to an off-site facility. Any on-site treatment

TABLE 13.3.9.2-2 Estimated Water Requirements during Operations at the Proposed Wah Wah Valley SEZ

Activity	Parabolic Trough	Power Tower	Dish Engine	PV
Full build-out capacity (MW) ^{a,b}	976	542	542	542
Water use requirements				
Mirror/panel washing (ac-ft/yr) ^{c,d}	488	271	271	27
Potable supply for workforce ac-ft/yr	14	6	6	1
Dry cooling (ac-ft/yr) ^e	195–976	108–542	NA ^f	NA
Wet cooling (ac-ft/yr) ^e	4,390–14,145	2,439–7,858	NA	NA
Total water use				
Non-cooled technologies (ac-ft/yr)	NA	NA	277	28
Dry-cooled (ac-ft/yr)	697–1,478	385–819	NA	NA
Wet-cooled (ac-ft/yr)	4,892–14,647	2,716–8,135	NA	NA
Wastewater generated				
Blowdown (ac-ft/yr) ^g	277	154	NA	NA
Sanitary wastewater (ac-ft/yr)	14	6	6	1

^a Land area for the parabolic trough technology was estimated at 5 acres/MW (0.02 km²/MW); land area for the power tower, dish engine, and PV technologies was estimated at 9 acres/MW (0.04 km²/MW).

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

^c Value assumes a usage rate of 0.5 ac-ft/yr/MW (617 m³/yr/MW) for mirror washing for the parabolic trough, power tower, and dish engine technologies and a rate of 0.05 ac-ft/yr/MW (62 m³/yr/MW) for panel washing for the PV systems.

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

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

^f NA = not applicable.

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

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of wastewater would have to ensure that treatment ponds are effectively lined in order to prevent any groundwater contamination.

Water demands during operations would most likely be met by withdrawing groundwater from wells constructed onsite. The parabolic trough and power tower technologies would require an estimated well yield of 239 to 916 gal/min (905 to 3,467 L/min) for dry cooling and 1,683 to 9,075 gal/min (6,371 to 34,353 L/min) for wet cooling. The required well yields for dry cooling are similar to average well yields of small irrigated farms in Utah, while the required well yields for wet cooling range from similar well yields of medium-sized irrigated farms to over three times greater than the average well yields of large irrigated farms in Utah (USDA 2009b).

1 The estimated water requirements for wet-cooling technologies are of similar magnitude
2 to the annual groundwater recharge for the entire valley as estimated by Stephens (1974)
3 (see Section 13.3.9.1.2). Therefore, wet-cooling technologies would not be feasible for use at
4 the proposed Wah Wah Valley SEZ. To the extent possible, facilities using dry cooling should
5 implement water conservation practices to limit water needs.
6

7 The availability of water rights and the impacts associated with groundwater withdrawals
8 would need to be assessed during the site characterization phase of a proposed solar project.
9 Less water would be needed for any of the four solar technologies if the full build-out capacity
10 was reduced. The analysis of water use for the various solar technologies assumed a single
11 technology for full build-out. Water use requirements for development scenarios that assume a
12 mixture of solar technologies can be estimated using water use factors described in Appendix M,
13 Section M.9.
14

15 The effects of groundwater withdrawal rates on potential drawdown of groundwater
16 elevations would need to be assessed during the site characterization phase and during the
17 development of constructed wells.
18

19 **Decommissioning/Reclamation**

20 All surface structures associated with the solar energy development would be dismantled,
21 and the site would be reclaimed to its preconstruction state during decommissioning. Land
22 disturbance and water use activities would be similar to those during the construction phase
23 (see Table 13.3.9.2-1) and may also include water to establish vegetation in some areas.
24 However, the total volume of water needed is expected to be less. Because quantities of water
25 needed during the decommissioning/reclamation phase would be less than those for construction,
26 impacts on surface and groundwater resources also would be less.
27
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31 ***13.3.9.2.3 Off-Site Impacts: Roads and Transmission Lines***

32 State Route 21 is adjacent to the proposed Wah Wah Valley SEZ and, as described in
33 Section 13.3.1.2, the nearest transmission lines are 42 mi (68 km) to the east of the SEZ.
34 Impacts associated with the construction of roads and transmission lines primarily deal with
35 water use demands for construction, water quality concerns relating to potential chemical spills,
36 and land disturbance effects on the natural hydrology. Water needed for road modification and
37 transmission line construction activities (e.g., for soil compaction, dust suppression, and potable
38 supply for workers) could be trucked to the construction area from an off-site source. As a result,
39 water use impacts would be negligible. Impacts on surface water and groundwater quality
40 resulting from spills would be minimized by implementing the programmatic design features
41 described in Appendix A, Section A.2.2 (e.g., cleaning up spills as soon as they occur). Ground-
42 disturbing activities that have the potential to increase sediment and dissolved solid loads in
43 downstream waters would be conducted following the programmatic design features to minimize
44 impacts associated with alterations to natural drainage pathways and hydrologic processes.
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1 **13.3.9.2.4 Summary of Impacts on Water Resources**
2

3 The impacts on water resources associated with developing solar energy in the proposed
4 Wah Wah Valley SEZ are associated with land disturbance effects on natural hydrology, water
5 use requirements for the various solar energy technologies, and water quality concerns. Impacts
6 relating to water use requirements vary depending on the type of solar technology built and, for
7 technologies using cooling systems, the type of cooling (wet, dry, hybrid) employed. Water
8 requirements would be greatest for wet-cooled parabolic trough and power tower facilities. Dry
9 cooling reduces water use requirements by approximately a factor of 10 compared with wet
10 cooling. PV requires the least amount of water among the solar energy technologies.
11

12 Land disturbance impacts primarily affect the regions near the Wah Wah Wash that cross
13 the eastern portion of the SEZ. Substantial flows are conveyed by this drainage during storm
14 events, as indicated by the observed degree of channel incision and sedimentation patterns.
15 Alterations to the natural drainage pattern could potentially cause further channel incision and
16 sedimentation impacts on the Wah Wah Wash. Water quality impacts specific to the proposed
17 Wah Wah Valley SEZ relate to TDS concentrations exceeding drinking water standards. The
18 Utah primary drinking water standards require that TDS concentrations be less than 2,000 mg/L
19 (*Utah Administrative Code*, Rule R309-200, Monitoring and Water Quality: Drinking Water
20 Standards). In the Wah Wah Valley, groundwater TDS concentrations have been reported that
21 exceed this drinking water threshold, so treatment of the potable water supply may be necessary.
22

23 Water use requirements for technologies using wet cooling are on the same order of
24 magnitude as the natural groundwater recharge for the Wah Wah Valley. Given that groundwater
25 surface elevations are typically greater than 600 ft (183 m) below the surface, it is highly likely
26 that groundwater extractions for wet cooling would cause drawdown in the basin-fill aquifer
27 and potentially impact the regional carbonate-rock aquifer. Therefore, wet cooling would not
28 be feasible for the full build-out scenario at the proposed Wah Wah Valley SEZ. In addition,
29 the pending water rights applications for the CICWCD and Beaver County (discussed in
30 Section 13.3.9.1.3) could potentially withdraw groundwater at quantities that exceed the
31 estimated value of groundwater recharge for the Wah Wah Valley (Section 13.3.9.1.2). Given
32 the high demand for groundwater and the limited information on the available supply within
33 the Wah Wah Valley, solar energy projects will need to implement water conservation measures
34 and choose technologies with low water demands in order to reduce water requirements.
35
36

37 **13.3.9.3 SEZ-Specific Design Features and Design Feature Effectiveness**
38

39 Implementing the programmatic design features described in Appendix A, Section A.2.2,
40 as required under BLM’s Solar Energy Program will mitigate some impacts on water resources.
41 Programmatic design features would focus on coordination with federal, state, and local agencies
42 that regulate the use of water resources to meet the requirements of permits and approvals
43 needed to obtain water for development, and on hydrological studies to characterize the aquifer
44 from which groundwater would be obtained (including drawdown effects, if a new point of
45 diversion is created). The greatest consideration for mitigating water impacts would be in the

1 selection of solar technologies. The mitigation of impacts would be best achieved by selecting
2 technologies with low water demands.

3
4 Proposed design features specific to the Wah Wah Valley SEZ include the following:

- 5
6 • Wet-cooling options would not be feasible, and other technologies should
7 incorporate water conservation measures;
- 8
9 • During site characterization, hydrologic investigations would need to identify
10 100-year floodplains and potential jurisdictional water bodies subject to Clean
11 Water Act Section 404 permitting, and siting of solar facilities and
12 construction activities should avoid areas identified as being within a 100-year
13 floodplain;
- 14
15 • Land disturbance and operations activities should avoid increasing drainage to
16 the Wah Wah Wash to prevent further channel incisions and sedimentation
17 issues;
- 18
19 • Groundwater rights must be obtained from the Utah Division of Water Rights
20 (Utah DWR 2005);
- 21
22 • Groundwater monitoring and production wells should be constructed in
23 accordance with Utah standards (Utah DWR 2008);
- 24
25 • Stormwater management plans and BMPs should comply with standards
26 developed by the Utah Division of Water Quality (UDWQ 2008); and
- 27
28 • Water for potable uses would have to meet, or be treated to meet, Utah
29 drinking water standards as defined by Utah Administrative Code
30 Rule R309-200.
- 31

1 **13.3.10 Vegetation**
2

3 This section addresses vegetation that could occur or is known to occur within the
4 potentially affected area of the proposed Wah Wah Valley SEZ. The affected area considered
5 in this assessment included the areas of direct and indirect effects. The area of direct effects is
6 defined as the area that would be physically modified during project development (i.e., where
7 ground-disturbing activities would occur) and included the SEZ and a 250-ft (76-m) wide
8 portion of an assumed transmission line corridor. The area of indirect effects was defined as
9 the area within 5 mi (8 km) of the SEZ boundary and within the 1-mi (1.6-km) wide assumed
10 transmission line corridor, where ground-disturbing activities would not occur, but that could be
11 indirectly affected by activities in the area of direct effect. No area of direct or indirect effects
12 was assumed for new access roads because they are not expected to be needed for developments
13 on the proposed Wah Wah Valley SEZ due to the proximity of an existing state highway.
14

15 Indirect effects considered in the assessment included effects from surface runoff, dust,
16 and accidental spills from the SEZ, but do not include ground-disturbing activities. The potential
17 degree of indirect effects would decrease with increasing distance away from the SEZ. This area
18 of indirect effects was identified on the basis of professional judgment and was considered
19 sufficiently large to bound the area that would potentially be subject to indirect effects. The
20 affected area is the area bounded by the areas of direct and indirect effects. These areas are
21 defined and the impact assessment approach is described in Appendix M.
22

23
24 **13.3.10.1 Affected Environment**
25

26 The proposed Wah Wah Valley SEZ is located within the Shadscale-dominated Saline
27 Basins Level IV ecoregion, which primarily supports a sparse saltbush-greasewood shrub
28 community (Woods et al. 2001). This ecoregion includes nearly flat to gently sloping valley
29 bottoms and lower hill slopes. Soils have a high salt and alkali content, and plants are salt-
30 and drought-tolerant. The dominant shrub species in this ecoregion are shadscale (*Atriplex*
31 *confertifolia*), winterfat (*Krascheninnikovia lanata*), greasewood (*Sarcobatus vermiculatus*),
32 and bud sagebrush (*Picrothamnus desertorum*). Perennial grasses are also typically present and
33 include bottlebrush squirreltail (*Elymus elymoides*), indian ricegrass (*Achnatherum hymenoides*),
34 and galleta (*Pleuraphis jamesii*). Annual precipitation in the vicinity of the SEZ is low,
35 averaging 6.77 in. (17.2 cm) at Wah Wah Ranch (see Section 13.3.13).
36

37 The region surrounding the SEZ consists of a mosaic of this ecoregion, the Sagebrush
38 Basins and Slopes Level IV ecoregion, and Woodland- and Shrub-covered Low Mountains Level
39 IV ecoregion. The Sagebrush Basins and Slopes ecoregion supports a Great Basin sagebrush
40 community dominated by Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*)
41 and includes perennial bunchgrasses. This ecoregion includes valleys, alluvial fans, bajadas,
42 mountain flanks, and stream terraces. The Woodland- and Shrub-covered Low Mountains
43 ecoregion includes pinyon-juniper woodlands and sagebrush communities, along with mountain
44 brush communities at higher elevations. Small areas of the Salt Deserts Level IV ecoregion also
45 occur in the region. This ecoregion is mostly barren and contains playas, salt flats, mud flats, low
46 terraces, and saline lakes. Playas and salt flats are ponded during wet periods and subject to wind

1 erosion when they are dry. Soils are poorly drained, have a high salt and alkali content, and are
2 often salt-crust. Plants in this ecoregion are generally sparse and widely scattered, if present
3 at all, and include extremely salt-tolerant species such as salicornia (*Salicornia* sp.), saltgrass
4 (*Distichlis spicata*), alkali sacaton (*Sporobolus airoides*), iodine bush (*Allenrolfea occidentalis*),
5 and greasewood. These ecoregions are all located within the Central Basin and Range Level III
6 ecoregion, which is described in Appendix I.

7
8 Land cover types described and mapped under SWReGAP (USGS 2005c) were used
9 to evaluate plant communities in and near the SEZ. Each cover type includes a range of
10 similar plant communities. Land cover types occurring within the potentially affected area of
11 the proposed Wah Wah Valley SEZ and within the assumed transmission line corridor are shown
12 in Figures 13.3.10.1-1 and 13.3.10.1-2, respectively. Table 13.3.10.1-1 provides the surface area
13 of each cover type within the potentially affected area.

14
15 Lands within the proposed Wah Wah Valley SEZ are classified primarily as Inter-
16 Mountain Basins Semi-Desert Shrub Steppe and Inter-Mountain Basins Mixed Salt Desert
17 Scrub. Additional cover types within the SEZ are given in Table 13.3.10.1-1. Dominant species
18 observed in September 2009 in the low scrub and shrub steppe communities present over much
19 of the SEZ included winterfat, rabbitbrush, halogeton, galleta, indian ricegrass, sagebrush, and
20 saltbush. Vegetation cover in the eastern portion of the SEZ was extremely sparse with a large
21 proportion of barren ground. Sensitive habitats on the SEZ include ephemeral dry wash and
22 playa habitats.

23
24 A wide variety of forest and woodland cover types occur within the transmission line
25 corridor, including Great Basin Pinyon-Juniper Woodland, Colorado Plateau Pinyon-Juniper
26 Woodland, Inter-Mountain Basins Mountain Mahogany Woodland and Shrubland, Rocky
27 Mountain Mesic Montane Mixed Conifer Forest and Woodland, Rocky Mountain Lower
28 Montane Riparian Woodland and Shrubland, Rocky Mountain Aspen Forest and Woodland,
29 Rocky Mountain Dry-Mesic Montane Mixed Conifer Forest and Woodland, and Southern Rocky
30 Mountain Ponderosa Pine Woodland.

31
32 The indirect impact area, including the area surrounding the SEZ within 5 mi (8 km) and
33 the transmission line corridor, includes 29 cover types, which are listed in Table 13.3.10.1-1. The
34 predominant cover type is Inter-Mountain Basins Semi-Desert Shrub Steppe.

35
36 There are no NWI data for the region that includes the proposed Wah Wah Valley SEZ
37 (USFWS 2009). Small ponds occur inside and outside the SEZ and are generally developed for
38 livestock or other uses. Numerous dry washes, including Wah Wah Wash, occur within the SEZ.
39 These drainages typically do not support wetland or riparian habitats and generally convey
40 surface runoff to playas such as the Wah Wah Valley Hardpan north of the SEZ, which is
41 associated with Wah Wah Wash, or to ponds or drainages outside the SEZ. Greasewood flat and
42 playa habitats also occur in the SEZ. These playas, flats, and dry washes typically contain water
43 for short periods during or following precipitation events. A number of springs that support
44 riparian plant communities, such as Wah Wah Springs west of the SEZ, occur in the vicinity of
45 the SEZ. See Section 13.3.9 for further discussion of springs.

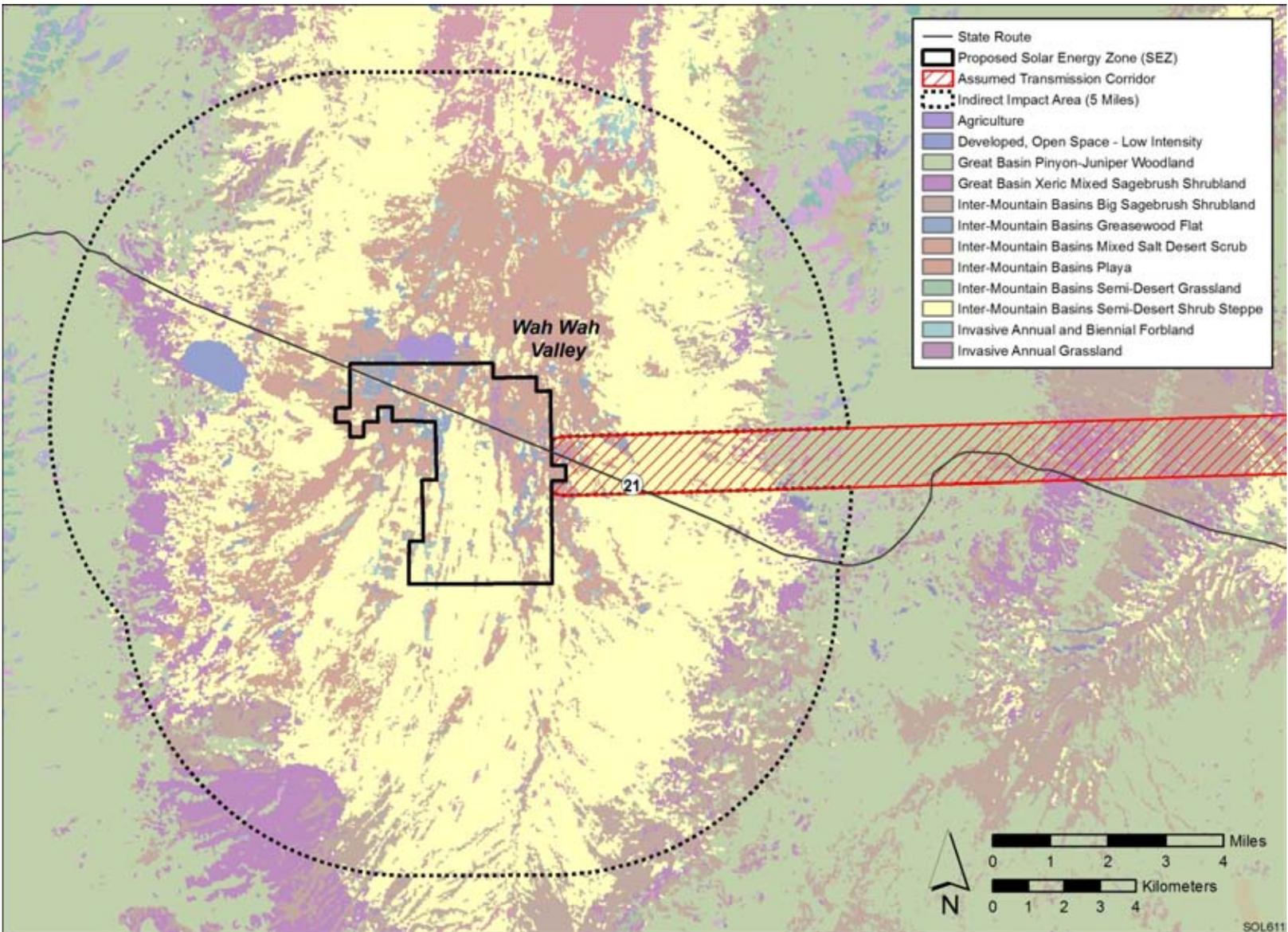


FIGURE 13.3.10.1-1 Land Cover Types within the Proposed Wah Wah Valley SEZ (Source: USGS 2004)

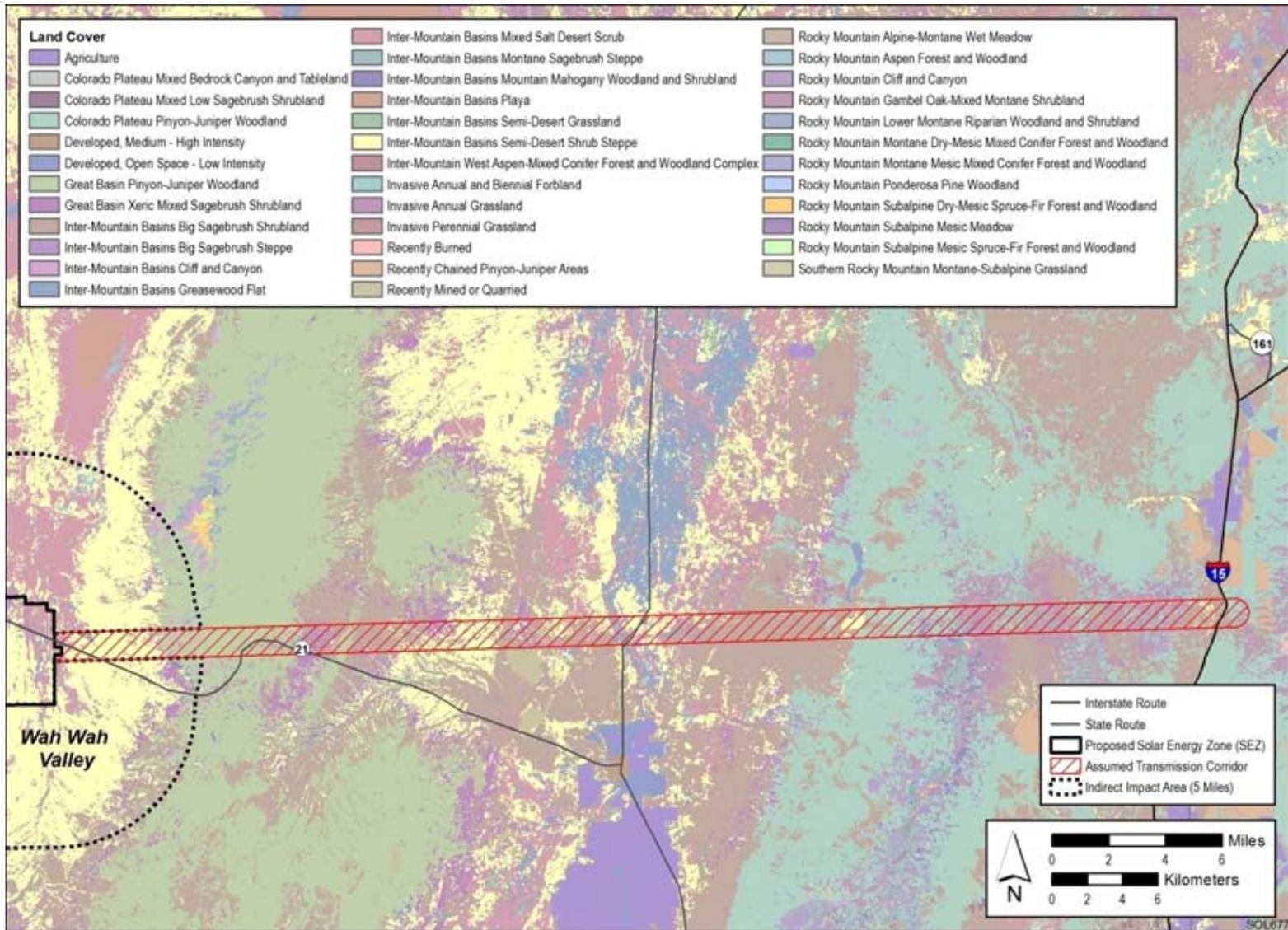


FIGURE 13.3.10.1-2 Land Cover Types within the Proposed Wah Wah Valley SEZ Assumed Transmission Line Corridor (Source: USGS 2004)

TABLE 13.3.10.1-1 Land Cover Types within the Potentially Affected Area of the Proposed Wah Wah Valley SEZ and Potential Impacts

Land Cover Type ^a	Area of Cover Type Affected (acres) ^b			Overall Impact Magnitude ^f
	Within SEZ (Direct Effects) ^c	Assumed Transmission Line (Direct Effects) ^d	Corridor and Outside SEZ (Indirect Effects) ^e	
S079 Inter-Mountain Basins Semi-Desert Shrub Steppe: Generally consists of perennial grasses with an open shrub and dwarf shrub layer.	2,862 acres ^g (0.4%, 0.5%)	217 acres (<0.1%)	49,315 acres (7.1%)	Small
S065 Inter-Mountain Basins Mixed Salt Desert Scrub: Generally consists of open shrublands that include at least one species of <i>Atriplex</i> , along with other shrubs. Perennial grasses dominate a sparse to moderately dense herbaceous layer.	2,271 acres (0.3%, 0.4%)	51 acres (<0.1)	16,284 acres (2.3%)	Small
S096 Inter-Mountain Basins Greasewood Flat: Dominated or co-dominated by greasewood (<i>Sarcobatus vermiculatus</i>) and generally occurring in areas with saline soils, a shallow water table, and intermittent flooding, although remaining dry for most growing seasons. This community type generally occurs near drainages or around playas. These areas may include, or may be co-dominated by, other shrubs, and may include a graminoid herbaceous layer.	616 acres (0.4%, 0.6%)	22 acres (<0.1%)	1,106 acres (0.7%)	Small
D08 Invasive Annual Grassland: Dominated by non-native annual grass species.	219 acres (0.4%, 0.6%)	7 acres (<0.1%)	462 acres (0.9%)	Small
D09 Invasive Annual and Biennial Forbland: Areas dominated by annual and biennial non-native forb species.	109 acres (0.3%, 0.5%)	1 acre (<0.1%)	875 acres (2.5%)	Small
S090 Inter-Mountain Basins Semi-Desert Grassland: Consists of perennial bunchgrasses as dominants or co-dominants. Scattered shrubs or dwarf shrubs may also be present.	10 acres (<0.1%, <0.1%)	1 acre (<0.1%)	96 acres (0.2%)	Small

TABLE 13.3.10.1-1 (Cont.)

Land Cover Type ^a	Area of Cover Type Affected (acres) ^b			Overall Impact Magnitude ^f
	Within SEZ (Direct Effects) ^c	Assumed Transmission Line (Direct Effects) ^d	Corridors and Outside SEZ (Indirect Effects) ^e	
<p>S054 Inter-Mountain Basins Big Sagebrush Shrubland: Dominated by basin big sagebrush (<i>Artemisia tridentata tridentata</i>), Wyoming big sagebrush (<i>Artemisia tridentata wyomingensis</i>), or both. Other shrubs may be present. Perennial herbaceous plants are present but not abundant.</p>	5 acres (<0.1%, <0.1%)	419 acres (<0.1%)	15,994 acres (1.6%)	Small
<p>S015 Inter-Mountain Basins Playa: Playa habitats are intermittently flooded and generally barren or sparsely vegetated. Depressions may contain small patches of grass and sparse shrubs may occur around playa margins.</p>	1 acre (<0.1%, <0.1%)	0 acres	120 acres (0.1%)	Small
<p>S040 Great Basin Pinyon-Juniper Woodland: Occurs on low-elevation slopes and ridges. Singleleaf pinyon (<i>Pinus monophylla</i>), Utah juniper (<i>Juniperus osteosperma</i>), or both are the dominant species, generally associating with curl-leaf mountain mahogany (<i>Cercocarpus ledifolius</i>). Understory species include shrubs and grasses.</p>	0 acres	153 acres (<0.1%)	14,326 acres (1.3%)	Small
<p>S046 Rocky Mountain Gambel Oak-Mixed Montane Shrubland: Occurs on dry foothills and lower mountain slopes. Gambel oak (<i>Quercus gambelii</i>) may be the only dominant species or share dominance with other shrubs.</p>	0 acres	138 acres (0.4%)	2,779 acres (8.2%)	Small
<p>S039 Colorado Plateau Pinyon-Juniper Woodland: Occurs on foothills, ridges, and low-elevation mountain slopes. Twoneedle pinyon (<i>Pinus edulis</i>), Utah juniper (<i>Juniperus osteosperma</i>), or both are the dominant species. Understory layers, if present, may be shrub- or grass-dominated.</p>	0 acres	126 acres (<0.1%)	2,529 acres (0.2%)	Small

TABLE 13.3.10.1-1 (Cont.)

Land Cover Type ^a	Area of Cover Type Affected (acres) ^b			Overall Impact Magnitude ^f
	Within SEZ (Direct Effects) ^c	Assumed Transmission Line (Direct Effects) ^d	Corridors and Outside SEZ (Indirect Effects) ^e	
S055 Great Basin Xeric Mixed Sagebrush Shrubland: Generally occurs on level plains, slopes, and ridges. The dominant shrub species are black sagebrush (<i>Artemisia nova</i>) or, at higher elevations, little sagebrush (<i>Artemisia arbuscula</i>), and co-dominants may be Wyoming big sagebrush (<i>Artemisia tridentata</i> ssp. <i>wyomingensis</i>) or yellow rabbitbrush (<i>Chrysothamnus viscidiflorus</i>). Other shrub species may also be present as well as sparse perennial bunchgrasses.	0 acres	60 acres (<0.1%)	7,477 acres (2.2%)	Small
S071 Inter-Mountain Basins Montane Sagebrush Steppe: Occurs on flats, ridges, level ridgetops, and mountain slopes. Mountain big sagebrush (<i>Artemisia tridentata vaseyana</i>) and related taxa such as big sagebrush (<i>Artemisia tridentata spiciformis</i>) are typically the dominant species. Perennial herbaceous species, especially grasses, are usually abundant, although shrublands are also present.	0 acres	45 acres (0.1%)	919 acres (1.8 %)	Small
D03 Recently Mined or Quarried: Includes open pit mines and quarries.	0 acres	11 acres (0.3%)	277 acres (6.2%)	Small
S050 Inter-Mountain Basins Mountain Mahogany Woodland and Shrubland: Occurs in hills and mountain ranges on rocky outcrops or escarpments and small to large stands in forested areas. Mostly occurs as shrubland on ridges and steep slopes, but may be a small tree in steppe habitat. The dominant species is mountain mahogany (<i>Cercocarpus ledifolius</i>). A number of shrub species are often present, and scattered conifers may also occur.	0 acres	10 acres (<0.1%)	393 acres (1.2%)	Small

TABLE 13.3.10.1-1 (Cont.)

Land Cover Type ^a	Area of Cover Type Affected (acres) ^b			Overall Impact Magnitude ^f
	Within SEZ (Direct Effects) ^c	Assumed Transmission Line (Direct Effects) ^d	Corridors and Outside SEZ (Indirect Effects) ^e	
S006 Rocky Mountain Cliff and Canyon and Massive Bedrock: Occurs on steep cliffs, narrow canyons, rock outcrops, and scree and talus slopes. This cover type includes barren and sparsely vegetated areas (less than 10% cover) with scattered trees and/or shrubs, or with small dense patches. Herbaceous plant cover is limited.	0 acres	7 acres (0.1%)	146 acres (2.3%)	Small
S009 Inter-Mountain Basins Cliff and Canyon: Includes barren and sparsely vegetated (generally <10% plant cover) steep cliff faces, narrow canyons, small rock outcrops, and scree and talus slopes. Composed of widely scattered coniferous trees and a variety of shrubs.	0 acres	3 acres (<0.1%)	427 acres (1.4%)	Small
S085 Southern Rocky Mountain Montane-Subalpine Grassland: Typically occurs as a mosaic of two or three plant associations on well-drained soils. The dominant species is usually a bunchgrass.	0 acres	3 acres (<0.1%)	137 acres (2.1%)	Small
S102 Rocky Mountain Alpine-Montane Wet Meadow: Occurs on wet soils in very low-velocity areas along ponds, lakes, streams, and toeslope seeps. This cover type is dominated by herbaceous species, and often occurs as a mosaic of several plant associations. The dominant species are often grass or grass-like plants.	0 acres	2 acres (0.6%)	49 acres (12.4%)	Small
N22 Developed, Medium-High Intensity: Includes housing and commercial/industrial development. Impervious surfaces comprise 50 to 100% of the total land cover.	0 acres	2 acres (<0.1%)	38 acres (0.9%)	Small
D06 Invasive Perennial Grassland: Dominated by non-native perennial grasses.	0 acres	2 acres (<0.1%)	62 acres (0.4%)	Small

TABLE 13.3.10.1-1 (Cont.)

Land Cover Type ^a	Area of Cover Type Affected (acres) ^b			Overall Impact Magnitude ^f
	Within SEZ (Direct Effects) ^c	Assumed Transmission Line (Direct Effects) ^d	Corridors and Outside SEZ (Indirect Effects) ^e	
S034 Rocky Mountain Mesic Montane Mixed Conifer Forest and Woodland: Occurs in lower and middle ravine slopes, along stream terraces, and on north- and east-facing slopes. Shrubs and herbaceous species are generally present.	0 acres	1 acre (<0.1%)	82 acres (1.0%)	Small
S093 Rocky Mountain Lower Montane Riparian Woodland and Shrubland: Occurs on streambanks, islands, and bars, in areas of annual or episodic flooding, and often occurs as a mosaic of tree-dominated communities with diverse shrubs.	0 acres	1 acre (<0.1%)	12 acres (0.5%)	Small
S023 Rocky Mountain Aspen Forest and Woodland: Dominated by quaking aspen (<i>Populus tremuloides</i>), with or without a significant presence of conifers. The understory may consist of only herbaceous species or multiple shrub and herbaceous layers.	0 acres	<1 acre (<0.1%)	7 acres (0.2%)	Small
S032 Rocky Mountain Dry-Mesic Montane Mixed Conifer Forest and Woodland: Occurs on mountain slopes, canyon sideslopes, and ridgetops. Shrub and graminoid species are generally present.	0 acres	<1 acre (<0.1%)	29 acres (0.3%)	Small
S036 Southern Rocky Mountain Ponderosa Pine Woodland: Occurs on dry slopes. Ponderosa pine (<i>Pinus ponderosa</i> , primarily var. <i>scopulorum</i> , and var. <i>brachyptera</i>) is the dominant species. Other tree species may be present. The understory is usually shrubby and grasses may be present.	0 acres	<1 acre (<0.1%)	6 acres (0.3%)	Small

TABLE 13.3.10.1-1 (Cont.)

Land Cover Type ^a	Area of Cover Type Affected (acres) ^b			Overall Impact Magnitude ^f
	Within SEZ (Direct Effects) ^c	Assumed Transmission Line (Direct Effects) ^d	Corridors and Outside SEZ (Indirect Effects) ^e	
S083 Rocky Mountain Subalpine Mesic Meadow: Occurs on gentle to moderate slopes on soils that are seasonally moist to saturated in spring. Forbs typically have more cover than graminoides.	0 acres	<1 acre (0.3%)	2 acres (6.4%)	Small
N21 Developed, Open Space—Low Intensity: Includes housing, parks, golf courses, and other areas planted in developed settings. Impervious surfaces comprise up to 49% of the total land cover.	0 acres	0 acres	463 acres (3.2%)	Small
N80 Agriculture: Areas where pasture/hay or cultivated crops account for more than 20% of total vegetation cover.	0 acres	0 acres	258 acres (0.4%)	Small

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

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

^c Includes the area of the cover type within the SEZ, the percentage that area represents of all occurrences of that cover type within the SEZ region (i.e., a 50-mi [80-km] radius from the center of the SEZ), and the percentage that area represents of all occurrences of that cover type on BLM lands within the SEZ region.

^d For transmission development, direct effects were estimated within a 42-mi (67-km) long, 250-ft (76-m) wide assumed transmission ROW from the SEZ to the nearest existing line. Direct impacts within this area were determined from the proportion of the cover type within the 1-mi (1.6-km) wide transmission corridor. Impacts are for the area of the cover type within the assumed ROW, and the percentage that area represents of all occurrences of that cover type within the SEZ region.

Footnotes continued on next page.

TABLE 13.3.10.1-1 (Cont.)

- ^e 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 portions of the 1-mi (1.6-km) wide transmission corridor where ground-disturbing activities would not occur. Indirect effects include effects from surface runoff, dust, and other factors from project developments. The potential degree of indirect effects would decrease with increasing distance away from the SEZ. Includes the area of the cover type within the indirect effects area and the percentage that area represents of all occurrences of that cover type within the SEZ region.
- ^f Overall impact magnitude categories were based on professional judgment and are (1) *small*: a relatively small proportion of the cover type ($\leq 1\%$) within the SEZ region would be lost; (2) *moderate*: an intermediate proportion of a cover type (>1 but $\leq 10\%$) would be lost; and (3) *large*: $>10\%$ of a cover type would be lost.
- ^g To convert acres to km^2 , multiply by 0.004047.

Numerous dry washes occur within the transmission line corridor. The Beaver River, a perennial stream, would be crossed by the transmission line corridor about 20 mi (32 km) east of the SEZ. Although riparian habitat occurs along upstream portions of the Beaver River, the portion of the river within the transmission line corridor is typically dry because of irrigation withdrawals; therefore, wetland or riparian habitats are not likely to occur along that portion of the river channel. Cover types within the corridor that may include wetland or riparian communities include Rocky Mountain Alpine-Montane Wet Meadow, Rocky Mountain Lower Montane Riparian Woodland and Shrubland, and Rocky Mountain Subalpine Mesic Meadow.

Table 13.3.10.1-2 lists the designated noxious weeds of Utah that are recorded as occurring in Beaver County (UDA 2008; USDA 2010), which includes the proposed Wah Wah Valley SEZ, and additional noxious weed species declared by Beaver County (UDA 2009). UDA (2008) provides a list of all Utah State designated noxious weeds. Halogeton (*Halogeton glomeratus*), an invasive species known to occur within the SEZ, is not included in this table.

13.3.10.2 Impacts

The construction of solar energy facilities within the proposed Wah Wah Valley SEZ would result in direct impacts on plant communities due to the removal of vegetation within the facility footprint during land-clearing and land-grading operations. Approximately 80% of the SEZ (4,878 acres [19.7 km²]) would be expected to be cleared with full development of the SEZ. The plant communities affected would depend on facility locations, and could include any of the communities occurring on the SEZ. Therefore, for the purposes of this analysis, all the area of each cover type within the SEZ is considered to be directly affected by removal with full development of the SEZ.

TABLE 13.3.10.1-2 Utah State Designated Noxious Weeds Known to Occur in Beaver County

Common Name	Scientific Name
Black henbane	<i>Hyoscyamus niger</i>
Bull thistle	<i>Cirsium vulgare</i>
Canada thistle	<i>Cirsium arvense</i>
Dalmatian toadflax	<i>Linaria dalmatica</i>
Field bindweed	<i>Convolvulus arvensis</i>
Hoary cress	<i>Cardaria</i> spp.
Houndstongue	<i>Cynoglossum officinale</i>
Poison hemlock	<i>Conium maculatum</i>
Quackgrass	<i>Agropyron repens</i>
Scotch thistle	<i>Onopordium acanthum</i>
Spotted knapweed	<i>Centaurea maculosa</i>
Yellow toadflax	<i>Linaria vulgaris</i>

Sources: UDA (2008, 2009); USDA (2010).

1 Indirect effects (caused, for example, by surface runoff or dust from the SEZ) have the
2 potential to degrade affected plant communities and may reduce biodiversity by promoting the
3 decline or elimination of species sensitive to disturbance. Indirect effects can also cause an
4 increase in disturbance-tolerant species or invasive species. High impact levels could result in
5 the elimination of a community or the replacement of one community type by another. The
6 proper implementation of programmatic design features, however, would reduce indirect effects
7 to a minor or small level of impact.
8

9 Possible impacts from solar energy facilities on vegetation that are encountered within
10 the SEZ are described in more detail in Section 5.10.1. Any such impacts would be minimized
11 through the implementation of required programmatic design features described in Appendix A,
12 Section A.2.2 and from any additional mitigation applied. Section 13.3.10.2.3, below identifies
13 design features of particular relevance to the proposed Wah Wah Valley SEZ.
14

15 ***13.3.10.2.1 Impacts on Native Species*** 16

17
18 The impacts of construction, operation, and decommissioning were considered small if
19 the impact affected a relatively small proportion (<1%) of the cover type in the SEZ region
20 (within 50 mi [80 km] of the center of the SEZ); a moderate impact (>1 but <10%) could affect
21 an intermediate proportion of cover type; a large impact could affect greater than 10% of a
22 cover type.
23

24 Solar facility construction and operation in the proposed Wah Wah Valley SEZ would
25 primarily affect communities of the Inter-Mountain Basins Semi-Desert Shrub Steppe and
26 Inter-Mountain Basins Mixed Salt Desert Scrub cover types. Additional cover types that would
27 be affected within the SEZ include Inter-Mountain Basins Greasewood Flat, Invasive Annual
28 Grassland, Invasive Annual and Biennial Forbland, Inter-Mountain Basins Semi-Desert
29 Grassland, Inter-Mountain Basins Big Sagebrush Shrubland, and Inter-Mountain Basins Playa.
30 The Invasive Annual Grassland and Invasive Annual and Biennial Forbland likely support few
31 native plant communities. Table 13.3.10.1-1 summarizes the potential impacts on land cover
32 types resulting from solar energy facilities in the proposed Wah Wah Valley SEZ. Many of these
33 cover types are relatively common in the SEZ region; however, several are relatively uncommon,
34 representing less than 1% of the land area within the SEZ region: Inter-Mountain Basins Semi-
35 Desert Grassland (0.9%) and Invasive Annual and Biennial Forbland (0.7%). Uncommon cover
36 types that would potentially be affected by the transmission line ROW are Rocky Mountain Cliff
37 and Canyon (0.1%), Inter-Mountain Basins Cliff and Canyon (0.6%), Rocky Mountain Aspen
38 Forest and Woodland (0.1%), Rocky Mountain Dry-Mesic Montane Mixed Conifer Forest and
39 Woodland (0.2%), Rocky Mountain Mesic Montane Mixed Conifer Forest and Woodland
40 (0.2%), Southern Rocky Mountain Ponderosa Pine Woodland (<0.1%), Rocky Mountain Gambel
41 Oak-Mixed Montane Shrubland (0.7%), Inter-Mountain Basins Mountain Mahogany Woodland
42 and Shrubland (0.7%), Rocky Mountain Subalpine Mesic Meadow (<0.1%), Southern Rocky
43 Mountain Montane-Subalpine Grassland (0.1%), Rocky Mountain Lower Montane Riparian
44 Woodland and Shrubland (<0.1%), Rocky Mountain Alpine-Montane Wet Meadow (<0.1%),
45 Developed, Medium-High Density (0.1%), Recently Mined or Quarried (0.1%), and Invasive

1 Perennial Grassland (0.3%). Playa and dry wash communities are important sensitive habitats in
2 the region.

3
4 The construction, operation, and decommissioning of solar projects within the proposed
5 Wah Wah Valley SEZ would result in small impacts on all cover types in the affected area.
6

7 Because of the arid conditions, re-establishment of shrub communities in temporarily
8 disturbed areas would likely be very difficult and might require extended periods of time. In
9 addition, noxious weeds could become established in disturbed areas and colonize adjacent
10 undisturbed habitats, thus reducing restoration success and potentially resulting in widespread
11 habitat degradation. Cryptogamic soil crusts occur in many of the shrubland communities in the
12 region. Damage to these crusts, as by the operation of heavy equipment or other vehicles, can
13 alter important soil characteristics, such as nutrient cycling and availability, and affect plant
14 community characteristics (Lovich and Bainbridge 1999).
15

16 The deposition of fugitive dust from large areas of disturbed soil onto habitats outside
17 a solar project area could result in reduced productivity or changes in plant community
18 composition. Fugitive dust deposition could affect plant communities of each of the cover
19 types occurring within the indirect impact area identified in Table 13.3.10.1-1.
20

21 Communities associated with playa habitats, such as the large playas (including Wah
22 Wah Valley Hardpan) associated with Wah Wah Wash north of the SEZ, greasewood flats
23 communities, or other intermittently flooded areas downgradient from solar projects in the
24 SEZ could be affected by ground-disturbing activities. Site clearing and grading could disrupt
25 surface water flow patterns, resulting in changes in the frequency, duration, depth, or extent
26 of inundation or soil saturation, and could potentially alter playa or greasewood flats plant
27 communities and affect community function. Increases in surface runoff from a solar energy
28 project site could also affect hydrologic characteristics of these communities. The introduction
29 of contaminants into these habitats could result from spills of fuels or other materials used on a
30 project site. Soil disturbance could result in sedimentation in these areas, which could degrade or
31 eliminate sensitive plant communities. Grading could also affect dry washes within the SEZ and
32 transmission line corridor. Alteration of surface drainage patterns or hydrology could adversely
33 affect downstream dry wash communities. Vegetation within these communities could be lost by
34 erosion or desiccation.
35

36 The use of groundwater within the proposed Wah Wah Valley SEZ for technologies with
37 high water requirements, such as wet-cooling systems, could contribute to the depletion of the
38 regional groundwater system (see Section 13.3.9). A number of springs occur in the vicinity of
39 the SEZ that support riparian communities. If these springs are hydrologically connected to the
40 aquifer below the SEZ, groundwater depletion and subsequent reductions in groundwater
41 discharges at the springs could result in degradation of these habitats. Studies of the Wah Wah
42 Valley groundwater recharge and discharge processes would be necessary to determine potential
43 effects of groundwater withdrawals within the proposed Wah Wah Valley SEZ on these springs
44 or those in hydrologically connected basins.
45

1 Cover types within the 42-mi (67-km) transmission line corridor that may include
2 wetland or riparian communities include Rocky Mountain Alpine-Montane Wet Meadow, Rocky
3 Mountain Lower Montane Riparian Woodland and Shrubland, and Rocky Mountain Subalpine
4 Mesic Meadow. The construction of transmission lines in a ROW outside of the SEZ could
5 potentially result in direct impacts on wetlands that may occur in or near the ROW if fill material
6 is placed within wetland areas, or in indirect impacts such as sedimentation or alterations of
7 hydrologic characteristics, which could result in degradation of wetland plant communities.
8

9 The construction of transmission lines could also result in impacts on forest and
10 woodland communities. A large number of forest and woodland cover types occur within the
11 transmission line corridor. Forest and woodland habitat within the ROW would likely be
12 converted to shrub- or grass-dominated habitat. Clearing of forest and woodland along the
13 ROW during construction would contribute to fragmentation of these habitats and changes in
14 characteristics in adjacent areas, such as light and soil moisture conditions. As a result, forest and
15 woodland communities along the ROW could be degraded. ROW management would maintain
16 altered habitat conditions within and adjacent to the ROW.
17
18

19 ***13.3.10.2 Impacts from Noxious Weeds and Invasive Plant Species*** 20

21 E.O. 13112, “Invasive Species,” directs federal agencies to prevent the introduction of
22 invasive species and provide for their control and to minimize the economic, ecological, and
23 human health impacts of invasive species (*Federal Register*, Volume 64, page 61836, Feb. 8,
24 1999). Potential effects of noxious weeds and invasive plant species that could result from solar
25 energy facilities are described in Section 5.10.1. Noxious weeds and invasive species could
26 inadvertently be brought to a project site by equipment previously used in infested areas, or
27 they may be present on or near a project site. Despite required programmatic design features
28 to prevent the spread of noxious weeds, project disturbance could potentially increase the
29 prevalence of noxious weeds and invasive species in the affected area of the proposed Wah Wah
30 Valley SEZ, and increase the probability that weeds could be transported into areas that were
31 previously relatively weed-free. This could result in reduced restoration success and possible
32 widespread habitat degradation.
33

34 Noxious weeds, including halogeton, occur on the SEZ. Additional species designated
35 as noxious weeds in Utah, and those known to occur in Beaver County, are given in
36 Table 13.3.10.1-2. Past or present land uses, such as grazing or OHV use, may affect the
37 susceptibility of plant communities to the establishment of noxious weeds and invasive species.
38 Approximately 219 acres (0.9 km²) of Invasive Annual Grassland occur within the SEZ, about
39 462 acres (1.9 km²) occur within 5 mi (8 km) of the SEZ and in the transmission line corridor,
40 and 7 acres (0.03 km²) occur within the ROW; approximately 109 acres (0.4 km²) of Invasive
41 Annual and Biennial Forbland occur within the SEZ, approximately 875 acres (3.5 km²) occur
42 within 5 mi (8 km) of the SEZ and in the transmission line corridor, and 1 acre (0.004 km²)
43 occurs within the ROW. About 62 acres (0.3 km²) of Invasive Perennial Grassland occur within
44 5 mi (8 km) of the SEZ and in the transmission line corridor, and 2 acres (0.008 km²) occur
45 within the ROW; about 38 acres (0.2 km²) of Developed, Medium-High Intensity occur within
46 5 mi (8 km) of the SEZ and in the transmission line corridor, and 2 acres (0.008 km²) occur

1 within the ROW; about 463 acres (1.9 km²) of Developed, Open Space–Low Intensity occur
2 within 5 mi (8 km) of the SEZ. Because disturbance may promote the establishment and spread
3 of invasive species, developed areas may provide sources of such species. Disturbance associated
4 with existing roads, transmission lines, and rail lines within the SEZ area of potential impacts
5 also likely contributes to the susceptibility of plant communities to the establishment and spread
6 of noxious weeds and invasive species.

9 **13.3.10.3 SEZ-Specific Design Features and Design Feature Effectiveness**

10
11 In addition to the programmatic design features, SEZ-specific design features would
12 reduce the potential for impacts on plant communities. While the specifics of some of these
13 practices are best established when considering specific project details, the following measures
14 can be identified at this time:

- 15
16 • An Integrated Vegetation Management Plan addressing invasive species
17 control and an Ecological Resources Mitigation and Monitoring Plan
18 addressing habitat restoration should be approved and implemented to
19 increase the potential for successful restoration of affected habitats and
20 minimize the potential for the spread of invasive species, such as those
21 occurring in Beaver County, that could be introduced as a result of solar
22 energy project activities (see Section 13.3.10.2.2). Invasive species control
23 should focus on biological and mechanical methods, where possible, to reduce
24 the use of herbicides.
 - 25
26 • Appropriate engineering controls should be used to minimize impacts on dry
27 wash, playa, and greasewood flat habitats, including downstream occurrences,
28 resulting from surface water runoff, erosion, sedimentation, altered hydrology,
29 accidental spills, or fugitive dust deposition to these habitats. Appropriate
30 buffers and engineering controls would be determined through agency
31 consultation.
 - 32
33 • All dry wash and playa habitats within the SEZ and all dry wash, wetland, and
34 riparian habitats within the assumed transmission line corridor (e.g., Beaver
35 Creek) should be avoided to the extent practicable, and any impacts should be
36 minimized and mitigated. A buffer area should be maintained around
37 wetlands, dry washes, and riparian habitats to reduce the potential for impacts.
 - 38
39 • Transmission line towers should be sited and constructed to minimize impacts
40 on wetlands, dry washes, and riparian areas, such as those associated with
41 Beaver Creek. Towers should span such areas whenever practicable.
 - 42
43 • Groundwater studies should be conducted to evaluate the potential for indirect
44 impacts on springs located in the vicinity of the SEZ or those in
45 hydrologically connected basins.
- 46

1 If these SEZ-specific design features are implemented in addition to programmatic design
2 features, it is anticipated that a high potential for impacts from invasive species and impacts on
3 dry washes, playas, springs, riparian habitats, and wetlands would be reduced to a minimal
4 potential for impact.
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13.3.11 Wildlife and Aquatic Biota

This section addresses wildlife (amphibians, reptiles, birds, and mammals) and aquatic biota that could occur within the potentially affected area of the proposed Wah Wah Valley SEZ. Wildlife known to occur within 50 mi (80 km) of the SEZ (i.e., the SEZ region) were determined from the Utah Conservation Data Center (UDWR 2009a). Land cover types suitable for each species were determined from SWReGAP (USGS 2004, 2005a, 2007). The amount of aquatic habitat within the SEZ region was determined by estimating the length of linear perennial stream and canal features and the area of standing waterbody features (i.e., ponds, lakes, and reservoirs) within 50 mi (80 km) of the SEZ by using available GIS surface water data sets.

The affected area considered in this assessment included the areas of direct and indirect effects. The area of direct effects was defined as the area that would be physically modified during project development (i.e., where ground-disturbing activities would occur) and included the SEZ and a 250-ft (76-m) wide portion of an assumed 42-mi (67.6-km) long transmission line corridor. No area of direct effects was assumed for a new access road, because State Route 21 traverses the SEZ.

The area of indirect effects was defined as the area within 5 mi (8 km) of the SEZ boundary and within the 1.0-mi (1.6-km) wide assumed transmission corridor where ground-disturbing activities would not occur but that could be indirectly affected by activities in the area of direct effects (e.g., surface runoff, dust, noise, lighting, and accidental spills in the SEZ or in the transmission line construction area). An additional area of indirect effects was considered for 37 mi (60 km) of the transmission corridor that would extend beyond the 5 mi (8 km) area of indirect effects for the SEZ. The potential degree of indirect effects would decrease with increasing distance from the SEZ and transmission line. The area of indirect effects was identified on the basis of professional judgment and was considered sufficiently large to bound the area that would potentially be subject to indirect effects. These areas of direct and indirect effects are defined and the impact assessment approach is described in Appendix M.

Dominant land cover habitat in the affected area is intermountain scrub-shrub, and the primary vegetation community types within the affected area are mixed salt desert scrub and sagebrush (*Artemisia* spp.) (see Section 13.3.10). The only aquatic or riparian habitats in the affected area occur within and along the Wah Wah Wash, which runs south to north through the eastern portion of the SEZ, and the Beaver River, which intersects the assumed transmission corridor approximately 20 mi (32 km) east of the SEZ (Figure 13.3.12.1-1).

13.3.11.1 Amphibians and Reptiles

13.3.11.1.1 Affected Environment

This section addresses amphibian and reptile species that are known to occur, or for which potentially suitable habitat occurs, on or within the potentially affected area of the proposed Wah Wah Valley SEZ. The list of amphibian and reptile species potentially present in the SEZ area was determined from range maps and habitat information available from the Utah

1 Conservation Data Center (UDWR 2009a). Land cover types suitable for each species were
2 determined from SWReGAP (USGS 2004, 2005a, 2007). See Appendix M for additional
3 information on the approach used.
4

5 Seven amphibian species occur in Beaver County, within which the proposed Wah Wah
6 Valley SEZ is located (UDWR 2009a). Based on species distributions within this area and
7 habitat preferences of the amphibian species, only the Great Basin spadefoot (*Spea*
8 *intermontana*) and the Great Plains toad (*Bufo cognatus*) would be expected to occur within
9 the SEZ (Stebbins 2003; UDWR 2009a).
10

11 Twenty-five reptile species are known to occur within Beaver County (UDWR 2009a).
12 About half of these species could occur within the proposed Wah Wah Valley SEZ
13 (Stebbins 2003; UDWR 2009a). Species expected to be fairly common to abundant within
14 the SEZ area include the common sagebrush lizard (*Sceloporus graciosus*), desert horned
15 lizard (*Phrynosoma platyrhinos*), eastern fence lizard (*S. undulatus*), gophersnake (*Pituophis*
16 *catenifer*), greater short-horned lizard (*Phrynosoma hernandesi*), long-nosed leopard lizard
17 (*Gambelia wislizenii*), nightsnake (*Hypsiglena torquata*), tiger whiptail (*Aspidoscelis tigris*),
18 and wandering gartersnake (*Thamnophis elegans vagrans*, a subspecies of terrestrial
19 gartersnake).
20

21 Table 13.3.11.1-1 provides habitat information for representative amphibian and reptile
22 species that could occur within the proposed Wah Wah Valley SEZ.
23
24

25 **13.3.11.1.2 Impacts**

26

27 The types of impacts that amphibians and reptiles could incur from construction,
28 operation, and decommissioning of utility-scale solar energy facilities are discussed in
29 Section 5.10.2.1. Any such impacts would be minimized through the implementation of
30 required programmatic design features described in Appendix A, Section A.2.2, and through
31 any additional mitigation applied. Section 13.3.11.1.3, below, identifies SEZ-specific design
32 features of particular relevance to the proposed Wah Wah Valley SEZ.
33

34 The assessment of impacts on amphibian and reptile species is based on available
35 information on the presence of species in the affected area, as presented in Section 13.3.11.1.1
36 following the analysis approach described in Appendix M. Additional NEPA assessments and
37 coordination with state natural resource agencies may be needed to address project-specific
38 impacts more thoroughly. These assessments and consultations could result in additional actions
39 required to avoid or mitigate impacts on amphibians and reptiles (see Section 13.3.11.1.3).
40

41 In general, impacts on amphibians and reptiles would result from habitat disturbance
42 (i.e., habitat reduction, fragmentation, and alteration) and from disturbance, injury, or mortality
43 to individual amphibians and reptiles. On the basis of the magnitude of impacts on amphibians
44 and reptiles summarized in Table 13.3.11.1-1, direct impacts on amphibian and reptile species
45 would be small, because 0.4% or less of potentially suitable habitats identified for the species in

TABLE 13.3.11.1-1 Habitats, Potential Impacts, and Potential Mitigation for Representative Amphibian and Reptile Species That Could Occur on or in the Affected Area of the Proposed Wah Wah Valley SEZ

Common Name (Scientific Name)	Habitat ^a	Maximum Area of Potential Habitat Affected ^b			Overall Impact Magnitude ^f and Species-Specific Mitigation ^g
		Within SEZ (Direct Effects) ^c	Outside SEZ (Indirect Effects) ^d	Within Transmission Corridor (Indirect and Direct Effects) ^e	
Amphibians					
Great Basin spadefoot (<i>Spea intermontana</i>)	Sagebrush flats, semidesert shrublands, pinyon-juniper woodlands, and spruce-fir forests. Breeds in temporary and permanent waters including rain pools, pools in intermittent streams, and flooded areas along streams. About 3,659,600 acres ^h of potentially suitable habitat occurs within the SEZ region.	2,276 acres of potentially suitable habitat lost (0.06% of available potentially suitable habitat) during construction and operations	63,280 acres of potentially suitable habitat (1.7% of available potentially suitable habitat)	1,067 acres of potentially suitable habitat lost (0.03% of available potentially suitable habitat) and 21,465 acres in area of indirect effects	Small overall impact. Avoid development in Wah Wah Wash.
Great Plains toad (<i>Bufo cognatus</i>)	Prefers desert, grassland, and agricultural habitats. Breeds in shallow temporary pools, quiet areas of streams, marshes, irrigation ditches, and flooded fields. In cold winter months, burrows underground and becomes inactive. About 915,931 acres of potentially suitable habitat occurs within the SEZ region.	3,488 acres of potentially suitable habitat lost (0.4% of available potentially suitable habitat) during construction and operations	54,265 acres of potentially suitable habitat (5.9% of available potentially suitable habitat)	331 acres of potentially suitable habitat lost (0.04% of available potentially suitable habitat) and 6,653 acres in area of indirect effects	Small overall impact. Avoid development in Wah Wah Wash.

TABLE 13.3.11.1-1 (Cont.)

Common Name (Scientific Name)	Habitat ^a	Maximum Area of Potential Habitat Affected ^b			Overall Impact Magnitude ^f and Species-Specific Mitigation ^g
		Within SEZ (Direct Effects) ^c	Outside SEZ (Indirect Effects) ^d	Within Transmission Corridor (Indirect and Direct Effects) ^e	
Lizards					
Common sagebrush lizard (<i>Sceloporus graciosus</i>)	Open ground with scattered low bushes. Usually found in sagebrush habitat, but also occurs in many other types of habitat including pinyon-juniper areas and open forests. Sometimes abundant in prairie dog colonies. Becomes inactive during cold winter months, often using stone piles, shrubs, or rodent burrows for cover. About 4,506,900 acres of potentially suitable habitat occurs within the SEZ region.	4,878 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat) during construction and operations	116,334 acres of potentially suitable habitat (2.6% of available potentially suitable habitat)	1,361 acres of potentially suitable habitat lost (0.03% of available potentially suitable habitat) and 27,379 acres in area of indirect effects	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effects.
Desert horned lizard (<i>Phrynosoma platyrhinos</i>)	Deserts dominated by sagebrush, creosote bush, greasewood, or cactus. Occurs on sandy flats, alluvial fans, washes, and edge of dunes. Burrows in soil during periods of inactivity. About 3,074,500 acres of potentially suitable habitat occurs in the SEZ region.	4,878 acres of potentially suitable habitat lost (0.2% of available potentially suitable habitat) during construction and operations	94,876 acres of potentially suitable habitat (3.1% of available potentially suitable habitat)	880 acres of potentially suitable habitat lost (0.03% of available potentially suitable habitat) and 17,699 acres in area of indirect effects	Small overall impact. Other than avoiding development in Wah Wah Wash, no species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effects.

TABLE 13.3.11.1-1 (Cont.)

Common Name (Scientific Name)	Habitat ^a	Maximum Area of Potential Habitat Affected ^b			Overall Impact Magnitude ^f and Species-Specific Mitigation ^g
		Within SEZ (Direct Effects) ^c	Outside SEZ (Indirect Effects) ^d	Within Transmission Corridor (Indirect and Direct Effects) ^e	
Lizards (Cont.)					
Eastern fence lizard (<i>Sceloporus undulatus</i>)	Sunny, rocky habitats of cliffs, talus, old lava flows and cones, canyons, and outcrops. Various vegetation adjacent to or among rocks includes montane forests, woodlands, semidesert shrubland, and various forbs and grasses. About 2,614,700 acres of potentially suitable habitat occurs in the SEZ region.	3,489 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat) during construction and operations	73,577 acres of potentially suitable habitat (2.8% of available potentially suitable habitat)	663 acres of potentially suitable habitat lost (0.03% of available potentially suitable habitat) and 13,332 acres in area of indirect effects	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effects.
Greater short-horned lizard (<i>Phrynosoma hernandesi</i>)	Short-grass prairies, sagebrush, semidesert shrublands, shale barrens, pinyon-juniper and pine-oak woodlands, oak-grass associations, and open conifer forests in mountainous areas. About 2,651,600 acres of potentially suitable habitat occurs in the SEZ region.	1,966 acres of potentially suitable habitat lost (0.06% of available potentially suitable habitat) during construction and operations	38,771 acres of potentially suitable habitat (1.5% of available potentially suitable habitat)	904 acres of potentially suitable habitat lost (0.03% of available potentially suitable habitat) and 18,188 acres in area of indirect effects	Small overall impact.

TABLE 13.3.11.1-1 (Cont.)

Common Name (Scientific Name)	Habitat ^a	Maximum Area of Potential Habitat Affected ^b			Overall Impact Magnitude ^f and Species-Specific Mitigation ^g
		Within SEZ (Direct Effects) ^c	Outside SEZ (Indirect Effects) ^d	Within Transmission Corridor (Indirect and Direct Effects) ^e	
Lizards (Cont.)					
Long-nosed leopard lizard (<i>Gambelia wislizenii</i>)	Desert and semidesert areas with scattered shrubs. Prefers sandy or gravelly flats and plains. Also prefers areas with abundant rodent burrows that they occupy when inactive. About 2,060,300 acres of potentially suitable habitat occurs in the SEZ region.	2,276 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat) during construction and operations	40,591 acres of potentially suitable habitat (2.0% of available potentially suitable habitat)	550 acres of potentially suitable habitat lost (0.03% of available potentially suitable habitat) and 11,059 acres in area of indirect effects	Small overall impact.
Tiger whiptail (<i>Aspidoscelis tigris</i>)	Primarily occurs in sparsely vegetated desert and shrubland habitats. During cold winter months, it often occupies underground burrows created by rodents or other lizards. About 3,436,600 acres of potentially suitable habitat occurs within the SEZ region.	4,878 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat) during construction and operations	97,087 acres of potentially suitable habitat (2.8% of available potentially suitable habitat)	773 acres of potentially suitable habitat lost (0.02% of available potentially suitable habitat) and 15,554 acres in area of indirect effects	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effects.

TABLE 13.3.11.1-1 (Cont.)

Common Name (Scientific Name)	Habitat ^a	Maximum Area of Potential Habitat Affected ^b			Overall Impact Magnitude ^f and Species-Specific Mitigation ^g
		Within SEZ (Direct Effects) ^c	Outside SEZ (Indirect Effects) ^d	Within Transmission Corridor (Indirect and Direct Effects) ^e	
Snakes					
Gophersnake (<i>Pituophis catenifer</i>)	Plains grasslands, sandhills, riparian areas, marshes, edges of ponds and lakes, rocky canyons, semidesert and mountain shrublands, montane woodlands, rural and suburban areas, and agricultural areas. Likely inhabits pocket gopher burrows in winter. About 3,180,200 acres of potentially suitable habitat occurs in the SEZ region.	1,970 acres of potentially suitable habitat lost (0.06% of available potentially suitable habitat) during construction and operations	46,686 acres of potentially suitable habitat (1.5% of available potentially suitable habitat)	965 acres of potentially suitable habitat lost (0.03% of available potentially suitable habitat) and 19,424 acres in area of indirect effects	Small overall impact.
Nightsnake (<i>Hypsiglena torquata</i>)	Arid and semiarid desert flats, plains, and woodlands; areas with rocky and sandy soils are preferred. During cold periods of the year, seeks refuge underground, in crevices, or under rocks. About 3,123,300 acres of potentially suitable habitat occurs within the SEZ region.	4,878 acres of potentially suitable habitat lost (0.2% of available potentially suitable habitat) during construction and operations	88,920 acres of potentially suitable habitat (2.8% of available potentially suitable habitat)	691 acres of potentially suitable habitat lost (0.02% of available potentially suitable habitat) and 13,910 acres in area of indirect effects	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effects.

TABLE 13.3.11.1-1 (Cont.)

Common Name (Scientific Name)	Habitat ^a	Maximum Area of Potential Habitat Affected ^b			Overall Impact Magnitude ^f and Species-Specific Mitigation ^g
		Within SEZ (Direct Effects) ^c	Outside SEZ (Indirect Effects) ^d	Within Transmission Corridor (Indirect and Direct Effects) ^e	
Snakes (Cont.)					
Wandering gartersnake (<i>Thamnophis elegans vagrans</i>)	Most terrestrial or wetland habitats in the vicinity of any lotic or lentic body of water. However, also occurs many miles from surface waters. About 1,898,100 acres of potentially suitable habitat occurs within the SEZ region.	2,868 acres of potentially suitable habitat lost (0.2% of available potentially suitable habitat) during construction and operations	69,571 acres of potentially suitable habitat (3.7% of available potentially suitable habitat)	741 acres of potentially suitable habitat lost (0.04% of available potentially suitable habitat) and 14,907 acres in area of indirect effects	Small overall impact.

- ^a Potentially suitable habitat was determined by using SWReGAP habitat suitability and land cover models. Area of potentially suitable habitat for each species is presented for the SEZ region, which is defined as the area within 50 mi (80 km) of the SEZ center.
- ^b Maximum area of potentially suitable habitat that could be affected relative to availability within the SEZ region. Habitat availability for each species within the region was determined by using SWReGAP habitat suitability and land cover models. This approach probably overestimates the amount of suitable habitat in the project area.
- ^c Direct effects within the SEZ consist of the ground-disturbing activities associated with construction and the maintenance of an altered environment associated with operations. A maximum of 4,878 acres of direct effect within the SEZ was assumed.
- ^d Area of indirect effects was assumed to be the area adjacent to the SEZ within 5 mi (8 km) of the SEZ boundary and within the 1-mi (1.6-km) wide transmission line corridor (less the assumed area of direct effects) that extends beyond the 5-mi (8-km) area adjacent to the SEZ boundary. Indirect effects include effects from surface runoff, dust, noise, lighting, and so on from the SEZ but do not include ground-disturbing activities. The potential degree of indirect effects would decrease with increasing distance from the SEZ.

Footnotes continued on next page.

TABLE 13.3.11.1-1 (Cont.)

- ^e For transmission development, direct effects were estimated within a 42-mi (67.6-km) long, 250-ft (76-m) wide ROW for an assumed new transmission line connecting the SEZ to the nearest existing line. Indirect effects were estimated within a 1-mi (1.6-km) wide transmission corridor to the existing transmission line, less the assumed area of direct effects.
- ^f Overall impact magnitude categories were based on professional judgment and are as follows: (1) *small*: $\leq 1\%$ of the population or its habitat would be lost and the activity would not result in a measurable change in carrying capacity or population size in the affected area; (2) *moderate*: >1 but $\leq 10\%$ of the population or its habitat would be lost and the activity would result in a measurable but moderate (not destabilizing) change in carrying capacity or population size in the affected area; (3) *large*: $>10\%$ of a population or its habitat would be lost and the activity would result in a large, measurable, and destabilizing change in carrying capacity or population size in the affected area. Note that much greater weight was given to the magnitude of direct effects because those effects would be difficult to mitigate. Programmatic design features would reduce most indirect effects to negligible levels.
- ^g 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.
- ^h To convert acres to km^2 , multiply by 0.004047.

Sources: NatureServe (2010); UDWR (2009a); USGS (2004, 2005a, 2007).

1 the SEZ region would be lost. Larger areas of potentially suitable habitats for most amphibian
2 and reptile species occur within the area of potential indirect effects (e.g., up to 5.9% of available
3 habitat for the Great Plains toad). Other impacts on amphibians and reptiles could result from
4 surface water and sediment runoff from disturbed areas, fugitive dust generated by project
5 activities, accidental spills, collection, and harassment. These indirect impacts would be
6 negligible with implementation of programmatic design features.

7
8 Decommissioning after operations cease could result in short-term negative impacts on
9 individuals and habitats within and adjacent to the SEZ. The negative impacts of
10 decommissioning would be reduced or eliminated as reclamation proceeds. Potentially long-term
11 benefits could accrue as habitats are restored in previously disturbed areas. Section 5.10.2.1.4
12 provides an overview of the impacts of decommissioning and reclamation on wildlife. Of
13 particular importance for amphibian and reptile species would be the restoration of original
14 ground surface contours, soils, and native plant communities associated with semiarid
15 shrublands.

16 17 18 ***13.3.11.1.3 SEZ-Specific Design Features and Design Feature Effectiveness***

19
20 The implementation of required programmatic design features described in Appendix A,
21 Section A.2.2, would reduce the potential for effects on amphibians and reptiles, especially for
22 those species that depend on habitat types that can be avoided (e.g., Wah Wah Wash). Indirect
23 impacts could be reduced to negligible levels by implementing programmatic design features,
24 especially those engineering controls that would reduce runoff, sedimentation, spills, and fugitive
25 dust. While SEZ-specific design features are best established when specific project details are
26 considered, the following design features can be identified at this time:

- 27
28 • Wah Wah Wash, which could provide potential breeding sites for the Great
29 Basin spadefoot and Great Plains toad, should be avoided.
30
31 • Instream and nearshore disturbance of the Beaver River should be avoided
32 when constructing the transmission line.
33

34 If these SEZ-specific design features are implemented in addition to programmatic design
35 features, impacts on amphibian and reptile species could be reduced. However, because
36 potentially suitable habitats for a number of the amphibian and reptile species occur throughout
37 much of the SEZ, additional species-specific mitigation of direct effects for those species would
38 be difficult or infeasible.

1 **13.3.11.2 Birds**

2
3
4 **13.3.11.2.1 Affected Environment**

5
6 This section addresses bird species that are known to occur, or for which potentially
7 suitable habitat occurs, on or within the potentially affected area of the proposed Wah Wah
8 Valley SEZ. The list of bird species potentially present in the SEZ area was determined
9 from range maps and habitat information available from the Utah Conservation Data Center
10 (UDWR 2009a). Land cover types suitable for each species were determined from SWReGAP
11 (USGS 2004, 2005a, 2007). See Appendix M for additional information on the approach used.

12
13 More than 235 species of birds are reported from Beaver County (Utah Ornithological
14 Society 2007). However, based on habitat preferences for these species, only about 10% of the
15 species would be expected to occur regularly within the proposed Wah Wah Valley SEZ.

16
17
18 **Waterfowl, Wading Birds, and Shorebirds**

19
20 As discussed in Section 4.10.2.2.2, waterfowl (ducks, geese, and swans), wading birds
21 (herons and cranes), and shorebirds (avocets, gulls, plovers, rails, sandpipers, stilts, and
22 terns) are among the most abundant groups of birds in the six-state solar study area. About
23 80 waterfowl, wading bird, and shorebird species have been reported from Beaver County
24 (Utah Ornithological Society 2007). However, within the proposed Wah Wah Valley SEZ,
25 waterfowl, wading birds, and shorebird species would be mostly absent to uncommon. The
26 Wah Wah Wash within the SEZ may attract a shorebird species, but the perennial stream, canal,
27 lake, and reservoir habitats within 50 mi (80 km) of the SEZ would provide more viable habitats
28 for this group of birds.

29
30
31 **Neotropical Migrants**

32
33 As discussed in Section 4.10.2.2.3, neotropical migrants represent the most diverse
34 category of birds within the six-state solar energy study area. Species that are common or
35 abundant within Beaver County, and that would be expected to occur within the proposed
36 Wah Wah Valley SEZ, include Bewick’s wren (*Thryomanes bewickii*), Brewer’s sparrow
37 (*Spizella breweri*), common raven (*Corvus corax*), gray flycatcher (*Empidonax wrightii*),
38 greater roadrunner (*Geococcyx californianus*), horned lark (*Eremophila alpestris*), Le Conte’s
39 thrasher (*Toxostoma leconteii*), loggerhead shrike (*Lanius ludovicianus*), rock wren (*Salpinctes*
40 *obsoletus*), sage sparrow (*Amphispiza belli*), sage thrasher (*Oreoscoptes montanus*), vesper
41 sparrow (*Pooecetes gramineus*), and western kingbird (*Tyrannus verticalis*) (UDWR 2009a).

1 **Birds of Prey**

2
3 Section 4.10.2.2.4 provides an overview of the birds of prey (raptors, owls, and vultures)
4 within the six-state solar study area. Twenty-three birds-of-prey species have been reported from
5 Beaver County (Utah Ornithological Society 2007). Raptor species that could occur within the
6 proposed Wah Wah Valley SEZ include the American kestrel (*Falco sparverius*), golden eagle
7 (*Aquila chrysaetos*), red-tailed hawk (*Buteo jamaicensis*), rough-legged hawk (*Buteo lagopus*,
8 only during winter), Swainson’s hawk (*Buteo swainsoni*), and turkey vulture (*Cathartes aura*)
9 (UDWR 2009a).

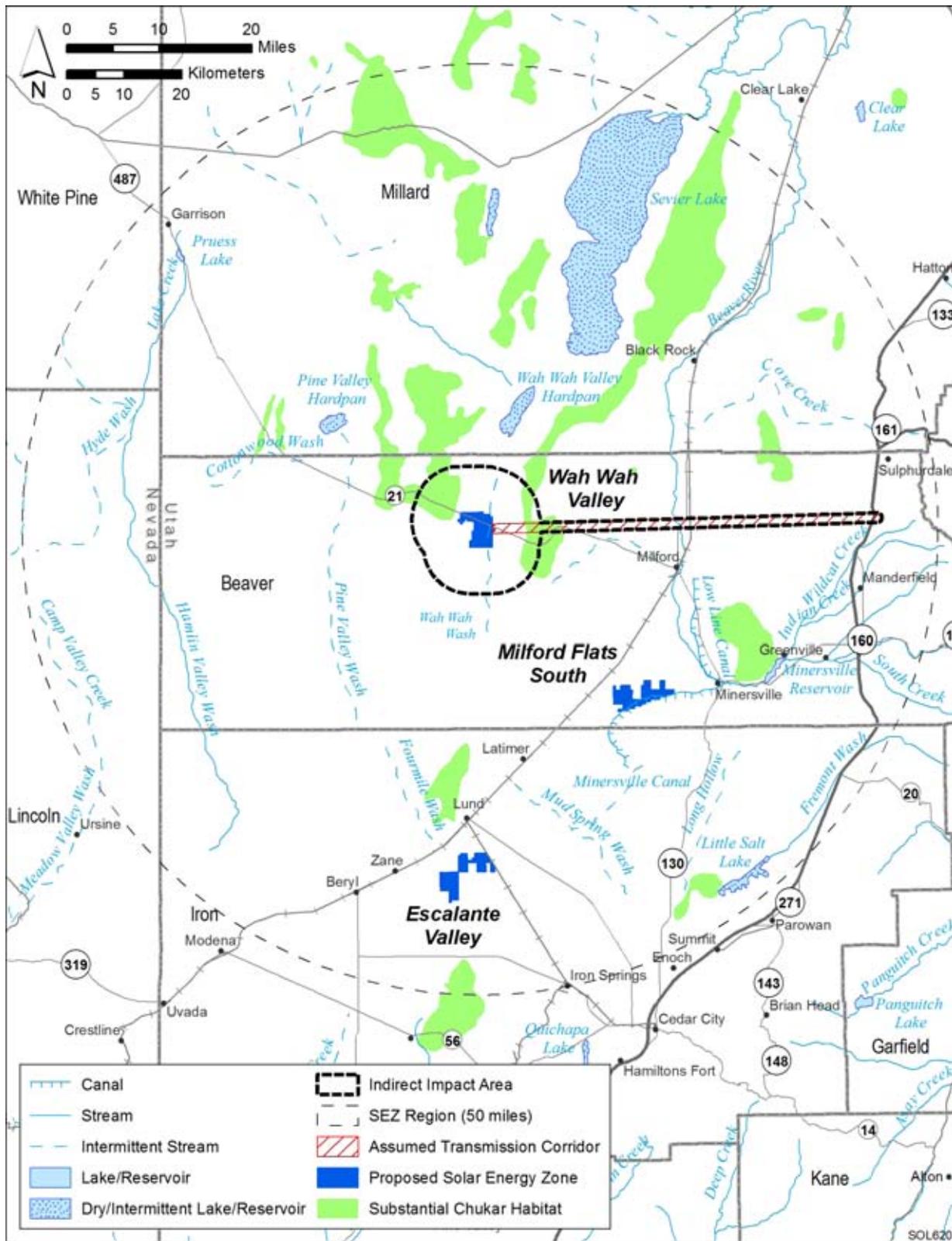
10
11
12 **Upland Game Birds**

13
14 Section 4.10.2.2.5 provides an overview of the upland game birds (primarily pheasants,
15 grouse, quail, and doves) that occur within the six-state solar study area. Upland game species
16 that could occur within the proposed Wah Wah Valley SEZ include the chukar (*Alectoris*
17 *chukar*), mourning dove (*Zenaida macroura*), and wild turkey (*Meleagris gallopavo*)
18 (UDWR 2009a).

19
20 The chukar is an introduced upland game bird. A management plan for the chukar in
21 Utah has been developed (UDWR 2003a). Preferred habitat for the chukar is steep, semiarid
22 slopes with rocky outcrops and shrubs with a grass and forb understory. Sources of water are
23 required during hot, dry periods; during the brooding period most birds are found within 0.25 mi
24 (0.4 km) of water (UDWR 2003a, 2009a). Grasses and seeds of forbs are the main foods; insects
25 are important to young chicks (UDWR 2003a). Urbanization and elimination of sagebrush are
26 among the major factors that adversely affect chukar habitat. Population declines periodically
27 occur due to severe winters or droughts (UDWR 2003a). The chukar is distributed throughout
28 Utah; nearly 20,400,000 acres (82,556 km²) of potential high and substantial value habitats⁷
29 occur in the state (UDWR 2003a). Figure 13.3.11.2-1 shows the location of the proposed Wah
30 Wah Valley SEZ relative to substantial chukar habitat. No areas of substantial chukar habitat
31 occur within the SEZ. However, the closest distance of the SEZ to substantial chukar habitat is
32 only about 0.5 mi (0.8 km) away. Nearly 344,200 acres (1,393 km²) of substantial chukar habitat
33 occurs within the SEZ region.

34
35 Two subspecies of wild turkey occur in Utah, the Rio Grande wild turkey (*Meleagris*
36 *gallopavo intermedia*) and Merriam’s wild turkey (*M. g. merriami*). Both subspecies have
37 established populations within Beaver County (UDWR 2009a). The Rio Grande wild turkey
38 prefers cottonwood riparian areas of rivers associated with oak-pine and pinyon-juniper forests,
39 while the Merriam’s wild turkey inhabits open stands of ponderosa pine interspersed with
40 aspen, grass meadows, and oaks grading into pinyon pine and juniper (UDWR 2009a). Areas
41 of brushy cover are used for nesting. Food items include pine nuts, acorn, grasses, weed seeds,

⁷ High value habitat is an area that provides for intensive use by a wildlife species. Substantial value habitat is an area used by a wildlife species but is not crucial for population survival. Degradation or unavailability of substantial value habitat will not lead to significant declines in carrying capacity and/or numbers of the wildlife species in question.



1
 2 **FIGURE 13.3.11.2-1 Location of the Proposed Wah Wah Valley SEZ Relative to Substantial**
 3 **Chukar Habitat (Source: UDWR 2006)**

1 and green vegetation. Insects are also important in the diet of young poult (UDWR 2009a).
2 Figure 13.3.11.2-2 shows the location of the proposed Wah Wah Valley SEZ relative to crucial
3 wild turkey habitat.⁸ The closest distance of the SEZ to crucial wild turkey habitat is about
4 9 mi (15 km). About 227,650 acres (921 km²) of crucial wild turkey habitat occurs within the
5 SEZ region.

6
7 Table 13.3.11.2-1 provides habitat information for representative bird species that could
8 occur within the proposed Wah Wah Valley SEZ. Special status bird species are discussed in
9 Section 13.3.12.

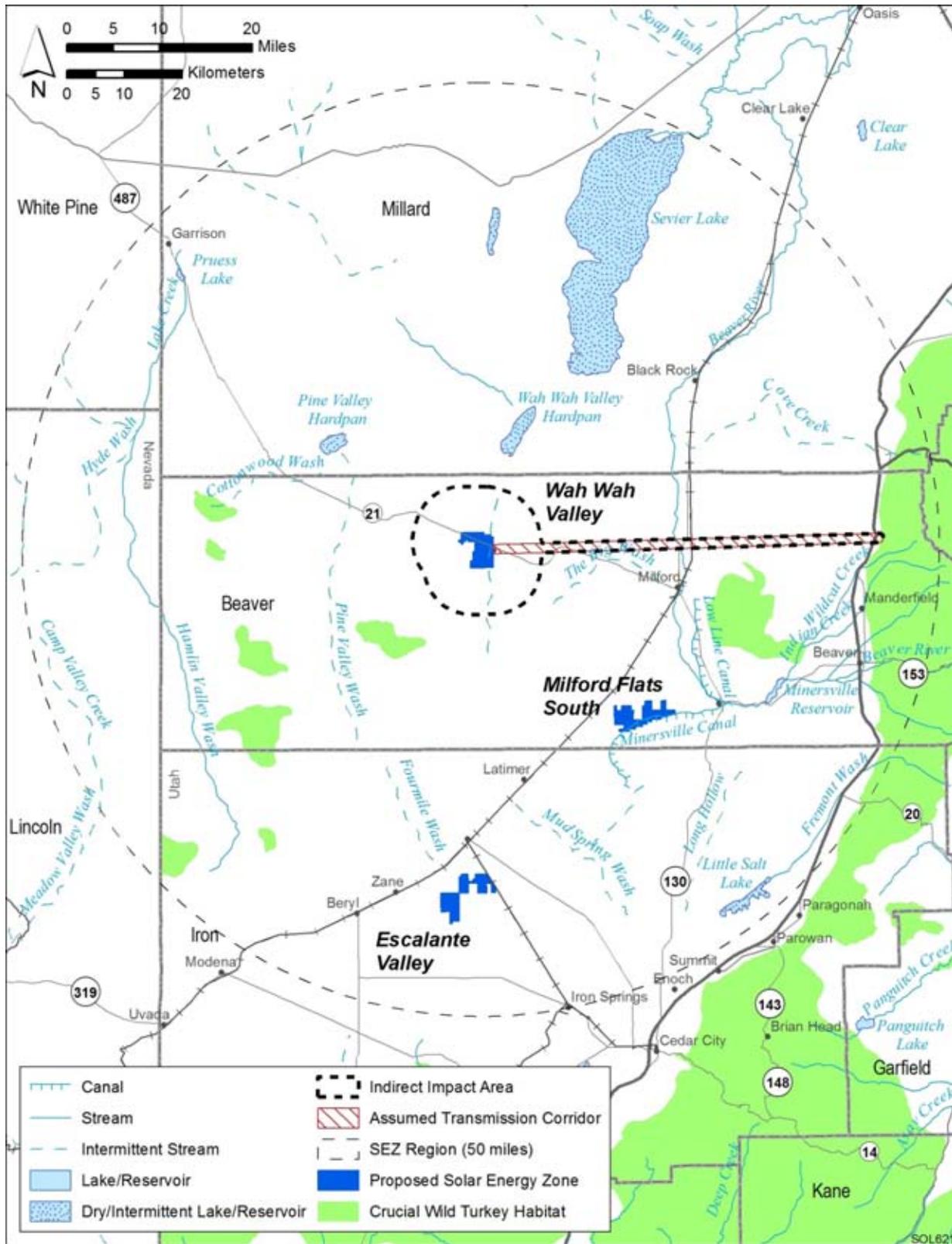
10 11 12 **13.3.11.2.2 Impacts**

13
14 The types of impacts that birds could incur from construction, operation, and
15 decommissioning of utility-scale solar energy facilities are discussed in Section 5.10.2.1. Any
16 such impacts would be minimized through the implementation of required programmatic design
17 features described in Appendix A, Section A.2.2, and through any additional mitigation applied.
18 Section 13.3.11.2.3, below, identifies design features of particular relevance to the proposed
19 Wah Wah Valley SEZ.

20
21 The assessment of impacts on bird species is based on available information on the
22 presence of species in the affected area, as presented in Section 13.3.11.2.1 following the
23 analysis approach described in Appendix M. Additional NEPA assessments and coordination
24 with federal or state natural resource agencies may be needed to address project-specific impacts
25 more thoroughly. These assessments and consultations could result in additional required actions
26 to avoid or mitigate impacts on birds (see Section 13.3.11.2.3).

27
28 In general, impacts on birds would result from habitat disturbance (i.e., habitat reduction,
29 fragmentation, and alteration) and from disturbance, injury, or mortality to individual birds.
30 Table 13.3.11.2-1 summarizes the potential magnitude of impacts on representative bird species
31 resulting from solar energy development in the proposed Wah Wah Valley SEZ. Direct impacts
32 on bird species would be small for all species, because only 0.3% or less of potentially suitable
33 habitats for the bird species would be lost (Table 13.3.11.2-1). The transmission line route
34 associated with the SEZ could result in the direct impact on 121 acres (0.5 km²) of substantial
35 chukar habitat and 8 acres (0.03 km²) of crucial wild turkey habitat, which represent only 0.03%
36 of the substantial chukar habitat and <0.004% of the crucial wild turkey habitat within the SEZ
37 region. Larger areas of potentially suitable habitat for bird species occur within the area of
38 potential indirect effects (e.g., up to 3.7% of potentially suitable habitat for the rough-legged
39 hawk). Other impacts on birds could result from collision with vehicles and infrastructure (e.g.,
40 buildings and fences), surface water and sediment runoff from disturbed areas, fugitive dust
41 generated by project activities, noise, lighting, spread of invasive species, accidental spills, and
42 harassment. Indirect impacts on areas outside the SEZ (e.g., impacts caused by dust generation,

⁸ Crucial value habitat is essential to the life history requirements of the wildlife species. Degradation or unavailability of crucial habitat will lead to significant declines in carrying capacity and/or numbers of the wildlife species in question.



1
 2 **FIGURE 13.3.11.2-2 Location of the Proposed Wah Wah Valley SEZ Relative to Crucial Wild**
 3 **Turkey Habitat (Source: UDRW 2006)**

TABLE 13.3.11.2-1 Habitats, Potential Impacts, and Potential Mitigation for Representative Bird Species That Could Occur on or in the Affected Area of the Proposed Wah Wah Valley SEZ

Common Name (Scientific Name)	Habitat ^a	Maximum Area of Potential Habitat Affected ^b			Overall Impact Magnitude ^f and Species-Specific Mitigation ^g
		Within SEZ (Direct Effects) ^c	Outside SEZ (Indirect Effects) ^d	Within Transmission Corridor (Indirect and Direct Effects) ^e	
<i>Neotropical Migrants</i>					
Bewick's wren (<i>Thryomanes bewickii</i>)	Generally associated with dense, brushy habitats. A permanent resident of lowland deserts and pinyon-juniper forests of southern Utah. Breeding occurs in brushy areas of open woodlands and other open habitats. A cavity nester with nests constructed in small enclosed areas such as tree cavities, nesting boxes, rock crevices, or the center of a brush pile. About 4,031,300 acres ^h of potentially suitable habitat occurs within the SEZ region.	3,484 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat) during construction and operations	100,447 acres of potentially suitable habitat (2.5% of available potentially suitable habitat)	1,291 acres of potentially suitable habitat lost (0.03% of available potentially suitable habitat) and 25,983 acres in area of indirect effects	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effects. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.

TABLE 13.3.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat ^a	Maximum Area of Potential Habitat Affected ^b			Overall Impact Magnitude ^f and Species-Specific Mitigation ^g
		Within SEZ (Direct Effects) ^c	Outside SEZ (Indirect Effects) ^d	Within Transmission Corridor (Indirect and Direct Effects) ^e	
<i>Neotropical Migrants (Cont.)</i>					
Brewer's sparrow (<i>Spizella breweri</i>)	Considered a shrubsteppe obligate. Occupies open desert scrub and cropland habitats. However, may also occur in high desert scrub (greasewood) habitats, particularly where adjacent to shrubsteppe habitats. Nests are usually located in patches of sagebrush that are taller and denser, with more bare ground and less herbaceous cover, than the surrounding habitat. Also breeds in large sagebrush openings in pinyon-juniper or coniferous forest habitats. About 2,195,200 acres of potentially suitable habitat occurs in the SEZ region.	2,286 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat) during construction and operations	44,401 acres of potentially suitable habitat (2.0% of available potentially suitable habitat)	734 acres of potentially suitable habitat lost (0.03% of available potentially suitable habitat) and 14,763 acres in area of indirect effects	Small overall impact. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.

TABLE 13.3.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat ^a	Maximum Area of Potential Habitat Affected ^b			Overall Impact Magnitude ^f and Species-Specific Mitigation ^g
		Within SEZ (Direct Effects) ^c	Outside SEZ (Indirect Effects) ^d	Within Transmission Corridor (Indirect and Direct Effects) ^e	
Neotropical Migrants (Cont.)					
Common raven (<i>Corvus corax</i>)	Occurs in most habitats. Trees and cliffs provide cover. Roosts primarily in trees. Nests on cliffs, bluffs, tall trees, or human-made structures. Forages in sparse, open terrain. About 4,894,500 acres of potentially suitable habitat occurs in the SEZ region.	4,878 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat) during construction and operations	120,203 acres of potentially suitable habitat (2.5% of available potentially suitable habitat)	1,427 acres of potentially suitable habitat lost (0.03% of available potentially suitable habitat) and 28,700 acres in area of indirect effects	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effects. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.
Gray flycatcher (<i>Empidonax wrightii</i>)	Inhabits woodlands and shrublands occurring predominately in pinyon-juniper, sagebrush, and desert shrublands. Nests are located low in shrubs or small trees, usually 2 to 5 ft above ground. About 3,580,900 acres of potentially suitable habitat occurs within the SEZ region.	2,867 acres of potentially suitable habitat lost (0.08% of available potentially suitable habitat) during construction and operations	98,399 acres of potentially suitable habitat (2.7% of available potentially suitable habitat)	1,257 acres of potentially suitable habitat lost (0.04% of available potentially suitable habitat) and 25,293 acres in area of indirect effects	Small overall impact. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.

TABLE 13.3.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat ^a	Maximum Area of Potential Habitat Affected ^b			Overall Impact Magnitude ^f and Species-Specific Mitigation ^g
		Within SEZ (Direct Effects) ^c	Outside SEZ (Indirect Effects) ^d	Within Transmission Corridor (Indirect and Direct Effects) ^e	
<i>Neotropical Migrants (Cont.)</i>					
Greater roadrunner (<i>Geococcyx californianus</i>)	Desert scrub, chaparral, edges of cultivated lands, and arid open areas with scattered brush. Requires thickets, large bushes, or small trees for shade, refuge, and roosting. Usually nests low in trees, shrubs, or clumps of cactus. Rarely nests on ground. About 3,685,000 acres of potentially suitable habitat occurs in the SEZ region.	2,276 acres of potentially suitable habitat lost (0.06% of available potentially suitable habitat) during construction and operations	63,069 acres of potentially suitable habitat (1.7% of available potentially suitable habitat)	1,010 acres of potentially suitable habitat lost (0.03% of available potentially suitable habitat) and 20,326 acres in area of indirect effects	Small overall impact. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.
Le Conte's thrasher (<i>Toxostoma leconteii</i>)	Open desert wash, alkali desert scrub, and desert succulent shrub habitats. Prefers to nest and forage in arroyos and washes lined with dense stands of creosote bush and salt bush. About 722,100 acres of potentially suitable habitat occurs in the SEZ region.	2,271 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat) during construction and operations	16,792 acres of potentially suitable habitat (2.3% of available potentially suitable habitat)	63 acres of potentially suitable habitat lost (0.009% of available potentially suitable habitat) and 1,273 acres in area of indirect effects	Small overall impact. Avoid development in Wah Wah Wash. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.

TABLE 13.3.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat ^a	Maximum Area of Potential Habitat Affected ^b			Overall Impact Magnitude ^f and Species-Specific Mitigation ^g
		Within SEZ (Direct Effects) ^c	Outside SEZ (Indirect Effects) ^d	Within Transmission Corridor (Indirect and Direct Effects) ^e	
<i>Neotropical Migrants (Cont.)</i>					
Loggerhead shrike (<i>Lanius ludovicianus</i>)	Open country with scattered trees and shrubs, savanna, desert scrub, desert riparian, Joshua tree, and, occasionally, open woodland habitats. Perches on poles, wires, or fence posts (suitable hunting perches are important aspect of habitat). Nests in shrubs and small trees. About 4,651,100 acres of potentially suitable habitat occurs in the SEZ region.	4,878 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat) during construction and operations	118,401 acres of potentially suitable habitat (2.5% of available potentially suitable habitat)	1,390 acres of potentially suitable habitat lost (0.03% of available potentially suitable habitat) and 27,962 acres in area of indirect effects	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effects. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.
Rock wren (<i>Salpinctes obsoletus</i>)	Arid and semiarid habitats. Breeds in areas with talus slopes, scrublands, or dry washes. Nests, constructed of plant materials, are located in rock crevices, and the nest entrance is paved with small rocks and stones. About 4,747,600 acres of potentially suitable habitat occurs within the SEZ region.	4,878 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat) during construction and operations	118,403 acres of potentially suitable habitat (2.5% of available potentially suitable habitat)	1,397 acres of potentially suitable habitat lost (0.03% of available potentially suitable habitat) and 28,098 acres in area of indirect effects	Small overall impact. Avoid development in Wah Wah Wash. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.

TABLE 13.3.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat ^a	Maximum Area of Potential Habitat Affected ^b			Overall Impact Magnitude ^f and Species-Specific Mitigation ^g
		Within SEZ (Direct Effects) ^c	Outside SEZ (Indirect Effects) ^d	Within Transmission Corridor (Indirect and Direct Effects) ^e	
<i>Neotropical Migrants (Cont.)</i>					
Sage sparrow (<i>Amphispiza belli</i>)	Prefers shrubland, grassland, and desert habitats. The nest, constructed of twigs and grasses, is located either low in a shrub or on the ground. About 4,607,600 acres of potentially suitable habitat occurs within the SEZ region.	4,878 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat) during construction and operations	117,968 acres of potentially suitable habitat (2.6% of available potentially suitable habitat)	1,397 acres of potentially suitable habitat lost (0.03% of available potentially suitable habitat) and 28,113 acres in area of indirect effects	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effects. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.

TABLE 13.3.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat ^a	Maximum Area of Potential Habitat Affected ^b			Overall Impact Magnitude ^f and Species-Specific Mitigation ^g
		Within SEZ (Direct Effects) ^c	Outside SEZ (Indirect Effects) ^d	Within Transmission Corridor (Indirect and Direct Effects) ^e	
Neotropical Migrants (Cont.)					
Sage thrasher (<i>Oreoscoptes montanus</i>)	Breeds in sagebrush shrublands, other shrublands, and cholla grasslands in the western United States and winters in the southwestern United States and northern Mexico. In Utah, nests in greasewood and sagebrush habitats in low-elevation deserts where it constructs a bulky nest in a concealed location, usually in sagebrush or on the ground, using twigs and grasses. About 3,411,600 acres of potentially suitable habitat occurs within the SEZ region.	4,878 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat) during construction and operations	17,968 acres of potentially suitable habitat (0.5% of available potentially suitable habitat)	1,397 acres of potentially suitable habitat lost (0.04% of available potentially suitable habitat) and 28,113 acres in area of indirect effects	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effects. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.

TABLE 13.3.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat ^a	Maximum Area of Potential Habitat Affected ^b			Overall Impact Magnitude ^f and Species-Specific Mitigation ^g
		Within SEZ (Direct Effects) ^c	Outside SEZ (Indirect Effects) ^d	Within Transmission Corridor (Indirect and Direct Effects) ^e	
Neotropical Migrants (Cont.)					
Vesper sparrow (<i>Pooecetes gramineus</i>)	Breeds in grasslands, open shrublands mixed with grasslands, and open pinyon-juniper woodlands. Occurs in open riparian and agricultural areas during migration. About 2,344,100 acres of potentially suitable habitat occurs in the SEZ region.	3,205 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat) during construction and operations	82,468 acres of potentially suitable habitat (3.5% of available potentially suitable habitat)	991 acres of potentially suitable habitat lost (0.04% of available potentially suitable habitat) and 19,932 acres in area of indirect effects	Small overall impact. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.
Western kingbird (<i>Tyrannus verticalis</i>)	Occurs in a variety of habitats including riparian forests and woodlands, savannahs, shrublands, agricultural lands, deserts, and urban areas. Nesting occurs in trees, bushes, and other raised areas, such as buildings. Migrates to Central America or the southeastern United States for the winter. About 3,253,100 acres of potentially suitable habitat occurs within the SEZ region.	4,878 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat) during construction and operations	100,819 acres of potentially suitable habitat (3.1% of available potentially suitable habitat)	1,172 acres of potentially suitable habitat lost (0.04% of available potentially suitable habitat) and 23,575 acres in area of indirect effects	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effects. Some measure of mitigation provided by the requirements of the Migratory Bird Treaty Act.

TABLE 13.3.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat ^a	Maximum Area of Potential Habitat Affected ^b			Overall Impact Magnitude ^f and Species-Specific Mitigation ^g
		Within SEZ (Direct Effects) ^c	Outside SEZ (Indirect Effects) ^d	Within Transmission Corridor (Indirect and Direct Effects) ^e	
Birds of Prey					
American kestrel (<i>Falco sparverius</i>)	Occurs in most open habitats, in various shrub and early successional forest habitats, forest openings, and various ecotones. Perches on trees, snags, rocks, utility poles and wires, and fence posts. Uses cavities in trees, snags, rock areas, banks, and buildings for nesting and cover. About 4,705,700 acres of potentially suitable habitat occurs in the SEZ region.	4,878 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat) during construction and operations	117,879 acres of potentially suitable habitat (2.5% of available potentially suitable habitat)	1,360 acres of potentially suitable habitat lost (0.03% of available potentially suitable habitat) and 27,363 acres in area of indirect effects	Small overall impact. No species- specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effects.
Golden eagle (<i>Aquila chrysaetos</i>)	Grasslands, shrublands, pinyon-juniper woodlands, and ponderosa pine forests. Occasionally in most other habitats, especially during migration and winter. Nests on cliffs and sometimes trees in rugged areas, with breeding birds ranging widely over surrounding areas. About 4,677,100 acres of potentially suitable habitat occurs in the SEZ region.	4,878 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat) during construction and operations	118,264 acres of potentially suitable habitat (2.5% of available potentially suitable habitat)	1,402 acres of potentially suitable habitat lost (0.03% of available potentially suitable habitat) and 28,211 acres in area of indirect effects	Small overall impact. No species- specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effects. Some measure of mitigation provided by the requirements of the Bald and Golden Eagle Protection Act.

TABLE 13.3.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat ^a	Maximum Area of Potential Habitat Affected ^b			Overall Impact Magnitude ^f and Species-Specific Mitigation ^g
		Within SEZ (Direct Effects) ^c	Outside SEZ (Indirect Effects) ^d	Within Transmission Corridor (Indirect and Direct Effects) ^e	
<i>Birds of Prey</i> (Cont.)					
Red-tailed hawk (<i>Buteo jamaicensis</i>)	Wide variety of habitats from deserts, mountains, and populated valleys. Open areas with scattered, elevated perch sites such as scrub desert, plains and montane grassland, agricultural fields, pastures urban parklands, broken coniferous forests, and deciduous woodland. Nests on cliff ledges or in tall trees. About 2,617,600 acres of potentially suitable habitat occurs in the SEZ region.	4,878 acres of potentially suitable habitat lost (0.2% of available potentially suitable habitat) during construction and operations	87,560 acres of potentially suitable habitat (3.3% of available potentially suitable habitat)	808 acres of potentially suitable habitat lost (0.03% of available potentially suitable habitat) and 16,261 acres in area of indirect effects	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effects.
Rough-legged hawk (<i>Buteo lagopus</i>)	A winter resident in Utah where it is usually found in grasslands, fields, marshes, sagebrush flats, and other open habitats. About 2,193,700 acres of potentially suitable habitat occurs within the SEZ region.	2,877 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat) during construction and operations	80,369 acres of potentially suitable habitat (3.7% of available potentially suitable habitat)	931 acres of potentially suitable habitat lost (0.04% of available potentially suitable habitat) and 18,738 acres in area of indirect effects	Small overall impact.

TABLE 13.3.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat ^a	Maximum Area of Potential Habitat Affected ^b			Overall Impact Magnitude ^f and Species-Specific Mitigation ^g
		Within SEZ (Direct Effects) ^c	Outside SEZ (Indirect Effects) ^d	Within Transmission Corridor (Indirect and Direct Effects) ^e	
<i>Birds of Prey</i> (Cont.)					
Swainson's hawk (<i>Buteo swainsoni</i>)	Grasslands, agricultural areas, shrublands, and riparian forests. Nests in trees in or near open areas. Migrants often occur in treeless areas. Large flocks often occur in agricultural areas near locust infestations. About 2,286,700 acres of potentially suitable habitat occurs in the SEZ region.	2,872 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat) during construction and operations	71,855 acres of potentially suitable habitat (3.1% of available potentially suitable habitat)	629 acres of potentially suitable habitat lost (0.03% of available potentially suitable habitat) and 12,654 acres in area of indirect effects	Small overall impact.
Turkey vulture (<i>Cathartes aura</i>)	Occurs in open stages of most habitats that provide adequate cliffs or large trees for nesting, roosting, and resting. Migrates and forages over most open habitats. Roosts communally in trees, exposed boulders, and occasionally transmission line support towers. About 2,308,400 acres of potentially suitable habitat occurs in the SEZ region.	2,271 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat) during construction and operations	37,185 acres of potentially suitable habitat (1.6% of available potentially suitable habitat)	394 acres of potentially suitable habitat lost (0.02% of available potentially suitable habitat) and 8,926 acres in area of indirect effects	Small overall impact.

TABLE 13.3.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat ^a	Maximum Area of Potential Habitat Affected ^b			Overall Impact Magnitude ^f and Species-Specific Mitigation ^g
		Within SEZ (Direct Effects) ^c	Outside SEZ (Indirect Effects) ^d	Within Transmission Corridor (Indirect and Direct Effects) ^e	
Upland Game Birds					
Chukar (<i>Alectoris chukar</i>)	Steep, semiarid slopes with rocky outcrops and shrubs with a grass and forb understory. Sources of water are required during hot, dry periods, with most birds during the brooding period found within 0.25 mi (0.4 km) of water. About 4,436,400 acres of potentially suitable habitat occurs in the SEZ region.	4,878 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat) during construction and operations	116,755 acres of potentially suitable habitat (2.6% of available potentially suitable habitat)	1,375 acres of potentially suitable habitat lost (0.03% of available potentially suitable habitat) and 27,664 acres in area of indirect effects	Small overall impact. Avoid development in Wah Wah Wash.
Mourning dove (<i>Zenaida macroura</i>)	Habitat generalist, occurring in grasslands, shrublands, croplands, lowland and foothill riparian forests, ponderosa pine forests, deserts, and urban and suburban areas. Rarely in aspen and other forests, coniferous woodlands, and alpine tundra. Nests on ground or in trees. Winters mostly in lowland riparian forests adjacent to cropland. About 4,484,700 acres of potentially suitable habitat occurs in the SEZ region.	4,878 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat) during construction and operations	110,851 acres of potentially suitable habitat (2.5% of available potentially suitable habitat)	1,330 acres of potentially suitable habitat lost (0.03% of available potentially suitable habitat) and 26,754 acres in area of indirect effects	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effects.

TABLE 13.3.11.2-1 (Cont.)

Common Name (Scientific Name)	Habitat ^a	Maximum Area of Potential Habitat Affected ^b			Overall Impact Magnitude ^f and Species-Specific Mitigation ^g
		Within SEZ (Direct Effects) ^c	Outside SEZ (Indirect Effects) ^d	Within Transmission Corridor (Indirect and Direct Effects) ^e	
Upland Game Birds (Cont.)					
Wild turkey (<i>Meleagris gallopavo</i>)	The Rio Grande wild turkey prefers cottonwood riparian areas of rivers associated with oak-pine and pinyon-juniper forests; while the Merriam's wild turkey inhabits open stands of ponderosa pine interspersed with aspen, grass meadows, and oaks grading into pinyon pine and juniper. Areas of brushy cover are used for nesting. About 3,832,500 acres of potentially suitable habitat occurs within the SEZ region.	2,878 acres of potentially suitable habitat lost (0.08% of available potentially suitable habitat) during construction and operations	99,982 acres of potentially suitable habitat (2.6% of available potentially suitable habitat)	1,312 acres of potentially suitable habitat lost (0.03% of available potentially suitable habitat) and 26,386 acres in area of indirect effects	Small overall impact.

^a Potentially suitable habitat was determined by using SWReGAP habitat suitability and land cover models. Area of potentially suitable habitat for each species is presented for the SEZ region, which is defined as the area within 50 mi (80 km) of the SEZ center.

^b Maximum area of potentially suitable habitat that could be affected relative to availability within the SEZ region. Habitat availability for each species within the region was determined by using SWReGAP habitat suitability and land cover models. This approach probably overestimates the amount of suitable habitat in the project area.

^c Direct effects within the SEZ consist of the ground-disturbing activities associated with construction and maintenance of an altered environment associated with operations. A maximum of 4,878 acres of direct effects within the SEZ was assumed.

Footnotes continued on next page.

TABLE 13.3.11.1-1 (Cont.)

-
- ^d Area of indirect effects was assumed to be the area adjacent to the SEZ within 5 mi (8 km) of the SEZ boundary and within the 1-mi (1.6-km) wide transmission line corridor (less the assumed area of direct effects) that extends beyond the 5-mi (8-km) area adjacent to the SEZ boundary. Indirect effects include effects from surface runoff, dust, noise, lighting, and so on from the SEZ but do not include ground-disturbing activities. The potential degree of indirect effects would decrease with increasing distance from the SEZ.
- ^e For transmission development, direct effects were estimated within a 42-mi (67.6-km) long, 250-ft (76-m) wide ROW for an assumed new transmission line connecting the SEZ to the nearest existing line. Indirect effects were estimated within a 1-mi (1.6-km) wide transmission corridor to the existing transmission line, less the assumed area of direct effects.
- ^f Overall impact magnitude categories were based on professional judgment and are as follows: (1) *small*: $\leq 1\%$ of the population or its habitat would be lost and the activity would not result in a measurable change in carrying capacity or population size in the affected area; (2) *moderate*: >1 but $\leq 10\%$ of the population or its habitat would be lost and the activity would result in a measurable but moderate (not destabilizing) change in carrying capacity or population size in the affected area; (3) *large*: $>10\%$ of a population or its habitat would be lost and the activity would result in a large, measurable, and destabilizing change in carrying capacity or population size in the affected area. Note that much greater weight was given to the magnitude of direct effects because those effects would be difficult to mitigate. Programmatic design features would reduce most indirect effects to negligible levels.
- ^g 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.
- ^h To convert acres to km^2 , multiply by 0.004047.

Sources: NatureServe (2010); UDWR (2009a); USGS (2004, 2005a, 2007).

1 erosion, and sedimentation) are expected to be negligible with implementation of programmatic
2 design features.

3
4 Decommissioning after operations cease could result in short-term negative impacts on
5 individuals and habitats within and adjacent to the SEZ. The negative impacts of
6 decommissioning would be reduced or eliminated as reclamation proceeds. Potentially long-term
7 benefits could accrue as habitats are restored in previously disturbed areas. Section 5.10.2.1.4
8 provides an overview of the impacts of decommissioning and reclamation on wildlife. Of
9 particular importance for bird species would be the restoration of original ground surface
10 contours, soils, and native plant communities associated with semiarid shrublands.

11 12 13 ***13.3.11.2.3 SEZ-Specific Design Features and Design Feature Effectiveness***

14
15 The successful implementation of programmatic design features presented in
16 Appendix A, Section A.2.2, would reduce the potential for effects on birds, especially for species
17 that depend on habitat types that can be avoided (e.g., Wah Wah Wash). Indirect impacts could
18 be reduced to negligible levels by implementing programmatic design features, especially those
19 engineering controls that would reduce runoff, sedimentation, spills, and fugitive dust. While
20 SEZ-specific design features important for reducing impacts on birds are best established when
21 specific project details are considered, the following design features can be identified at this
22 time:

- 23
24 • For solar energy developments that occur within the SEZ, the requirements
25 contained within the 2010 Memorandum of Understanding between the BLM
26 and USFWS to promote the conservation of migratory birds will be followed.
- 27
28 • Take⁹ of golden eagles and other raptors should be avoided. Mitigation
29 regarding the golden eagle should be developed in consultation with the
30 USFWS and the UDWR. A permit may be required under the Bald and
31 Golden Eagle Protection Act.
- 32
33 • The steps outlined in the *Utah Field Office Guidelines for Raptor Protection*
34 *from Human and Land Use Disturbances* (Romin and Muck 1999) should
35 be followed.

⁹ Take under the Bald and Golden Eagle Protection Act means to pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, destroy, molest, or disturb. *Disturb* means “to agitate or bother a Bald Eagle or a Golden Eagle to a degree that causes, or is likely to cause, based on the best scientific information available, 1) injury to an eagle, 2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or 3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior. If compatible with the preservation of bald and golden eagles, the Secretary of the Interior may issue regulations authorizing the taking, possession and transportation of these eagles for scientific or exhibition purposes, for religious purposes of Indian tribes or for the protection of wildlife, agricultural or other interests.” Requests by Native Americans to take eagles from the wild, where the take is necessary to meet the religious purposes of the Tribe, will be given first priority over all other take except, as necessary, to alleviate safety emergencies.

- 1 • Wah Wah Wash, which could provide an occasional watering and feeding site
2 for some bird species, should be avoided.
3
- 4 • Instream and nearshore disturbance of the Beaver River should be avoided
5 when constructing the transmission line.
6

7 If these SEZ-specific design features are implemented in addition to programmatic design
8 features, impacts on bird species could be reduced. However, because potentially suitable
9 habitats for a number of the bird species occur throughout much of the SEZ, additional species-
10 specific mitigation of direct effects for those species would be difficult or infeasible.
11

12 **13.3.11.3 Mammals**

14 ***13.3.11.3.1 Affected Environment***

15
16 This section addresses mammal species that are known to occur, or for which
17 potentially suitable habitat occurs, on or within the potentially affected area of the proposed
18 Wah Wah Valley SEZ. The list of mammal species potentially present in the SEZ area was
19 determined from range maps and habitat information available from the Utah Conservation
20 Data Center (UDWR 2009a). Land cover types suitable for each species were determined from
21 SWReGAP (USGS 2004, 2005a, 2007). See Appendix M for additional information on the
22 approach used. Nearly 80 species of mammals are known to occur within Beaver County
23 (UDWR 2009a). Based on species distributions and habitat preferences, less than 30 mammal
24 species could occur within the proposed Wah Wah Valley SEZ (UDWR 2009a). Similar to the
25 overview of mammals provided for the six-state solar energy study area (Section 4.10.2.3), the
26 following discussion for the SEZ emphasizes big game and other mammal species that (1) have
27 key habitats within or near the SEZ, (2) are important to humans (e.g., big game, small game,
28 and furbearer species), and/or (3) are representative of other species that share important
29 habitats.
30
31

32 **Big Game**

33
34 The big game species that could occur within the area of the proposed Wah Wah Valley
35 SEZ include American black bear (*Ursus americanus*, fairly common in Utah), cougar (*Puma*
36 *concolor*, fairly common in Utah), elk (*Cervis canadensis*, common in the mountainous regions
37 of Utah), mule deer (*Odocoileus hemionus*, common in Utah), and pronghorn (*Antilocapra*
38 *americana*, common in Utah) (UDWR 2009a).
39
40

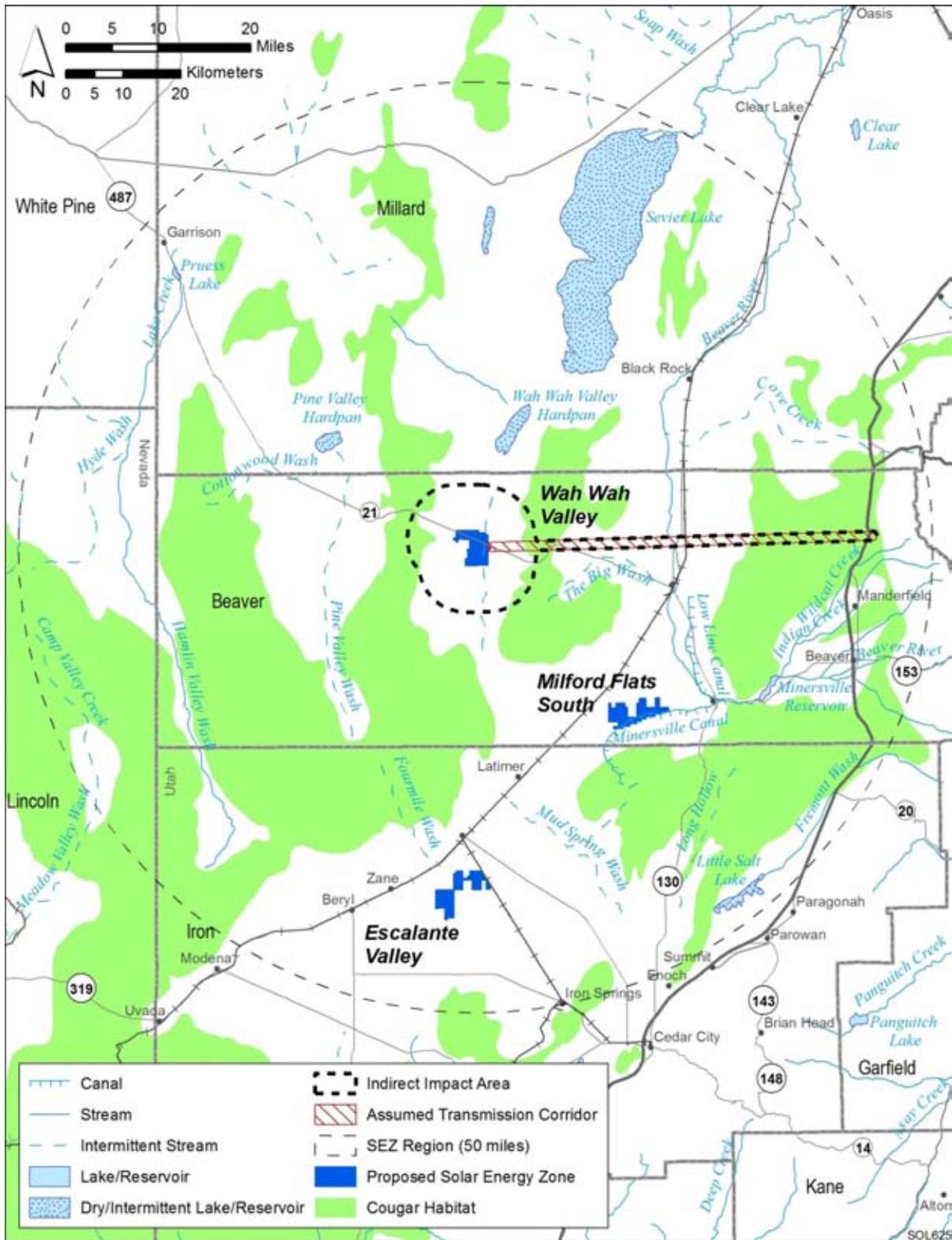
41
42
43 ***American Black Bear.*** The American black bear occurs throughout much of Utah, where
44 it primarily inhabits forested areas (UDWR 2009a). However, no areas of substantial or
45

1 crucial American black bear habitat occur near the SEZ. The closest distance of the SEZ to
2 substantial and crucial American black bear habitat is 26 mi (42 km).

3
4
5 **Cougar.** The cougar is fairly common in Utah (UDWR 2009a). A management plan for
6 the cougar in Utah has been developed (UDWR 2009b). Cougar habitat encompasses about
7 59,325,200 acres (240,080 km²) in Utah; the statewide cougar population is estimated at
8 2,500 to 4,000 (UDWR 2009b). Cougars occur mostly in rough, broken foothills and canyon
9 country, often in association with pinyon-juniper and pine-oak brush areas (CDOW 2009;
10 Pederson undated), avoiding areas of sagebrush and low-growing shrubs or other areas without
11 tall cover (Pederson undated). The proposed Wah Wah Valley SEZ overlaps the cougar's
12 overall range, but the SEZ does not occur within high-value cougar habitat (UDWR 2009a).
13 Figure 13.3.11.3-1 shows the location of the SEZ relative to areas of the woodland and shrub-
14 covered low mountain Level IV ecoregion. These ecoregion areas would potentially provide
15 suitable cougar habitat. The closest distance of these areas to the proposed Wah Wah Valley
16 SEZ is 2 mi (3 km). About 1,473,600 acres (5,963 km²) of the woodland and shrub-covered
17 low mountain Level IV ecoregion occurs within the SEZ region.

18
19
20 **Elk.** Elk are common in most mountainous regions of Utah. They inhabit mountain
21 meadows and forests during the summer and foothills and valley grasslands during the
22 winter (UDWR 2009a). Elk require an available water source on all seasonal ranges and prefer
23 to be within 0.5 mi (0.8 km) of water. Elk also require cover for escape and protection
24 (UDWR 2010b). Crucial elk habitat is continuously being lost and fragmented within Utah.
25 The statewide management plan for elk has been updated (UDWR 2010b). The management
26 objective is a statewide population of 80,000 elk. The statewide population estimate in 2009
27 was nearly 68,000. Within the Southwest Desert, Indian Peaks Big Game Management Unit,
28 which encompasses the area that includes the proposed Wah Wah Valley SEZ, the population
29 estimate was 1,150 (UDWR 2010b). Figure 13.3.11.3-2 shows the location of the SEZ relative
30 to areas of crucial elk habitat. The closest distance from the SEZ to these areas is 2 mi (3 km).
31 About 881,500 acres (3,567 km²) of crucial elk habitat occurs within the SEZ region.

32
33
34 **Mule Deer.** The mule deer is the most important game species in Utah. It is common
35 throughout the state, being least abundant in desert areas (UDWR 2008). A statewide
36 management plan for mule deer has been developed (UDWR 2008). Crucial mule deer habitat
37 is continuously being lost and fragmented within Utah. The statewide population has been
38 declining for more than 30 years. The 2003 post-season statewide population estimate was
39 302,000, much lower than the long-term management objective of 426,000 (UDWR 2008).
40 Figure 13.3.11.3-3 shows the location of the proposed Wah Wah Valley SEZ relative to areas
41 of crucial mule deer habitat. The closest distance of the SEZ to these areas is 3 mi (5 km). About
42 1,610,600 acres (6,518 km²) of crucial mule deer habitat occurs within the SEZ region.



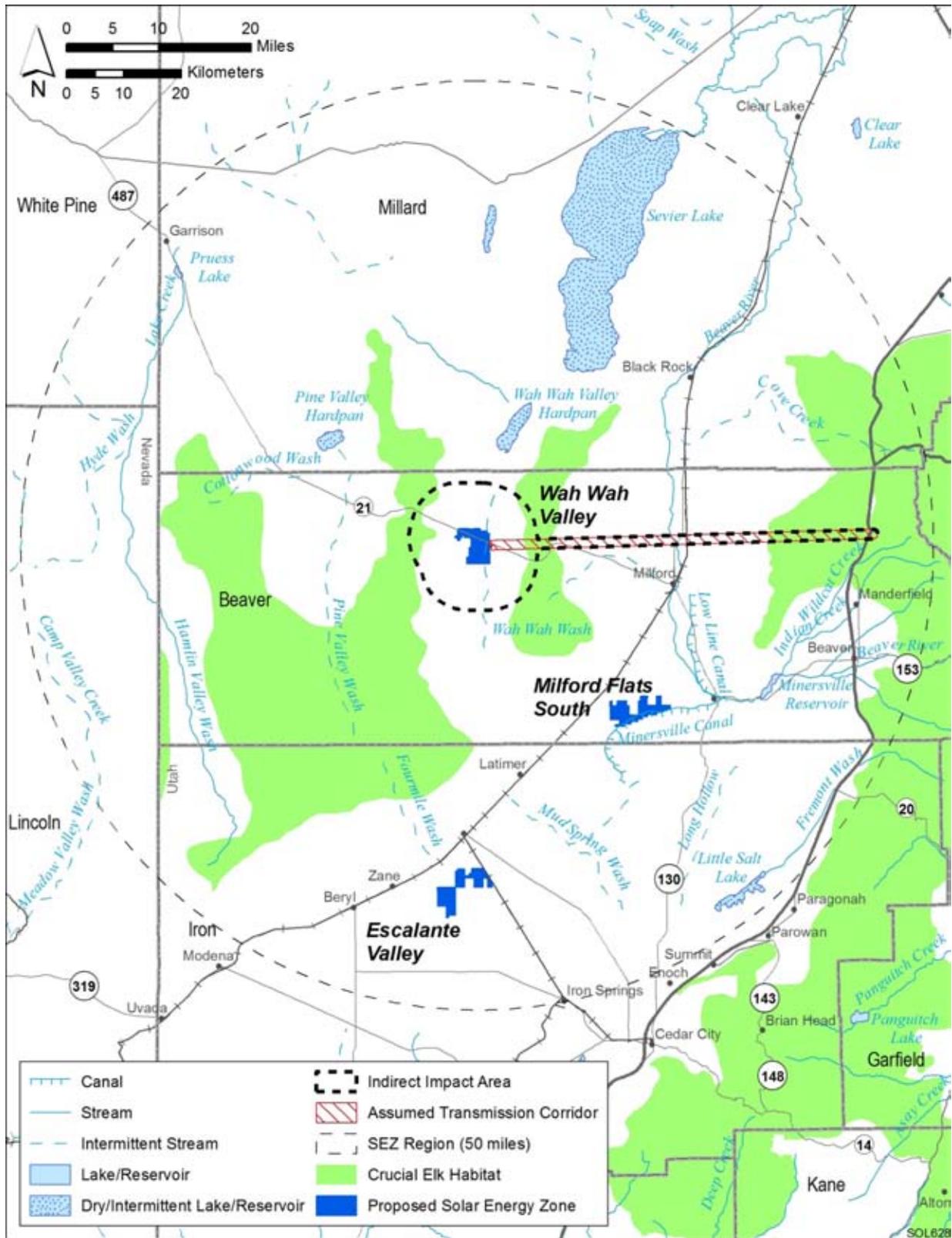
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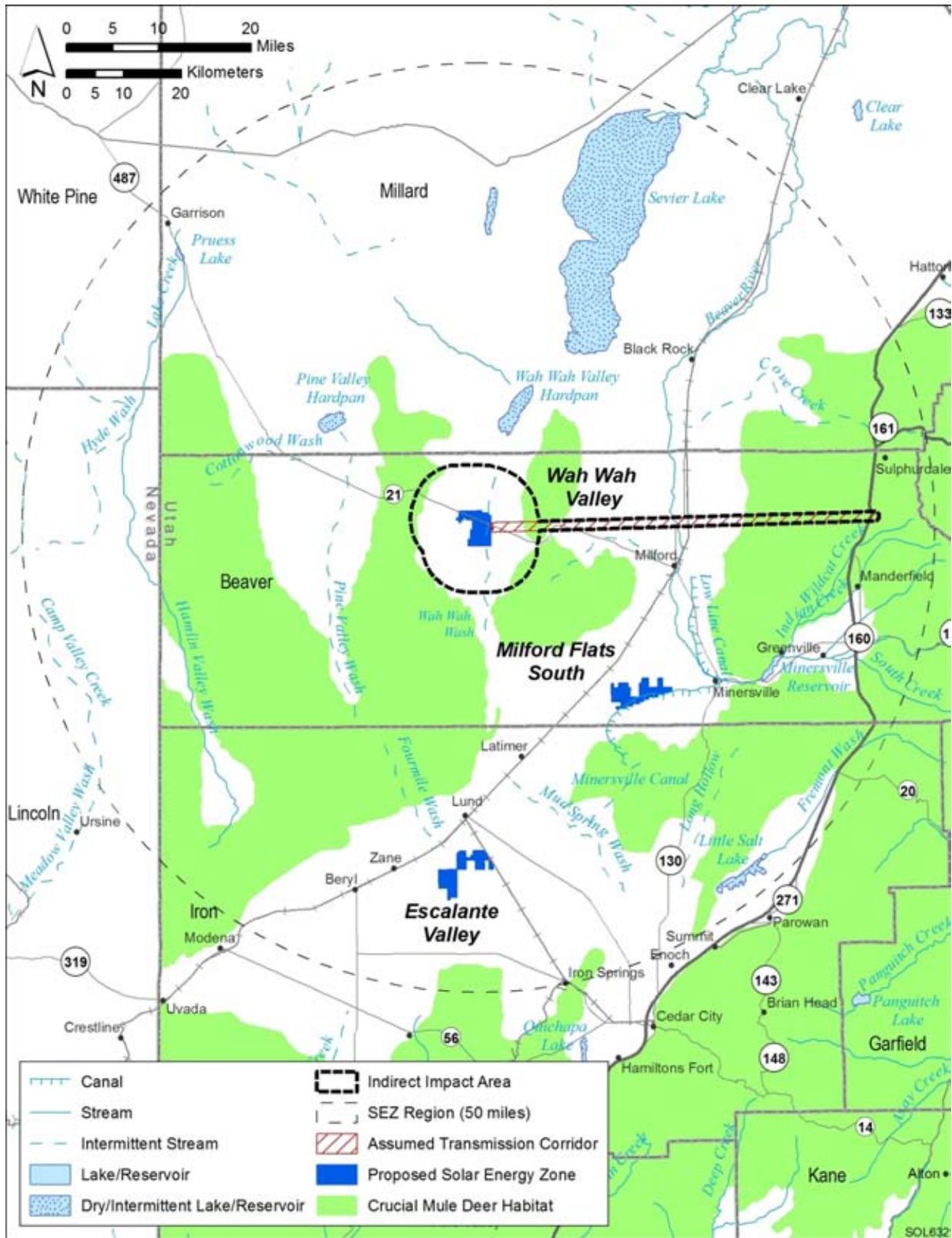
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FIGURE 13.3.11.3-1 Location of the Proposed Wah Wah Valley SEZ Relative to Woodland and Shrub-Covered Low Mountain Level IV Ecoregion Areas (Cougar Habitat) (Source: Woods et al. 2001)



2 **FIGURE 13.3.11.3-2 Location of the Proposed Wah Wah Valley SEZ Relative to Elk Crucial**
 3 **Habitat Areas (Source: UDWR 2006)**



1
 2 **FIGURE 13.3.11.3-3 Location of the Proposed Wah Wah Valley SEZ Relative to Mule Deer**
 3 **Crucial Habitat Areas (Source: UDWR 2006)**

1 **Pronghorn.** The pronghorn is common in Utah, occurring primarily in shrubsteppe
2 habitat in large expanses of open, low-rolling, or flat terrain (UDWR 2009a,c). A statewide
3 management plan for pronghorn has been developed (UDWR 2009c). The statewide population
4 of pronghorn is estimated at 12,000 to 14,000 (UDWR 2009c). Within the Southwest Desert Big
5 Game Management Unit, which encompasses the proposed Wah Wah Valley SEZ, the
6 population estimate is 1,675 (UDWR 2009c). Figure 13.3.11.3-4 shows that the SEZ is contained
7 within areas of crucial pronghorn habitat. Over 2,680,900 acres (10,849 km²) of crucial
8 pronghorn habitat occurs within the SEZ region.
9

10 **Other Mammals**

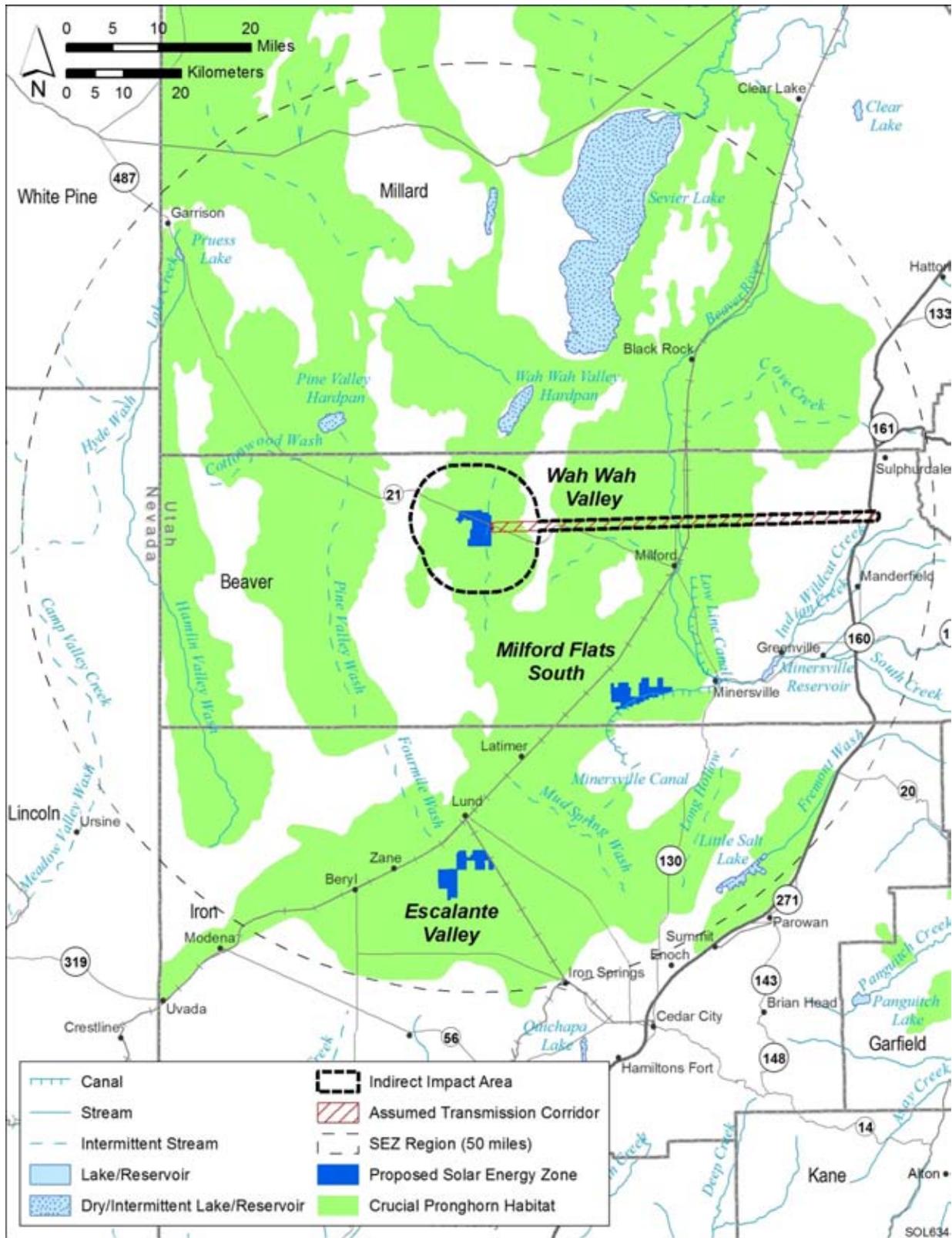
11 A number of small game and furbearer species occur within the area of Beaver County.
12
13 Species that could occur within the area of the proposed Wah Wah Valley SEZ include the
14 American badger (*Taxidea taxus*, common in deserts and grasslands), black-tailed jackrabbit
15 (*Lepus californicus*, most abundant rabbit species in Utah), coyote (*Canis latrans*, common), and
16 desert cottontail (*Sylvilagus audubonii*, widely distributed from desert areas to lower slopes of
17 mountains) (UDWR 2009a).
18
19

20 Nongame (small) mammal species include bats, mice, voles, moles, and shrews. Species
21 that could occur within the area of the proposed Wah Wah Valley SEZ include the desert
22 woodrat (*Neotoma lepida*, common in western Utah), Great Basin pocket mouse (*Perognathus*
23 *parvus*, common), least chipmunk (*Neotamias minimus*, wide-ranging in many types of habitats),
24 northern grasshopper mouse (*Onychomys leucogaster*, common), sagebrush vole (*Lemmiscus*
25 *curtatus*, moderately common), and white-tailed antelope squirrel (*Ammospermophilus leucurus*,
26 common) (UDWR 2009a). Bat species that may occur within the area of the SEZ include the
27 Brazilian free-tailed bat (*Tadarida brasiliensis*), little brown myotis (*Myotis lucifugus*), long-
28 legged myotis (*M. volans*), and western pipistrelle (*Parastrellus hesperus*) (UDWR 2009a).
29 However, roost sites for the bat species (e.g., caves, hollow trees, rock crevices, or buildings)
30 would be limited to absent within the SEZ.
31

32 Table 13.3.11.3-1 provides habitat information for representative mammal species that
33 could occur within the proposed Wah Wah Valley SEZ. Special status mammal species are
34 discussed in Section 13.3.12.
35
36

37 **13.3.11.3.2 Impacts**

38
39 The types of impacts that mammals could incur from construction, operation, and
40 decommissioning of utility-scale solar energy facilities are discussed in Section 5.10.2.1. Any



1
 2 **FIGURE 13.3.11.3-4 Location of the Proposed Wah Wah Valley SEZ Relative to Pronghorn**
 3 **Crucial Habitat Areas (Source: UDWR 2006)**

TABLE 13.3.11.3-1 Habitats, Potential Impacts, and Potential Mitigation for Representative Mammal Species That Could Occur on or in the Affected Area of the Proposed Wah Wah Valley SEZ

Common Name (Scientific Name)	Habitat ^a	Maximum Area of Potential Habitat Affected ^b			Overall Impact Magnitude ^f and Species-Specific Mitigation ^g
		Within SEZ (Direct Effects) ^c	Outside SEZ (Indirect Effects) ^d	Within Transmission Corridor (Indirect and Direct Effects) ^e	
Big Game American black bear (<i>Ursus americanus</i>)	Montane shrublands and forests, and subalpine forests at moderate elevations. About 3,161,500 acres ^h of potentially suitable habitat occurs in the SEZ region.	16 acres of potentially suitable habitat lost (<0.001% of available potentially suitable habitat) during construction and operations	47,169 acres of potentially suitable habitat (1.5% of available potentially suitable habitat)	1,009 acres of potentially suitable habitat lost (0.03% of available potentially suitable habitat) and 20,298 acres in area of indirect effects	Small overall impact. Avoid the intermontane basin big sagebrush shrubland land cover type in the southeastern portion of the SEZ.
Cougar (<i>Puma concolor</i>)	Most common in rough, broken foothills and canyon country, often in association with montane forests, shrublands, and pinyon-juniper woodlands. About 4,472,400 acres of potentially suitable habitat occurs in the SEZ region.	4,878 acres of potentially suitable habitat lost 0.1% of available potentially suitable habitat) during construction and operations	117,149 acres of potentially suitable habitat (2.6% of available potentially suitable habitat)	1,385 acres of potentially suitable habitat lost (0.03% of available potentially suitable habitat) and 27,867 acres in area of indirect effects	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effects.

TABLE 13.3.11.3-1 (Cont.)

Common Name (Scientific Name)	Habitat ^a	Maximum Area of Potential Habitat Affected ^b			Overall Impact Magnitude ^f and Species-Specific Mitigation ^g
		Within SEZ (Direct Effects) ^c	Outside SEZ (Indirect Effects) ^d	Within Transmission Corridor (Indirect and Direct Effects) ^e	
Big Game (Cont.)					
Elk (<i>Cervis canadensis</i>)	Semi-open forest, mountain meadows, foothills, plains, valleys, and alpine tundra. Uses open spaces such as alpine pastures, marshy meadows, river flats, brushy clean cuts, forest edges, and semidesert areas. About 1,820,000 acres of potentially suitable habitat occurs in the SEZ region.	5 acres of potentially suitable habitat lost (<0.001% of available potentially suitable habitat) during construction and operations	30,353 acres of potentially suitable habitat (1.7% of available potentially suitable habitat)	807 acres of potentially suitable habitat lost (0.04% of available potentially suitable habitat) and 16,244 acres in area of indirect effect	Small overall impact. Avoid the intermontane basin big sagebrush shrubland land cover type in the southeastern portion of the SEZ.
Mule deer (<i>Odocoileus hemionus</i>)	Most habitats including coniferous forests, desert shrub, chaparral, and grasslands with shrubs. Greatest densities in shrublands on rough, broken terrain that provides abundant browse and cover. About 3,562,700 acres of potentially suitable habitat occurs in the SEZ region.	4,878 acres of potentially suitable habitat lost (0.2% of available potentially suitable habitat) during construction and operations	102,230 acres of potentially suitable habitat (2.9% of available potentially suitable habitat)	1,203 acres of potentially suitable habitat lost (0.03% of available potentially suitable habitat) and 24,196 acres in area of indirect effects	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effects.

TABLE 13.3.11.3-1 (Cont.)

Common Name (Scientific Name)	Habitat ^a	Maximum Area of Potential Habitat Affected ^b			Overall Impact Magnitude ^f and Species-Specific Mitigation ^g
		Within SEZ (Direct Effects) ^c	Outside SEZ (Indirect Effects) ^d	Within Transmission Corridor (Indirect and Direct Effects) ^e	
Big Game (Cont.)					
Pronghorn (<i>Antilocarpa americana</i>)	Grasslands and semidesert shrublands on rolling topography that affords good visibility. Most abundant in shortgrass or midgrass prairies and least common in xeric habitats. About 1,917,800 acres of potentially suitable habitat occurs in the SEZ region.	1,513 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat) during construction and operations	78,460 acres of potentially suitable habitat (3.4% of available potentially suitable habitat)	820 acres of potentially suitable habitat lost (0.04% of available potentially suitable habitat) and 16,504 acres in area of indirect effects	Small overall impact.
Small Game and Furbearers					
American badger (<i>Taxidea taxus</i>)	Open grasslands and deserts, meadows in subalpine and montane forests, alpine tundra. Digs burrows in friable soils. Most common in areas with abundant populations of ground squirrels, prairie dogs, and pocket gophers. About 4,737,300 acres of potentially suitable habitat occurs in the SEZ region.	4,878 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat) during construction and operations	117,979 acres of potentially suitable habitat (2.5% of available potentially suitable habitat)	1,395 acres of potentially suitable habitat lost (0.03% of available potentially suitable habitat) and 28,064 acres in area of indirect effects	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effects.

TABLE 13.3.11.3-1 (Cont.)

Common Name (Scientific Name)	Habitat ^a	Maximum Area of Potential Habitat Affected ^b			Overall Impact Magnitude ^f and Species-Specific Mitigation ^g
		Within SEZ (Direct Effects) ^c	Outside SEZ (Indirect Effects) ^d	Within Transmission Corridor (Indirect and Direct Effects) ^e	
<i>Small Game and Furbearers (Cont.)</i>					
Black-tailed jackrabbit (<i>Lepus californicus</i>)	Open plains, fields, and deserts with scattered thickets or patches of shrubs. Also open, early stages of forests and chaparral habitats. Rests during the day in shallow depressions, and uses shrubs for cover. About 4,796,800 acres of potentially suitable habitat occurs in the SEZ region.	4,878 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat) during construction and operations	117,700 acres of potentially suitable habitat (2.5% of available potentially suitable habitat)	1,349 acres of potentially suitable habitat lost (0.03% of available potentially suitable habitat) and 27,141 acres in area of indirect effects	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effects.
Coyote (<i>Canis latrans</i>)	All habitats at all elevations. Least common in dense coniferous forest. Where human control efforts occur, they are restricted to broken, rough country with abundant shrub cover and a good supply of rabbits or rodents. About 5,013,800 acres of potentially suitable habitat occurs in the SEZ region.	4,878 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat) during construction and operations	120,854 acres of potentially suitable habitat (2.4% of available potentially suitable habitat)	1,428 acres of potentially suitable habitat lost (0.03% of available potentially suitable habitat) and 28,724 acres in area of indirect effects	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effects.

TABLE 13.3.11.3-1 (Cont.)

Common Name (Scientific Name)	Habitat ^a	Maximum Area of Potential Habitat Affected ^b			Overall Impact Magnitude ^f and Species-Specific Mitigation ^g
		Within SEZ (Direct Effects) ^c	Outside SEZ (Indirect Effects) ^d	Within Transmission Corridor (Indirect and Direct Effects) ^e	
<i>Small Game and Furbearers (Cont.)</i>					
Desert cottontail (<i>Sylvilagus audubonii</i>)	Abundant to common in grasslands, open forests, and desert shrub habitats. Can occur in areas with minimal vegetation as long as adequate cover (e.g., rock piles, fallen logs, fence rows) is present. Thickets and patches of shrubs, vines, and brush also used as cover. About 4,612,500 acres of potentially suitable habitat occurs in the SEZ region.	4,878 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat) during construction and operations	117,713 acres of potentially suitable habitat (2.6% of available potentially suitable habitat)	1,380 acres of potentially suitable habitat lost (0.03% of available potentially suitable habitat) and 27,775 acres in area of indirect effects	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effects.
<i>Nongame (small) Mammals</i>					
Brazilian free-tailed bat (<i>Tadarida brasiliensis</i>)	Cliffs, deserts, grasslands, old fields, savannas, shrublands, woodlands, and suburban/urban areas. Roosts in buildings, caves, and hollow trees. May roost in rock crevices, bridges, signs, or cliff swallow nests during migration. Large maternity colonies inhabit caves, buildings, culverts, and bridges. About 4,500,200 acres of potentially suitable habitat occurs in the SEZ region.	4,878 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat) during construction and operations	110,308 acres of potentially suitable habitat (2.5% of available potentially suitable habitat)	1,304 acres of potentially suitable habitat lost (0.03% of available potentially suitable habitat) and 26,238 acres in area of indirect effects	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effects.

TABLE 13.3.11.3-1 (Cont.)

Common Name (Scientific Name)	Habitat ^a	Maximum Area of Potential Habitat Affected ^b			Overall Impact Magnitude ^f and Species-Specific Mitigation ^g
		Within SEZ (Direct Effects) ^c	Outside SEZ (Indirect Effects) ^d	Within Transmission Corridor (Indirect and Direct Effects) ^e	
<i>Nongame (small) Mammals (Cont.)</i>					
Desert woodrat (<i>Neotoma lepidus</i>)	Sagebrush scrub; chaparral; deserts and rocky slopes with scattered cactus, yucca, pine-juniper, or other low vegetation; creosote bush desert; Joshua tree woodlands; scrub oak woodlands, pinyon-juniper woodlands; and riparian zones. Most abundant in rocky areas with Joshua trees. Dens built of debris on ground, among cacti or yucca, along cliffs, among rocks, or occasionally in trees. About 4,612,500 acres of potentially suitable habitat occurs in the SEZ region.	4,878 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat) during construction and operations	105,651 acres of potentially suitable habitat (2.3% of available potentially suitable habitat)	785 acres of potentially suitable habitat lost (0.02% of available potentially suitable habitat) and 15,804 acres in area of indirect effects	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effects.
Great Basin pocket mouse (<i>Perognathus parvus</i>)	Prefers arid grassland, sagebrush, and pinyon-juniper habitats with sandy soil. About 4,443,200 acres of potentially suitable habitat occurs within the SEZ region.	4,878 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat) during construction and operations	63,280 acres of potentially suitable habitat (1.4% of available potentially suitable habitat)	1,067 acres of potentially suitable habitat lost (0.02% of available potentially suitable habitat) and 21,465 acres in area of indirect effects	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effects.

TABLE 13.3.11.3-1 (Cont.)

Common Name (Scientific Name)	Habitat ^a	Maximum Area of Potential Habitat Affected ^b			Overall Impact Magnitude ^f and Species-Specific Mitigation ^g
		Within SEZ (Direct Effects) ^c	Outside SEZ (Indirect Effects) ^d	Within Transmission Corridor (Indirect and Direct Effects) ^e	
<i>Nongame (small)</i>					
<i>Mammals (Cont.)</i>					
Least chipmunk (<i>Neotamias minimus</i>)	Low-elevation semidesert shrublands, montane shrublands and woodlands, forest edges, and alpine tundra. About 4,737,400 acres of potentially suitable habitat occurs in the SEZ region.	4,878 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat) during construction and operations	117,807 acres of potentially suitable habitat (2.5% of available potentially suitable habitat)	1,401 acres of potentially suitable habitat lost (0.03% of available potentially suitable habitat) and 28,183 acres in area of indirect effects	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effects.
Little brown myotis (<i>Myotis lucifugus</i>)	Various habitats including pinyon-juniper woodlands, montane shrublands, and riparian woodlands. It uses man-made structures for summer roosting, although caves and hollow trees are also utilized. Winter hibernation often occurs in caves or mines, Most foraging activity occurs in woodlands over or near water. About 4,113,400 acres of potentially suitable habitat occurs within the SEZ region.	4,878 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat) during construction and operations	107,866 acres of potentially suitable habitat (2.6% of available potentially suitable habitat)	1,222 acres of potentially suitable habitat lost (0.03% of available potentially suitable habitat) and 24,582 acres in area of indirect effects	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effects.

TABLE 13.3.11.3-1 (Cont.)

Common Name (Scientific Name)	Habitat ^a	Maximum Area of Potential Habitat Affected ^b			Overall Impact Magnitude ^f and Species-Specific Mitigation ^g
		Within SEZ (Direct Effects) ^c	Outside SEZ (Indirect Effects) ^d	Within Transmission Corridor (Indirect and Direct Effects) ^e	
<i>Nongame (small)</i>					
<i>Mammals (Cont.)</i>					
Long-legged myotis (<i>Myotis volans</i>)	Prefers pine forest, desert, and riparian habitats. Old buildings, rock crevices, and hollow trees are used for daytime roosting and winter hibernation. It forages in open areas, such as forest clearings. About 3,425,700 acres of potentially suitable habitat occurs within the SEZ region.	4,878 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat) during construction and operations	94,741 acres of potentially suitable habitat (2.8% of available potentially suitable habitat)	913 acres of potentially suitable habitat lost (0.03% of available potentially suitable habitat) and 18,376 acres in area of indirect effects	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effects.
Northern grasshopper mouse (<i>Onychomys leucogaster</i>)	Occurs in grasslands, sagebrush deserts, overgrazed pastures, weedy roadside ditches, sand dunes, and other habitats with sandy soil and sparse vegetation. About 3,644,300 acres of potentially suitable habitat occurs within the SEZ region.	2,877 acres of potentially suitable habitat lost (0.08% of available potentially suitable habitat) during construction and operations	98,959 acres of potentially suitable habitat (2.7% of available potentially suitable habitat)	1,292 acres of potentially suitable habitat lost (0.04% of available potentially suitable habitat) and 25,984 acres in area of indirect effects	Small overall impact.

TABLE 13.3.11.3-1 (Cont.)

Common Name (Scientific Name)	Habitat ^a	Maximum Area of Potential Habitat Affected ^b			Overall Impact Magnitude ^f and Species-Specific Mitigation ^g
		Within SEZ (Direct Effects) ^c	Outside SEZ (Indirect Effects) ^d	Within Transmission Corridor (Indirect and Direct Effects) ^e	
<i>Nongame (small)</i>					
<i>Mammals (Cont.)</i>					
Sagebrush vole (<i>Lemmiscus curtatus</i>)	Typically associated with semiarid sagebrush and grassland areas. Burrows are often constructed near sagebrush. About 1,050,800 acres of potentially suitable habitat occurs within the SEZ region.	5 acres of potentially suitable habitat lost (<0.001% of available potentially suitable habitat) during construction and operations	17,108 acres of potentially suitable habitat (1.6% of available potentially suitable habitat)	469 acres of potentially suitable habitat lost (0.04% of available potentially suitable habitat) and 9,432 acres in area of indirect effects	Small overall impact. Avoid the intermontane basin big sagebrush shrubland land cover type in the southeastern portion of the SEZ.
Western pipistrelle (<i>Parastrellus esperus</i>)	Deserts and lowlands, desert mountain ranges, desert scrub flats, and rocky canyons. Roosts mostly in rock crevices, sometimes mines and caves, and rarely in buildings. Suitable roosts occur in rocky canyons and cliffs. Most abundant bat in desert regions. About 3,237,200 acres of potentially suitable habitat occurs in the SEZ region.	4,878 acres of potentially suitable habitat lost (0.2% of available potentially suitable habitat) during construction and operations	91,722 acres of potentially suitable habitat (2.8% of available potentially suitable habitat)	1,003 acres of potentially suitable habitat lost (0.03% of available potentially suitable habitat) and 20,182 acres in area of indirect effects	Small overall impact. No species-specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effects.

TABLE 13.3.11.3-1 (Cont.)

Common Name (Scientific Name)	Habitat ^a	Maximum Area of Potential Habitat Affected ^b			Overall Impact Magnitude ^f and Species-Specific Mitigation ^g
		Within SEZ (Direct Effects) ^c	Outside SEZ (Indirect Effects) ^d	Within Transmission Corridor (Indirect and Direct Effects) ^e	
<i>Nongame (small)</i>					
<i>Mammals (Cont.)</i>					
White-tailed antelope squirrel <i>(Ammospermophilus leucurus)</i>	Low deserts, semidesert and montane shrublands, plateaus, and foothills in areas with sparse vegetation and hard gravelly surfaces. Spends nights and other periods of inactivity in underground burrows. About 2,468,100 acres of potentially suitable habitat occurs within the SEZ region.	4,878 acres of potentially suitable habitat lost (0.2% of available potentially suitable habitat) during construction and operations	81,453 acres of potentially suitable habitat (3.3% of available potentially suitable habitat)	586 acres of potentially suitable habitat lost (0.02% of available potentially suitable habitat) and 11,781 acres in area of indirect effects	Small overall impact. No species- specific mitigation of direct effects is feasible because suitable habitat is widespread in the area of direct effects.

- ^a Potentially suitable habitat was determined by using SWReGAP habitat suitability and land cover models. Area of potentially suitable habitat for each species is presented for the SEZ region, which is defined as the area within 50 mi (80 km) of the SEZ center.
- ^b Maximum area of potentially suitable habitat that could be affected relative to availability within the SEZ region. Habitat availability for each species within the region was determined by using SWReGAP habitat suitability and land cover models. This approach probably overestimates the amount of suitable habitat in the project area.
- ^c Direct effects within the SEZ consist of the ground-disturbing activities associated with construction and the maintenance of an altered environment associated with operations. A maximum of 4,878 acres of direct effect within the SEZ was assumed.
- ^d Area of indirect effects was assumed to be the area adjacent to the SEZ within 5 mi (8 km) of the SEZ boundary and within the 1-mi (1.6-km) wide transmission line corridor (less the assumed area of direct effects) that extends beyond the 5-mi (8-km) area adjacent to the SEZ boundary. Indirect effects include effects from surface runoff, dust, noise, lighting, and so on from the SEZ but do not include ground-disturbing activities. The potential degree of indirect effects would decrease with increasing distance from the SEZ.

Footnotes continued on next page.

TABLE 13.3.11.1-1 (Cont.)

- ^e For transmission development, direct effects were estimated within a 42-mi (67.6-km) long, 250-ft (76-m) wide ROW for an assumed new transmission line connecting the SEZ to the nearest existing line. Indirect effects were estimated within a 1-mi (1.6-km) wide transmission corridor to the existing transmission line, less the assumed area of direct effects.
- ^f Overall impact magnitude categories were based on professional judgment and are as follows: (1) *small*: $\leq 1\%$ of the population or its habitat would be lost and the activity would not result in a measurable change in carrying capacity or population size in the affected area; (2) *moderate*: >1 but $\leq 10\%$ of the population or its habitat would be lost and the activity would result in a measurable but moderate (not destabilizing) change in carrying capacity or population size in the affected area; (3) *large*: $>10\%$ of a population or its habitat would be lost and the activity would result in a large, measurable, and destabilizing change in carrying capacity or population size in the affected area. Note that much greater weight was given to the magnitude of direct effects because those effects would be difficult to mitigate. Programmatic design features would reduce most indirect effects to negligible levels.
- ^g 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.
- ^h To convert acres to km^2 , multiply by 0.004047.

Sources: NatureServe (2010); UDWR (2009a); USGS (2004, 2005a, 2007).

1 such impacts would be minimized through the implementation of required programmatic design
2 features described in Appendix A, Section A.2.2, and through any additional mitigation applied.
3 Section 13.3.11.3.3, below, identifies design features of particular relevance to mammals for the
4 proposed Wah Wah Valley SEZ.
5

6 The assessment of impacts on mammal species is based on available information on
7 the presence of species in the affected area, as presented in Section 13.3.11.3.1 following
8 the analysis approach described in Appendix M. Additional NEPA assessments and coordination
9 with state natural resource agencies may be needed to address project-specific impacts more
10 thoroughly. These assessments and consultations could result in additional required actions to
11 avoid or mitigate impacts on mammals (see Section 13.3.11.3.3).
12

13 Table 13.3.11.3-1 summarizes the potential magnitude of impacts on representative
14 mammal species resulting from solar energy development (with the inclusion of programmatic
15 design features) in the proposed Wah Wah Valley SEZ.
16

17 **American Black Bear**

18
19
20 Based on land cover analyses, only 16 acres (0.06 km²) of potentially suitable American
21 black bear habitat could be directly lost by solar energy development within the proposed
22 Wah Wah Valley SEZ. This is less than 0.001% of the potentially suitable American black bear
23 habitat within the SEZ region. Based on mapped ranges, the SEZ is 26 mi (42 km) from both the
24 closest substantial and crucial American black bear habitats. Thus, solar energy development
25 would not directly affect these habitats. Overall, impacts on the American black bear from solar
26 energy development in the SEZ would be small (Table 13.3.11.3-1).
27

28 **Cougar**

29
30
31 Based on land cover analyses, up to 4,878 acres (19.7 km²) of potentially suitable
32 cougar habitat could be directly lost through solar energy development within the proposed
33 Wah Wah Valley SEZ. This is 0.1% of potentially suitable cougar habitat within the SEZ
34 region. Based on mapped ranges, the SEZ is 2 mi (3 km) from the closest preferred habitat for
35 the cougar (i.e., areas contained within the woodland and shrub-covered low mountain Level IV
36 ecoregion; Figure 13.3.11.3-1). Thus, solar energy development would not directly affect
37 preferred cougar habitat. The transmission line route for the SEZ would occur within preferred
38 cougar habitat. Direct impact would total 518 acres (2 km²), which represents less than 0.04% of
39 preferred cougar habitat within the SEZ region. The area of preferred cougar habitat within the
40 indirect effects area for the SEZ and transmission line route would total 23,598 acres (95.5 km²),
41 which is 1.6% of the preferred cougar habitat within the SEZ region. Overall, impacts on cougar
42 from solar energy development in the SEZ would be small.
43
44
45

1 **Elk**

2
3 Based on land cover analyses, only 5 acres (0.02 km²) of potentially suitable elk habitat
4 could be directly lost through solar energy development within the proposed Wah Wah Valley
5 SEZ. This is less than 0.001% of potentially suitable elk habitat within the SEZ region. Based
6 on mapped ranges, the SEZ is 2 mi (3 km) from the closest area of crucial elk habitat
7 (Figure 13.3.11.3-2). Thus, solar energy development would not directly affect important elk
8 habitat. The transmission line route for the SEZ would occur within crucial elk habitat. Direct
9 impact would total 444 acres (1.8 km²), which represents 0.05% of crucial elk habitat within
10 the SEZ region. The area of crucial elk habitat within the indirect effects area for the SEZ and
11 transmission line route would total 22,020 acres (89 km²), which is 2.5% of the crucial elk
12 habitat within the SEZ region. Overall, impacts on elk from solar energy development in the
13 SEZ would be small.

14
15
16 **Mule Deer**

17
18 Based on land cover analyses, up to 4,878 acres (19.7 km²) of potentially suitable mule
19 deer habitat could be directly lost through solar energy development within the proposed Wah
20 Wah Valley SEZ. This is 0.2% of potentially suitable mule deer habitat within the SEZ region.
21 Based on mapped ranges, the SEZ is 3 mi (5 km) from the closest area of crucial mule deer
22 habitat (Figure 13.3.11.3-3). Thus, solar energy development would not directly affect crucial
23 mule deer habitat. The transmission line route for the SEZ would occur within crucial mule deer
24 habitat. Direct impact would total 548 acres (2.2 km²), which represents 0.03% of crucial mule
25 deer habitat within the SEZ region. The area of crucial mule deer habitat within the indirect
26 effects area for the SEZ and transmission line route would total 22,937 acres (93 km²), which is
27 1.4% of the crucial mule deer habitat within the SEZ region. Overall, impacts on mule deer from
28 solar energy development in the SEZ would be small.

29
30
31 **Pronghorn**

32
33 Based on land cover analyses, about 1,510 acres (6.1 km²) of potentially suitable
34 pronghorn habitat could be directly lost through solar energy development within the proposed
35 Wah Wah Valley SEZ. This is 0.1% of potentially suitable pronghorn habitat within the SEZ
36 region. Based on mapped ranges, the SEZ and its transmission line route would be located within
37 crucial pronghorn habitat (Figure 13.3.11.3-4). This could result in the direct reduction of
38 4,878 acres (20 km²) of crucial pronghorn habitat within the SEZ and 755 acres (3 km²) for the
39 transmission line. Fencing, considered a major problem on pronghorn ranges, would present a
40 barrier or hindrance to pronghorn movement (UDWR 2009c). There is about 2,680,900 acres
41 (10,849 km²) of crucial pronghorn habitat within the SEZ region. Therefore solar energy
42 development would have a small impact, directly eliminating about 0.2% of crucial pronghorn
43 habitat within the SEZ region. The area of crucial pronghorn habitat within the indirect effects
44 area for the SEZ and transmission line route would total 94,791 acres (384.6 km²), which is
45 3.5% of the crucial pronghorn habitat within the SEZ region. Overall, impacts on pronghorn
46 from solar energy development in the SEZ would be small.

1 **Other Mammals**
2

3 Direct impacts on small game, furbearers, and nongame (small) mammal species would
4 be small, as 0.08 to 0.2% of potential habitats identified for these species would be lost
5 (Table 13.3.11.3-1). Larger areas of potentially suitable habitat for these species occur within the
6 area of potential indirect effects (i.e., ranging from 1.4% for the Great Basin pocket mouse to
7 3.3% for the white-tailed antelope squirrel).
8

9
10 **Summary**
11

12 Overall, direct impacts on mammal species would be small for all species, because
13 only 0.2% or less of potentially suitable habitats for mammal species would be lost
14 (Table 13.3.11.3-1). Larger areas of potentially suitable habitat for mammal species occur
15 within the area of potential indirect effects (e.g., up to 3.4% of potentially suitable habitat for
16 the pronghorn). Other impacts on mammals could result from collision with vehicles and
17 infrastructure (e.g., fences), surface water and sediment runoff from disturbed areas, fugitive
18 dust generated by project activities, noise, lighting, spread of invasive species, accidental
19 spills, and harassment. Indirect impacts on areas outside the SEZ (e.g., impacts caused by
20 dust generation, erosion, and sedimentation) would be negligible with implementation of
21 programmatic design features.
22

23 Decommissioning after operations cease could result in short-term negative impacts on
24 individuals and habitats within and adjacent to the SEZ. The negative impacts of
25 decommissioning would be reduced or eliminated as reclamation proceeds. Potentially long-term
26 benefits could accrue as habitats are restored in previously disturbed areas. Section 5.10.2.1.4
27 provides an overview of the impacts of decommissioning and reclamation on wildlife. Of
28 particular importance for mammal species would be the restoration of original ground surface
29 contours, soils, and native plant communities associated with semiarid shrublands.
30

31
32 ***13.3.11.3.3 SEZ-Specific Design Features and Design Feature Effectiveness***
33

34 The implementation of required programmatic design features described in Appendix A,
35 Section A.2.2, would reduce the potential for effects on mammals. While SEZ-specific design
36 features are best established when considering specific project details, design features that can be
37 identified at this time include the following:
38

- 39 • The fencing around the solar energy development should not block the free
40 movement of mammals, particularly big game species.
- 41
- 42 • Wah Wah Wash, which could provide an occasional watering and feeding site
43 for some mammal species, should be avoided.
- 44
- 45 • Instream and nearshore disturbance of the Beaver River should be avoided
46 when constructing the transmission line.

- The intermontane basin big sagebrush shrubland land cover type in the southeastern portion of the SEZ, which is the only identified suitable land cover type for the elk and sagebrush vole and about a third of the suitable habitat for the American black bear in the SEZ, should be avoided.

If these SEZ-specific design features are implemented in addition to the programmatic design features, impacts on mammals could be reduced. However, potentially suitable habitats for a number of the mammal species occur throughout much of the SEZ; therefore, species-specific mitigation of direct effects for those species would be difficult or infeasible.

13.3.11.4 Aquatic Biota

13.3.11.4.1 Affected Environment

The proposed Wah Wah Valley SEZ is located in semiarid desert valley where surface waters are typically limited to intermittent washes and dry lakebeds that only contain water for short periods during or following precipitation events. No perennial streams, surface water bodies, seeps, or springs are present on the proposed Wah Wah Valley SEZ. However, direct effects would result from construction of the presumed 250-ft (76-m) wide transmission line corridor that would cross directly over Beaver River, a perennial stream approximately 19 mi (31 km) directly east of the SEZ. The Beaver River is a popular fishing area that supports native and introduced fish species (UDWR 2010a). Approximately 4 mi (6 km) of Wah Wah Wash runs through the eastern portion of the SEZ and is the only intermittent stream in the area of direct effects. Although intermittent, channel incision and sediment deposition patterns observed during site visits indicated that substantial flows occur in Wah Wah Wash during large runoff events. Ephemeral or intermittent streams may contain a diverse seasonal community of fish and invertebrates, with the latter potentially present in a dormant state, even in dry periods (Levick et al. 2008). A study of intermittent desert streams and washes indicated communities consisted of primarily terrestrial invertebrates, but also contained aquatic taxa from *Insecta*, *Hydracarina*, *Crustacea*, *Oligochaeta*, *Hirudinea*, and *Gastropoda* groups as well as tolerant native and introduced fish species (URS Corporation 2006). However, site-specific surveys would be necessary to characterize aquatic biota, if present. Biota in ephemeral or intermittent streams may also contribute to populations in perennial reaches by discharging downstream during wet periods when hydrologic connectivity is higher (Levick et al. 2008). However, Wah Wah Wash has no hydrologic connection to any permanent stream or water body. Consequently, Wah Wah Wash does not provide habitat or contribute to fish and macroinvertebrate populations in perennial streams. Although there is little comprehensive information about the distribution of wetlands within the area, based on local hydrology, wetlands are unlikely or uncommon (Section 13.3.10.1).

No perennial water bodies or streams are present in the area of potential indirect effects within 5 mi (8 km) of the SEZ. However, 10 mi (16 km) of the intermittent/ephemeral Wah Wah Wash is located within the area of indirect effects and the 1 mi (2 km) area of indirect effects associated with the new transmission line corridor crosses over Beaver River. The Wah Wah

1 Wash runs from the SEZ to the Wah Wah Valley Hardpan, a dry lake approximately 9 mi
2 (14 km) north of the SEZ boundary. Because these intermittent habitats are usually dry, no
3 significant aquatic biota would be expected to occur in the Wah Wah Valley Hardpan. However,
4 ephemeral or nonpermanent pools, which form within intermittent lakebeds during wet periods,
5 may contain invertebrates that are either aquatic opportunists (i.e., species that occupy both
6 temporary and permanent waters) or specialists adapted to living in temporary aquatic
7 environments (Graham 2001). Although most ephemeral pools are populated with widespread
8 species, some can contain species that are endemic to particular geographic regions or even
9 specific pools (Graham 2001). On the basis of information for other ephemeral pools in the
10 American Southwest, ostracods (seed shrimp) and small planktonic crustaceans (e.g., copepods
11 or cladocerans) are expected to be present, and larger branchiopod crustaceans such as fairy
12 shrimp could occur (Graham 2001). Various types of insects that have aquatic larval stages, such
13 as dragonflies and a variety of midges and other fly larvae, may also occur depending on pool
14 longevity, distance to permanent water features, and the abundance of other invertebrates for
15 prey (Graham 2001).

16

17 Outside of the indirect effects area, but within 50 mi (80 km) of the proposed Wah Wah
18 Valley SEZ, there are approximately 1,597 acres (6.5 km²) of lake and reservoir habitat and
19 127,494 acres (516 km²) of dry lake. Also present within 50 mi (80 km) of the SEZ is
20 approximately 272 mi (438 km) of perennial stream, 269 mi (433 km) of intermittent stream,
21 and 32 mi (51 km) of canal.

22

23

24 ***13.3.11.4.2 Impacts***

25

26 Because surface water habitats are a unique feature in the arid landscape in the vicinity
27 of the proposed Wah Wah Valley SEZ, the maintenance and protection of such habitats may be
28 important to the survival of aquatic and terrestrial organisms. The types of impacts that aquatic
29 habitats and biota could incur from the development of utility-scale solar energy facilities are
30 described in Section 5.6.3. Aquatic habitats present on or near the locations selected for
31 construction of solar energy facilities could be affected in a number of ways, including (1) direct
32 disturbance, (2) deposition of sediments, (3) changes in water quantity, and (4) degradation of
33 water quality.

34

35 Land disturbance within the SEZ could increase the transport of soil to aquatic habitat
36 via waterborne and airborne pathways. However, no permanent water bodies, perennial streams,
37 or wetlands are present within the boundaries of the proposed Wah Wah Valley SEZ, making
38 direct impacts on aquatic habitats or aquatic biota unlikely. In addition, given the proximity of
39 the nearest perennial stream to the SEZ (~20 mi [32 km]), it is unlikely for solar energy
40 development within the SEZ to indirectly affect aquatic habitat outside the SEZ. The intermittent
41 Wah Wah Wash is located within the SEZ and could be adversely affected by site development.
42 In addition, the new transmission line would cross Beaver River, which could cause direct and
43 indirect effects on aquatic habitat and biota. The nature and extent of impacts on aquatic biota
44 are partly a function of construction and design features. Due to the length of the Beaver River,
45 avoidance would be a difficult mitigation option. Overhead transmission lines could potentially
46 be used so that there would be no need to place structures directly within aquatic habitat.

1 However, overhead transmission lines would shade portions of the Beaver River, resulting in
2 localized physical changes in water temperature and irradiance that could affect biological
3 productivity. The introduction of waterborne sediments to the Wah Wah Wash and Beaver River
4 from areas of ground disturbance could be minimized using common mitigation measures, such
5 as settling basins, silt fences, or the redirection of water draining from developed areas.
6

7 In arid environments, reductions in the quantity of water in aquatic habitats are of
8 particular concern. Water quantity in aquatic habitats could also be affected if significant
9 amounts of surface water or groundwater are utilized for power plant cooling water, for washing
10 mirrors, or for other needs. The greatest need for water would occur if technologies employing
11 wet cooling, such as parabolic trough or power tower, were developed at the site; the associated
12 impacts would ultimately depend on the water source used (including groundwater from aquifers
13 at various depths). There are no surface water habitats on the proposed Wah Wah Valley SEZ
14 that could be used to supply water needs. Water demands during normal operations would most
15 likely be met by withdrawing groundwater from wells constructed on-site, potentially affecting
16 water levels in surface water features outside of the proposed SEZ and, as a consequence,
17 potentially reducing habitat size and connectivity and creating more adverse environmental
18 conditions for aquatic organisms in those habitats. Additional details regarding the volume of
19 water required and the types of organisms present in potentially affected water bodies would be
20 required to further evaluate the potential for impacts from water withdrawals.
21

22 As described in Section 5.10.2.4, water quality in aquatic habitats could be affected by
23 the introduction of contaminants such as fuels, lubricants, or pesticides/herbicides during site
24 characterization, construction, operation, or decommissioning/reclamation of a solar energy
25 facility and during construction of the presumed transmission line. Contaminants have the
26 greatest potential to enter Wah Wah Wash and Beaver River. The level of impacts from releases
27 of toxicants would depend on the type and volume of chemicals entering the waterway, the
28 location of the release, the nature of the water body (e.g., size, volume, and flow rates), and the
29 types and life stages of organisms present in the receiving waterway. In general, lubricants and
30 fuel would not be expected to enter waterways in appreciable quantities as long as heavy
31 machinery is not used in or near waterways, and as long as fueling locations for construction
32 equipment are situated away from the waterway. These practices may be difficult to implement
33 when constructing the new transmission corridor over Beaver River. Consequently, there should
34 be plans in place to control spills that do occur.
35
36

37 ***13.3.11.4.3 SEZ-Specific Design Features and Design Feature Effectiveness*** 38

39 The implementation of required programmatic design features described in Appendix A,
40 Section A.2.2, could greatly reduce or eliminate the potential for effects on aquatic biota and
41 aquatic habitats from development and operation of solar energy facilities. While some
42

1 SEZ-specific design features are best established when specific project details are being
2 considered, the following design feature can be identified at this time:

- 3
4 • Transmission lines should be sited and constructed to minimize impacts on
5 aquatic habitats whenever possible and transmission lines should span Beaver
6 River.

7
8 If this SEZ-specific design feature is implemented in addition to other programmatic
9 project design features and if the utilization of water from groundwater or surface water sources
10 is adequately controlled to maintain sufficient water levels in nearby aquatic habitats, the
11 potential impacts on aquatic biota and habitats from solar energy development in the Wah Wah
12 Valley SEZ would be negligible.

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1 **13.3.12 Special Status Species (Threatened, Endangered, Sensitive, and Rare Species)**
2

3 This section addresses special status species that are known to occur, or for which
4 suitable habitat occurs, on or within the potentially affected area of the proposed Wah Wah
5 Valley SEZ. Special status species include the following types of species¹⁰:
6

- 7 • Species listed as threatened or endangered under the ESA;
- 8
- 9 • Species that are proposed for listing, under review, or are candidates for
10 listing under the ESA;
- 11
- 12 • Species that are listed by the BLM as sensitive;
- 13
- 14 • Species that are listed by the state of Utah¹¹; and
- 15
- 16 • Species that have been ranked by the state of Utah as S1 or S2, or species of
17 concern by the state of Utah or by the USFWS; hereafter referred to as “rare”
18 species.
19

20 Special status species known to occur within 50 mi (80 km) of the Wah Wah Valley
21 SEZ center (i.e., the SEZ region) were determined from natural heritage records and other
22 data available through NatureServe Explorer (NatureServe 2010), Utah Division of Wildlife
23 Resources Conservation Data Center (UDWR 2009d), UDWR Vertebrate Information
24 (UDWR 2003b), Utah Plants Atlas (Shultz et al. 2006), *Utah Rare Plant Guide* (UNPS 2009),
25 and SWReGAP (USGS 2004, 2005a, 2007). Information reviewed consisted of county-level
26 occurrences as determined from NatureServe and USGS 7.5-minute quad-level occurrences, as
27 well as modeled land cover types and predicted suitable habitats for the species within the 50-mi
28 (80-km) region, as determined from SWReGAP. The 50-mi (80-km) SEZ region intersects
29 Beaver, Iron, Millard, Piute, and Sevier Counties, Utah, as well as Lincoln and White Pine
30 Counties, Nevada. However, the affected area occurs only in Beaver County, Utah
31 (Figure 13.3.12.1-1). See Appendix M for additional information on the approach used to
32 identify species that could be affected by development within the SEZ.
33

34
35 **13.3.12.1 Affected Environment**
36

37 The affected area considered in the assessment included the areas of direct and indirect
38 effects. The area of direct effects was defined as the area that would be physically modified
39 during project development (i.e., where ground-disturbing activities would occur). For the

¹⁰ See Section 4.6.4 for definitions of these species categories. Note that some of the categories of species included here do not fit BLM’s definition of special status species as defined in BLM Manual 6840 (BLM 2008). These species are included here to ensure broad consideration of species that may be most vulnerable to impacts.

¹¹ According to Utah Administrative Rule R657-48, as described in the *Utah Sensitive Species List* (UDWR 2010c), there are no species that receive a separate regulatory designation from the UDWR or the state of Utah.

1 proposed Wah Wah Valley SEZ, the area of direct effects included the SEZ and the portion of
2 the transmission line corridor where ground-disturbing activities are assumed to occur (refer to
3 Section 13.3.1.2 for development assumptions). The area of indirect effects was defined as the
4 area within 5 mi (8 km) of the SEZ boundary and within the 1-mi (1.6-km) wide transmission
5 corridor where ground-disturbing activities would not occur but that could be indirectly affected
6 by activities in the area of direct effect. Indirect effects considered in the assessment include
7 effects from surface runoff, dust, noise, lighting, and accidental spills from the SEZ, but do not
8 include ground-disturbing activities. The potential magnitude of indirect effects would decrease
9 with increasing distance away from the SEZ. The area of indirect effects was identified on the
10 basis of professional judgment and was considered sufficiently large to bound the area that
11 would potentially be subject to indirect effects. The affected area includes both the direct and
12 indirect effects areas.
13

14 The primary vegetation community types within the affected area are mixed salt desert
15 scrub and sagebrush (*Artemisia* spp.) (see Section 13.3.10). Potentially unique habitats in the
16 affected area in which special status species may reside include riverine and riparian areas, desert
17 playas, grasslands, woodlands, and rocky cliffs and outcrops. The only aquatic or riparian
18 habitats in the affected area occur within and along the Wah Wah Wash, which occurs along the
19 eastern boundary of the SEZ, and the Beaver River, which intersects the transmission corridor
20 approximately 20 mi (32 km) east of the SEZ (Figure 13.3.12.1-1). There are also playa habitats
21 and man-made earthen livestock watering areas throughout the area of indirect effects
22 (Section 13.3.9).
23

24 All special status species that are known to occur within the proposed Wah Wah Valley
25 SEZ region (i.e., within 50 mi [80 km] of the center of the SEZ) are listed, with their status,
26 nearest recorded occurrence, and habitats in Appendix J. Of these species, there are 22 that
27 could occur in the affected area of the SEZ, based on recorded occurrences or the presence of
28 potentially suitable habitat in the area. These species, their status, and their habitats are
29 presented in Table 13.3.12.1-1. For many of the species listed in the table, their predicted
30 potential occurrence in the affected area is based only on a general correspondence between
31 mapped SWReGAP land cover types and descriptions of species habitat preferences. This overall
32 approach to identifying species in the affected area probably overestimates the number of species
33 that actually occur in the affected area. For many of the species identified as having potentially
34 suitable habitat in the affected area, the nearest known occurrence is more than 20 mi (32 m)
35 away from the SEZ.
36

37 Based on information provided by the UDWR, quad-level occurrence records for
38 13 special status species intersect the proposed Wah Wah Valley SEZ affected area
39 (Table 13.3.12.1-1). These species include the bald eagle, ferruginous hawk, greater sage-grouse,
40 long-billed curlew, northern goshawk, short-eared owl, western burrowing owl, dark kangaroo
41 mouse, fringed myotis, kit fox, pygmy rabbit, spotted bat, and Townsend's big-eared bat. There
42 are no groundwater-dependent species in the vicinity of the SEZ based upon UDWR records,
43 information provided by the USFWS (Stout 2009), and the evaluation of groundwater resources
44 in the Milford Flats South SEZ region (Section 13.3.9).

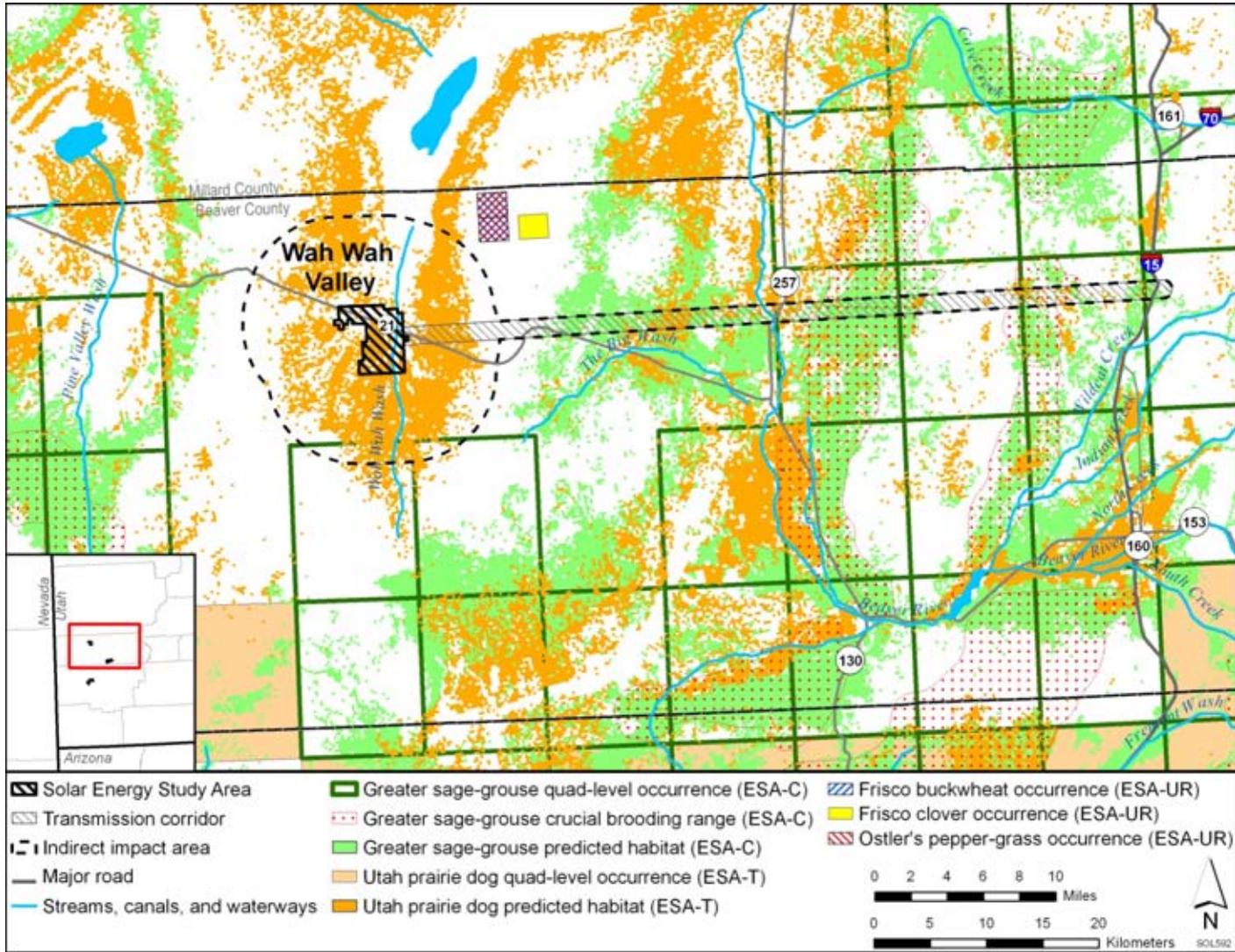


FIGURE 13.3.12.1-1 Known or Potential Occurrences of Species Listed as Endangered, Threatened, Candidates, or under Review for Listing under the ESA That May Occur in the Proposed Wah Wah Valley SEZ Affected Area (Sources: Shultz et al. 2006; USGS 2007; UDWR 2009d)

TABLE 13.3.12.1-1 Habitats, Potential Impacts, and Potential Mitigation for Special Status Species That Could Occur on or in the Affected Area of the Proposed Wah Wah Valley SEZ

Common Name	Scientific Name	Listing Status ^a	Habitat ^b	Maximum Area of Potential Habitat Affected ^c			Overall Impact Magnitude ^g and Species-Specific Mitigation ^h
				Within SEZ (Direct Effects) ^d	Transmission Line (Direct Effects) ^e	Indirect Effects (Outside SEZ and Corridors) ^f	
Plants							
Compact cat's-eye	<i>Cryptantha compacta</i>	BLM-S; FWS-SC; UT-S2	Salt desert shrub and mixed shrub communities at elevations between 5,000 and 8,400 ft. ⁱ Known from southwestern Millard County and northwestern Beaver County, Utah and eastern Nevada. Nearest recorded occurrence is 25 mi ^j northwest of the SEZ. About 2,866,813 acres ^k of potentially suitable habitat occurs within the SEZ region.	5,132 acres of potentially suitable habitat lost (0.2% of available potentially suitable habitat)	932 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	94,900 acres of potentially suitable habitat (3.3% of available potentially suitable habitat)	Small overall impact. Pre-disturbance surveys and avoiding or minimizing disturbance of occupied habitats in the areas of direct effect; translocation of individuals from areas of direct effect; or compensatory mitigation of direct effects on occupied habitats could reduce impacts. Note that these same potential mitigations apply to all special status plants.

TABLE 13.3.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status ^a	Habitat ^b	Maximum Area of Potential Habitat Affected ^c			Overall Impact Magnitude ^g and Species-Specific Mitigation ^h
				Within SEZ (Direct Effects) ^d	Transmission Line (Direct Effects) ^e	Indirect Effects (Outside SEZ and Corridors) ^f	
Plants (Cont.)							
Frisco buckwheat	<i>Eriogonum soredium</i>	ESA-UR; BLM-S; UT-S1	Endemic to a small area in the San Francisco Mountains in Beaver County, Utah, on white limestone outcrops associated with pinyon-juniper communities. Elevation ranges between 6,600 and 7,300 ft. Known to occur in the San Francisco Mountains approximately 7 mi northeast of the SEZ. About 37,100 acres of potentially suitable habitat occurs within the SEZ region.	0 acres	13 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	650 acres of potentially suitable habitat (1.8% of available potentially suitable habitat)	Small overall impact. Avoiding or minimizing disturbance of rocky cliffs and outcrops in the transmission corridor could reduce impacts. See compact cat's-eye for a list of potential mitigations applicable to all special status plant species.

TABLE 13.3.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status ^a	Habitat ^b	Maximum Area of Potential Habitat Affected ^c			Overall Impact Magnitude ^g and Species-Specific Mitigation ^h
				Within SEZ (Direct Effects) ^d	Transmission Line (Direct Effects) ^e	Indirect Effects (Outside SEZ and Corridors) ^f	
Plants (Cont.)							
Frisco clover	<i>Trifolium friscanum</i>	ESA-UR; BLM-S; UT-S1	Endemic to four mountain ranges in Beaver and Millard Counties, Utah, on volcanic gravels and limestone substrates in association with pinyon-juniper woodlands at elevations between 6,900 and 7,300 ft. Nearest recorded occurrence is 8 mi northeast of the SEZ. About 1,505,400 acres of potentially suitable habitat occurs within the SEZ region.	0 acres	287 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	18,650 acres of potentially suitable habitat (1.2% of available potentially suitable habitat)	Small overall impact. Avoiding or minimizing disturbance of woodlands and rocky cliffs and outcrops in the transmission corridor could reduce impacts. See compact cat's-eye for a list of potential mitigations applicable to all special status plant species.
Jone's globemallow	<i>Sphaeralcea caespitosa</i>	BLM-S; FWS-SC; UT-S2	Known from at least four occurrences in western Utah and six occurrences in eastern Nevada on federal and state lands on dolomite calcareous soils in association with mixed shrub, pinyon-juniper, and grassland communities at elevations between 5,000 and 6,500 ft. Nearest recorded occurrence is 7 mi west of the SEZ. About 4,471,200 acres of potentially suitable habitat occurs within the SEZ region.	5,360 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat)	1,221 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	113,700 acres of potentially suitable habitat (2.5% of available potentially suitable habitat)	Small overall impact. See compact cat's-eye for a list of potential mitigations applicable to all special status plant species.

TABLE 13.3.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status ^a	Habitat ^b	Maximum Area of Potential Habitat Affected ^c			Overall Impact Magnitude ^g and Species-Specific Mitigation ^h
				Within SEZ (Direct Effects) ^d	Transmission Line (Direct Effects) ^e	Indirect Effects (Outside SEZ and Corridors) ^f	
Plants (Cont.)							
Long-calyx milkvetch	<i>Astragalus oophorus lonchocalyx</i>	BLM-S; FWS-SC; UT-S1	Endemic to the Great Basin in western Utah and eastern Nevada in pinyon-juniper woodlands, sagebrush, and mixed shrub communities at elevations between 5,800 and 7,500 ft. Nearest recorded occurrence is 12 mi northeast of the SEZ. About 4,351,100 acres of potentially suitable habitat occurs within the SEZ region.	5,132 acres of potentially suitable habitat lost (0.2% of available potentially suitable habitat)	1,208 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	112,900 acres of potentially suitable habitat (2.6% of available potentially suitable habitat)	Small overall impact. See compact cat's-eye for a list of potential mitigations applicable to all special status plant species.
Money wild buckwheat	<i>Eriogonum nummulare</i>	BLM-S	Western Utah and eastern Nevada on gravelly washes, flats, and slopes in saltbush and sagebrush communities and pinyon-juniper woodlands. Nearest recorded occurrence is 20 mi north of the SEZ. About 3,760,200 acres of potentially suitable habitat occurs within the SEZ region.	2,900 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat)	869 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	60,000 acres of potentially suitable habitat (1.6% of available potentially suitable habitat)	Small overall impact. See compact cat's-eye for a list of potential mitigations applicable to all special status plant species.

TABLE 13.3.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status ^a	Habitat ^b	Maximum Area of Potential Habitat Affected ^c			Overall Impact Magnitude ^g and Species-Specific Mitigation ^h
				Within SEZ (Direct Effects) ^d	Transmission Line (Direct Effects) ^e	Indirect Effects (Outside SEZ and Corridors) ^f	
Plants (Cont.)							
Ostler's ivesia	<i>Ivesia shockleyi ostleri</i>	BLM-S; FWS-SC; UT-S1	Endemic to the Wah Wah Mountains and Needle Range of western Beaver County, Utah, in pinyon-juniper and ponderosa pine forests in crevices of quartzite outcrops at elevations between 6,500 and 8,000 ft. Nearest recorded occurrence is 15 mi southwest of the SEZ. About 1,507,100 acres of potentially suitable habitat occurs within the SEZ region.	0 acres	287 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	18,650 acres of potentially suitable habitat (1.2% of available potentially suitable habitat)	Small overall impact. Avoiding or minimizing disturbance of woodlands and rocky cliffs and outcrops in the transmission corridor could reduce impacts. See compact cat's-eye for a list of potential mitigations applicable to all special status plant species.

TABLE 13.3.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status ^a	Habitat ^b	Maximum Area of Potential Habitat Affected ^c			Overall Impact Magnitude ^g and Species-Specific Mitigation ^h
				Within SEZ (Direct Effects) ^d	Transmission Line (Direct Effects) ^e	Indirect Effects (Outside SEZ and Corridors) ^f	
Plants (Cont.)							
Ostler's pepper-grass	<i>Lepidium ostleri</i>	ESA-UR; BLM-S; UT-S1	Endemic to a small area in the San Francisco Mountains in Beaver County, Utah, on limestone outcrops within pinyon-juniper communities at elevations between 5,800 and 6,800 ft. Nearest recorded occurrence is within 7 mi northeast of the SEZ.	0 acres	13 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	650 acres of potentially suitable habitat (1.2% of available potentially suitable habitat)	Small overall impact. Avoiding or minimizing disturbance of rocky cliffs and outcrops in the transmission corridor could reduce impacts. See compact cat's-eye for a list of potential mitigations applicable to all special status plant species.
Birds							
Bald eagle ^l	<i>Haliaeetus leucocephalus</i>	BLM-S; UT-SC; UT-S1	A winter resident throughout the SEZ region, most commonly along large bodies of water where fish and waterfowl prey are available. Wintering areas are associated with open water. May occasionally forage in arid shrubland habitats. Quad-level occurrences intersect the SEZ and other portions of the affected area. About 2,666,800 acres of potentially suitable habitat occurs within the SEZ region.	2,982 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat)	608 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	78,500 acres of potentially suitable habitat (2.9% of available potentially suitable habitat)	Small overall impact on foraging habitat only. Avoidance of direct impacts on all foraging habitat is not feasible because suitable foraging habitat is widespread in the area of direct effect.

TABLE 13.3.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status ^a	Habitat ^b	Maximum Area of Potential Habitat Affected ^c			Overall Impact Magnitude ^g and Species-Specific Mitigation ^h
				Within SEZ (Direct Effects) ^d	Transmission Line (Direct Effects) ^e	Indirect Effects (Outside SEZ and Corridors) ^f	
<i>Birds (Cont.)</i> Ferruginous hawk	<i>Buteo regalis</i>	BLM-S; UT-SC; UT-S2	A year-round resident in the SEZ region. Grasslands, shrublands, agricultural lands, and the periphery of pinyon-juniper forests throughout the SEZ region. Nests are generally constructed in trees and exposed rock outcrops along cliffs, buttes, and creek banks. Quad-level occurrences intersect the SEZ and other portions of the affected area. About 1,749,900 acres of potentially suitable habitat occurs within the SEZ region.	795 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	551 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	26,650 acres of potentially suitable habitat (1.5% of available potentially suitable habitat)	Small overall impact on potentially suitable foraging and nesting habitat. Pre-disturbance surveys and avoiding or minimizing disturbance of occupied nesting habitats in the area of direct effect or compensatory mitigation of direct effects on occupied nesting habitats could reduce impacts.

TABLE 13.3.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status ^a	Habitat ^b	Maximum Area of Potential Habitat Affected ^c			Overall Impact Magnitude ^g and Species-Specific Mitigation ^h
				Within SEZ (Direct Effects) ^d	Transmission Line (Direct Effects) ^e	Indirect Effects (Outside SEZ and Corridors) ^f	
Birds (Cont.)							
Greater sage-grouse	<i>Centrocercus urophasianus</i>	ESA-C; BLM-S; UT-SC; UT-S2	A year-round resident in the SEZ region. Plains, foothills, and mountain valleys dominated by sagebrush throughout the SEZ region. Lek sites are located in relatively open areas surrounded by sagebrush or in areas where sagebrush density is low. Nesting usually occurs on the ground where sagebrush density is higher. Quad-level occurrences intersect the affected area south of the SEZ. Crucial brooding habitat for the species exists about 22 mi east of the SEZ and intersects the transmission corridor. About 1,608,000 acres of potentially suitable habitat occurs within the SEZ region.	0 acres	626 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	12,650 acres of potentially suitable habitat (0.8% of available potentially suitable habitat)	Small overall impact. Pre-disturbance surveys and avoiding or minimizing disturbance of occupied habitats, especially leks and nesting sites in the areas of direct effect; or compensatory mitigation of direct effects on occupied habitats could reduce impacts. Mitigation should be developed in coordination with the USFWS and UDWR.

TABLE 13.3.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status ^a	Habitat ^b	Maximum Area of Potential Habitat Affected ^c			Overall Impact Magnitude ^g and Species-Specific Mitigation ^h
				Within SEZ (Direct Effects) ^d	Transmission Line (Direct Effects) ^e	Indirect Effects (Outside SEZ and Corridors) ^f	
Birds (Cont.)							
Long-billed curlew	<i>Numenius americanus</i>	BLM-S; UT-SC; UT-S2	Summer resident and migrant throughout the SEZ region in short-grass grasslands near standing water. Species is likely to be transient only in the vicinity of the SEZ. Quad-level occurrences intersect the affected area within the transmission corridor approximately 20 mi east of the SEZ. About 331,700 acres of potentially suitable habitat occurs within the SEZ region.	142 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	8 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	3,230 acres of potentially suitable habitat (1.0% of available potentially suitable habitat)	Small overall impact. No species-specific mitigation needed. Only transient individuals are expected in the affected area.
Northern goshawk	<i>Accipiter gentilis</i>	BLM-S	A year-round resident in the SEZ region. Mature mountain forest and riparian zone habitats throughout the SEZ region. Nests in trees in mature deciduous, coniferous, and mixed forests. Forages in both heavily forested and relatively open shrubland habitats. Quad-level occurrences intersect the affected area north of the SEZ. About 245,300 acres of potentially suitable habitat occurs within the SEZ region.	0 acres	97 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	4,731 acres of potentially suitable habitat (1.9% of available potentially suitable habitat)	Small overall impact on potentially suitable foraging and nesting habitat. Pre-disturbance surveys and avoiding or minimizing disturbance of occupied nesting habitats (woodlands) in the area of direct effects or compensatory mitigation of direct effects on occupied nesting habitats could reduce impacts.

TABLE 13.3.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status ^a	Habitat ^b	Maximum Area of Potential Habitat Affected ^c			Overall Impact Magnitude ^g and Species-Specific Mitigation ^h
				Within SEZ (Direct Effects) ^d	Transmission Line (Direct Effects) ^e	Indirect Effects (Outside SEZ and Corridors) ^f	
Birds (Cont.)							
Short-eared owl	<i>Asio flammeus</i>	BLM-S; UT-SC; UT-S2	Year-round resident within the SEZ region. Inhabits grasslands, shrublands, and other open habitats throughout the SEZ region. Nomadic, often selecting unique breeding sites each year, depending on local rodent densities. Nests on the ground near shrubs. Quad-level occurrences intersect the affected area east and west of the SEZ. About 4,138,850 acres of potentially suitable habitat occurs within the SEZ region.	5,510 acres of potentially suitable habitat lost (0.2% of available potentially suitable habitat)	1,152 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	106,000 acres of potentially suitable habitat (2.6% of available potentially suitable habitat)	Small overall impact. Pre-disturbance surveys and avoiding or minimizing disturbance of occupied nesting habitats in the area of direct effect or compensatory mitigation of direct effects on occupied nesting habitats could reduce impacts.

TABLE 13.3.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status ^a	Habitat ^b	Maximum Area of Potential Habitat Affected ^c			Overall Impact Magnitude ^g and Species-Specific Mitigation ^h
				Within SEZ (Direct Effects) ^d	Transmission Line (Direct Effects) ^e	Indirect Effects (Outside SEZ and Corridors) ^f	
Birds (Cont.)							
Western burrowing owl	<i>Athene cunicularia hypugaea</i>	BLM-S; FWS-SC; UT-SC	A year-round resident in the SEZ region. Open grasslands and prairies, as well as disturbed sites such as golf courses, cemeteries, and airports throughout the SEZ region. Nests in burrows constructed by mammals (prairie dog, badger, etc.). Quad-level occurrences intersect the SEZ and other portions of the affected area. About 3,037,300 acres of potentially suitable habitat occurs within the SEZ region.	5,268 acres of potentially suitable habitat lost (0.2% of available potentially suitable habitat)	734 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	91,500 acres of potentially suitable habitat (3.0% of available potentially suitable habitat)	Small overall impact on foraging and nesting habitat. Pre-disturbance surveys and avoiding or minimizing disturbance of occupied burrows in the area of direct effect or compensatory mitigation of direct effects on occupied burrows could reduce impacts.

TABLE 13.3.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status ^a	Habitat ^b	Maximum Area of Potential Habitat Affected ^c			Overall Impact Magnitude ^g and Species-Specific Mitigation ^h
				Within SEZ (Direct Effects) ^d	Transmission Line (Direct Effects) ^e	Indirect Effects (Outside SEZ and Corridors) ^f	
Mammals Dark kangaroo mouse	<i>Microdiposops megacephalus</i>	BLM-S; UT-SC; UT-S2	Sagebrush-dominated areas with sandy soils in Great Basin region. Nocturnally active during warm weather, the species remains in underground burrows during the day and cold winter months. Quad-level occurrences intersect the SEZ and other portions of the affected area. About 1,060,500 acres of potentially suitable habitat occurs within the SEZ region.	2,840 acres of potentially suitable habitat lost (0.3% of available potentially suitable habitat)	374 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	26,700 acres of potentially suitable habitat (2.5% of available potentially suitable habitat)	Small overall impact. Pre-disturbance surveys and avoiding or minimizing disturbance of occupied habitats in the areas of direct effect or compensatory mitigation of direct effects on occupied habitats could reduce impacts.

TABLE 13.3.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status ^a	Habitat ^b	Maximum Area of Potential Habitat Affected ^c			Overall Impact Magnitude ^g and Species-Specific Mitigation ^h
				Within SEZ (Direct Effects) ^d	Transmission Line (Direct Effects) ^e	Indirect Effects (Outside SEZ and Corridors) ^f	
Mammals (Cont.)							
Fringed myotis	<i>Myotis thysanodes</i>	BLM-S; FWS-SC; UT-SC	Wide range of habitats including lowland riparian, desert shrub, pinyon-juniper, and sagebrush habitats. Roost sites have been reported in buildings and caves. Quad-level occurrences intersect the affected area within the transmission corridor approximately 40 mi east of the SEZ. About 4,433,300 acres of potentially suitable habitat occurs within the SEZ region.	5,822 acres of potentially suitable habitat lost (0.2% of available potentially suitable habitat)	1,200 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	112,050 acres of potentially suitable habitat (2.5% of available potentially suitable habitat)	Small overall impact on potentially suitable foraging and roosting habitat. Pre-disturbance surveys and avoiding or minimizing disturbance of occupied roosting habitats in the area of direct effect or compensatory mitigation of direct effects on occupied roosting habitats could reduce impacts.

TABLE 13.3.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status ^a	Habitat ^b	Maximum Area of Potential Habitat Affected ^c			Overall Impact Magnitude ^g and Species-Specific Mitigation ^h
				Within SEZ (Direct Effects) ^d	Transmission Line (Direct Effects) ^e	Indirect Effects (Outside SEZ and Corridors) ^f	
Mammals (Cont.)							
Kit fox	<i>Vulpes macrotis</i>	BLM-S; UT-SC	Open prairie, plains, and desert habitats where it inhabits burrows and preys on rodents, rabbits, hares, and small birds. Quad-level occurrences intersect the SEZ and other portions of the affected area. About 2,641,200 acres of potentially suitable habitat occurs within the SEZ region.	5,268 acres of potentially suitable habitat lost (0.2% of available potentially suitable habitat)	657 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	89,200 acres of potentially suitable habitat (3.4% of available potentially suitable habitat)	Small overall impact. Pre-disturbance surveys and avoiding or minimizing disturbance of occupied habitats in the areas of direct effect, translocation of individuals from areas of direct effect, or compensatory mitigation of direct effects on occupied habitats could reduce impacts.

TABLE 13.3.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status ^a	Habitat ^b	Maximum Area of Potential Habitat Affected ^c			Overall Impact Magnitude ^g and Species-Specific Mitigation ^h
				Within SEZ (Direct Effects) ^d	Transmission Line (Direct Effects) ^e	Indirect Effects (Outside SEZ and Corridors) ^f	
Mammals (Cont.)							
Pygmy rabbit	<i>Brachylagus idahoensis</i>	BLM-S; UT-SC; UT-S2	Sagebrush-shrubland habitats throughout the SEZ region. Prefers loose soils to dig burrows. Quad-level occurrences intersect the affected area within the transmission corridor approximately 10 mi east of the SEZ. About 930,850 acres of potentially suitable habitat occurs within the SEZ region.	0 acres	358 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	12,600 acres of potentially suitable habitat (1.4% of available potentially suitable habitat)	Small overall impact. Pre-disturbance surveys and avoiding or minimizing disturbance of occupied habitats in the areas of direct effect, translocation of individuals from areas of direct effect, or compensatory mitigation of direct effects on occupied habitats could reduce impacts.

TABLE 13.3.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status ^a	Habitat ^b	Maximum Area of Potential Habitat Affected ^c			Overall Impact Magnitude ^g and Species-Specific Mitigation ^h
				Within SEZ (Direct Effects) ^d	Transmission Line (Direct Effects) ^e	Indirect Effects (Outside SEZ and Corridors) ^f	
Mammals (Cont.)							
Spotted bat	<i>Euderma maculatum</i>	BLM-S; FWS-SC; UT-SC; UT-S2	Near forests and shrubland habitats throughout the SEZ region. Uses caves and rock crevices for day roosting and winter hibernation. Quad-level occurrences intersect the affected area within the transmission corridor approximately 10 mi east of the SEZ. About 3,404,900 acres of potentially suitable habitat occurs within the SEZ region.	2,840 acres of potentially suitable habitat lost (0.1% of available potentially suitable habitat)	789 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	52,500 acres of potentially suitable habitat (1.5% of available potentially suitable habitat)	Small overall impact on potentially suitable foraging and roosting habitat. Pre-disturbance surveys and avoiding or minimizing disturbance of occupied roosting habitats in the area of direct effect or compensatory mitigation of direct effects on occupied roosting habitats could reduce impacts.

TABLE 13.3.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status ^a	Habitat ^b	Maximum Area of Potential Habitat Affected ^c			Overall Impact Magnitude ^g and Species-Specific Mitigation ^h
				Within SEZ (Direct Effects) ^d	Transmission Line (Direct Effects) ^e	Indirect Effects (Outside SEZ and Corridors) ^f	
Mammals (Cont.)							
Townsend's big-eared bat	<i>Corynorhinus townsendii</i>	BLM-S; FWS-SC; UT-SC	Near forests and shrubland habitats below 9,000 ft elevation throughout the SEZ region. The species may use caves, mines, and buildings for day roosting and winter hibernation. Quad-level occurrences intersect the affected area east of the SEZ. About 3,283,500 acres of potentially suitable habitat occurs within the SEZ region.	5,268 acres of potentially suitable habitat lost (0.2% of available potentially suitable habitat)	712 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	90,200 acres of potentially suitable habitat (2.7% of available potentially suitable habitat)	Small overall impact on potentially suitable foraging and roosting habitat. Pre-disturbance surveys and avoiding or minimizing disturbance of occupied roosting habitats in the area of direct effect or compensatory mitigation of direct effects on occupied roosting habitats could reduce impacts.

TABLE 13.3.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status ^a	Habitat ^b	Maximum Area of Potential Habitat Affected ^c			Overall Impact Magnitude ^g and Species-Specific Mitigation ^h
				Within SEZ (Direct Effects) ^d	Transmission Line (Direct Effects) ^e	Indirect Effects (Outside SEZ and Corridors) ^f	
Mammals (Cont.)							
Utah prairie dog	<i>Cynomys parvidens</i>	ESA-T; UT-S1	Endemic to southwestern Utah in grasslands in level mountain valleys and areas with deep, well-drained soils. Colonies reside in underground burrow systems, which are dynamic in size and location. Nearest quad-level occurrences are 20 mi south of the SEZ; colonies are known to occur outside of the affected area within 18 mi south of the SEZ. About 641,400 acres of potentially suitable habitat occurs within the SEZ region.	2,982 acres of potentially suitable habitat lost (0.5% of available potentially suitable habitat)	261 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	50,650 acres of potentially suitable habitat (7.9% of available potentially suitable habitat)	Small overall impact. Pre-disturbance surveys and avoiding or minimizing disturbance of occupied habitats in the area of direct effect, translocation of individuals from area of direct effect, or compensatory mitigation of direct effects on occupied habitats could reduce impacts. Mitigation should be developed in consultation with the USFWS and UDWR.

Footnotes on next page.

TABLE 13.3.12.1-1 (Cont.)

-
- ^a BLM-S = listed as a sensitive species by the BLM; ESA-C = candidate for listing under the ESA; ESA-T = listed as threatened under the ESA; ESA-UR = under review for listing under the ESA; FWS-SC = USFWS species of concern; UT-S1 = ranked as S1 in the state of Utah; UT-S2 = ranked as S2 in the state of Utah; UT-SC = Utah species of concern.
- ^b For plant species, potentially suitable habitat was determined by using SWReGAP land cover types. For terrestrial vertebrate species, potentially suitable habitat was determined by using SWReGAP habitat suitability and land cover models. Area of potentially suitable habitat for each species is presented for the SEZ region, which is defined as the area within 50 mi (80 km) of the SEZ center.
- ^c Maximum area of potentially suitable habitat that could be affected relative to availability within the SEZ region. Habitat availability for each species within the region was determined by using SWReGAP habitat suitability and land cover models. This approach probably overestimates the amount of suitable habitat in the project area.
- ^d Direct effects within the SEZ consist of the ground-disturbing activities associated with construction and the maintenance of an altered environment associated with operations.
- ^e For transmission development, direct effects were estimated within a 42-mi (67-km) long, 250-ft (76-m) wide transmission ROW from the SEZ to the nearest existing line. Direct impacts within this area were determined from the proportion of potentially suitable habitat within the 1-mi (1.6-km) wide transmission corridor. No new access road development is assumed to be needed due to the proximity of this infrastructure to the SEZ.
- ^f 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 transmission corridor 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; (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.
- ^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 ft to m, multiply by 0.3048.
- ^j To convert mi to km, multiply by 1.609.
- ^k To convert acres to km², multiply by 0.004047.
- ^l Species in bold text have been recorded or have designated critical habitat in the affected area.

1 ***13.3.12.1.1 Species Listed under the ESA That Could Occur in the Affected Area***
2

3 The USFWS did not identify any ESA-listed species in its scoping comments on the
4 proposed Wah Wah Valley SEZ (Stout 2009). However, the Utah prairie dog is listed as
5 threatened under the ESA and has the potential to occur within the affected area of the SEZ on
6 the basis of observed occurrences near the affected area and the presence of potentially suitable
7 habitat in the affected area (Figure 13.3.12.1-1; Table 13.3.12.1-1). Appendix J provides basic
8 information on life history, habitat needs, and threats to populations of this species. No other
9 species that is currently listed under the ESA is known to occur within the proposed Wah Wah
10 Valley SEZ affected area.
11

12 The Utah prairie dog occurs in grasslands, level mountain valleys, and areas with deep,
13 well-drained soils and low-growing vegetation that allows for good visibility. The Utah prairie
14 dog is one of three prairie dog species in the state of Utah and the only prairie dog species to
15 occur in the vicinity of the SEZ (UDWR 2009d). The USFWS indicated that suitable habitat for
16 the species may occur on the SEZ (Stout 2009). Potential habitat for the Utah prairie dog within
17 the SEZ region is described by SWReGAP as year-round known or probable habitat.
18

19 SWReGAP predicts the presence of potentially suitable habitat for the species on the
20 SEZ and throughout other portions of the affected area (Figure 13.3.12.1-1; Table 13.3.12.1-1).
21 The nearest quad-level records for this species are approximately 20 mi (32 km) south of the
22 SEZ. Data provided by the Utah prairie dog colony tracking database¹² also indicates the
23 presence of active Utah prairie dog colonies outside the affected area, approximately 18 mi
24 (29 km) southwest of the SEZ. Critical habitat for this species has not been designated by
25 the USFWS.
26

27
28 ***13.3.12.1.2 Species That Are Candidates for Listing under the ESA***
29

30 The greater sage-grouse is the only species that is a candidate for listing as threatened or
31 endangered under the ESA that may occur in the affected area of the proposed Wah Wah Valley
32 SEZ. This species is known to occur in plains, foothills, and mountain valleys dominated by
33 sagebrush. In their scoping comments on the SEZ (Stout 2009), the USFWS indicated that
34 suitable sage-grouse habitat occurs throughout the proposed Wah Wah Valley SEZ region.
35 Potential habitat for the greater sage-grouse within the SEZ region is described by SWReGAP as
36 year-round known or probable habitat.
37

38 Quad-level records for this species intersect the affected area south of the SEZ.
39 SWReGAP predicts the presence of potentially suitable habitat for the species on the SEZ and
40 throughout other portions of the affected area. The UDWR has also identified crucial brooding
41 habitat for this species within 22 mi (35 km) east of the SEZ. This crucial brooding habitat also
42 intersects the assumed transmission corridor for the SEZ (Figure 13.3.12.1-1; Table 13.3.12.1-1).

¹² The Utah prairie dog colony tracking database contains sensitive data that were provided by the Utah Division of Wildlife Resources, for official use only. These data were used for the analyses in this PEIS but the distributions were not displayed on figures in this PEIS.

1 According to the SWReGAP habitat suitability model, potentially suitable habitat for this species
2 does not occur on the SEZ. However, potentially suitable habitat may occur in the transmission
3 corridor and throughout portions of the area of indirect effects (Table 13.3.12.1-1).
4
5

6 ***13.3.12.1.3 Species That Are under Review for Listing under the ESA*** 7

8 The USFWS did not identify any species currently being reviewed for listing under the
9 ESA in its scoping comments on the proposed Wah Wah Valley SEZ (Stout 2009). However,
10 there are three species under review for listing under the ESA that have the potential to occur
11 within the affected area of the proposed SEZ on the basis of recorded occurrences near the
12 affected area and the presence of potentially suitable habitat in the affected area. These
13 species are Frisco buckwheat, Frisco clover, and Ostler's pepper-grass (Figure 13.3.12.1-1;
14 Table 13.3.12.1-1). Appendix J provides basic information on life history, habitat needs, and
15 threats to populations of these species. General information on each species is provided below.
16
17

18 **Frisco Buckwheat** 19

20 The Frisco buckwheat is a perennial herb endemic to a small area in the San Francisco
21 Mountains in Beaver County, Utah. It is primarily known to occur on private land near the
22 vicinity of the old mining town of Frisco. The species grows in short, dense mats on limestone
23 outcrops in pinyon-juniper communities at elevations between 6,600 and 7,300 ft (2,000 and
24 2,225 m). The species is known to occur about 7 mi (11 km) northeast of the SEZ within the
25 San Francisco Mountains (Figure 13.3.12.1-1). Suitable habitat for the species does not occur on
26 the SEZ, but potentially suitable habitat may occur within the area of indirect effects and the
27 transmission corridor (Table 13.3.12.1-1).
28
29

30 **Frisco Clover** 31

32 The Frisco clover is a perennial herb endemic to four mountain ranges in Beaver and
33 Millard Counties, Utah. The species grows in short mats on limestone and volcanic gravel
34 substrates, usually on steep slopes, within pinyon-juniper communities at elevations between
35 6,900 and 7,300 ft (2,100 and 2,225 m). The species is known to occur about 8 mi (13 km)
36 northeast of the SEZ within the San Francisco Mountains (Figure 13.3.12.1-1). Suitable habitat
37 for the species does not occur on the SEZ, but potentially suitable habitat may occur within the
38 area of indirect effects and the transmission corridor (Table 13.3.12.1-1).
39
40

41 **Ostler's Pepper-Grass** 42

43 Ostler's pepper-grass is a perennial herb endemic to a small area in the San Francisco
44 Mountains in Beaver County, Utah. The species grows in short tufts on limestone outcrops
45 within pinyon-juniper communities at elevations between 5,800 and 6,800 ft (1,770 and
46 2,070 m). The species is known to occur about 7 mi (11 km) northeast of the SEZ within the

1 San Francisco Mountains (Figure 13.3.12.1-1). Suitable habitat for the species does not occur on
2 the SEZ, but potentially suitable habitat may occur within the area of indirect effects and the
3 transmission corridor (Table 13.3.12.1-1).
4
5

6 ***13.3.12.1.4 BLM-Designated Sensitive Species*** 7

8 There are 21 BLM-designated sensitive species that may occur in the affected area of the
9 proposed Wah Wah Valley SEZ (see Table 13.3.12.1-1). These BLM-designated species include
10 the following: (1) plants—compact cat’s-eye, Frisco buckwheat, Frisco clover, Jone’s
11 globemallow, long-calyx milkvetch, money wild buckwheat, Ostler’s ivesia, and Ostler’s pepper-
12 grass; (2) birds—bald eagle, ferruginous hawk, greater sage-grouse, long-billed curlew, northern
13 goshawk, short-eared owl, and western burrowing owl; and (3) mammals—dark kangaroo
14 mouse, fringed myotis, kit fox, pygmy rabbit, spotted bat, and Townsend’s big-eared bat. Quad-
15 level occurrences intersect the SEZ affected area for the following BLM-designated species: bald
16 eagle, ferruginous hawk, long-billed curlew, northern goshawk, short-eared owl, western
17 burrowing owl, dark kangaroo mouse, fringed myotis, kit fox, pygmy rabbit, spotted bat, and
18 Townsend’s big-eared bat. Habitats in which these species are found, the amount of potentially
19 suitable habitat in the affected area, and known locations of the species relative to the SEZ are
20 presented in Table 13.3.12.1-1. Four of these species (Frisco buckwheat, Frisco clover, Ostler’s
21 pepper-grass, and greater sage-grouse) were discussed in Sections 13.3.12.1.2 and 13.3.12.1.3
22 because of their status under the ESA. All other BLM-designated sensitive species as related to
23 the SEZ are described in the remainder of this section. Additional life history information for
24 these species is provided in Appendix J.
25
26

27 **Compact Cat’s-Eye** 28

29 The compact cat’s eye is a perennial herb endemic to the Great Basin of southwestern
30 Utah. It occurs in scattered locations throughout the proposed Wah Wah Valley SEZ region.
31 Suitable habitat includes salt desert shrub-scrub. The species is known to occur about 25 mi
32 (40 km) northwest of the SEZ. Potentially suitable habitat for the species may occur on the SEZ
33 and in other portions of the affected area (Table 13.3.12.1-1).
34
35

36 **Jone’s Globemallow** 37

38 Jone’s globemallow is a perennial herb endemic to the Great Basin of southwestern Utah.
39 It inhabits mixed shrublands, pinyon-juniper woodlands, and grassland communities. The species
40 is known to occur about 7 mi (11 km) west of the SEZ. Potentially suitable habitat for the species
41 may occur on the SEZ and in other portions of the affected area (Table 13.3.12.1-1).
42
43
44

1 **Long-Calyx Milkvetch**

2
3 The long-calyx milkvetch is a perennial herb endemic to the Great Basin of southwestern
4 Utah. It inhabits mixed shrublands, pinyon-juniper woodlands, and grassland communities. The
5 species is known to occur about 12 mi (19 km) northeast of the SEZ. Potentially suitable habitat
6 for the species may occur on the SEZ and in other portions of the affected area
7 (Table 13.3.12.1-1).

8
9
10 **Money Wild Buckwheat**

11
12 The money wild buckwheat is a perennial shrub from the southwestern United States. It
13 inhabits saltbush, sagebrush, and pinyon-juniper woodland communities on gravelly substrates.
14 The species is known to occur about 20 mi (32 km) north of the SEZ. Potentially suitable habitat
15 for the species may occur on the SEZ and in other portions of the affected area
16 (Table 13.3.12.1-1).

17
18
19 **Ostler’s Ivesia**

20
21 Ostler’s ivesia is a perennial herb endemic to the Wah Wah Mountains and Needle Range
22 in Beaver County, Utah. It is found in crevices of rock outcrops within pinyon-juniper forests.
23 The species is known to occur about 15 mi (24 km) southwest of the SEZ. Potentially suitable
24 habitat for the species may occur on portions of the affected area of the proposed Wah Wah
25 Valley SEZ (Table 13.3.12.1-1).

26
27
28 **Bald Eagle**

29
30 The bald eagle is known to occur in the SEZ region and is primarily associated with
31 larger waterbodies. The species has been recorded in the vicinity of the proposed Wah Wah
32 Valley SEZ and quad-level occurrences for this species intersect the SEZ. According to the
33 SWReGAP habitat suitability model, only potentially suitable nonbreeding winter habitat
34 occurs in the SEZ affected area. Suitable nesting habitat does not occur in the affected area,
35 but shrubland habitats suitable for foraging may occur on the SEZ and throughout the affected
36 area (Table 13.3.12.1-1).

37
38
39 **Ferruginous Hawk**

40
41 The ferruginous hawk is known to occur in the SEZ region, where it forages in shrubland
42 habitats. Quad-level occurrences for this species intersect the proposed Wah Wah Valley SEZ
43 and other portions of the affected area. According to the SWReGAP habitat suitability model,
44 potentially suitable year-round habitat may occur in the SEZ affected area (Table 13.3.12.1-1).
45 Most of the suitable habitat in the affected area is represented by foraging habitat (shrublands);
46 however, potentially suitable nesting habitat (woodlands and rocky cliffs and outcrops) may

1 occur in portions of the affected area. On the basis of an evaluation of SWReGAP land cover
2 types, there are no forested habitats or rocky cliffs and outcrops on the SEZ that may be
3 potentially suitable nesting habitat for the ferruginous hawk. However, approximately
4 9,000 acres (36 km²) of forested habitat within the transmission corridor may provide potentially
5 suitable nesting habitat for this species. In addition, approximately 12,750 acres (52 km²) of
6 forested habitat occurs throughout other portions of the area of indirect effects outside the SEZ
7 and the transmission corridor. Approximately 220 acres (1 km²) of rocky cliffs and outcrops may
8 occur in the transmission corridor; an additional 650 acres (2.5 km²) of rocky cliffs and outcrops
9 may occur in the area of indirect effects outside the SEZ and the transmission corridor.

12 **Long-Billed Curlew**

14 The long-billed curlew is known to occur in the SEZ region, where it may occur as a
15 summer resident and migrant in short-grass grasslands near standing water. Quad-level
16 occurrences for this species intersect the affected area of the proposed Wah Wah Valley SEZ
17 within the transmission corridor approximately 20 mi (32 km) east of the SEZ. According to the
18 SWReGAP habitat suitability model, suitable habitat for this species does not occur on the SEZ.
19 However, potentially suitable nonbreeding migratory habitat is expected to occur on the SEZ and
20 other portions of the affected area. Suitable nesting habitat does not occur in the affected area,
21 but the species may be observed as a transient in grassland habitats throughout the affected area
22 (Table 13.3.12.1-1).

25 **Northern Goshawk**

27 The northern goshawk is known to occur in the SEZ region, where it forages in montane
28 forests and valley shrubland habitats. Quad-level occurrences for this species intersect the
29 affected area north of the proposed Wah Wah Valley SEZ. According to the SWReGAP habitat
30 suitability model, potentially suitable year-round habitat may occur in the affected area
31 (Table 13.3.12.1-1). Suitable foraging or nesting habitat is not expected to occur on the SEZ;
32 however, suitable habitat may occur within the transmission corridor and other portions of the
33 affected area. Most of this suitable habitat in the affected area is represented by foraging habitat
34 (shrublands); however, potentially suitable nesting habitat (woodlands) may occur in portions of
35 the affected area. On the basis of an evaluation of SWReGAP land cover types, approximately
36 9,000 acres (36 km²) of woodland habitat that may be potentially suitable nesting habitat occurs
37 in the transmission corridor; approximately 12,750 acres (52 km²) of this habitat occurs in the
38 area if indirect effects outside the SEZ and the transmission corridor.

41 **Short-Eared Owl**

43 The short-eared owl is known to occur in the SEZ region, where it forages in grasslands,
44 shrublands, and other open habitats. Quad-level occurrences for this species intersect the affected
45 area east and west of the proposed Wah Wah Valley SEZ. According to the SWReGAP habitat
46 suitability model, potentially suitable year-round habitat occurs in the SEZ region. Open

1 grasslands suitable for foraging and nesting may occur in the area of direct effects and
2 throughout other portions of the affected area (Table 13.3.12.1-1).

3 4 5 **Western Burrowing Owl**

6
7 The western burrowing owl is known to occur in the SEZ region, where it forages in
8 grasslands, shrublands, and open disturbed areas. This species typically nests in burrows
9 constructed by mammals such as prairie dogs. Quad-level occurrences for this species intersect
10 the proposed Wah Wah Valley SEZ and other portions of the affected area. According to the
11 SWReGAP habitat suitability model, only potentially suitable summer breeding habitat is
12 expected to occur in the SEZ affected area (Table 13.3.12.1-1). The availability of nest sites
13 (burrows) within the affected area has not been determined, but grassland and shrubland habitat
14 that may be suitable for either foraging or nesting occurs throughout the affected area.

15 16 17 **Dark Kangaroo Mouse**

18
19 The dark kangaroo mouse occurs in the Great Basin region in areas dominated by
20 sagebrush and is known to occur within the SEZ region. Quad-level occurrences for this species
21 intersect the proposed Wah Wah Valley SEZ and other portions of the affected area. According
22 to the SWReGAP habitat suitability model, suitable habitat is expected to occur throughout the
23 SEZ and other portions of the affected area (Table 13.3.12.1-1).

24 25 26 **Fringed Myotis**

27
28 The fringed myotis is known to occur in the SEZ region, where it occurs in a variety of
29 habitats including riparian, shrubland, sagebrush, and pinyon-juniper woodlands. The species
30 roosts in buildings and caves. Quad-level occurrences for this species intersect the affected area
31 of the proposed Wah Wah Valley SEZ within the transmission corridor approximately 40 mi
32 (64 km) east of the SEZ. According to the SWReGAP habitat suitability model, potentially
33 suitable year-round habitat may be present within the affected area (Table 13.3.12.1-1). On the
34 basis of an evaluation of SWReGAP land cover types, there is no potentially suitable roosting
35 habitat (rocky cliffs and outcrops) on the SEZ. However, approximately 220 acres (1 km²) of
36 this potentially suitable roosting habitat may occur in the transmission corridor; an additional
37 650 acres (2.5 km²) of this potentially suitable roosting habitat occurs in the area of indirect
38 effects outside the SEZ and the transmission corridor.

39 40 41 **Kit Fox**

42
43 The kit fox is widely distributed throughout western North America. Within the Wah
44 Wah Valley SEZ region, this species is known to occur in open grassland and shrubland habitats,
45 where it uses burrows for resting and breeding. Quad-level occurrences for this species intersect
46 the SEZ and other portions of the affected area. According to the SWReGAP habitat suitability

1 model, potentially suitable year-round habitat for the species may occur on the SEZ and in other
2 portions of the affected area (Table 13.3.12.1-1).

3
4
5 **Pygmy Rabbit**

6
7 The pygmy rabbit is widely distributed throughout the Great Basin and intermountain
8 regions of western North America. This species is known to occur in western Utah, where it
9 prefers areas with tall dense sagebrush and loose soils. Quad-level occurrences for this species
10 intersect the affected area of the proposed Wah Wah Valley SEZ within the transmission corridor
11 approximately 10 mi (16 km) east of the Wah Wah Valley SEZ. According to the SWReGAP
12 habitat suitability model, suitable habitat for the pygmy rabbit does not occur on the SEZ.
13 However, potentially suitable year-round habitat may occur in the transmission corridor and
14 throughout portions of the area of indirect effects (Table 13.3.12.1-1).

15
16
17 **Spotted Bat**

18
19 The spotted bat is known to occur in the SEZ region, where it inhabits forest and
20 shrubland habitats and roosts in caves and rock crevices. Quad-level occurrences for this species
21 intersect the affected area of the proposed Wah Wah Valley SEZ within the transmission corridor
22 approximately 10 mi (16 km) east of the SEZ. According to the SWReGAP habitat suitability
23 model, potentially suitable year-round habitat may be present within the affected area
24 (see Table 13.3.12.1-1). On the basis of an evaluation of SWReGAP land cover types, there is no
25 potentially suitable roosting habitat (rocky cliffs and outcrops) on the SEZ. However,
26 approximately 220 acres (1 km²) of this potentially suitable roosting habitat may occur in the
27 transmission corridor; an additional 650 acres (2.5 km²) of this potentially suitable roosting
28 habitat occurs in the area of indirect effects outside the SEZ and the transmission corridor.

29
30
31 **Townsend's Big-Eared Bat**

32
33 The Townsend's big-eared bat is known to occur in the SEZ region, where it inhabits
34 forest and shrubland habitats and roosts in caves, mines, and buildings. Quad-level occurrences
35 for this species intersect the affected area east of the SEZ. According to the SWReGAP habitat
36 suitability model, potentially suitable year-round habitat may be present within the affected area
37 (see Table 13.3.12.1-1). On the basis of an evaluation of SWReGAP land cover types, there is no
38 potentially suitable roosting habitat (rocky cliffs and outcrops) on the SEZ. However,
39 approximately 220 acres (1 km²) of this potentially suitable roosting habitat may occur in the
40 transmission corridor; an additional 650 acres (2.5 km²) of this potentially suitable roosting
41 habitat occurs in the area of indirect effects outside the SEZ and the transmission corridor.

1 **13.3.12.1.5 State-Listed Species**

2
3 According to Utah Administrative Rule R657-48, as described in the *Utah Sensitive*
4 *Species List* (UDWR 2010c), there are no species that receive a separate regulatory designation
5 from the UDWR or the state of Utah.
6

7
8 **13.3.12.1.6 Rare Species**

9
10 There are 20 species that have a state status of S1 or S2 in Utah or that are considered
11 species of concern by the state of Utah or the USFWS may occur in the affected area of the
12 proposed Wah Wah Valley SEZ (see Table 13.3.12.1-1). All of these species have been
13 previously discussed as ESA-listed (see Section 13.3.12.1.1), ESA candidate (see
14 Section 13.3.12.1.2), species under review for ESA listing (see Section 13.3.12.1.3), or
15 BLM-designated sensitive (see Section 13.3.12.1.4).
16

17
18 **13.3.12.2 Impacts**

19
20 The potential for impacts on special status species from utility-scale solar energy
21 development within the proposed Wah Wah Valley SEZ is discussed in this section. The types
22 of impacts that special status species could incur from construction and operation of utility-scale
23 solar energy facilities are discussed in Section 5.10.4.
24

25 The assessment of impacts on special status species is based on available information
26 on the presence of species in the affected area, as presented in Section 13.3.12.1, following the
27 analysis approach described in Appendix M. It is assumed that, prior to development, surveys
28 would be conducted to determine the presence of special status species and their habitats in and
29 near areas where ground-disturbing activities would occur. Additional NEPA assessments, ESA
30 consultations, and coordination with state natural resource agencies may be needed to address
31 project-specific impacts more thoroughly. These assessments and consultations could result in
32 additional required actions to avoid, minimize, or mitigate impacts on special status species
33 (see Section 13.3.12.3).
34

35 Solar energy development within the proposed Wah Wah Valley SEZ could affect a
36 variety of habitats (see Sections 13.3.10 and 13.3.11). These impacts on habitats could in turn
37 affect special status species that are dependent on those habitats. Based on UDWR records, quad-
38 level occurrences of the following 13 special status species intersect the affected area of the
39 proposed Wah Wah Valley SEZ: bald eagle, ferruginous hawk, greater sage-grouse, long-billed
40 curlew, northern goshawk, short-eared owl, western burrowing owl, dark kangaroo mouse,
41 fringed myotis, kit fox, pygmy rabbit, spotted bat, and Townsend's big-eared bat. Other special
42 status species may occur on the SEZ or within the affected area based upon the presence of
43 potentially suitable habitat. As discussed in Section 13.3.12.1, this approach to identifying the
44 species that could occur in the affected area probably overestimates the number of species that
45 actually occur in the affected area, and may therefore overestimate impacts on some special
46 status species.
47

1 Potential direct and indirect impacts on special status species within the SEZ and in
2 the area of indirect effect outside the SEZ are presented in Table 13.3.12.1-1. In addition, the
3 overall potential magnitude of impacts on each species (assuming programmatic design features
4 are in place) is presented along with any potential species-specific mitigation measures that
5 could further reduce impacts.

6
7 Impacts on special status species could occur during all phases of development
8 (construction, operation, and decommissioning and reclamation) of a utility-scale solar energy
9 project within the SEZ. Construction and operation activities could result in short- or long-term
10 impacts on individuals and their habitats, especially if these activities are sited in areas where
11 special status species are known to or could occur. As presented in Section 13.3.1.2, a 42-mi
12 (67-km) long transmission corridor is assumed to be needed to serve solar facilities within this
13 SEZ. No new access roads are assumed to be needed to serve solar energy developments within
14 this SEZ because of existing infrastructure adjacent to or within the SEZ.

15
16 Direct impacts would result from habitat destruction or modification. It is assumed that
17 direct impacts would occur only within the SEZ or assumed transmission corridor, where
18 ground-disturbing activities are expected to occur. Indirect impacts could result from surface
19 water and sediment runoff from disturbed areas, fugitive dust generated by project activities,
20 accidental spills, harassment, and lighting. No ground-disturbing activities associated with
21 project development are anticipated to occur within the area of indirect effects.
22 Decommissioning of facilities and reclamation of disturbed areas after operations cease could
23 result in short-term negative impacts on individuals and habitats adjacent to project areas, but
24 long-term benefits would accrue if original land contours and native plant communities were
25 restored in previously disturbed areas.

26
27 The successful implementation of programmatic design features (discussed in
28 Appendix A, Section A.2.2) would reduce direct impacts on some special status species,
29 especially those that depend on habitat types that can be easily avoided (e.g., pinyon-juniper
30 woodlands). Indirect impacts on special status species could be reduced to negligible levels by
31 implementing programmatic design features, especially those engineering controls that would
32 reduce runoff, sedimentation, spills, and fugitive dust.

33 34 35 ***13.3.12.2.1 Impacts on Species Listed under the ESA***

36
37 The Utah prairie dog is the only species listed under the ESA that has the potential to
38 occur in the affected area of the proposed Wah Wah Valley SEZ. Although the USFWS did
39 not identify this species in their scoping comments on the proposed Wah Wah Valley SEZ
40 (Stout 2009), potentially suitable shrubland habitat occurs throughout the affected area, and
41 the nearest quad-level occurrences for this species are 20 mi (32 km) south of the SEZ
42 (Figure 13.3.12.1-1). Furthermore, information provided by the Utah prairie dog colony tracking
43 database indicates the presence of Utah prairie dog colonies outside the affected area, about
44 18 mi (29 km) southwest of the SEZ. According to SWReGAP, about 2,982 acres (12 km²) of
45 potentially suitable habitat on the SEZ and 261 acres (1 km²) of potentially suitable habitat in
46 the transmission corridor could be directly affected by construction and operations

1 (see Table 13.3.12.1-1). This direct effects area represents about 0.5% of available potentially
2 suitable habitat of the Utah prairie dog in the SEZ region. About 50,650 acres (205 km²) of
3 suitable habitat occurs in the area of potential indirect effects; this area represents about 7.9%
4 of the available potentially suitable habitat in the SEZ region (see Table 13.3.12.1-1).
5

6 The overall impact on the Utah prairie dog from construction, operation, and
7 decommissioning of utility-scale solar energy facilities within the proposed Wah Wah Valley
8 SEZ is considered small because the amount of potentially suitable habitat for this species in the
9 area of direct effects represents less than 1% of potentially suitable habitat in the SEZ region.
10

11 The implementation of programmatic design features and complete avoidance of all
12 suitable habitats could reduce impacts to negligible levels. Impacts could also be reduced by
13 conducting pre-disturbance surveys, buffering the locations of known prairie dog colonies,
14 and avoiding or minimizing disturbances within those areas, as recommended by the USFWS
15 (Stout 2009). Formal consultation with the USFWS under Section 7 of the ESA is required
16 for any federal action that may adversely affect an ESA-listed species. Therefore, prior to
17 development, consultation with the USFWS would be necessary to discuss potential impacts on
18 the Utah prairie dog, develop an approved pre-disturbance survey protocol, develop site-specific
19 mitigation, authorize incidental take statements, and develop a Utah prairie dog translocation
20 and monitoring program (if necessary).
21

22 To offset impacts of solar development on the SEZ, compensatory mitigation may be
23 needed to balance the acreage of habitat lost with acquisition of lands that would be improved
24 and protected for Utah prairie dog populations. Compensation can be accomplished by
25 improving the carrying capacity for the Utah prairie dog on the acquired lands. As for other
26 mitigation actions, consultations with the USFWS and the UDWR would be necessary to
27 determine the appropriate mitigation ratio to acquire, enhance, and preserve these lands.
28
29

30 ***13.3.12.2 Impacts on Species That Are Candidates for Listing under the ESA***

31

32 The greater sage-grouse is the only species that is a candidate for listing under the ESA
33 that could occur in the affected area of the proposed Wah Wah Valley SEZ. Quad-level
34 occurrences for this species intersect the affected area south of the SEZ and potentially suitable
35 sagebrush habitat occurs throughout the affected area (see Figure 13.3.12.1-1). In their scoping
36 comments on the SEZ, the USFWS identified a potential impact on greater sage-grouse habitat
37 resulting from solar energy development on the SEZ (Stout 2009). According to SWReGAP,
38 suitable habitat for this species does not occur on the SEZ itself. However, about 626 acres
39 (2.5 km²) of potentially suitable habitat in the transmission corridor could be directly affected by
40 construction and operations (see Table 13.3.12.1-1). This direct effects area represents less than
41 0.1% of available potentially suitable habitat for the greater sage-grouse in the SEZ region.
42 About 12,650 acres (51 km²) of suitable habitat occurs in the area of potential indirect effects;
43 this area represents about 0.8% of the available potentially suitable habitat in the SEZ region
44 (see Table 13.3.12.1-1).
45

1 The overall impact on the greater sage-grouse from construction, operation, and
2 decommissioning of utility-scale solar energy facilities within the proposed Wah Wah Valley
3 SEZ is considered small because the amount of potentially suitable habitat for this species in the
4 area of direct effects represents less than 1% of potentially suitable habitat in the SEZ region.
5 The implementation of programmatic design features alone may not be sufficient to reduce
6 impacts to negligible levels because potentially suitable sagebrush habitats are widespread
7 within the transmission corridor.
8

9 Efforts to mitigate the impacts of solar energy development on the greater sage-grouse in
10 the proposed Wah Wah Valley SEZ should be developed in consultation with the USFWS and
11 UDWR following the *Strategic Plan for Management of Sage Grouse* (UDWR 2009e) and
12 *Guidelines to Manage Sage Grouse Populations and Their Habitats* (Connelly et al. 2000).
13 Impacts could be reduced by conducting pre-disturbance surveys and avoiding or minimizing
14 disturbance of occupied habitats in the area of direct effects, especially leks and nesting areas.
15 If avoidance or minimization is not a feasible option, a compensatory mitigation plan could be
16 developed and implemented to mitigate direct effects on occupied habitats. Compensation could
17 involve the protection and enhancement of existing occupied or suitable habitats to compensate
18 for habitats lost to development. Any mitigation plans should be developed in coordination with
19 the USFWS and UDWR.
20

21 22 ***13.3.12.2.3 Impacts on Species That Are under Review for Listing under the ESA*** 23

24 The USFWS did not identify any species currently being reviewed for listing under the
25 ESA in its scoping comments on the proposed Wah Wah Valley SEZ (Stout 2009). However,
26 there are three species under review for listing under the ESA that have the potential to occur
27 within the affected area of the proposed SEZ: Frisco buckwheat, Frisco clover, and Ostler's
28 pepper-grass. Impacts on these species are discussed below.
29

30 31 **Frisco Buckwheat** 32

33 The Frisco buckwheat is not known to occur in the affected area of the proposed Wah
34 Wah Valley SEZ, and potentially suitable habitat for this species does not occur on the SEZ.
35 However, approximately 13 acres (<0.1 km²) of potentially suitable habitat in the transmission
36 corridor could be directly affected by construction and operations (see Table 13.3.12.1-1). This
37 direct impact area represents less than 0.1% of available potentially suitable habitat in the SEZ
38 region. About 650 acres (3 km²) of potentially suitable habitat occurs in the area of potential
39 indirect effects; this area represents about 1.8% of the available potentially suitable habitat in the
40 SEZ region (see Table 13.3.12.1-1).
41

42 The overall impact on the Frisco buckwheat from construction, operation, and
43 decommissioning of utility-scale solar energy facilities within the proposed Wah Wah Valley
44 SEZ is considered small because the amount of potentially suitable habitat for this species in the
45 area of direct effects represents less than 1% of potentially suitable habitat in the SEZ region.
46

1 The implementation of programmatic design features and avoidance of all suitable
2 habitats (e.g., rock outcrops) may be sufficient to reduce impacts to negligible levels. If
3 avoidance of all suitable habitats is not possible, impacts could be reduced by conducting pre-
4 disturbance surveys and avoiding or minimizing disturbance to occupied habitats within the
5 area of direct effects. If avoidance or minimization is not a feasible option, plants could be
6 translocated from areas of direct effect to protected areas that would not be affected directly
7 or indirectly by future development. Alternatively, or in combination with translocation, a
8 compensatory mitigation plan could be developed and implemented to mitigate direct effects
9 on occupied habitats. Compensation could involve the protection and enhancement of existing
10 occupied or suitable habitats to compensate for habitats lost to development. A comprehensive
11 mitigation strategy that used one or more of these options could be designed to completely offset
12 the impacts of development. Any mitigation plans for this species should be developed in
13 coordination with the USFWS and UDWR.

14 15 16 **Frisco Clover**

17
18 The Frisco clover is not known to occur in the affected area of the proposed Wah Wah
19 Valley SEZ, and potentially suitable habitat for this species does not occur on the SEZ. However,
20 approximately 287 acres (1 km²) of potentially suitable habitat in the transmission corridor could
21 be directly affected by construction and operations (see Table 13.3.12.1-1). This direct impact
22 area represents less than 0.1% of available potentially suitable habitat in the SEZ region. About
23 18,650 acres (75 km²) of potentially suitable habitat occurs in the area of potential indirect
24 effects; this area represents about 1.2% of the available potentially suitable habitat in the SEZ
25 region (see Table 13.3.12.1-1).

26
27 The overall impact on the Frisco clover from construction, operation, and
28 decommissioning of utility-scale solar energy facilities within the proposed Wah Wah Valley
29 SEZ is considered small because the amount of potentially suitable habitat for this species in the
30 area of direct effects represents less than 1% of potentially suitable habitat in the SEZ region.

31
32 The implementation of programmatic design features and avoidance of all suitable
33 habitats (e.g., rock outcrops and pinyon-juniper woodlands) may be sufficient to reduce impacts
34 to negligible levels. If avoidance of all suitable habitats is not possible, impacts could be reduced
35 by implementing the mitigation options described previously for the Frisco buckwheat. The need
36 for mitigation should first be determined by conducting preconstruction surveys for the species
37 and its habitat on the SEZ. Any mitigation plans for this species should be developed in
38 coordination with the USFWS and UDWR.

39 40 41 **Ostler's Pepper-Grass**

42
43 The Ostler's pepper-grass is not known to occur in the affected area of the proposed Wah
44 Wah Valley SEZ, and potentially suitable habitat for this species does not occur on the SEZ.
45 However, approximately 13 acres (<0.1 km²) of potentially suitable habitat in the transmission
46 corridor could be directly affected by construction and operations (see Table 13.3.12.1-1). This

1 direct impact area represents less than 0.1% of available potentially suitable habitat in the SEZ
2 region. About 650 acres (3 km²) of potentially suitable habitat occurs in the area of potential
3 indirect effects; this area represents about 1.2% of the available potentially suitable habitat in the
4 SEZ region (see Table 13.3.12.1-1).

5
6 The overall impact on the Ostler's pepper-grass from construction, operation, and
7 decommissioning of utility-scale solar energy facilities within the proposed Wah Wah Valley
8 SEZ is considered small because the amount of potentially suitable habitat for this species in the
9 area of direct effects represents less than 1% of potentially suitable habitat in the SEZ region.

10
11 The implementation of programmatic design features and avoidance of all suitable
12 habitats (e.g., rock outcrops) may be sufficient to reduce impacts to negligible levels. If
13 avoidance of all suitable habitats is not possible, impacts could be reduced by implementing the
14 mitigation options described previously for the Frisco buckwheat. The need for mitigation should
15 first be determined by conducting preconstruction surveys for the species and its habitat on the
16 SEZ. Any mitigation plans for this species should be developed in coordination with the USFWS
17 and UDWR.

18 19 20 ***13.3.12.2.4 Impacts on BLM-Designated Sensitive Species***

21
22 Of the 21 BLM-designated sensitive species that could occur in the affected area of the
23 proposed Wah Wah Valley SEZ, four species—Frisco buckwheat, Frisco clover, Ostler's pepper-
24 grass, and greater sage-grouse—were discussed in Sections 13.3.12.2.2 and 13.3.12.2.3 because
25 of their status under the ESA. Impacts on all other BLM-designated sensitive species that have
26 potentially suitable habitat within the affected area of the proposed Wah Wah Valley SEZ are
27 discussed below.

28 29 30 **Compact Cat's-Eye**

31
32 The compact cat's-eye is not known to occur in the affected area of the proposed
33 Wah Wah Valley SEZ; however, approximately 5,132 acres (21 km²) of potentially suitable
34 habitat on the SEZ and 932 acres (4 km²) of potentially suitable habitat in the transmission
35 corridor could be directly affected by construction and operations (see Table 13.3.12.1-1). This
36 direct impact area represents about 0.2% of available potentially suitable habitat in the SEZ
37 region. About 94,900 acres (384 km²) of potentially suitable habitat occurs in the area of
38 potential indirect effects; this area represents about 3.3% of the available potentially suitable
39 habitat in the SEZ region (see Table 13.3.12.1-1).

40
41 The overall impact on the compact cat's-eye from construction, operation, and
42 decommissioning of utility-scale solar energy facilities within the proposed Wah Wah Valley
43 SEZ is considered small because the amount of potentially suitable habitat for this species in the
44 area of direct effects represents less than 1% of potentially suitable habitat in the SEZ region.
45 The implementation of programmatic design features may be sufficient to reduce indirect
46 impacts to negligible levels.

1 Avoidance of all potentially suitable habitats to mitigate impacts on the compact cat's-
2 eye is not feasible because potentially suitable shrubland habitats are widespread throughout the
3 area of direct effect. For this species and other special status plants, impacts could be reduced by
4 conducting pre-disturbance surveys and avoiding or minimizing disturbance to occupied habitats
5 in the area of direct effects. If avoidance or minimization is not a feasible option, plants could be
6 translocated from areas of direct effect to protected areas that would not be affected directly or
7 indirectly by future development. Alternatively, or in combination with translocation, a
8 compensatory mitigation plan could be developed and implemented to mitigate direct effects on
9 occupied habitats. Compensation could involve the protection and enhancement of existing
10 occupied or suitable habitats to compensate for habitats lost to development. A comprehensive
11 mitigation strategy that used one or more of these options could be designed to completely offset
12 the impacts of development.
13
14

15 **Jone's Globemallow**

16
17 Jone's globemallow is not known to occur in the affected area of the proposed Wah Wah
18 Valley SEZ; however, approximately 5,360 acres (22 km²) of potentially suitable habitat on the
19 SEZ and 1,221 acres (5 km²) of potentially suitable habitat in the transmission corridor could be
20 directly affected by construction and operations (Table 13.3.12.1-1). This direct impact area
21 represents about 0.1% of available potentially suitable habitat in the SEZ region. About
22 113,700 acres (460 km²) of potentially suitable habitat occurs in the area of potential indirect
23 effects; this area represents about 2.5% of the available potentially suitable habitat in the SEZ
24 region (Table 13.3.12.1-1).
25

26 The overall impact on the Jone's globemallow from construction, operation, and
27 decommissioning of utility-scale solar energy facilities within the proposed Wah Wah Valley
28 SEZ is considered small because the amount of potentially suitable habitat for this species in the
29 area of direct effects represents less than 1% of potentially suitable habitat in the SEZ region.
30 The implementation of programmatic design features may be sufficient to reduce indirect
31 impacts to negligible levels.
32

33 Avoidance of all potentially suitable habitats to mitigate impacts on the Jone's
34 globemallow is not feasible because these habitats (i.e., shrublands) are widespread throughout
35 the area of direct effects. However, impacts could be reduced to negligible levels with the
36 implementation of programmatic design features and the mitigation options described previously
37 for the compact cat's-eye. The need for mitigation should first be determined by conducting
38 preconstruction surveys for the species and its habitat in the area of direct effects.
39
40

41 **Long-Calyx Milkvetch**

42
43 The long-calyx milkvetch is not known to occur in the affected area of the proposed
44 Wah Wah Valley SEZ; however, approximately 5,132 acres (21 km²) of potentially suitable
45 habitat on the SEZ and 1,208 acres (5 km²) of potentially suitable habitat in the transmission
46 corridor could be directly affected by construction and operations (see Table 13.3.12.1-1). This

1 direct impact area represents about 0.2% of available potentially suitable habitat in the SEZ
2 region. About 112,900 acres (457 km²) of potentially suitable habitat occurs in the area of
3 potential indirect effects; this area represents about 2.6% of the available potentially suitable
4 habitat in the SEZ region (see Table 13.3.12.1-1).

5
6 The overall impact on the long-calyx milkvetch from construction, operation, and
7 decommissioning of utility-scale solar energy facilities within the proposed Wah Wah Valley
8 SEZ is considered small because the amount of potentially suitable habitat for this species in the
9 area of direct effects represents less than 1% of potentially suitable habitat in the SEZ region.
10 The implementation of programmatic design features may be sufficient to reduce indirect
11 impacts to negligible levels.

12
13 Avoidance of all potentially suitable habitats to mitigate impacts on the long-calyx
14 milkvetch is not feasible because these habitats (i.e., sagebrush and shrublands) are widespread
15 throughout the area of direct effects. However, impacts could be reduced to negligible levels
16 with the implementation of programmatic design features and the mitigation options described
17 previously for the compact cat's-eye. The need for mitigation should first be determined by
18 conducting preconstruction surveys for the species and its habitat in the area of direct effects.

20 21 **Money Wild Buckwheat**

22
23 The money wild buckwheat is not known to occur in the affected area of the proposed
24 Wah Wah Valley SEZ; however, approximately 2,900 acres (12 km²) of potentially suitable
25 habitat on the SEZ and 869 acres (0.3 km²) of potentially suitable habitat in the transmission
26 corridor could be directly affected by construction and operations (see Table 13.3.12.1-1). This
27 direct impact area represents about 0.1% of available potentially suitable habitat in the SEZ
28 region. About 83,450 acres (338 km²) of potentially suitable habitat occurs in the area of
29 potential indirect effects; this area represents about 2.4% of the available potentially suitable
30 habitat in the SEZ region (see Table 13.3.12.1-1).

31
32 The overall impact on the money wild buckwheat from construction, operation, and
33 decommissioning of utility-scale solar energy facilities within the proposed Wah Wah Valley
34 SEZ is considered small because the amount of potentially suitable habitat for this species in the
35 area of direct effects represents less than 1% of potentially suitable habitat in the SEZ region.
36 The implementation of programmatic design features may be sufficient to reduce indirect
37 impacts to negligible levels.

38
39 Avoidance of all potentially suitable habitats to mitigate impacts on the money wild
40 buckwheat is not feasible because these habitats (i.e., sagebrush and shrublands) are widespread
41 throughout the area of direct effects. However, impacts could be reduced to negligible levels
42 with the implementation of programmatic design features and the mitigation options described
43 previously for the compact cat's-eye. The need for mitigation should first be determined by
44 conducting preconstruction surveys for the species and its habitat in the area of direct effects.

1 **Ostler’s Ivesia**

2
3 Ostler’s ivesia is not known to occur in the affected area of the proposed Wah Wah
4 Valley SEZ, and potentially suitable habitat for this species does not occur on the SEZ. However,
5 approximately 287 acres (1 km²) of potentially suitable habitat in the transmission corridor could
6 be directly affected by construction and operations (see Table 13.3.12.1-1). This direct impact
7 area represents less than 0.1% of available potentially suitable habitat in the SEZ region. About
8 18,650 acres (75 km²) of potentially suitable habitat occurs in the area of potential indirect
9 effects; this area represents about 1.2% of the available potentially suitable habitat in the SEZ
10 region (see Table 13.3.12.1-1).

11
12 The overall impact on the Ostler’s ivesia from construction, operation, and
13 decommissioning of utility-scale solar energy facilities within the proposed Wah Wah Valley
14 SEZ is considered small because the amount of potentially suitable habitat for this species in the
15 area of direct effects represents less than 1% of potentially suitable habitat in the SEZ region.

16
17 The implementation of programmatic design features and avoiding or minimizing
18 disturbance of all suitable habitats (e.g., rock outcrops and pinyon-juniper forests) may be
19 sufficient to reduce impacts to negligible levels. If avoidance of all potentially suitable habitats is
20 not possible, impacts could be reduced by implementing the mitigation options described
21 previously for the compact cat’s-eye. The need for mitigation should first be determined by
22 conducting preconstruction surveys for the species and its habitat in the area of direct effects.

23
24
25 **Bald Eagle**

26
27 The bald eagle is a winter resident within the proposed Wah Wah Valley SEZ region.
28 Approximately 2,982 acres (12 km²) of potentially suitable foraging habitat on the SEZ and
29 608 acres (2 km²) of potentially suitable foraging habitat in the transmission corridor could be
30 directly affected by construction and operations (see Table 13.3.12.1-1). This direct impact area
31 represents about 0.1% of available potentially suitable foraging habitat in the SEZ region.
32 About 78,500 acres (318 km²) of potentially suitable habitat occurs in the area of potential
33 indirect effect; this area represents about 2.9% of the available potentially suitable habitat in
34 the SEZ region (see Table 13.3.12.1-1).

35
36 The overall impact on the bald eagle from construction, operation, and decommissioning
37 of utility-scale solar energy facilities within the proposed Wah Wah Valley SEZ is considered
38 small because direct effects would only occur on potentially suitable foraging habitat, and the
39 amount of this habitat in the area of direct effects represents less than 1% of potentially suitable
40 habitat in the SEZ region. The implementation of programmatic design features are expected to
41 reduce indirect impacts to negligible levels. Avoidance of direct impacts on all potentially
42 suitable foraging habitat is not a feasible way to mitigate impacts on the bald eagle because
43 potentially suitable shrubland is widespread throughout the area of direct effects and readily
44 available in other portions of the affected area.

1 **Ferruginous Hawk**

2
3 The ferruginous hawk is a year-round resident within the proposed Wah Wah Valley SEZ
4 region, and potentially suitable breeding and nonbreeding may occur in the affected area.
5 Approximately 795 acres (3 km²) of potentially suitable habitat on the SEZ and 551 acres
6 (2 km²) of potentially suitable habitat in the transmission corridor could be directly affected by
7 construction and operations (see Table 13.3.12.1-1). This direct impact area represents about
8 0.1% of available suitable habitat in the SEZ region. About 26,650 acres (108 km²) of potentially
9 suitable habitat occurs in the area of potential indirect effect; this area represents about 1.5% of
10 the available potentially suitable habitat in the SEZ region (see Table 13.3.12.1-1). Most of the
11 suitable habitat in the affected area is represented by foraging habitat (shrublands); however,
12 potentially suitable nesting habitat (woodlands and rocky cliffs and outcrops) may occur in
13 portions of the affected area. On the basis of an evaluation of SWReGAP land cover types, there
14 are no forested habitats or rocky cliffs and outcrops on the SEZ. However, approximately
15 9,000 acres (36 km²) of forested habitat within the transmission corridor may provide potentially
16 suitable nesting habitat for this species. In addition, approximately 12,750 acres (52 km²) of
17 forested habitat occurs throughout other portions of the area of indirect effects outside the SEZ
18 and the transmission corridor. Approximately 220 acres (1 km²) of rocky cliffs and outcrops may
19 occur in the transmission corridor; an additional 650 acres (2.5 km²) of rocky cliffs and outcrops
20 may occur in the area of indirect effects outside the SEZ and the transmission corridor.

21
22 The overall impact on the ferruginous hawk from construction, operation, and
23 decommissioning of utility-scale solar energy facilities within the proposed Wah Wah Valley
24 SEZ is considered small because the amount of potentially suitable habitat for this species in the
25 area of direct effects represents less than 1% of potentially suitable foraging habitat in the SEZ
26 region. The implementation of programmatic design features may be sufficient to reduce indirect
27 impacts on this species to negligible levels.

28
29 Avoidance of direct impacts on all foraging habitat is not feasible because suitable
30 foraging habitat (shrublands) is widespread in the area of direct effect and may be readily
31 available in other portions of the affected area. However, avoiding or minimizing disturbance of
32 all occupied nesting habitat (woodlands and rocky cliffs and outcrops) in the area of direct
33 effects is feasible, and could reduce impacts. If avoiding or minimizing disturbance of all
34 occupied nesting habitat is not a feasible option, a compensatory mitigation plan could be
35 developed and implemented to mitigate direct effects. Compensation could involve the
36 protection and enhancement of existing occupied or suitable habitats to compensate for habitats
37 lost to development. A comprehensive mitigation strategy that used one or both of these options
38 could be designed to completely offset the impacts of development. The need for mitigation,
39 other than programmatic design features, should be determined by conducting pre-disturbance
40 surveys for the species and its habitat within the area of direct effects.

41
42
43 **Long-Billed Curlew**

44
45 The long-billed curlew is a summer resident and migrant within the proposed Wah Wah
46 Valley SEZ region, and individuals may occur as migratory transients in grassland and wetland

1 habitats (playas) in the affected area. Approximately 142 acres (0.5 km²) of potentially suitable
2 habitat on the SEZ and 8 acres (<0.1 km²) of potentially suitable habitat in the transmission
3 corridor could be directly affected by construction and operations (see Table 13.3.12.1-1). This
4 direct impact area represents less than 0.1% of available potentially suitable habitat in the SEZ
5 region. About 3,230 acres (13 km²) of potentially suitable habitat occurs in the area of potential
6 indirect effect; this area represents about 1.0% of the available potentially suitable habitat in the
7 SEZ region (see Table 13.3.12.1-1). Most of this area could serve as foraging habitat
8 (i.e., grasslands); the species is not expected to nest in the affected area.
9

10 The overall impact on the long-billed curlew from construction, operation, and
11 decommissioning of utility-scale solar energy facilities within the proposed Wah Wah Valley
12 SEZ is considered small because the amount of potentially suitable habitat for this species in the
13 area of direct effects represents less than 1% of potentially suitable habitat in the SEZ region.
14 The implementation of programmatic design features may be sufficient to reduce indirect
15 impacts on this species to negligible levels. No species-specific mitigation of direct effects is
16 warranted because the species occurs only as a transient in the affected area and the affected area
17 represents a very small proportion of potentially suitable foraging habitat in the SEZ region.
18
19

20 **Northern Goshawk**

21
22 The northern goshawk is considered to be a year-round resident within the proposed Wah
23 Wah Valley SEZ region, where it occurs in montane forests and shrubland habitats. According to
24 the SWReGAP habitat suitability model, potentially suitable habitat does not exist on the SEZ.
25 However, approximately 97 acres (0.4 km²) of potentially suitable habitat in the transmission
26 corridor could be directly affected by construction and operations (see Table 13.3.12.1-1). This
27 direct impact area represents less than 0.1% of available suitable habitat in the SEZ region.
28 About 4,731 acres (19 km²) of potentially suitable habitat occurs in the area of potential
29 indirect effect; this area represents about 1.9% of the available potentially suitable habitat in the
30 SEZ region (see Table 13.3.12.1-1). Most of this suitable habitat in the affected area is
31 represented by foraging habitat (shrublands); however, potentially suitable nesting habitat
32 (woodlands) may occur in portions of the affected area. On the basis of an evaluation of
33 SWReGAP land cover types, approximately 9,000 acres (36 km²) of woodland habitat that may
34 be potentially suitable nesting habitat occurs in the transmission corridor; approximately
35 12,750 acres (52 km²) of this habitat occurs in the area if indirect effects outside the SEZ and the
36 transmission corridor.
37

38 The overall impact on the northern goshawk from construction, operation, and
39 decommissioning of utility-scale solar energy facilities within the proposed Wah Wah Valley
40 SEZ is considered small because the amount of potentially suitable habitat for this species in the
41 area of direct effects represents less than 1% of potentially suitable habitat in the SEZ region.
42 The implementation of programmatic design features may be sufficient to reduce indirect
43 impacts on this species to negligible levels.
44

45 The avoidance of all potentially suitable foraging habitats (shrublands) is not feasible to
46 mitigate impacts on the northern goshawk because these habitats are widespread throughout the

1 area of direct effects and the SEZ region. However, avoiding or minimizing disturbance of all
2 occupied nesting habitat (woodlands) within the transmission corridor is feasible, and could
3 reduce impacts. If avoiding or minimizing disturbance of all occupied nesting habitat is not
4 feasible, a compensatory mitigation plan could be developed and implemented to mitigate direct
5 effects. Compensation could involve the protection and enhancement of existing occupied or
6 suitable habitats to compensate for habitats lost to development. A comprehensive mitigation
7 strategy that used one or both of these options could be designed to completely offset the impacts
8 of development. The need for mitigation, other than programmatic design features, should be
9 determined by conducting pre-disturbance surveys for the species and its habitat within the area
10 of direct effects.

11 12 13 **Short-Eared Owl** 14

15 The short-eared owl is considered to be a year-round resident within the proposed Wah
16 Wah Valley SEZ region, where it is known to occur in open grasslands and shrublands.
17 Approximately 5,510 acres (22 km²) of potentially suitable habitat on the SEZ and 1,152 acres
18 (5 km²) of potentially suitable habitat in the transmission corridor could be directly affected by
19 construction and operations (see Table 13.3.12.1-1). This direct impact area represents about
20 0.2% of available potentially suitable habitat in the SEZ region. About 106,000 acres (429 km²)
21 of potentially suitable habitat occurs in the area of potential indirect effect; this area represents
22 about 2.6% of the available potentially suitable habitat in the SEZ region (see Table 13.3.12.1-1).
23 Most of this area could serve as foraging habitat (i.e., shrublands), although open grassland and
24 shrubland habitats that could serve as suitable nesting habitat could occur in the affected area.
25

26 The overall impact on the short-eared owl from construction, operation, and
27 decommissioning of utility-scale solar energy facilities within the proposed Wah Wah Valley
28 SEZ is considered small because the amount of potentially suitable habitat for this species in the
29 area of direct effects represents less than 1% of potentially suitable habitat in the SEZ region.
30 The implementation of programmatic design features may be sufficient to reduce indirect
31 impacts on this species to negligible levels.
32

33 The avoidance of all potentially suitable foraging habitats (shrublands) is not feasible to
34 mitigate impacts on the short-eared owl because these habitats are widespread throughout the
35 area of direct effects and may be readily available in other portions of the SEZ region. However,
36 impacts on the short-eared owl could be reduced by conducting pre-disturbance surveys and
37 avoiding or minimizing disturbance to occupied habitats in the area of direct effects. If avoiding
38 or minimizing disturbance of all occupied habitat are not feasible options, a compensatory
39 mitigation plan could be developed and implemented to mitigate direct effects. Compensation
40 could involve the protection and enhancement of existing occupied or suitable habitats to
41 compensate for habitats lost to development. A comprehensive mitigation strategy that used
42 one or both of these options could be designed to completely offset the impacts of development.
43 The need for mitigation, other than programmatic design features, should be determined by
44 conducting pre-disturbance surveys for the species and its habitat within the area of direct
45 effects.
46

1 **Western Burrowing Owl**
2

3 The western burrowing owl is considered to be a summer resident within the proposed
4 Wah Wah Valley SEZ region, where it is known to forage in grasslands and shrublands. Within
5 the SEZ region, the species nests in burrows constructed by mammals such as prairie dogs.
6 Approximately 5,268 acres (21 km²) of potentially suitable habitat on the SEZ and 734 acres
7 (3 km²) of potentially suitable habitat in the transmission corridor could be directly affected by
8 construction and operations (see Table 13.3.12.1-1). This direct impact area represents about
9 0.2% of available potentially suitable habitat in the SEZ region. About 91,500 acres (370 km²) of
10 potentially suitable habitat occurs in the area of potential indirect effect; this area represents
11 about 3.0% of the available potentially suitable habitat in the SEZ region (see Table 13.3.12.1-1).
12 Most of this area could serve as foraging and nesting habitat (shrublands). The abundance of
13 burrows suitable for nesting on the SEZ and in the area of indirect effects has not been
14 determined.
15

16 The overall impact on the western burrowing owl from construction, operation, and
17 decommissioning of utility-scale solar energy facilities within the proposed Wah Wah Valley
18 SEZ is considered small because the amount of potentially suitable habitat for this species in the
19 area of direct effects represents less than 1% of potentially suitable habitat in the SEZ region.
20 The implementation of programmatic design features may be sufficient to reduce indirect
21 impacts on this species to negligible levels.
22

23 Avoidance of all potentially suitable habitats is not feasible to mitigate impacts on the
24 western burrowing owl because potentially suitable shrubland habitats are widespread
25 throughout the area of direct effect and may be readily available in other portions of the SEZ
26 region. However, impacts on the western burrowing owl could be reduced by conducting
27 pre-disturbance surveys and avoiding or minimizing disturbance to occupied burrows and habitat
28 in the area of direct effects. If avoiding or minimizing disturbance of all occupied habitat are not
29 feasible options, a compensatory mitigation plan could be developed and implemented to
30 mitigate direct effects. Compensation could involve the protection and enhancement of existing
31 occupied or suitable habitats to compensate for habitats lost to development. A comprehensive
32 mitigation strategy that used one or both of these options could be designed to completely offset
33 the impacts of development. The need for mitigation, other than programmatic design features,
34 should be determined by conducting pre-disturbance surveys for the species and its habitat
35 within the area of direct effects.
36
37

38 **Dark Kangaroo Mouse**
39

40 The dark kangaroo mouse is considered to be a year-round resident within the proposed
41 Wah Wah Valley SEZ region, where it is known to occur in sandy regions dominated by
42 sagebrush. Approximately 2,840 acres (11 km²) of potentially suitable habitat on the SEZ and
43 374 acres (1.5 km²) of potentially suitable habitat in the transmission corridor could be directly
44 affected by construction and operations (see Table 13.3.12.1-1). This direct impact area
45 represents about 0.3% of available potentially suitable habitat in the SEZ region. About
46 26,700 acres (108 km²) of potentially suitable habitat occurs in the area of potential

1 indirect effect; this area represents about 2.5% of the available potentially suitable habitat in the
2 SEZ region (see Table 13.3.12.1-1).

3
4 The overall impact on the dark kangaroo mouse from construction, operation, and
5 decommissioning of utility-scale solar energy facilities within the proposed Wah Wah Valley
6 SEZ is considered small because the amount of potentially suitable habitat for this species in the
7 area of direct effects represents less than 1% of potentially suitable habitat in the SEZ region.
8 The implementation of programmatic design features may be sufficient to reduce indirect
9 impacts on this species to negligible levels.

10
11 The avoidance of all potentially suitable habitats is not feasible to mitigate impacts on
12 the dark kangaroo mouse because potentially suitable sagebrush habitats are widespread
13 throughout the area of direct effects. However, pre-disturbance surveys and avoiding or
14 minimizing disturbance to occupied habitats in the area of direct effects could reduce impacts.
15 If avoidance or minimization is not a feasible option, a compensatory mitigation plan could be
16 developed and implemented to mitigate direct effects on occupied habitats. Compensation could
17 involve the protection and enhancement of existing occupied or suitable habitats to compensate
18 for habitats lost to development. A comprehensive mitigation strategy that uses one or both of
19 these options could be designed to completely offset the impacts of development.

20 21 22 **Fringed Myotis**

23
24 The fringed myotis is considered to be a year-round resident within the proposed Wah
25 Wah Valley SEZ region, where it is known to forage in riparian, shrubland, and forested habitats.
26 Approximately 5,822 acres (23.5 km²) of potentially suitable habitat on the SEZ and 1,200 acres
27 (5 km²) of potentially suitable habitat in the transmission corridor could be directly affected by
28 construction and operations (see Table 13.3.12.1-1). This direct impact area represents about
29 0.2% of available potentially suitable habitat in the SEZ region. About 112,050 acres (453 km²)
30 of potentially suitable habitat occurs in the area of potential indirect effect; this area represents
31 about 2.5% of the available potentially suitable habitat in the SEZ region (see Table 13.3.12.1-1).
32 Most of this suitable habitat in the affected area is represented by foraging habitat (shrublands);
33 however, potentially suitable roosting habitat (rocky cliffs and outcrops) may occur in portions
34 of the affected area. On the basis of an evaluation of SWReGAP land cover types, there is no
35 potentially suitable roosting habitat on the SEZ. However, approximately 220 acres (1 km²) of
36 potentially suitable roosting habitat may occur in the transmission corridor; an additional
37 650 acres (2.5 km²) of potentially suitable roosting habitat occurs in the area of indirect effects
38 outside the SEZ and the access road and transmission corridors.

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

1 Avoidance of direct impacts on all foraging habitat is not feasible because suitable
2 foraging habitat (shrublands) is widespread in the area of direct effect and may be readily
3 available in other portions of the affected area. However, avoiding or minimizing disturbance of
4 all occupied roosting habitat (rocky cliffs and outcrops) within the transmission corridor is
5 feasible, and could reduce impacts. If avoiding or minimizing disturbance of all occupied
6 roosting habitat is not feasible, a compensatory mitigation plan could be developed and
7 implemented to mitigate direct effects. Compensation could involve the protection and
8 enhancement of existing occupied or suitable habitats to compensate for habitats lost to
9 development. A comprehensive mitigation strategy that used one or both of these options could
10 be designed to completely offset the impacts of development. The need for mitigation, other than
11 programmatic design features, should be determined by conducting pre-disturbance surveys for
12 the species and its habitat within the area of direct effects.
13
14

15 **Kit Fox**

16
17 The kit fox is considered to be a year-round resident within the proposed Wah Wah
18 Valley SEZ region, where it is known to occur in grassland and shrubland habitats.
19 Approximately 5,268 acres (21 km²) of potentially suitable habitat on the SEZ and 657 acres
20 (3 km²) of potentially suitable habitat in the transmission corridor could be directly affected by
21 construction and operations (see Table 13.3.12.1-1). This direct impact area represents about
22 0.2% of available potentially suitable habitat in the SEZ region. About 89,200 acres (361 km²) of
23 potentially suitable habitat occurs in the area of potential indirect effect; this area represents
24 about 3.4% of the available potentially suitable habitat in the SEZ region (see Table 13.3.12.1-1).
25

26 The overall impact on the kit fox from construction, operation, and decommissioning of
27 utility-scale solar energy facilities within the proposed Wah Wah Valley SEZ is considered small
28 because the amount of potentially suitable habitat for this species in the area of direct effects
29 represents less than 1% of potentially suitable habitat in the SEZ region. The implementation of
30 programmatic design features may be sufficient to reduce indirect impacts on this species to
31 negligible levels.
32

33 The avoidance of all potentially suitable habitats is not feasible to mitigate impacts on the
34 kit fox because potentially suitable shrubland habitats are widespread throughout the area of
35 direct effects. However, pre-disturbance surveys and avoiding or minimizing disturbance of
36 occupied habitats in the area of direct effects could reduce impacts. If avoidance or minimization
37 is not a feasible option, a translocation and compensatory mitigation plan could be developed
38 and implemented to mitigate direct effects on occupied habitats. Coordination with the
39 appropriate federal and state agencies should be required for the development of any
40 translocation and compensatory mitigation plans. Compensation could involve the protection
41 and enhancement of existing occupied or suitable habitats to compensate for habitats lost to
42 development. A comprehensive mitigation strategy that uses one or both of these options could
43 be designed to completely offset the impacts of development.
44
45
46

1 **Pygmy Rabbit**
2

3 The pygmy rabbit is considered to be a year-round resident within the proposed Wah
4 Wah Valley SEZ region, where it is known to occur in sagebrush habitats. According to the
5 SWReGAP habitat suitability model, potentially suitable habitat does not exist on the SEZ.
6 However, approximately 358 acres (1.5 km²) of potentially suitable habitat in the transmission
7 corridor could be directly affected by construction and operations (see Table 13.3.12.1-1). This
8 direct impact area represents less than 0.1% of available potentially suitable habitat in the SEZ
9 region. About 12,600 acres (51 km²) of potentially suitable habitat occurs in the area of potential
10 indirect effect; this area represents about 1.4% of the available potentially suitable habitat in the
11 SEZ region (see Table 13.3.12.1-1).
12

13 The overall impact on the pygmy rabbit from construction, operation, and
14 decommissioning of utility-scale solar energy facilities within the proposed Wah Wah Valley
15 SEZ is considered small because the amount of potentially suitable habitat for this species in the
16 area of direct effects represents less than 1% of potentially suitable habitat in the SEZ region.
17 The implementation of programmatic design features may be sufficient to reduce indirect
18 impacts on this species to negligible levels.
19

20 The avoidance of all potentially suitable habitats is not feasible to mitigate impacts on the
21 pygmy rabbit because potentially suitable sagebrush habitats are widespread throughout the area
22 of direct effects. However, pre-disturbance surveys and avoiding or minimizing disturbance of
23 occupied habitats in the area of direct effects could reduce impacts. If avoidance or minimization
24 is not a feasible option, a translocation and compensatory mitigation plan could be developed
25 and implemented to mitigate direct effects on occupied habitats. Coordination with the
26 appropriate federal and state agencies should be required for the development of any
27 translocation and compensatory mitigation plans. Compensation could involve the protection
28 and enhancement of existing occupied or suitable habitats to compensate for habitats lost to
29 development. A comprehensive mitigation strategy that uses one or both of these options could
30 be designed to completely offset the impacts of development.
31
32

33 **Spotted Bat**
34

35 The spotted bat is considered to be a year-round resident within the proposed Wah
36 Wah Valley SEZ region, where it is known to forage in shrubland and forested habitats.
37 Approximately 2,840 acres (11.5 km²) of potentially suitable habitat on the SEZ and 789 acres
38 (3 km²) of potentially suitable habitat in the transmission corridor could be directly affected by
39 construction and operations (see Table 13.3.12.1-1). This direct impact area represents about
40 0.1% of available potentially suitable habitat in the SEZ region. About 52,500 acres (212 km²) of
41 potentially suitable habitat occurs in the area of potential indirect effect; this area represents
42 about 1.5% of the available potentially suitable habitat in the SEZ region (see Table 13.3.12.1-1).
43 Most of this suitable habitat in the affected area is represented by foraging habitat (shrublands);
44 however, potentially suitable roosting habitat (rocky cliffs and outcrops) may occur in portions
45 of the affected area. On the basis of an evaluation of SWReGAP land cover types, there is no
46 potentially suitable roosting habitat on the SEZ. However, approximately 220 acres (1 km²) of

1 this potentially suitable roosting habitat may occur in the transmission corridor; an additional
2 650 acres (2.5 km²) of this potentially suitable roosting habitat occurs in the area of indirect
3 effects outside the SEZ and the access road and transmission corridors.
4

5 The overall impact on the spotted bat from construction, operation, and decommissioning
6 of utility-scale solar energy facilities within the proposed Wah Wah Valley SEZ is considered
7 small because the amount of potentially suitable habitat for this species in the area of direct
8 effects represents less than 1% of potentially suitable habitat in the SEZ region. The
9 implementation of programmatic design features may be sufficient to reduce indirect impacts
10 on this species to negligible levels.
11

12 Avoidance of direct impacts on all foraging habitat is not feasible because suitable
13 foraging habitat (shrublands) is widespread in the area of direct effect and may be readily
14 available in other portions of the affected area. However, avoiding or minimizing disturbance
15 of all occupied roosting habitat (rocky cliffs and outcrops) within the transmission corridor is
16 feasible, and could reduce impacts. If avoiding or minimizing disturbance of all occupied
17 roosting habitat is not feasible, a compensatory mitigation plan could be developed and
18 implemented to mitigate direct effects. Compensation could involve the protection and
19 enhancement of existing occupied or suitable habitats to compensate for habitats lost to
20 development. A comprehensive mitigation strategy that used one or both of these options could
21 be designed to completely offset the impacts of development. The need for mitigation, other than
22 programmatic design features, should be determined by conducting pre-disturbance surveys for
23 the species and its habitat within the area of direct effects.
24
25

26 **Townsend's Big-Eared Bat**

27

28 The Townsend's big-eared bat is considered to be a year-round resident within the
29 proposed Wah Wah Valley SEZ region, where it is known to forage in shrubland and forested
30 habitats. Approximately 5,268 acres (21 km²) of potentially suitable habitat on the SEZ and
31 712 acres (3 km²) of potentially suitable habitat in the transmission corridor could be directly
32 affected by construction and operations (see Table 13.3.12.1-1). This direct impact area
33 represents about 0.2% of available potentially suitable habitat in the SEZ region. About
34 90,200 acres (365 km²) of potentially suitable habitat occurs in the area of potential
35 indirect effect; this area represents about 2.7% of the available potentially suitable habitat in the
36 SEZ region (see Table 13.3.12.1-1). Most of this suitable habitat in the affected area is
37 represented by foraging habitat (shrublands); however, potentially suitable roosting habitat
38 (rocky cliffs and outcrops) may occur in portions of the affected area. On the basis of an
39 evaluation of SWReGAP land cover types, there is no potentially suitable roosting habitat on the
40 SEZ. However, approximately 220 acres (1 km²) of this potentially suitable roosting habitat may
41 occur in the transmission corridor; an additional 650 acres (2.5 km²) of this potentially suitable
42 roosting habitat occurs in the area of indirect effects outside the SEZ and the access road and
43 transmission corridors.
44

45 The overall impact on the Townsend's big-eared bat from construction, operation, and
46 decommissioning of utility-scale solar energy facilities within the proposed Wah Wah Valley

1 SEZ is considered small because the amount of potentially suitable habitat for this species in the
2 area of direct effects represents less than 1% of potentially suitable habitat in the SEZ region.
3 The implementation of programmatic design features may be sufficient to reduce indirect
4 impacts on this species to negligible levels.
5

6 Avoidance of direct impacts on all foraging habitat is not feasible because suitable
7 foraging habitat (shrublands) is widespread in the area of direct effect and may be readily
8 available in other portions of the affected area. However, avoiding or minimizing disturbance of
9 all occupied roosting habitat (rocky cliffs and outcrops) within the transmission corridor is
10 feasible, and could reduce impacts. If avoiding or minimizing disturbance of all occupied
11 roosting habitat is not feasible, a compensatory mitigation plan could be developed and
12 implemented to mitigate direct effects. Compensation could involve the protection and
13 enhancement of existing occupied or suitable habitats to compensate for habitats lost to
14 development. A comprehensive mitigation strategy that used one or both of these options could
15 be designed to completely offset the impacts of development. The need for mitigation, other than
16 programmatic design features, should be determined by conducting pre-disturbance surveys for
17 the species and its habitat within the area of direct effects.
18
19

20 ***13.3.12.2.5 Impacts on State-Listed Species***

21
22 According to Utah Administrative Rule R657-48, as described in the *Utah Sensitive*
23 *Species List* (UDWR 2010c), there are no species that receive a separate regulatory designation
24 from the UDWR or the state of Utah.
25
26

27 ***13.3.12.2.6 Impacts on Rare Species***

28
29 There are 20 species with a state status of S1 or S2 in Utah or species of concern by the
30 state of Utah or the USFWS that may occur in the affected area of the proposed Wah Wah Valley
31 SEZ. Impacts have been previously discussed for all of these species because of their status
32 under the ESA (see Sections 13.3.12.2.1, 13.3.12.2.2, and 13.3.12.2.3) or the BLM
33 (see Section 13.3.12.2.4).
34
35

36 **13.3.12.3 SEZ-Specific Design Features and Design Feature Effectiveness**

37
38 The implementation of required programmatic design features described in Appendix A
39 would greatly reduce or eliminate the potential for effects of utility-scale solar energy
40 development on special status species. While some SEZ-specific mitigation measures are best
41 established when specific project details are being considered, the following design features can
42 be identified at this time:
43

- 44 • Pre-disturbance surveys should be conducted to determine the presence
45 and abundance of special status species, including those identified in
46 Table 13.3.12.1-1; disturbance to occupied habitats for these species should be

1 avoided or impacts on occupied habitats minimized to the extent practicable.
2 If avoiding or minimizing impacts on occupied habitats is not possible,
3 translocation of individuals from areas of direct effect, or compensatory
4 mitigation of direct effects on occupied habitats could reduce impacts. A
5 comprehensive mitigation strategy for special status species that used one
6 or more of these options to offset the impacts of development should be
7 developed in coordination with the appropriate federal and state agencies.
8

- 9 • Avoiding or minimizing disturbance of rocky cliff and outcrop habitats in
10 the area of direct effect could reduce impacts on the following special status
11 species: Frisco buckwheat, Ostler's pepper-grass, ferruginous hawk (nesting),
12 fringed myotis (roosting), spotted bat (roosting), and Townsend's big-eared
13 bat (roosting).
14
- 15 • Avoiding or minimizing disturbance of woodland habitats in the area of direct
16 effect could reduce impacts on the following special status species: Frisco
17 clover, Ostler's ivesia, ferruginous hawk (nesting), and the northern goshawk
18 (nesting).
19
- 20 • Consultation with the USFWS and the UDWR should be conducted to address
21 the potential for impacts on the Utah prairie dog—a species listed as
22 threatened under the ESA. Consultation would identify an appropriate survey
23 protocol, avoidance measures, and, if appropriate, reasonable and prudent
24 alternatives, reasonable and prudent measures, and terms and conditions for
25 incidental take statements.
26
- 27 • Coordination with the USFWS and UDWR should be conducted to address
28 the potential for impacts on the greater sage-grouse—a candidate species for
29 listing under the ESA. Coordination with the USFWS and UDWR should also
30 be conducted for the following species that are under review for listing under
31 the ESA: Frisco buckwheat, Frisco clover, and Ostler's pepper-grass.
32 Coordination with the USFWS and UDWR would identify an appropriate
33 pre-disturbance survey protocol, avoidance measures, and any potential
34 compensatory mitigation actions for each of these species.
35
- 36 • Harassment or disturbance of special status species and their habitats in the
37 affected area should be mitigated. This can be accomplished by identifying
38 any additional sensitive areas and implementing necessary protection
39 measures based upon consultation with the USFWS and UDWR.
40

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

1 **13.3.13 Air Quality and Climate**

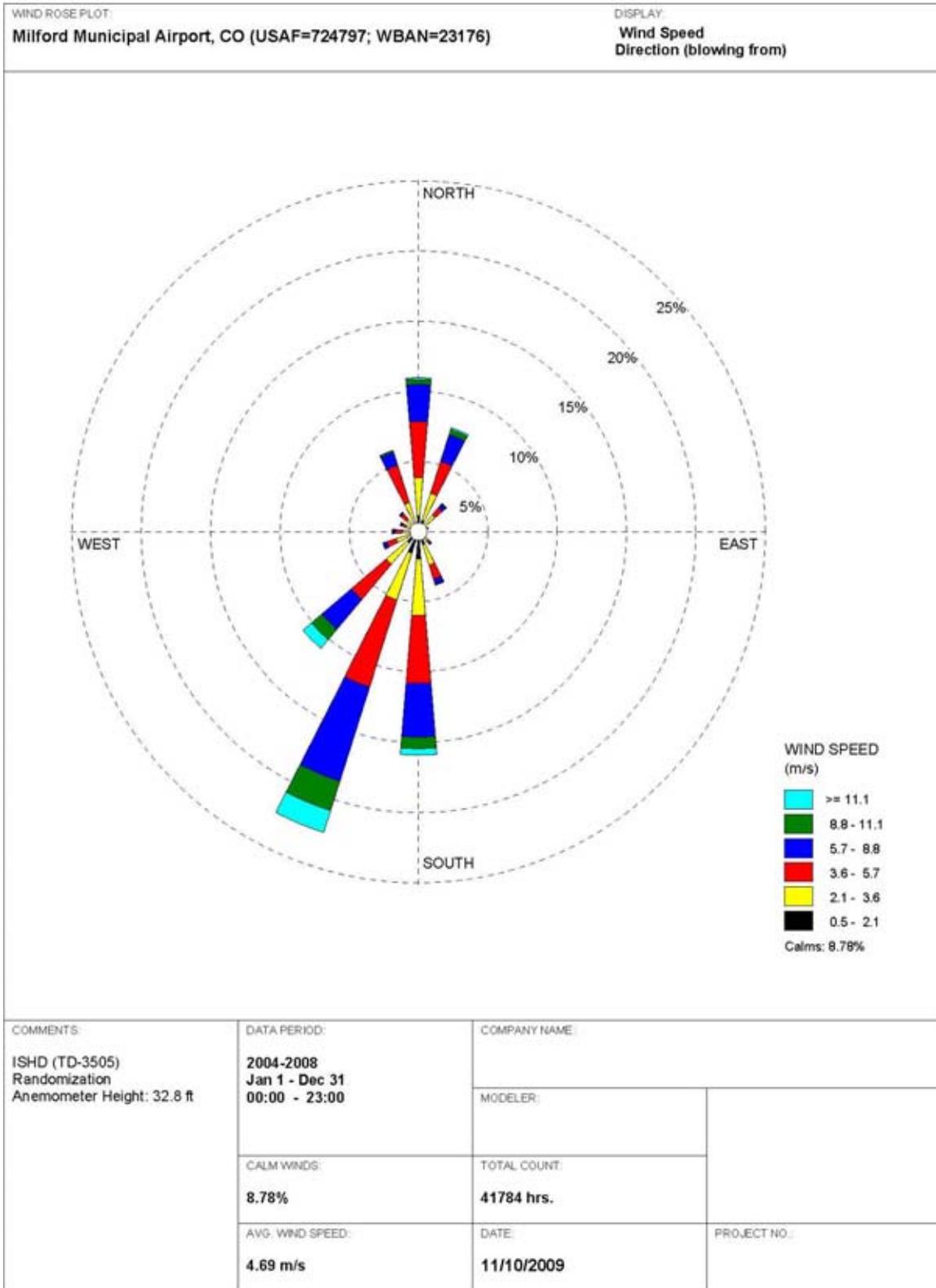
2
3
4 **13.3.13.1 Affected Environment**

5
6
7 **13.3.13.1.1 Climate**

8
9 The proposed Wah Wah Valley SEZ is located in southwestern Utah, in the northwestern
10 portion of Beaver County. The SEZ is at an elevation of about 4,960 ft (1,512 m) and thus
11 experiences lower air temperatures than lower elevations of comparable latitude. Pacific storms
12 along with prevailing westerly winds lose moisture as they ascend the Cascade and Sierra
13 Nevada Ranges. Therefore, air masses reaching Utah are relatively dry, resulting in light
14 precipitation over the state (NCDC 2009a). Subzero temperatures and prolonged cold spells
15 during the winter months are rare over most parts of the state, because mountain ranges to the
16 east and north block Arctic air masses. Utah experiences relatively strong insolation (solar
17 radiation) during the day and rapid nocturnal cooling because of its relatively thin atmosphere,
18 resulting in wide ranges in daily temperature. In general, the climate of the proposed SEZ is
19 temperate and dry (NCDC 1989). Meteorological data collected at the Milford Municipal
20 Airport, which is about 20 mi (32 km) east of the proposed Wah Wah Valley SEZ, and at
21 Wah Wah Ranch, just outside the north boundary of the proposed SEZ, are summarized below.

22
23 A wind rose from the Milford Municipal Airport for the 5-year period 2004 to 2008 and
24 taken at a level of 33 ft (10 m) is presented in Figure 13.3.13.1-1 (NCDC 2009b). During this
25 period, the annual average wind speed at the airport was about 10.5 mph (4.7 m/s), with a
26 prevailing wind direction from the south–southwest (about 22.4% of the time) and secondarily
27 from the south (about 15.9% of the time), parallel to nearby mountain ranges. About half of the
28 time, winds blew from these directions, ranging from south to southwest inclusive. Winds blew
29 predominantly from the south–southwest every month throughout the year, except in March from
30 the north. Wind speeds categorized as calm (less than 1.1 mph [0.5 m/s]) occurred frequently
31 (almost 9% of the time). Average wind speeds were relatively uniform by season with the
32 highest in fall at 11.1 mph (5.0 m/s); lower in spring and winter at 10.4 mph (4.6 m/s); and
33 lowest in summer at 10.1 mph (4.5 m/s).

34
35 For the 1955 to 2008 period, the annual average temperature at Wah Wah Ranch was
36 51.4°F (10.8°C) (WRCC 2009). January was the coldest month, with an average minimum
37 temperature of 14.2°F (–9.9°C), and July was the warmest month with an average maximum
38 temperature of 94.7°F (34.8°C). In summer, daytime maximum temperatures were frequently
39 above 90°F (32.2°F), and minimum temperatures were in the 50s. On most days of colder
40 months (November through February), the minimum temperatures recorded were below freezing
41 ($\leq 32^\circ\text{F}$ [0°C]); subzero temperatures also occurred about 4 and 3 days in January and December,
42 respectively. During the same period, the highest temperature, 108°F (42.2°C), was reached in
43 July 2003, and the lowest, –30°F (–34.4°C), in December 1990. Each year, about 70 days had a
44 maximum temperature of $\geq 90^\circ\text{F}$ (32.2°C), while about 167 days had minimum temperatures at or
45 below freezing.



1

2

3

FIGURE 13.3.13.1-1 Wind Rose at 33-ft (10-m) Height at Milford Municipal Airport, Milford, Utah, 2004 to 2008 (Source: NCDC 2009b)

1 For the 1955 to 2008 period, annual precipitation at Wah Wah Ranch averaged about
2 6.77 in. (17.2 cm) (WRCC 2009). There is an average of 35 days annually with measurable
3 precipitation (0.01 in. [0.025 cm] or higher). Precipitation is the lowest in winter and evenly
4 distributed over spring through fall. During summer months, low-pressure storm systems in the
5 area are rare, and precipitation during this period occurs as showers and thundershowers in
6 widely varying amounts (NCDC 1989). Snow is usually light and powdery with below-average
7 moisture content, starting as early as September and continuing as late as April; most of the snow
8 falls from November through March. The annual average snowfall at Wah Wah Ranch is about
9 5.2 in. (13.2 cm) (WRCC 2009).

10
11 Because the area surrounding the proposed SEZ is so far from major water bodies
12 (e.g., about 410 mi [660 km] to the Pacific Ocean) and because surrounding mountain ranges
13 block air masses, severe weather events, such as thunderstorms and tornadoes, are rare.

14
15 No flood and high wind event were reported in Beaver County (NCDC 2010).

16
17 In Beaver County, two hail events in total, which caused no damage, have been reported
18 since 1981. Hail measuring 1.00 in. (2.5 cm) in diameter was reported in 1981. Since 1956,
19 22 thunderstorm wind events up to a maximum wind speed of 79 mph (35 m/s) occurred on
20 occasion, mostly during the summer months, but caused minimal damage (NCDC 2010).

21
22 During a fall 2009 site visit, windblown dusts were observed in Beaver County.
23 However, no dust storm events were reported in Beaver County (NCDC 2010). The ground
24 surface of the SEZ is covered predominantly with silty clay loams, fine sandy loams, and sandy
25 clay loams, which have relatively moderate dust storm potential. Occasional dust storms can
26 deteriorate air quality and visibility and have adverse respiratory health effects. High winds in
27 combination with dry soil conditions result in blowing dust in Utah (UDEQ 2009), typically
28 during the spring through fall months.

29
30 Complex terrain typically disrupts the mesocyclones associated with tornado-producing
31 thunderstorms, and thus tornadoes in Beaver County, which encompasses the proposed
32 Wah Wah Valley SEZ, occur infrequently. In the period from 1950 to July 2010, a total of
33 six tornadoes (0.1 per year each) were reported in Beaver County (NCDC 2010). However, all
34 tornadoes occurring in Beaver County were relatively weak (i.e., all were F0 on the Fujita
35 tornado scale). None of these tornadoes caused deaths, injuries, or property damage or hit the
36 area near the Wah Wah Valley SEZ (more than 15 mi [24 km] from the SEZ).

37 38 39 ***13.3.13.1.2 Existing Air Emissions***

40
41 Beaver County, which encompasses the proposed Wah Wah Valley SEZ, has only a few
42 industrial emission sources, and the amount of their emissions is relatively low. Mobile source
43 emissions, primarily from I-15, account for substantial portions of total NO_x and CO emissions
44 in Beaver County.

1 Data for 2002 on annual emissions of criteria pollutants
 2 and VOCs in Beaver County are presented in Table 13.3.13.1-1
 3 (WRAP 2009). Emission data are classified into six source
 4 categories: point, area (including fugitive dust), onroad mobile,
 5 nonroad mobile, biogenic, and fire (e.g., wildfires, prescribed
 6 fires, agricultural fires, structural fires). In Beaver County, area
 7 sources were the major contributors to SO₂, PM₁₀, and
 8 PM_{2.5}¹³—about 58, 83, and 57%, respectively, of total county
 9 emissions. Onroad sources were major contributors to NO_x and
 10 CO emissions (48 and 60%, respectively). Biogenic sources
 11 (e.g., naturally occurring emissions from vegetation, including
 12 trees, plants, and crops) accounted for most of the VOC
 13 emissions (about 98%) and were a secondary contributor to CO
 14 emissions (about 34%). Nonroad sources were secondary
 15 contributors to SO₂, NO_x, and PM_{2.5} (about 32, 38, and 26%,
 16 respectively, of total county emissions), while point sources
 17 were minor sources of criteria pollutants and VOCs. (Fire
 18 emissions were not estimated in Beaver County in 2002.)
 19

20 Information on GHG emissions was not available at the
 21 county level in Utah. In 2005, the state of Utah produced about
 22 69 MMT of *gross*¹⁴ CO₂e emissions¹⁵ (Roe et al. 2007). Gross
 23 GHG emissions in Utah increased by about 40% from 1990 to
 24 2005, which was more than twice as fast as the national rate
 25 (about 16%). In 2005, electricity production (37.2%) was the
 26 primary contributor to gross GHG emission sources in Utah,
 27 followed by transportation (24.6%). Fossil fuel use (in the
 28 residential, commercial, and nonfossil industrial sectors)
 29 accounted for about 17.7% of total state emissions, while fossil
 30 fuel industry and agriculture accounted for about 6% each.
 31 Utah's *net* CO₂e emissions were about 31 MMT, considering carbon sinks from forestry activities
 32 and agricultural soils throughout the state. The EPA (2009a) also estimated that in 2005, CO₂
 33 emissions from fossil fuel combustion were 66 MMT, which is comparable to the state's estimate.
 34 The electric power generation (53%) and transportation (25%) sectors accounted for more than

TABLE 13.3.13.1-1 Annual Emissions of Criteria Pollutants and VOCs in Beaver County, Utah, Encompassing the Proposed Wah Wah Valley SEZ, 2002^a

Pollutant ^b	Emissions (tons/yr)
SO ₂	238
NO _x	2,294
CO	17,633
VOCs	43,589
PM ₁₀	755
PM _{2.5}	164

^a Includes point, area (including fugitive dust), onroad and nonroad mobile, biogenic, and fire emissions.

^b Notation: CO = carbon monoxide; NO_x = nitrogen oxides; PM_{2.5} = particulate matter with a diameter of ≤2.5 μm; PM₁₀ = particulate matter with a diameter of ≤10 μm; SO₂ = sulfur dioxide; and VOCs = volatile organic compounds.

Source: WRAP (2009).

¹³ Particulate matter (PM) is dust, smoke, and other solid particles and liquid droplets in the air. The size of the particulate is important and is measured in micrometers (μm). A micrometer is 1 millionth of a meter (0.000039 in.). PM₁₀ is PM with an aerodynamic diameter less than or equal to 10 μm, and PM_{2.5} is PM with an aerodynamic diameter less than or equal to 2.5 μm.

¹⁴ Excluding GHG emissions removed as a result of forestry and other land uses and excluding GHG emissions associated with exported electricity.

¹⁵ A measure used to compare the emissions from various GHGs on the basis of their global warming potential, defined as the cumulative radiative forcing effects of a gas over a specified time horizon resulting from the emission of a unit mass of gas relative to a reference gas, CO₂. The CO₂e for a gas is derived by multiplying the mass of the gas by the associated global warming potential.

1 three-fourths of the CO₂ emissions total, and the residential, commercial, and industrial sectors
2 accounted for the remainder.

3 4 5 **13.3.13.1.3 Air Quality** 6

7 The State of Utah has adopted NAAQS for six criteria pollutants: SO₂, NO₂, CO, O₃,
8 particulate matter (PM₁₀, and PM_{2.5}), and Pb (EPA 2010; Prey 2009). The NAAQS for criteria
9 pollutants are presented in Table 13.3.13.1-2.

10
11 Beaver County, which encompasses the proposed Wah Wah Valley SEZ, is located
12 administratively within the Utah Intrastate AQCR, along with the remaining 15 counties in Utah,
13 except the Wasatch Front Intrastate AQCR (including Salt Lake City) and the Four Corners
14 Interstate AQCR (including southern and east central counties in Utah). Currently, Beaver
15 County is designated as being in unclassifiable/attainment for all criteria pollutants (Title 40,
16 Part 81, Section 345 of the *Code of Federal Regulations* [40 CFR 81.345]).
17

18 Because of low population density, little industrial activity (except for agricultural and
19 hog production activities), and low traffic volumes (except on I-15), anthropogenic emissions in
20 Beaver County are small; thus, ambient air quality is relatively good. The primary air quality
21 concern for the lower elevations in Beaver County (e.g., around the Wah Wah Valley SEZ) is
22 soil erosion (NRCS 2005). High winds, coupled with soils that are susceptible to wind erosion,
23 cause dust storms that can damage human health, livestock, and crops and degrade the
24 environmental stability of the area. Many farming and ranching operations have to deepen wells
25 and increase pump capacities to obtain access to the available well waters. Larger engines and
26 motors to drive the higher capacity pumps have increased energy consumption and associated air
27 emissions. Another occasional problem in the area is objectionable odor, primarily from feedlots.
28

29 No measurement data are available for criteria pollutants in Beaver County (EPA 2009b).
30 Background concentrations of SO₂, NO₂, CO, PM₁₀, and PM_{2.5} representative of Beaver County
31 have been developed by the Utah Division of Air Quality for air-quality-modeling purposes and
32 are presented in Table 13.3.13.1-2 (Prey 2009). Ambient air quality in Beaver County is
33 relatively good, considering that background levels representative of Beaver County were lower
34 than their respective standards (up to 55%), except O₃. The background O₃ concentration
35 presented in the table taken at Zion NP from 2004 to 2008 exceeds the NAAQS. Albeit in a
36 remote area, both local and distant point and mobile emission sources, including power plants,
37 refineries, and lime kilns, would affect air quality at Zion NP.
38

39 The PSD regulations (see 40 CFR 52.21), which are designed to limit the growth of air
40 pollution in clean areas, apply to a major new source or modification of an existing major source
41 within an attainment or unclassified area (see Section 4.11.2.3). As a matter of policy, the EPA
42 recommends that the permitting authority notify the Federal Land Managers when a proposed
43 PSD source would locate within 62 mi (100 km) of a sensitive Class I area. There are several
44 Class I areas around the proposed Wah Wah Valley SEZ, none of which are situated within
45 62 mi (100 km). The nearest Class I area is Zion NP (40 CFR 81.430), about 65 mi (105 km)
46 south-southeast of the SEZ, and the other nearby Class I areas include Bryce Canyon NP and

TABLE 13.3.13.1-2 NAAQS and Background Concentration Levels Representative of the Proposed Wah Wah Valley SEZ

Pollutant ^a	Averaging Time	NAAQS ^b	Background Concentration Level	
			Concentration ^{c,d}	Measurement Location, Year
SO ₂	1-hour	0.075 ppm ^e	NA ^f	NA
	3-hour	0.5 ppm	0.008 ppm (1.6%)	Estimate
	24-hour	0.14 ppm	0.004 ppm (2.9%)	Estimate
	Annual	0.03 ppm	0.002 ppm (6.7%)	Estimate
NO ₂	1-hour	0.100 ppm ^g	NA	NA
	Annual	0.053 ppm	0.005 ppm (9.4%)	Estimate
CO	1-hour	35 ppm	1 ppm (2.9%)	Estimate
	8-hour	9 ppm	1 ppm (11%)	Estimate
O ₃	1-hour	0.120 ppm ^h	NA	NA
	8-hour	0.075 ppm	0.091 ppm (121%)	Zion NP, Washington County, 2005; highest of fourth-highest daily maximum during 2004 to 2008
PM ₁₀	24-hour	150 µg/m ³	83 µg/m ³ (55%)	Graymont Lime Kiln, about 17 mi (27 km) north-northeast of Black Rock in Millard County
	Annual	50 µg/m ³ ⁱ	21.8 µg/m ³ (44%)	
PM _{2.5}	24-hour	35 µg/m ³	18 µg/m ³ (51%)	St. George, Washington County, 2005 Estimate, 2006
	Annual	15.0 µg/m ³	8 µg/m ³ (53%)	
Pb	Calendar quarter	1.5 µg/m ³	0.08 µg/m ³ (5.3%)	Magna, Salt Lake County, 2005
	Rolling 3-month	0.15 µg/m ³ ^j	NA	NA

^a Notation: CO = carbon monoxide; NO₂ = nitrogen dioxide; O₃ = ozone; Pb = lead; PM_{2.5} = particulate matter with a diameter of ≤2.5 µm; PM₁₀ = particulate matter with a diameter of ≤10 µm; and SO₂ = sulfur dioxide.

^b The State of Utah has adopted NAAQS for all criteria pollutants.

^c Background concentrations for SO₂, NO₂, CO, PM₁₀, and PM_{2.5} are developed for the Beaver County by the Utah Division of Air Quality for NAAQS and/or PSD modeling purposes.

^d Values in parentheses are background concentration levels as a percentage of NAAQS. Calculation of 1-hour SO₂, 1-hour NO₂, and rolling 3-month Pb to NAAQS was not made, because no measurement data based on new NAAQS are available. Although not representative of the Beaver County, highest monitored value of Pb in Utah is presented to show that Pb is not an issue in the state of Utah.

^e Effective August 23, 2010.

^f NA = not applicable or not available.

^g Effective April 12, 2010.

Footnotes continued on next page.

TABLE 13.3.13.1-2 (Cont.)

-
- h The EPA revoked the 1-hour O₃ standard in all areas, although some areas have continuing obligations under that standard (“anti-backsliding”).
 - i Effective December 18, 2006, the EPA revoked the annual PM₁₀ standard of 50 µg/m³ but annual PM₁₀ concentrations are presented for comparison purposes.
 - j Effective January 12, 2009.
- Sources: EPA (2009b, 2010); Prey (2009).

1
2
3 Capital Reef NP, about 85 mi (136 km) southeast and 105 mi (169 km) east–southeast of the
4 SEZ, respectively. These Class I areas are not located directly downwind of prevailing winds at
5 the SEZ (see Figure 13.3.13.1-1).
6
7

8 **13.3.13.2 Impacts**

9

10 Potential impacts on ambient air quality associated with a solar project would be of
11 most concern during the construction phase. Impacts on ambient air quality from fugitive dust
12 emissions resulting from soil disturbances are anticipated, but they would be of short duration.
13 During the operations phase, only a few sources with generally low-level emissions would exist
14 for any of the four types of solar technologies evaluated. A solar facility would either not burn
15 fossil fuels or burn only small amounts during operation. (For facilities using HTFs, fuel could
16 be used to maintain the temperature of the HTFs for more efficient daily start-up.) Conversely,
17 solar facilities would displace air emissions that would otherwise be released from fossil fuel
18 power plants.
19

20 Air quality impacts shared by all solar technologies are discussed in detail in
21 Section 5.11.1, and technology-specific impacts are discussed in Section 5.11.2. Impacts
22 specific to the proposed Wah Wah Valley SEZ are presented in the following sections. Any such
23 impacts would be minimized through the implementation of required programmatic design
24 features described in Appendix A, Section A.2.2, and through any additional mitigation applied.
25 Section 13.3.13.3 below identifies SEZ-specific design features of particular relevance to the
26 Wah Wah Valley SEZ.
27
28

29 **13.3.13.2.1 Construction**

30

31 The proposed Wah Wah Valley SEZ has a relatively flat terrain; thus only minimum site
32 preparation activities, perhaps with no large-scale earthmoving operations, would be required.
33 However, fugitive dust emissions from soil disturbances during the entire construction phase
34 would be a major concern because of the large areas that would be disturbed in a region that
35 experiences windblown dust problems. Fugitive dusts, which are released near ground level,
36 typically have more localized impacts than similar emissions from an elevated stack, which has
37 additional plume rise induced by buoyancy and momentum effects.
38

1 **Methods and Assumptions**

2
3 Air quality modeling for PM₁₀ and PM_{2.5} emissions associated with construction
4 activities was performed using the EPA-recommended AERMOD model (EPA 2009c).
5 Details for emissions estimation, the description of AERMOD, input data processing procedures,
6 and modeling assumption are described in Section M.13 of Appendix M. Estimated air
7 concentrations were compared with the applicable NAAQS levels at the site boundaries and
8 nearby communities and with PSD increment levels at nearby Class I areas.^{16,17} However, no
9 receptors were modeled for PSD analysis at the nearest Class I area, Zion NP, because it is about
10 65 mi (105 km) from the SEZ, which is over the maximum modeling distance of 31 mi (50 km)
11 for AERMOD. Instead, several regularly spaced receptors in the direction of the Zion NP were
12 selected as surrogates for the PSD analysis. For the Wah Wah Valley SEZ, the modeling was
13 conducted based on the following assumptions and input:

- 14
15 • Emissions were distributed uniformly over the 3,000 acres (12.1 km²), and in
16 the upper half of the SEZ, close to the nearest residences adjacent to the
17 northern SEZ boundary;
- 18
19 • Surface hourly meteorological data came from the Milford Municipal Airport
20 and upper air sounding data from Salt Lake City for the 2004 to 2008 period;
21 and
- 22
23 • A regularly spaced receptor grid over a modeling domain of 62 mi × 62 mi
24 (100 km × 100 km) was centered on the proposed SEZ, and there were
25 additional discrete receptors at the SEZ boundaries.

26 27 28 **Results**

29
30 The modeling results for both PM₁₀ and PM_{2.5} concentration increments and total
31 concentrations (modeled plus background concentrations) that would result from construction-
32 related fugitive emissions are summarized in Table 13.3.13.2-1. The maximum 24-hour PM₁₀
33 concentration increment modeled at the site boundaries is 576 µg/m³, which far exceeds the
34 relevant standard of 150 µg/m³. The total 24-hour PM₁₀ concentration (increment plus
35 background) of 659 µg/m³ would further exceed this standard at the SEZ boundary. However,

¹⁶ To provide a quantitative assessment, the modeled air impacts of construction were compared to the NAAQS levels and the PSD Class I increment levels. Although the Clean Air Act exempts construction activities from PSD requirements, a comparison with the Class I increment levels was used to quantify potential impacts. Only monitored data can be used to determine the attainment status. Modeled data are used to assess potential problems and as a consideration in the permitting process.

¹⁷ In Utah, construction lasting less than 180 days might be considered temporary and not require modeling (Maung 2009). For a longer development time, modeling would be required if PM₁₀ emissions exceeded 5 tons/yr. However, for a staged development in which different areas were being developed at different times, the decision to require modeling would depend on the details of the development plan. In all situations, the state must be informed of development plans and must be presented with a written fugitive dust control plan.

TABLE 13.3.13.2-1 Maximum Air Quality Impacts from Emissions Associated with Construction Activities for the Proposed Wah Wah Valley SEZ

Pollutant ^a	Averaging Time	Rank ^b	Concentration ($\mu\text{g}/\text{m}^3$)				Percentage of NAAQS	
			Maximum Increment ^b	Background ^c	Total	NAAQS	Increment	Total
PM ₁₀	24-hour	H6H	576	83	659	150	384	439
	Annual ^d	NA ^e	87.7	21.8	110	50	175	219
PM _{2.5}	24-hour	H8H	42.0	18	60.0	35	120	171
	Annual	NA ^e	8.8	8	16.8	15.0	58	112

^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 See Table 13.3.13.1-2 (Source: Prey [2009]).

^d Effective December 18, 2006, the EPA revoked the annual PM₁₀ standard of 50 $\mu\text{g}/\text{m}^3$ but annual PM₁₀ concentrations are presented for comparison purposes.

^e NA = not applicable.

1
2
3 high PM₁₀ concentrations would be limited to the immediate area surrounding the SEZ boundary
4 and would decrease quickly with distance. The predicted maximum 24-hour concentration
5 increment is about 353 $\mu\text{g}/\text{m}^3$ at the nearest residences, adjacent to the northern SEZ boundary.
6 There are no communities north of the Wah Wah Valley SEZ, which is downwind of prevailing
7 winds in the area. Predicted maximum 24-hour PM₁₀ concentration increments would be much
8 lower, about 5 $\mu\text{g}/\text{m}^3$ or less at communities along the nearby valley; about 4 $\mu\text{g}/\text{m}^3$ at Milford
9 and less than 1 $\mu\text{g}/\text{m}^3$ at Minersville. Annual modeled PM₁₀ concentration increments and total
10 concentration at the SEZ boundary are 88 and 110 $\mu\text{g}/\text{m}^3$, respectively. These concentrations are
11 higher than the standard of 50 $\mu\text{g}/\text{m}^3$, which was revoked by the EPA in 2006. Annual PM₁₀
12 concentration increments would be lower at the aforementioned residences or communities—
13 about 51 $\mu\text{g}/\text{m}^3$ at the nearest residences, and 0.2 $\mu\text{g}/\text{m}^3$ or less at aforementioned communities.
14

15 Total 24-hour PM_{2.5} concentrations would be about 60 $\mu\text{g}/\text{m}^3$ at the SEZ boundary,
16 which is higher than the standard of 35 $\mu\text{g}/\text{m}^3$; modeled concentrations are more than twice the
17 background concentrations in this total. The total annual average PM_{2.5} concentration would be
18 about 16.8 $\mu\text{g}/\text{m}^3$, which is somewhat higher than the standard of 15.0 $\mu\text{g}/\text{m}^3$. At the nearest
19 residences, the predicted maximum 24-hour and annual PM_{2.5} concentration increments would
20 be about of about 28 and 5.1 $\mu\text{g}/\text{m}^3$, respectively.
21

1 Predicted 24-hour and annual PM₁₀ concentration increments at the surrogate receptors
2 for the nearest Class I area—Zion NP—would be about 8.2 and 0.26 µg/m³, or 102 and 6.6% of
3 the PSD increments for the Class I area, respectively. These surrogate receptors are more than
4 36 mi (58 km) from Zion NP, and thus predicted concentrations in the Zion NP would be lower
5 than those values (about 47% of the PSD increments for 24-hour PM₁₀), considering the same
6 decay ratio with distance.

7
8 In conclusion, during the construction of solar facilities, predicted 24-hour and annual
9 PM₁₀ and PM_{2.5} concentration levels could exceed the standard levels at the SEZ boundaries and
10 in the immediate surrounding areas. To reduce potential impacts on ambient air quality and in
11 compliance with programmatic design features, aggressive dust control measures would be used.
12 Potential air quality impacts on nearby residences (except the nearest residences adjacent to the
13 northern SEZ boundary) and communities would be lower. Modeling indicates that emissions
14 from construction activities are not anticipated to exceed Class I PSD PM₁₀ increments at the
15 nearest federal Class I area (Zion NP). Construction activities are not subject to the PSD
16 program, and the comparison provides only a screen to gauge the size of the impact.
17 Accordingly, it is anticipated that impacts of construction activities on ambient air quality would
18 be moderate and temporary.

19
20 Construction emissions from the engine exhaust from heavy equipment and vehicles
21 could cause impacts on AQRVs (e.g., visibility and acid deposition) at the nearest federal Class I
22 area, Zion NP, which is not located directly downwind of prevailing winds. SO_x emissions from
23 engine exhaust would be very low, because programmatic design features would require that
24 ultra-low-sulfur fuel with a sulfur content of 15 ppm be used. NO_x emissions from engine
25 exhaust would be primary contributors to potential impacts on AQRVs. Construction-related
26 emissions are temporary and thus would cause some unavoidable but short-term impacts.

27
28 Transmission lines within a designated ROW would be constructed to connect to the
29 nearest regional grid. A regional 138-kV transmission line is located about 42 mi (68 km)
30 southeast of the Wah Wah Valley SEZ; thus construction of a transmission line over this
31 relatively long distance would likely be needed. Construction activities would result in fugitive
32 dust emissions from soil disturbance and engine exhaust emissions from heavy equipment and
33 vehicles. The duration of transmission line construction from the Wah Wah Valley SEZ could
34 be performed in about three years. However, the construction site along the transmission line
35 ROW would move continuously; thus no particular area would be exposed to air emissions for a
36 prolonged period. Therefore, potential air quality impacts on nearby residences along the
37 transmission line ROW, if any, would be minor and temporary.

38 39 40 **13.3.13.2.2 Operations**

41
42 Emission sources associated with the operation of a solar facility would include auxiliary
43 boilers; vehicle (commuter, visitor, support, and delivery) traffic; maintenance (e.g., mirror
44 cleaning and repair and replacement of damaged mirrors); and drift from cooling towers for the
45 parabolic trough or power tower technology if wet cooling were implemented (drift comprises
46 low-level PM emissions).

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

3
 4 Estimates of potential air emissions displaced by solar project development at the Wah
 5 Wah Valley SEZ are presented in Table 13.3.13.2-2. Total power generation capacity ranging
 6 from 542 to 976 MW is estimated for the Wah Wah Valley SEZ for various solar technologies
 7 (see Section 13.3.1.2). The estimated amount of emissions avoided for the solar technologies
 8 evaluated depends only on the megawatts of conventional fossil fuel power displaced, because a
 9 composite emission factor per megawatt-hour of power by conventional technologies is assumed
 10 (EPA 2009d). If the Wah Wah Valley SEZ were fully developed, it is expected that emissions
 11 avoided would be substantial. Development of solar power in the SEZ would result in avoided
 12 air emissions ranging from 2.6 to 4.6% of total emissions of SO₂, NO_x, Hg, and CO₂ from
 13 electric power systems in the state of Utah (EPA 2009d). Avoided emissions would be up to
 14
 15

TABLE 13.3.13.2-2 Annual Emissions from Combustion-Related Power Generation Displaced by Full Solar Development of the Proposed Wah Wah Valley SEZ

Area Size (acres)	Capacity (MW) ^a	Power Generation (GWh/yr) ^b	Emission Rates (tons/yr; 10 ³ tons/yr for CO ₂) ^c			
			SO ₂	NO _x	Hg	CO ₂
6,097	542–976	950–1,709	945–1,701	1,807–3,253	0.004–0.007	1,024–1,844
Percentage of total emissions from electric power systems in Utah ^d			2.6–4.6%	2.6–4.6%	2.6–4.6%	2.6–4.6%
Percentage of total emissions from all source categories in Utah ^e			1.7–3.1%	0.74–1.3%	NA ^f	1.4–2.5%
Percentage of total emissions from electric power systems in the six-state study area ^d			0.38–0.68%	0.49–0.88%	0.13–0.23%	0.39–0.70%
Percentage of total emissions from all source categories in the six-state study area ^e			0.20–0.36%	0.07–0.12%	NA	0.12–0.22%

^a It is assumed that the SEZ would eventually have development on 80% of the lands and that a range of 5 acres (0.020 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.

^b A capacity factor of 20% is assumed.

^c Composite combustion-related emission factors for SO₂, NO_x, Hg, and CO₂ of 1.99, 3.81, 7.8 × 10⁻⁶, and 2,158 lb/MWh, respectively, were used for the state of Utah.

^d Emission data for all air pollutants are for 2005.

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

^f NA = not estimated.

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

1 0.9% of total emissions from electric power systems in the six-state study area. When compared
2 with all source categories, power production from the same solar facilities would displace up to
3 3.1% of SO₂, 1.3% of NO_x, and 2.5% of CO₂ emissions in the state of Utah (EPA 2009a;
4 WRAP 2009). These emissions would be up to 0.4% of total emissions from all source
5 categories in the six-state study area. Power generation from fossil fuel-fired power plants
6 accounts for about 97.5% of the total electric power generation in Utah, most of which is from
7 coal combustion (more than 94%). Thus, solar facilities built in the Wah Wah Valley SEZ could
8 displace relatively more fossil fuel emissions than those built in other states that rely less on
9 fossil fuel-generated power.

10
11 As discussed in Section 5.11.1.5, the operation of associated transmission lines would
12 generate some air pollutants from activities such as periodic site inspections and maintenance.
13 However, these activities would occur infrequently, and the amount of emissions would be small.
14 In addition, transmission lines could produce minute amounts of O₃ and its precursor NO_x
15 associated with corona discharge (i.e., the breakdown of air near high-voltage conductors),
16 which is most noticeable for higher voltage lines during rain or very humid conditions. Since
17 the proposed SEZ in Utah is located in an arid desert environment, these emissions would be
18 small, and potential impacts on ambient air quality associated with transmission lines would be
19 negligible, considering the infrequent occurrences and small amount of emissions from corona
20 discharges.

21 22 23 ***13.3.13.2.3 Decommissioning/Reclamation***

24
25 As discussed in Section 5.11.1.4, decommissioning/reclamation activities are similar to
26 construction activities but are on a more limited scale and of shorter duration. Potential impacts
27 on ambient air quality would be correspondingly less than those from construction activities.
28 Decommissioning activities would last for a short period, and their potential impacts would be
29 moderate and temporary. The same mitigation measures adopted during the construction phase
30 would also be implemented during the decommissioning phase (Section 5.11.3).

31 32 33 **13.3.13.3 SEZ-Specific Design Features and Design Feature Effectiveness**

34
35 No SEZ-specific design features are required. Limiting dust generation during
36 construction and operations at the proposed Wah Wah Valley SEZ (as by increased watering
37 frequency or road paving or treatment) is a required programmatic design feature under BLM's
38 Solar Energy Program. These extensive fugitive dust control measures would keep off-site PM
39 levels as low as possible during construction.
40

1 **13.3.14 Visual Resources**

2
3
4 **13.3.14.1 Affected Environment**

5
6 As shown in Figure 13.3.14.1-1, the proposed Wah Wah Valley SEZ is located in Wah
7 Wah Valley, a north–south trending valley northwest of the Escalante Desert, across the Shauntie
8 Hills, and lying between the Wah Wah Mountains to the west and southwest, the Shauntie Hills
9 to the south and southeast, and the San Francisco Mountains to the east. Within the SEZ,
10 elevation ranges from 4,874 to 5,093 ft (1,486 to 1,552 m).

11
12 The SEZ is within a flat, treeless, relatively narrow north–south trending valley. The
13 horizon line and forms of mountains to the east and west of the SEZ are the dominant visual
14 features. Vegetation consists primarily of low shrubs (generally less than 1 ft [0.3 m] in height),
15 but during a September 2009 site visit, much of the SEZ appeared devoid of vegetation, or nearly
16 so, with broad expanses of gravel and sand flats dominating foreground-middleground views.
17 The area may be more heavily vegetated during different seasons. During the site visit, the very
18 sparse vegetation presented a range of pale yellows, light browns, and grays, with very little
19 banding or other variation. Most areas presented a uniform gray from bare soil, with an
20 occasional plant; however, slightly more vegetation is present in the far southern portion of the
21 site. During the site visit, significant windblown dust was present constantly, severely limiting
22 visibility. Some or all of the vegetation might be snow-covered in winter, which might
23 significantly affect the visual qualities of the area by changing the color contrasts associated with
24 the vegetation, which could in turn change the contrasts associated with the introduction of solar
25 facilities into the landscape. No water features are present on the site. This landscape type is
26 common within the region. Panoramic views of the site are shown in Figures 13.3.14.1-2,
27 13.3.14.1-3, and 13.3.14.1-4.

28
29 State Route 21 passes through the northern portion of the SEZ. Travelers on the highway
30 would be the primary viewers of the SEZ, because there are few inhabitants in the area and few
31 visitors to the SEZ and its immediate surroundings. Several unpaved roads cross the site. An
32 historic power line with poles is visible crossing portions of the site. No active electric
33 transmission lines are located within the SEZ. Other than State Route 21, the few dirt roads, and
34 wire fences, there is little evidence of cultural modifications within the SEZ that detract from the
35 site’s scenic quality.

36
37 Off-site views include the Wah Wah Mountains to the west and south and the
38 San Francisco Mountains to the east. These mountains are large enough and close enough to
39 dominate views to the east and west from the SEZ. Furthermore, the visual line of State Route 21
40 draws the viewer’s attention to the mountains, particularly to the west, because that is where the
41 highway extends through a mountain pass (Wah Wah Pass), which makes a pronounced visual
42 break in the line of the Wah Wah Mountains. Both the Wah Wah Mountains and San Francisco
43 Mountains add to the scenic quality of the SEZ by providing a dramatic backdrop to views that
44 include them.

Draft Solar PEIS
1



2 **FIGURE 13.3.14.1-2 Approximately 180° Panoramic View of the Proposed Wah Wah Valley SEZ, Looking West from the Eastern**
3 **Boundary of the Proposed SEZ on State Route 21**

13.3-197
6
7



8 **FIGURE 13.3.14.1-3 Approximately 120° Panoramic View of the Proposed Wah Wah Valley SEZ, Looking North–Northwest from the**
9 **Northwest Portion of the Proposed SEZ, with Off-Site Ranch Visible at Far Right and Wah Wah Mountains Left and Center**

December 2010
12
13
14



13 **FIGURE 13.3.14.1-4 Approximately 120° Panoramic View of the Proposed Wah Wah Valley SEZ, Looking East from Central Section of**
14 **the Proposed SEZ, with Frisco Peak Visible at Far Left**

1 Other than State Route 21, few off-site cultural disturbances are visible from the SEZ;
2 however, a ranch with irrigated agricultural lands is immediately north of the northern boundary
3 of the SEZ and is visible from the northern portion of the SEZ. The ranch includes several low
4 buildings that introduce strong regular geometry into the landscape and provide contrast in form,
5 color, and texture. The ranch also includes many trees, which introduce contrasts in form, line,
6 color, and texture in the otherwise treeless, flat landscape; however they provide a natural
7 appearing screen to some of the man-made structures.
8

9 Current land uses within the SEZ include grazing, general outdoor recreation,
10 backcountry driving and OHV use, and hunting for both small and big game. The land is used
11 mostly by local residents, but usage levels are low. Because the SEZ location is remote, with
12 few people living nearby and with frequent windblown dust, there are few visitors, and the
13 number of viewers is relatively low. As noted previously, most viewers would be travelers on
14 State Route 21, but that road is relatively lightly traveled.
15

16 The BLM conducted a VRI for the SEZ and surrounding lands in 2009 to 2010
17 (BLM 2010a). The VRI evaluates BLM-administered lands based on *scenic quality*; *sensitivity*
18 *level*, in terms of public concern for preservation of scenic values in the evaluated lands; and
19 *distance* from travel routes or key observation points. Based on these three factors, BLM-
20 administered lands are placed into one of four Visual Resource Inventory Classes, which
21 represent the relative value of the visual resources. Classes I and II are the most valued; Class III
22 represents a moderate value; and Class IV represents the least value. Class I is reserved for
23 specially designated areas, such as national wildernesses and other congressionally and
24 administratively designated areas where decisions have been made to preserve a natural
25 landscape. Class II is the highest rating for lands without special designation. More information
26 about VRI methodology is available in Section 5.12 and in *Visual Resource Inventory*,
27 BLM Manual Handbook 8410-1 (BLM 1986a).
28

29 The VRI values for the SEZ and immediate surroundings are VRI Class IV, indicating
30 low relative visual values. The inventory indicates low scenic quality for the SEZ and its
31 immediate surroundings, based primarily on the lack of topographic relief and water features,
32 grazing damage, and the relative commonness of the landscape type within the region. The SEZ
33 also received very low scores for variety in vegetation types and color. The SEZ was noted as
34 being in need of rehabilitation to restore visual values. A positive visual attribute noted in the
35 inventory was the attractive off-site views; however, this positive attribute was insufficient to
36 raise the scenic quality to the “Moderate” level. The inventory indicates low sensitivity for the
37 SEZ and its immediate surroundings, due in part to relatively low levels of use and public
38 interest. More information about the VRI methodology is available in Section 5.12 and in *Visual*
39 *Resource Inventory*, BLM Manual Handbook 8410-1 (BLM 1986a).
40

41 Lands within the 25-mi (40-km), 650-ft (198-m) viewshed of the SEZ contain
42 57,070 acres (230.95 km²) of VRI Class II areas, primarily in the mountains east and west of the
43 SEZ; 9,014 acres (36.48 km²) of Class III areas on mountain slopes mountains northeast and
44 southwest of the SEZ; and 84,806 acres (343.20 km²) of VRI Class IV areas, concentrated
45 primarily in the Wah Wah Valley and nearby mountain ranges south of the SEZ. The VRI map
46 for the SEZ and surrounding lands is shown in Figure 13.3.14.1-5.

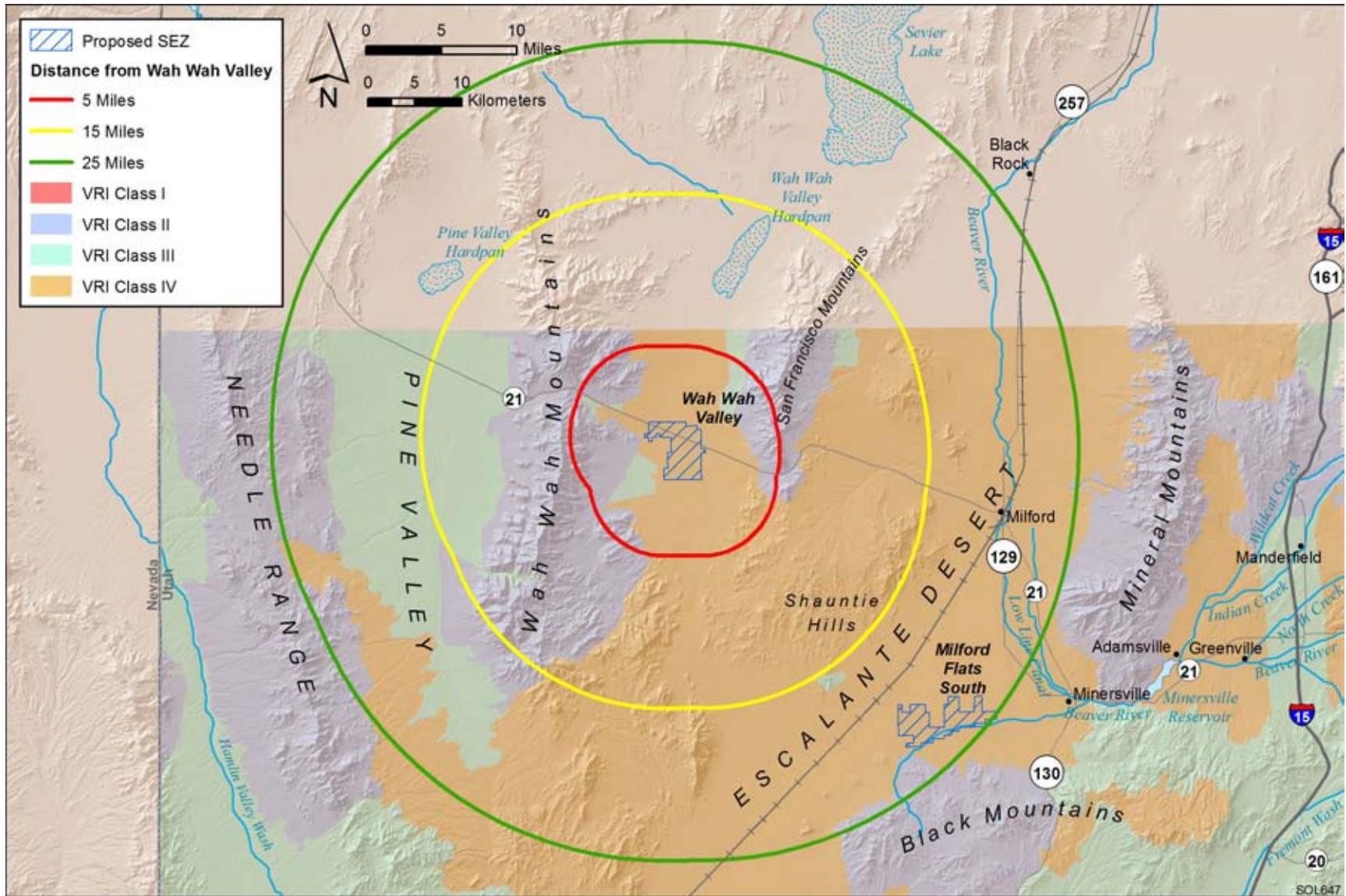


FIGURE 13.3.14.1-5 Visual Resource Inventory Values for the Proposed Wah Wah Valley SEZ and Surrounding Lands

1 The Pinyon Management Framework Plan (BLM 1983a) indicates that the entire SEZ is
2 managed as VRM Class IV, which permits major modification of the existing character of the
3 landscape. The VRM map for the SEZ and surrounding lands is shown in Figure 13.3.14.1-6.
4 More information about the BLM VRM program is available in Section 5.12 and in *Visual*
5 *Resource Management*, BLM Manual Handbook 8400 (BLM 1984).
6
7

8 **13.3.14.2 Impacts**

9

10 The potential for impacts from utility-scale solar energy development on visual resources
11 within the proposed Wah Wah Valley SEZ and surrounding lands, as well as the impacts of
12 related developments (e.g., access roads and transmission lines) outside of the SEZ, is presented
13 in this section.
14

15 Site-specific impact assessment is needed to systematically and thoroughly assess visual
16 impact levels for a particular project. Without precise information about the location of a project
17 and a relatively complete and accurate description of its major components and their layout, it is
18 not possible to assess precisely the visual impacts associated with the facility. However, if the
19 general nature and location of a facility are known, a more generalized assessment of potential
20 visual impacts can be made by describing the range of expected visual changes and discussing
21 contrasts typically associated with these changes. In addition, a general analysis can identify
22 sensitive resources that may be at risk if a future project is sited in a particular area. Detailed
23 information about the methodology employed for the visual impact assessment used in this PEIS,
24 including assumptions and limitations, is presented in Appendix M.
25
26

27 *Potential Glint and Glare Impacts.* Similarly, the nature and magnitude of potential glint-
28 and glare-related visual impacts for a given solar facility is highly dependent on viewer position,
29 sun angle, the nature of the reflective surface and its orientation relative to the sun and the
30 viewer, atmospheric conditions, and other variables. The determination of potential impacts
31 from glint and glare from solar facilities within a given proposed SEZ would require precise
32 knowledge of these variables, and is not possible given the scope of the PEIS. Therefore, the
33 following analysis does not describe or suggest potential contrast levels arising from glint and
34 glare for facilities that might be developed within the SEZ; however, it should be assumed that
35 glint and glare are possible visual impacts from *any* utility-scale solar facility, regardless of size,
36 landscape setting, or technology type. The occurrence of glint and glare at solar facilities could
37 potentially cause large, but temporary, increases in brightness and visibility of the facilities. The
38 visual contrast levels projected for sensitive visual resource areas discussed in the following
39 analysis do not account for potential glint and glare effects; however, these effects would be
40 incorporated into a future site- and project-specific assessment that would be conducted for
41 specific proposed utility-scale solar energy projects. For more information about potential glint
42 and glare impacts associated with utility-scale solar energy facilities, see Section 5.12.
43
44

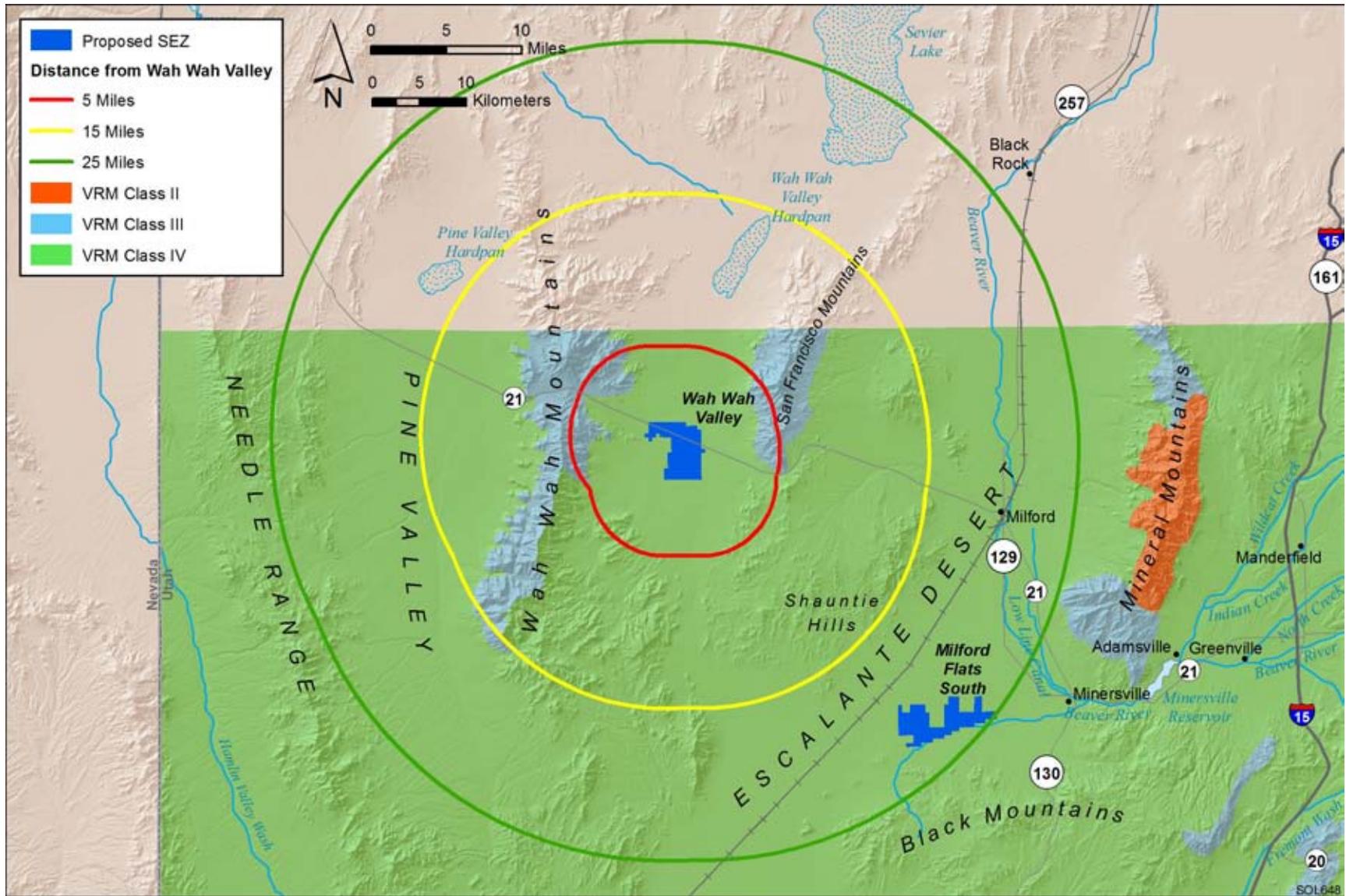


FIGURE 13.3.14.1-6 Visual Resource Management Classes for the Proposed Wah Wah Valley SEZ and Surrounding Lands

1 **13.3.14.2.1 Impacts on the Proposed Wah Wah Valley SEZ**
2

3 Some or all of the SEZ could be developed for one or more utility-scale solar energy
4 projects, utilizing one or more of the solar energy technologies described in Appendix F.
5 Because of the industrial nature and large size of utility-scale solar energy facilities, large visual
6 impacts would occur on the SEZ as a result of the construction, operation, and decommissioning
7 of solar energy facilities. In addition, large impacts could occur at solar facilities using highly
8 reflective surfaces or major light-emitting facility components (solar dish, parabolic trough, and
9 power tower technologies), with lesser impacts associated with reflective surfaces expected from
10 PV facilities. These impacts would be expected to involve major modification of the existing
11 character of the landscape and would likely dominate the views nearby.
12

13 Additional potential impacts would occur as a result of the construction, operation,
14 and decommissioning of related facilities, such as access roads and electric transmission lines.
15 While the primary visual impacts associated with solar energy development within the SEZ
16 would occur during daylight hours, lighting required for utility-scale solar energy facilities
17 would be a potential source of visual impacts at night, both within the SEZ and on
18 surrounding lands.
19

20 Common and technology-specific visual impacts from utility-scale solar energy
21 development, as well as impacts associated with electric transmission lines, are discussed
22 in Section 5.12 of this PEIS. Impacts would last throughout construction, operation, and
23 decommissioning, and some impacts could continue after project decommissioning. Visual
24 impacts resulting from solar energy development in the SEZ would be in addition to impacts
25 from solar energy development and other development that may occur on other public or private
26 lands within the SEZ viewshed, and are subject to cumulative effects. For discussion of
27 cumulative impacts, see Section 6.5.
28

29 The changes described above would be expected to be consistent with BLM VRM
30 objectives for VRM Class IV, as seen from nearby KOPs. More information about impact
31 determination using the BLM VRM program is available in Section 5.12 and in *Visual Resource*
32 *Contrast Rating*, BLM Manual Handbook 8431-1 (BLM 1986b).
33

34 Implementation of the programmatic design features intended to reduce visual impacts
35 (described in Appendix A, Section A.2.2) would be expected to reduce visual impacts associated
36 with utility-scale solar energy development within the SEZ; however, the degree of effectiveness
37 of these design features could be assessed only at the site- and project-specific level. Given the
38 large scale, reflective surfaces, and strong regular geometry of utility-scale solar energy facilities
39 and the lack of screening vegetation and landforms within the SEZ viewshed, siting the facilities
40 away from sensitive visual resource areas and other sensitive viewing areas would be the primary
41 means of mitigating visual impacts. The effectiveness of other visual impact mitigation measures
42 would generally be limited.
43
44
45

1 ***13.3.14.2.2 Impacts on Lands Surrounding the Proposed Wah Wah Valley SEZ***
2
3

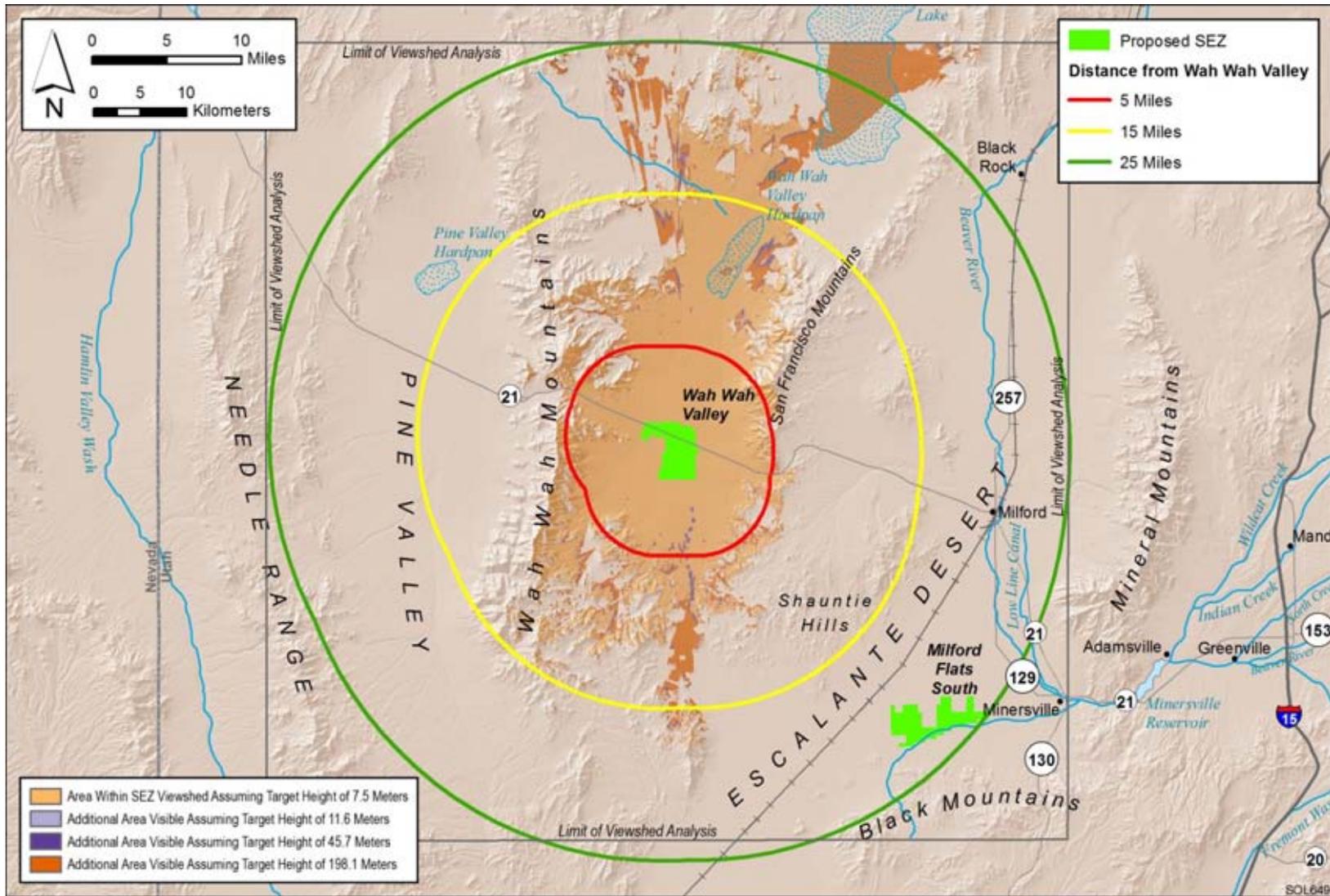
4 **Impacts on Selected Sensitive Visual Resource Areas**
5

6 Because of the large size of utility-scale solar energy facilities and the generally flat,
7 open nature of the proposed SEZ, lands outside the SEZ would be subjected to visual impacts
8 related to construction, operation, and decommissioning of utility-scale solar energy facilities.
9 The affected areas and extent of impacts would depend on a number of visibility factors and
10 viewer distance (for a detailed discussion of visibility and related factors, see Section 5.7). A key
11 component in determining impact levels is the intervisibility between the project and potentially
12 affected lands; if topography, vegetation, or structures screen the project from viewer locations,
13 there is no impact.
14

15 Preliminary viewshed analyses were conducted to identify which lands surrounding
16 the proposed SEZ could have views of solar facilities in at least some portion of the SEZ
17 (see Appendix M for important information on assumptions and limitations of the methods
18 used). Four viewshed analyses were run, one each for four different heights assumed to be
19 representative of project elements associated with potential solar energy technologies: PV and
20 parabolic trough arrays (24.6 ft [7.5 m]), solar dishes and power blocks for CSP technologies
21 (38 ft [11.6 m]), transmission towers and short solar power towers (150 ft [45.7 m]), and tall
22 solar power towers (650 ft [198.1 m]). Viewshed maps for the SEZ for all four solar technology
23 heights are available in Appendix N.
24

25 Figure 13.3.14.2-1 shows the combined results of the viewshed analyses for all four solar
26 technologies. The colored segments indicate areas with clear lines of sight to one or more areas
27 within the SEZ and from which solar facilities within these areas of the SEZ would be expected
28 to be visible, assuming the absence of screening vegetation or structures and presence of
29 adequate lighting and other atmospheric conditions. The light brown areas are locations from
30 which PV and parabolic trough arrays located in the SEZ could be visible. Solar dishes and
31 power blocks for CSP technologies would be visible from the areas shaded in light brown and
32 the additional areas shaded in light purple. Transmission towers and short solar power towers
33 would be visible from the areas shaded light brown, light purple, and the additional areas shaded
34 in dark purple. Power tower facilities located in the SEZ could be visible from areas shaded light
35 brown, light purple, dark purple, and at least the upper portions of power tower receivers could
36 be visible from the additional areas shaded in medium brown.
37

38 For the following visual impact discussion, the tall solar power tower (650 ft [198.1 m])
39 and PV and parabolic trough array (24.6 ft [7.5 m]) viewsheds are shown in the figures and
40 discussed in the text. These heights represent the maximum and minimum landscape visibility,
41 respectively, for solar energy technologies analyzed in the PEIS. Viewsheds for solar dish and
42 CSP technology power blocks (38 ft [11.6 m]) and transmission towers and short solar power
43 towers (150 ft [45.7 m]) are presented in Appendix N. The visibility of these facilities would fall
44 between that for tall power towers and PV and parabolic trough arrays.
45
46



1
2 **FIGURE 13.3.14.2-1 Viewshed Analyses for the Proposed Wah Wah Valley SEZ and Surrounding Lands, Assuming Solar**
3 **Technology Heights of 24.6 ft (7.5 m), 38 ft (11.6 m), 150 ft (45.7 m), and 650 ft (198.1 m) (shaded areas indicate lands from**
4 **which solar development within the SEZ could be visible)**

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

3
4 Figure 13.3.14.2-2 shows the results of a GIS analysis that overlaid selected federal,
5 state, and BLM-designated sensitive visual resource areas onto the combined tall solar power
6 tower (650 ft [198.1 m]) and PV and parabolic trough array (24.6 ft [7.5 m]) viewsheds to
7 illustrate which of these sensitive visual resource areas could have views of solar facilities
8 within the SEZ and therefore would potentially be subject to visual impacts from those facilities.
9 Distance zones that correspond with BLM’s VRM system-specified foreground-middleground
10 distance (5 mi [8 km]), background distance (15 mi [24 km]), and a 25-mi (40-km) distance
11 zone are shown to indicate the effect of distance from the SEZ on impact levels, which are highly
12 dependent on distance.

13
14 The scenic resources included in the analysis were as follows:

- 15 • National Parks, National Monuments, National Recreation Areas, National
16 Preserves, National Wildlife Refuges, National Reserves, National
17 Conservation Areas, National Historic Sites;
- 18 • Congressionally authorized Wilderness Areas;
- 19 • Wilderness Study Areas;
- 20 • National Wild and Scenic Rivers;
- 21 • Congressionally authorized Wild and Scenic Study Rivers;
- 22 • National Scenic Trails and National Historic Trails;
- 23 • National Historic Landmarks and National Natural Landmarks;
- 24 • All-American Roads, National Scenic Byways, State Scenic Highways; and
25 BLM- and USFS-designated scenic highways/byways;
- 26 • BLM-designated Special Recreation Management Areas; and
- 27 • ACECs designated because of outstanding scenic qualities.

28
29
30 Potential impacts on specific sensitive resource areas visible from and within 25 mi
31 (40 km) of the proposed Wah Wah Valley SEZ are discussed below. The results of this analysis
32 are also summarized in Table 13.3.14.2-1. Further discussion of impacts on these areas is
33 available in Sections 13.3.3 (Specially Designated Areas and Lands with Wilderness
34 Characteristics) and 13.3.17 (Cultural Resources) of this PEIS.

35
36 The following visual impact analysis describes *visual contrast levels* rather than *visual*
37 *impact levels*. *Visual contrasts* are changes in the landscape as seen by viewers, including
38

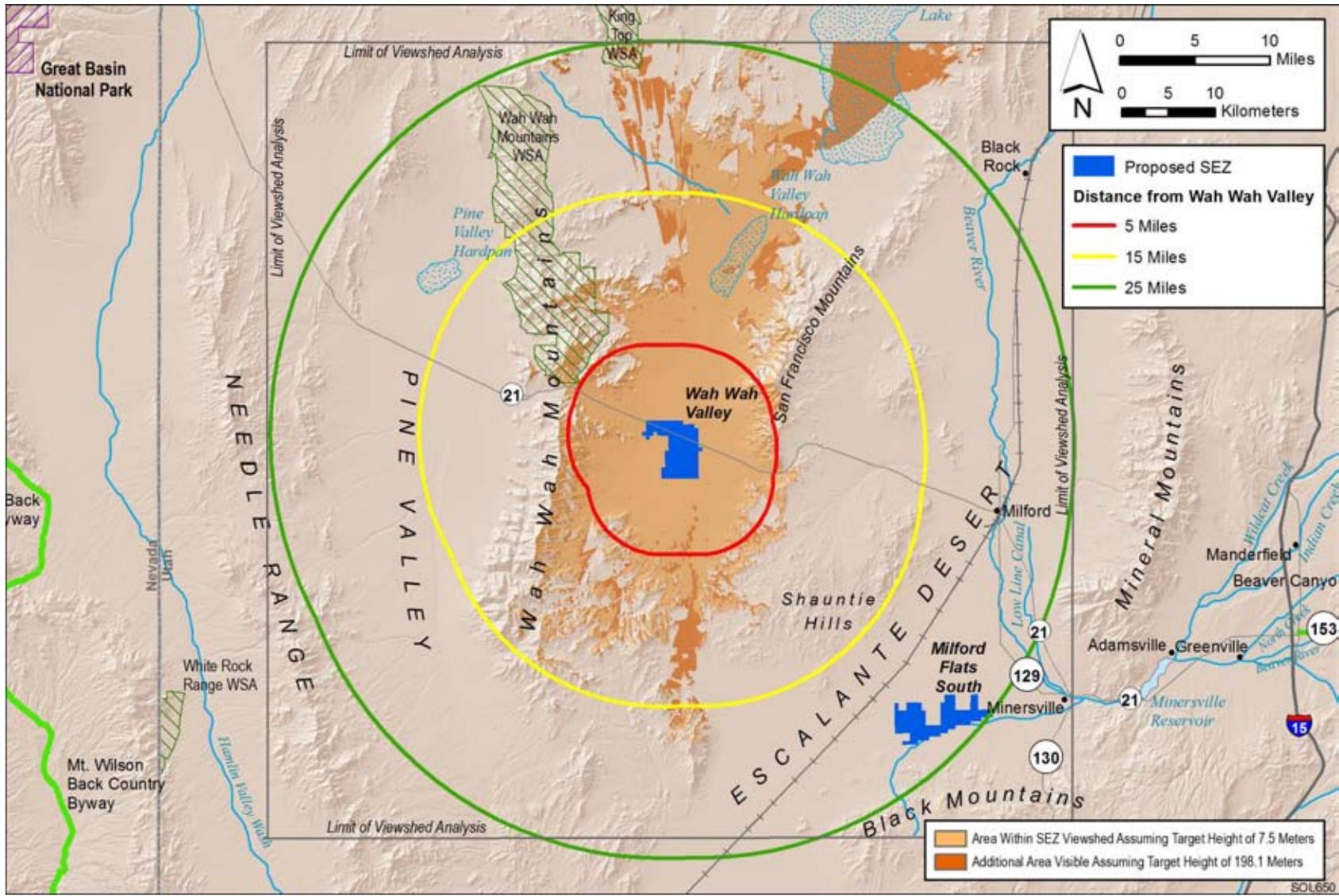


FIGURE 13.3.14.2-2 Overlay of Selected Sensitive Visual Resource Areas onto Combined 650-ft (198.1-m) and 24.6-ft (7.5-m) Viewsheds for the Proposed Wah Wah Valley SEZ

1
2
3

TABLE 13.3.14.2-1 Selected Potentially Affected Sensitive Visual Resources within a 25-mi (40.2-km) Viewshed of the Proposed Wah Wah Valley SEZ, Assuming a Viewshed Analysis Target Height of 650 ft (198.1 m)

Feature Type	Feature Name and Total Acreage	Visible within 5 mi	Feature Area or Linear Distance ^a	
			Visible between	
			5 and 15 mi	15 and 25 mi
WSA	King Top (92,808 acres)	0 acres	0 acres	969 acres (1%) ^b
	Wah Wah Mountains (49,406 acres)	0 acres	3,777 acres (8%)	0 acres

^a To convert acre to km², multiply by 0.004047; to convert mi to km, multiply by 1.609.

^b Percentage of total feature area for areal features.

1
2
3 changes in the forms, lines, colors, and textures of objects seen in the landscape. A measure
4 of *visual impact* includes potential human reactions to the visual contrasts arising from a
5 development activity, based on viewer characteristics, including attitudes and values,
6 expectations, and other characteristics that are viewer- and situation-specific. Accurate
7 assessment of visual impacts requires knowledge of the potential types and numbers of viewers
8 for a given development and their characteristics and expectations, specific locations from which
9 the project might be viewed, and other variables that were not available or not feasible to
10 incorporate in the PEIS analysis. These variables would be incorporated into a future site- and
11 project-specific assessment that would be conducted for specific proposed utility-scale solar
12 energy projects. For more discussion of visual contrasts and impacts see Section 5.12.

13
14
15 **Wilderness Study Areas**

- 16
17 • *Wah Wah Mountains.* The Wah Wah Mountains WSA is about 5 mi (8 km)
18 northwest of the SEZ at the point of closest approach and encompasses
19 49,406 acres (200 km²). Elevations in the southern mountains of the WSA
20 range from 6,400 ft (1,951 m) to 8,900 ft (2,713 m). The Wah Wah Mountains
21 ACEC is located within the southern portion of the WSA and was designated
22 for its biological resources.

23
24 As shown in Figure 13.3.14.2-2, solar energy facilities within the SEZ could
25 be visible from much of the southeast portion of the WSA (about 3,777 acres
26 [15.3 km²] in the 650-ft (198.1-m) viewshed, or 8% of the total WSA acreage.
27 Portions of the WSA within the 24.6-ft (7.5-m) viewshed encompass about
28 3,288 acres (13.31 km²) or 6.7% of the total WSA acreage. The main visible
29 area of the WSA extends from the point of closest approach to a few small
30 areas of visibility out to approximately 10.3 mi (16.6 km).

1 Figure 13.3.14.2-3 is a three-dimensional Google Earth perspective
2 visualization of the SEZ (highlighted in orange) as seen from a high, unnamed
3 peak (elevation about 8,900 ft [2,700 m]) at the far southern end of the WSA,
4 about 6.8 mi (11 km) from the northwest corner of the SEZ, and 4,000 ft
5 (1,230 m) above the valley floor. The visualization includes simplified
6 wireframe models of a hypothetical solar power tower facility. The models
7 were placed within the SEZ as a visual aide for assessing the approximate size
8 and viewing angle of utility-scale solar facilities. The receiver towers depicted
9 in the visualization are properly scaled models of a 459-ft (139.9-m) power
10 tower with an 867-acre (3.5-km²) field of 12-ft (3.7-m) heliostats, each
11 representing about 100 MW of electric generating capacity. Two models were
12 placed in the SEZ for this and other visualizations shown in this section of the
13 PEIS. In the visualization, the SEZ area is depicted in orange, the heliostat
14 fields in blue.

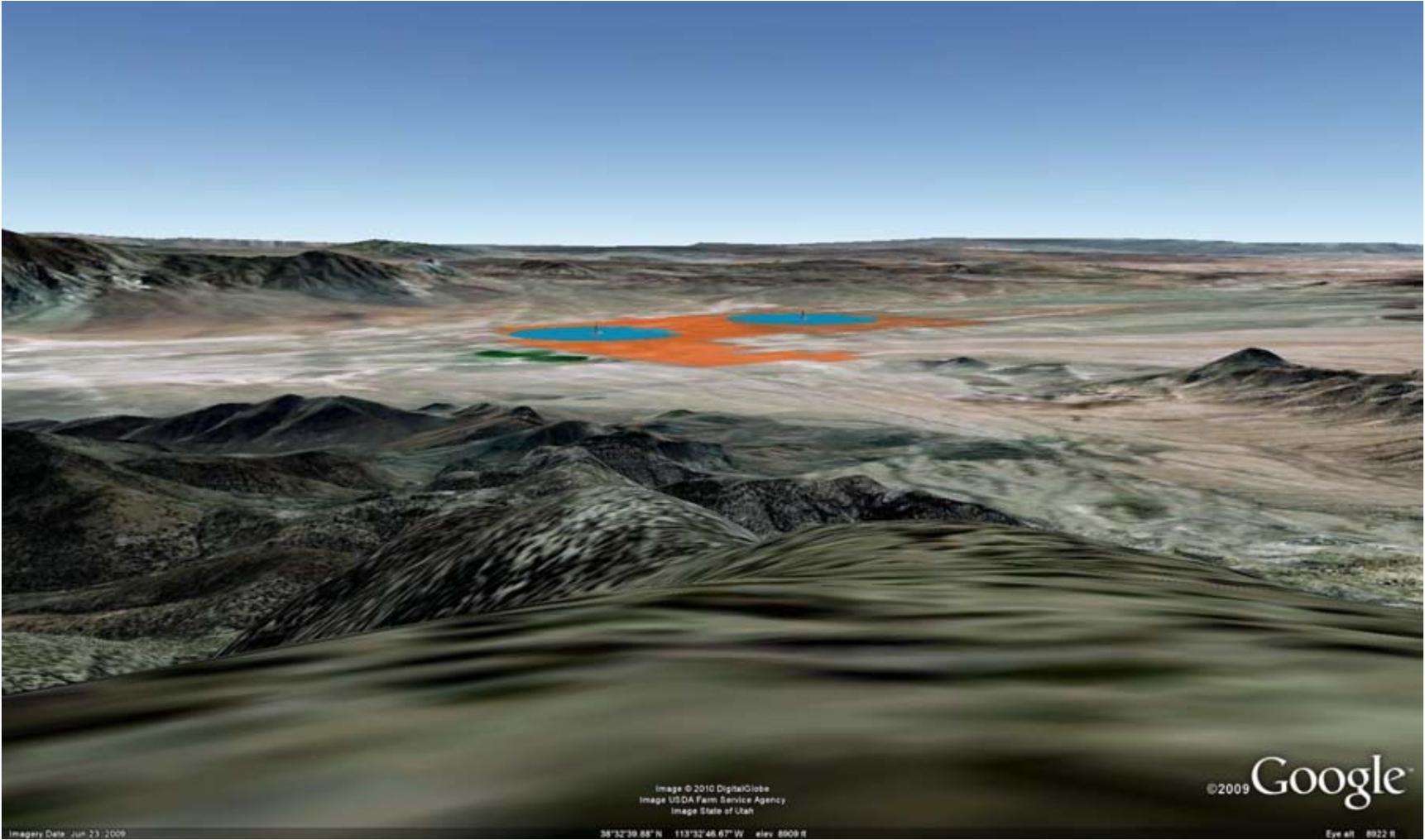
15
16 The upper slopes and peaks of the Wah Wah Mountains are covered with
17 scattered low trees and shrubs, insufficient for screening views of the SEZ
18 from most locations within the WSA. As shown in the visualization, the entire
19 SEZ would be visible from this location and would occupy a substantial
20 portion of the field of view. At this and other higher-elevation viewpoints
21 within the WSA, the angle of view would not be great enough that the tops of
22 solar collector arrays within the SEZ would be visible.

23
24 Taller ancillary facilities, such as buildings, transmission structures, and
25 cooling towers, and plumes (if present) would likely be visible projecting
26 above the collector/reflector arrays. The ancillary facilities could create form
27 and line contrasts with the strongly horizontal, regular, and repeating forms
28 and lines of the collector/reflector arrays. Color and texture contrasts would
29

GOOGLE EARTH™ VISUALIZATIONS

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

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



1

FIGURE 13.3.14.2-3 Google Earth Visualization of the Proposed Wah Wah Valley SEZ (shown in orange tint) and Surrounding Lands, with Power Tower Wireframe Models, as Seen from a Southern Peak in the Wah Wah Mountains WSA

1 also be possible, but their extent would depend on the materials and surface
2 treatments utilized in the facilities.

3
4 If operating power towers were present within the SEZ, the receivers would
5 likely appear as bright points of light atop discernable tower structures against
6 the backdrop of the Wah Wah Valley floor, and could be conspicuous from
7 this viewpoint. If sufficiently tall, the power towers could have red or white
8 flashing hazard navigation lights that would likely be visible from the WSA
9 at night, and could be conspicuous from this viewpoint, given the dark night
10 skies in the vicinity of the SEZ. Other lighting associated with solar facilities
11 in the SEZ could potentially be visible as well.

12
13 The potential visual contrast expected for this viewpoint would depend on the
14 numbers, types, sizes, and locations of solar facilities in the SEZ, and other
15 project- and site-specific factors. Under the 80% development scenario
16 analyzed in this PEIS, solar facilities within the SEZ would be expected to
17 create moderate visual contrasts as viewed from this location.

18
19 Figure 13.3.14.2-4 is a Google Earth visualization of the SEZ as seen from an
20 unnamed peak (elevation about 8,900 ft [2,700 m]) near the northern limit of
21 the SEZ viewed within the WSA, 9.7 mi (15.5 km) from the northwest
22 corner of the SEZ and about 3,200 ft (980 m) above the valley floor.

23
24 As shown in the visualization, nearly the entire SEZ is visible from this
25 location, except the far northwest corner. The SEZ occupies a substantial
26 portion of the field of view. Because of the increased distance and lower
27 viewpoint elevation, the SEZ is seen at a somewhat lower viewing angle than
28 in Figure 13.3.14.2-3, reducing the apparent size of the SEZ and the model
29 facilities shown in the view. Also, this viewing angle shows the model
30 facilities more edge on so that they appear to repeat the line of the horizon,
31 tending to reduce visual contrast somewhat. The angle of view is still high
32 enough that the tops of solar collector arrays within the SEZ would be visible.
33 Taller solar facility components, such as transmission towers, could be visible,
34 depending on lighting, but might not be noticed by casual observers.

35
36 If operating power towers were present within the SEZ, the receivers would
37 likely appear as bright points of light atop discernable tower structures against
38 the backdrop of the Wah Wah Valley floor. If sufficiently tall, the power
39 towers could have red or white flashing hazard navigation lights that would
40 likely be visible from this viewpoint from this viewpoint at night. Other
41 lighting associated with solar facilities in the SEZ could potentially be visible
42 as well.

43
44 The potential visual contrast expected for this viewpoint would depend on the
45 numbers, types, sizes, and locations of solar facilities in the SEZ, and other
46 project- and site-specific factors. Under the 80% development scenario

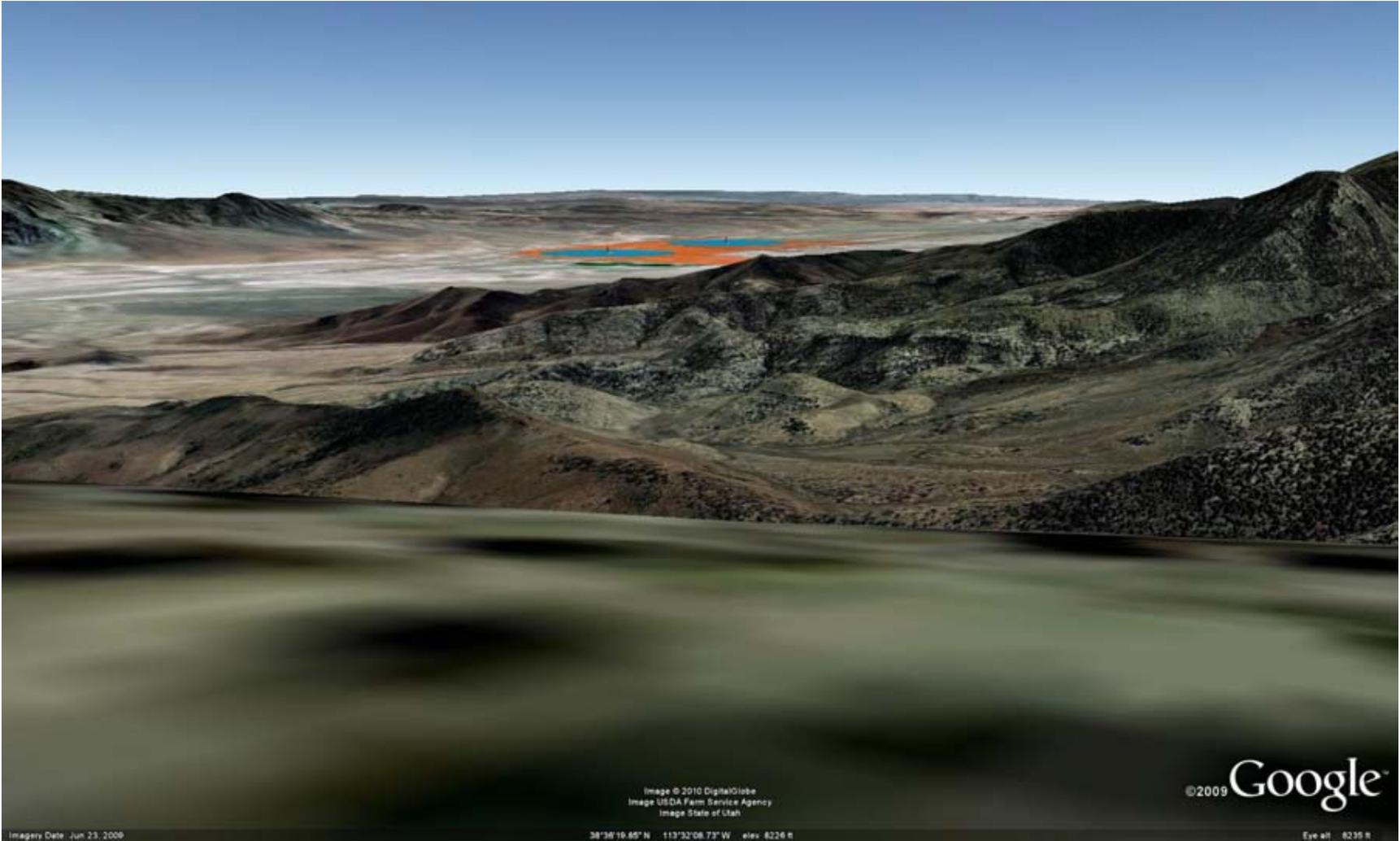


FIGURE 13.3.14.2-4 Google Earth Visualization of the Proposed Wah Wah Valley SEZ (shown in orange tint) and Surrounding Lands, with Power Tower Wireframe Models, as Seen from a Peak near the Northern Limit of the SEZ Viewshed in the Wah Wah Mountains WSA

1 analyzed in this PEIS, solar facilities within the SEZ would be expected to
2 create weak visual contrasts as viewed from this location.

3
4 In general, potential visual contrast expected for viewers within the WSA
5 would be highly dependent on viewer locations in the WSA, but would also
6 depend on the numbers, types, sizes, and locations of solar facilities in the
7 SEZ, as well as other project- and site-specific factors. Under the 80%
8 development scenario analyzed in this PEIS, solar facilities within the SEZ
9 would be expected to create weak to moderate visual contrasts as viewed from
10 the WSA. The highest levels of visual contrast would be expected for viewing
11 locations at higher elevations in the far southern portion of the WSA, with less
12 visibility and lower contrast levels expected at the more distant locations in
13 the SEZ viewshed farther north within the WSA and at lower elevations.

- 14
15 • *King Top*. King Top WSA is located about 23.6 mi (38.0 km) north of the
16 SEZ at the point of closest approach and encompasses 92,808 acres
17 (375.6 km²). Within the 25-mi (40-km) SEZ viewshed analyzed in the PEIS,
18 the Wah Wah Valley SEZ is visible from portions of the Confusion Range in
19 the far southern end of the King Top WSA. As shown in Figure 13.3.14.2-2,
20 the closest points in the WSA are farther than 23 mi (38 km) from the SEZ,
21 and much of the western portion of the SEZ is screened from view by
22 intervening mountain ranges. Portions of the WSA within the 650-ft
23 (198.1-m) viewshed (approximately 969 acres [3.9 km²], or 1% of the total
24 WA acreage) extend from the point of nearest approach to beyond 25 mi
25 (40 km) from the SEZ. Portions of the WSA within the 24.6-ft (7.5-m)
26 viewshed encompass about 587 acres (2.4 km²) or 0.6% of the total WSA
27 acreage.

28
29 Because of the large distance to the SEZ and partial screening of the SEZ
30 from view, the SEZ would occupy a very small portion of the field of view as
31 seen from the King Top WSA. Furthermore, the angle of view would be quite
32 low, so that solar facilities within the visible portion of the SEZ would be seen
33 edge on, reducing their visible area and repeating the line of the horizon,
34 which would tend to reduce visual contrast. At more than 23 mi (38 km), low-
35 height solar facilities and some other solar and ancillary facilities might be
36 hard to distinguish from the background textures and colors. Power tower
37 receivers within the visible portion of the WSA would likely be visible as
38 distant points of light just under the southern horizon, viewed against the Wah
39 Wah Valley floor. If sufficiently tall, power towers within the SEZ could have
40 red or white flashing hazard navigation lights that could be visible at night
41 from this and other locations in the Kingtop WSA.

42
43 Visual contrasts associated with solar energy development within the SEZ
44 would depend on viewer location within the WSA; solar facility type, size,
45 and location within the SEZ; and other visibility factors. Where there was a

1 clear view of the SEZ, weak levels of visual contrast would be expected under
2 the 80% development scenario analyzed in the PEIS.

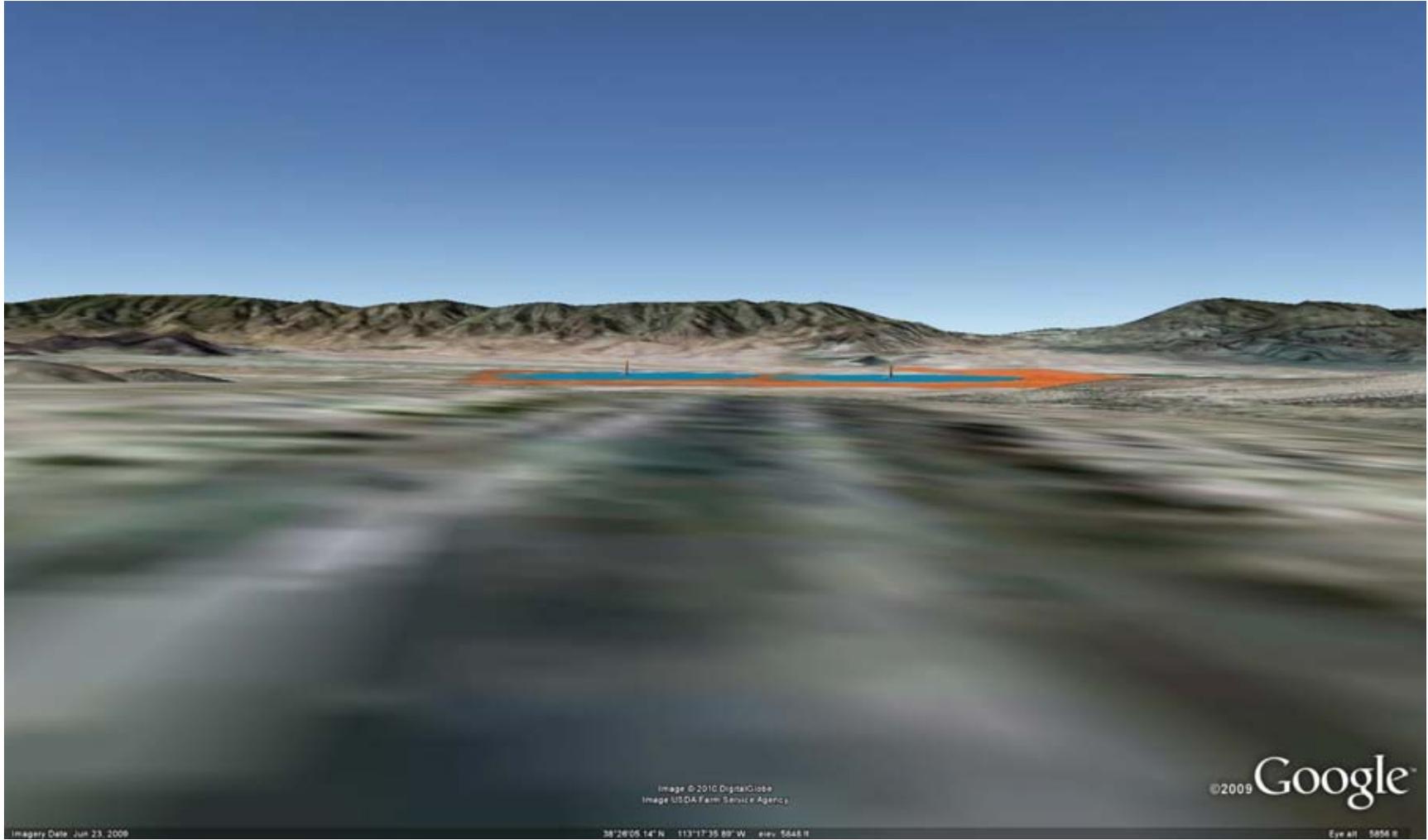
3
4 Additional scenic resources exist at the national, state, and local levels, and impacts may
5 occur on both federal and nonfederal lands, including sensitive traditional cultural properties
6 important to Tribes. Note that in addition to the resource types and specific resources analyzed
7 in this PEIS, future site-specific NEPA analyses would include state and local parks, recreation
8 areas, other nonfederal sensitive visual resources, and communities close enough to the proposed
9 project to be affected by visual impacts. Selected other lands and resources are included in the
10 discussion below.

11
12 In addition to impacts associated with the solar energy facilities themselves, sensitive
13 visual resources could be affected by facilities that would be built and operated in conjunction
14 with the solar facilities. With respect to visual impacts, the most important associated facilities
15 would be access roads and transmission lines, the precise location of which cannot be determined
16 until a specific solar energy project is proposed. Currently, there are no suitable transmission
17 lines within the proposed SEZ; thus, construction and operation of a transmission line both inside
18 and outside the proposed SEZ would be required. Note that depending on project- and site-
19 specific conditions, visual impacts associated with access roads and (particularly) transmission
20 lines could be large. Detailed information about visual impacts associated with transmission lines
21 is presented in Section 5.7.1. A detailed site-specific NEPA analysis would be required to
22 determine visibility and associated impacts precisely for any future solar projects, based on more
23 precise knowledge of facility location and characteristics.

24 25 26 **Impacts on Selected Other Lands and Resources**

27
28
29 **State Route 21.** As shown in Figure 13.3.14.2-2, approximately 16 mi (26 km) of State
30 Route 21 is within the 650-ft (198.1-m) viewshed of the Wah Wah Valley SEZ, with about
31 3.8 mi (6.1 km) of the route passing through the northern half of the SEZ from east-southeast
32 to west-northwest. State Route 21 crosses the Wah Wah Valley from east-southeast to west-
33 northwest through two mountain passes on either side of the valley. From both directions, State
34 Route 21 descends long slopes to the SEZ in the middle of the valley floor. Consequently,
35 motorists traveling both directions on State Route 21 would have extended, open views of solar
36 facilities within the SEZ. These views would be from elevated viewpoints near the passes, but
37 from successively lower elevations approaching the SEZ. For travelers approaching the SEZ at
38 highway speeds, the SEZ would be in view for about five minutes prior to entering the SEZ,
39 regardless of the direction of travel, and three to four minutes would be required to cross the SEZ
40 itself.

41
42 Figure 13.3.14.2-5 is a Google Earth perspective visualization of the SEZ as seen from
43 State Route 21, about 5.2 mi (8.3 km) east of the SEZ, facing northwest toward the northern
44 portion of the SEZ. The visualization suggests that from this location, the SEZ would occupy
45 much of the horizontal field of view, but the viewing angle would be low, and the SEZ would
46 appear as a horizontal band across the valley floor at the base of the Wah Wah Mountains. The



1

2 **FIGURE 13.3.14.2-5 Google Earth Visualization of the Wah Wah Valley SEZ (shown in orange tint) and Surrounding Lands, with Power**
3 **Tower Wireframe Models, as Seen from State Route 21 Approximately 5.2 mi (8.3 km) East of the SEZ**
4

1 low angle of view would reduce the visible area of solar facilities within the SEZ, and the low
2 horizontal forms would repeat the line of the horizon, tending to reduce visual contrast.

3
4 Taller, ancillary facilities such as buildings, transmission structures, cooling towers, and
5 plumes (if present) would likely be visible projecting above the collector/reflector arrays, and
6 their structural details could be evident at least for nearby facilities. The ancillary facilities could
7 create form and line contrasts with the strongly horizontal, regular, and repeating forms and lines
8 of the collector/reflector arrays. Color and texture contrasts would also be likely, but their extent
9 would depend on the materials and surface treatments utilized in the facilities.

10
11 The receivers of power towers in the eastern portion of the SEZ would likely appear as
12 very bright, nonpoint (i.e., having visible cylindrical or rectangular areas) light sources atop
13 plainly discernable tower structures that would attract visual attention from this viewpoint. If
14 sufficiently tall, the power towers could have red or white flashing hazard navigation lights that
15 would likely be visible from this location at night. They could be very conspicuous, given the
16 dark night skies in the vicinity of the SEZ. Other lighting associated with solar facilities in the
17 SEZ could potentially be visible as well, at least for facilities in the closest portions of the SEZ.

18
19 Figure 13.3.14.2-6 is a Google Earth perspective visualization of the SEZ as seen from
20 State Route 21, approximately 1.4 mi (2.3 km) east of the SEZ, facing northwest toward the
21 northern portion of the SEZ. The visualization suggests that if viewed from this location on
22 State Route 21, the SEZ could occupy enough of the field of view that viewers would have to
23 turn their heads to encompass the whole SEZ. Solar energy developments within the SEZ
24 would likely strongly attract attention and could dominate the view from State Route 21,
25 depending on the technology employed and other visibility factors.

26
27 From this viewpoint, solar collector arrays would be seen nearly edge on and would
28 repeat the horizontal line of the plain in which the SEZ is situated. This would tend to reduce
29 visual line contrast, but as the viewer approached the SEZ, the collector arrays could increase in
30 apparent size until they no longer appeared as horizontal lines against the natural-appearing
31 backdrop. Steam plumes, transmission towers, and other tall facility components would likely
32 project above the collector/reflector arrays of solar facilities within the SEZ, and would be
33 visible against the mountain backdrop. Their forms, lines, colors, and textures could create
34 substantial additional contrasts. Structural details of some facility components would likely be
35 visible.

36
37 If operating power tower receivers were present within the SEZ, the receivers would
38 appear as brilliant, white, nonpoint-light sources, and the towers would likely project above the
39 valley floor and could potentially interfere with views of the Wah Wah Mountains to the west. In
40 addition, during certain times of the day from certain angles, sunlight on dust particles in the air
41 might result in the appearance of light streaming down from the tower(s). When operating, the
42 power towers would be likely to strongly attract visual attention, as seen from this viewpoint. If
43 sufficiently tall, the power towers could have red or white flashing hazard navigation lights that
44 would likely be visible from this location at night; they could be very conspicuous, given the
45 dark night skies in the vicinity of the SEZ.



2 **FIGURE 13.3.14.2-6 Google Earth Visualization of the Proposed Wah Wah Valley SEZ (shown in orange tint) and Surrounding Lands,**
3 **with Power Tower Wireframe Models, as Seen from State Route 21 Approximately 1.4 mi (2.3 km) East of the SEZ**

1 Visual contrast would increase further as travelers on State Route 21 entered the SEZ.
2 If power tower facilities were located in the SEZ, the receivers could appear as brilliant light
3 sources on either side of the roadway and would likely strongly attract viewers. If solar facilities
4 were located on both the north and south sides of the road, the banks of solar collectors on both
5 sides of the roadway could form a visual “tunnel” that travelers would pass through briefly. If
6 solar facilities were located close to the roadway, given the 80% development scenario analyzed
7 in the PEIS, they would be expected to dominate views from State Route 21 and would create
8 strong visual contrasts for the three to four minutes required to cross the SEZ.
9

10 Road travelers heading east on State Route 21 would, in general, be subjected to the same
11 types of visual contrasts and would have a very similar visual experience.
12

13 In summary, for travelers on State Route 21, visual contrasts associated with solar energy
14 development within the SEZ would be highly dependent on the highway, with respect to the
15 SEZ; solar facility type, size, and location within the SEZ; and other visibility factors. As
16 travelers approached and passed through the SEZ on State Route 21, under the 80% development
17 scenario analyzed in this PEIS, contrast levels would gradually rise, and strong levels of visual
18 contrast would be expected.
19
20

21 ***13.3.14.2.3 Summary of Visual Resource Impacts for the Proposed Wah Wah*** 22 ***Valley SEZ*** 23

24 Because under the 80% development scenario analyzed in the PEIS there could be
25 numerous solar facilities within the SEZ, a variety of technologies employed, and a range of
26 supporting facilities that would contribute to visual impacts, a visually complex, industrial
27 landscape with a man-made appearance could result. This essentially industrial-appearing
28 landscape would contrast greatly with the surrounding generally natural-appearing lands. Large
29 visual impacts on the SEZ and surrounding lands within the SEZ viewshed would be associated
30 with solar energy development due to major modification of the character of the existing
31 landscape. There is the potential for additional impacts from construction and operation of
32 transmission lines and access roads within and outside the SEZ.
33

34 The SEZ is in an area of low scenic quality. Residents, workers, and visitors to the area
35 may experience visual impacts from solar energy facilities located within the SEZ (as well as any
36 associated access roads and transmission lines) as they travel area roads. The residents nearest to
37 the SEZ could be subjected to large visual impacts from solar energy development within the
38 SEZ. State Route 21 passes through the SEZ, and travelers on that road could be subjected to
39 very strong visual contrasts from solar development within the SEZ, but typically their exposure
40 would be brief.
41

42 Utility-scale solar energy development within the proposed Wah Wah Valley SEZ could
43 cause moderate levels of visual contrast as observed from the Wah Wah Mountains WSA at
44 distances between 5 and 10 mi (8 and 16 km) from the SEZ. A very small portion of the King
45 Top WSA is within the viewshed of the SEZ, but it is too far away to be affected significantly by
46 visual impacts resulting from solar development within the SEZ. The closest community is more

1 than 25 mi (40 km) from the SEZ and is therefore likely to experience minimal, to no, visual
2 impacts from solar development within the SEZ.
3
4

5 **13.3.14.3 SEZ-Specific Design Features and Design Feature Effectiveness**

6

7 No SEZ-specific design features have been identified to protect visual resources for
8 the proposed Wah Wah Valley SEZ. As noted in Section 5.12, the presence and operation of
9 large-scale solar energy facilities and equipment would introduce major visual changes into
10 non-industrialized landscapes and could create strong visual contrasts in line, form, color, and
11 texture that could not easily be mitigated substantially. Implementation of the programmatic
12 design features intended to reduce visual impacts (described in Appendix A, Section A.2.2)
13 would be expected to reduce visual impacts associated with utility-scale solar energy
14 development within the SEZ; however, the degree of effectiveness of these design features
15 could be assessed only at site- and project-specific levels. Given the large scale, reflective
16 surfaces, and strong regular geometry of utility-scale solar energy facilities and the lack of
17 screening vegetation and landforms within the SEZ viewshed, siting the facilities away from
18 sensitive visual resource areas and other sensitive viewing areas would be the primary means of
19 mitigating visual impacts. The effectiveness of other visual impact mitigation measures would
20 generally be limited.
21
22

1 **13.3.15 Acoustic Environment**

2
3
4 **13.3.15.1 Affected Environment**

5
6 The proposed Wah Wah Valley SEZ is located in southwestern Utah, in the northwestern
7 portion of Beaver County. The State of Utah and Beaver County, which encompasses the
8 proposed Wah Wah Valley SEZ, have no applicable quantitative noise-level regulations.
9 However, neighboring Iron County has quantitative noise limits applicable to solar power plants,
10 which are used for the analysis. No solar power plant should exceed 65 dBA as measured at the
11 property line, or 50 dBA as measured at the nearest neighboring inhabitable building
12 (Iron County 2009).

13
14 State Route 21 passes southeast–northwest through the northern half of the SEZ. The
15 UP Railroad runs about 18 mi (29 km) to the southeast. The nearest airport is Milford Municipal
16 Airport, about 20 mi (32 km) east of the SEZ. Small-scale irrigated agricultural lands are present
17 on the northern boundary of the SEZ. No sensitive receptors (e.g., hospitals, schools, or nursing
18 homes) exist around the SEZ, except residences adjacent to the northern SEZ boundary. No
19 communities exist within a 20-mi (32-km) radius of the SEZ. The nearest population center
20 with schools is Milford, about 20 mi (32 km) east–southeast. Accordingly, noise sources around
21 the SEZ include road traffic, aircraft flyover, and agricultural activities. Other noise sources
22 are associated with current land use around the SEZ, including grazing, outdoor recreation,
23 backcountry and OHV use, and hunting. The proposed Wah Wah Valley SEZ is in a remote and
24 undeveloped area, the overall character of which is rural. To date, no environmental noise survey
25 has been conducted around the proposed Wah Wah Valley SEZ. On the basis of the population
26 density, the day-night average sound level (L_{dn} or DNL) is estimated to be 26 dBA for Beaver
27 County, lower than the level typical of a rural area, which would be in the range of 33 to 47 dBA
28 L_{dn} ¹⁸ (Eldred 1982; Miller 2002).

29
30
31 **13.3.15.2 Impacts**

32
33 Potential noise impacts associated with solar projects in the Wah Wah Valley SEZ would
34 occur during all phases of the projects. During the construction phase, potential noise impacts on
35 the nearest residences (just next to the northern boundary) associated with operation of heavy
36 equipment and vehicular traffic would be anticipated, albeit of short duration. During the
37 operations phase, potential impacts on the nearest residences would be anticipated, depending on
38 the solar technologies employed. Noise impacts shared by all solar technologies are discussed in
39 detail in Section 5.13.1, and technology-specific impacts are presented in Section 5.13.2. Impacts
40 specific to the Wah Wah Valley SEZ are presented in this section. Any such impacts would be
41 minimized through the implementation of required programmatic design features described in
42 Appendix A, Section A.2.2, and through any additional SEZ-specific design features applied

¹⁸ Rural and undeveloped areas have sound levels in the range of 33 to 47 dBA as L_{dn} (Eldred 1982). Typically, the nighttime level is 10 dBA lower than the daytime level, and it can be interpreted as 33 to 47 dBA (mean 40 dBA) during daytime hours and 23 to 37 dBA (mean 30 dBA) during nighttime hours.

1 (see Section 13.3.15.3). This section discusses potential noise impacts on humans, although
2 potential noise impacts on wildlife at nearby sensitive areas are discussed. Additional discussion
3 on potential noise impacts on wildlife is presented in Section 5.10.2.
4
5

6 **13.3.15.2.1 Construction**

7

8 The proposed Wah Wah Valley SEZ has a relatively flat terrain; thus, minimal site
9 preparation activities would be required, and associated noise levels would be lower than those
10 during general construction (e.g., erecting building structures and installing equipment, piping,
11 and electrical).
12

13 For the parabolic trough and power tower technologies, the highest construction noise
14 levels would occur at the power block area, where key components (e.g., steam turbine/
15 generator) needed to generate electricity are located; a maximum of 95 dBA at a distance of 50 ft
16 (15 m) is assumed, if impact equipment such as pile drivers or rock drills is not being used.
17 Typically, the power block area is located in the center of the solar facility, at a distance of more
18 than 0.5 mi (0.8 km) from the facility boundary. Noise levels from construction of the solar array
19 would be lower than 95 dBA. When geometric spreading and ground effects are considered, as
20 explained in Section 4.13.1, noise levels would attenuate to about 50 dBA at a distance of 0.5 mi
21 (0.8 km) from the power block area. This noise level is the same as the Iron County regulation
22 of 50 dBA for a solar facility. In addition, mid- and high-frequency noise from construction
23 activities is significantly attenuated by atmospheric absorption under the low-humidity
24 conditions typical of an arid desert environment and by temperature lapse conditions typical of
25 daytime hours; thus noise attenuation to Iron County regulation levels would occur at distances
26 somewhat shorter than 0.5 mi (0.8 km). If a 10-hour daytime work schedule is considered, the
27 EPA guideline level of 55 dBA L_{dn} for residential areas (EPA 1974) would occur at about
28 1,200 ft (370 m) from the power block area, which would be well within the facility boundary.
29 For construction activities occurring near the northern SEZ boundary, estimated noise levels
30 would be about 74 dBA¹⁹ at the nearest residences, which is well above both the Iron County
31 regulation of 50 dBA for a solar facility and typical daytime mean rural background level of
32 40 dBA. In addition, an estimated 70 dBA L_{dn} ²⁰ at these residences is well above the
33 EPA guideline of 55 dBA L_{dn} for residential areas.
34

35 There are no specially designated areas within 5 mi (8 km) of the Wah Wah Valley
36 SEZ, which is the greatest distance at which noise (other than extremely loud noise) would be
37 discernable. Thus, no noise impact analysis for nearby specially designated areas was conducted.
38

39 Depending on the soil conditions, pile driving might be required for installation of
40 solar dish engines. However, the pile drivers used would be relatively small and quiet, such as

¹⁹ Typically, public access would not be allowed within 330 ft (100 m) from the construction site for safety reasons. Therefore, construction of a solar facility would not occur within this distance from the nearest residences.

²⁰ For this analysis, background levels of 40 and 30 dBA for daytime and nighttime hours, respectively, were assumed, which resulted in day-night average noise level (L_{dn}) of 40 dBA.

1 vibratory or sonic drivers, rather than the impulsive impact pile drivers frequently seen at large-
2 scale construction sites. Potential impacts on the nearest residences (just next to the northern
3 SEZ boundary) would be anticipated to be minor, except when pile driving occurs near the
4 residences.

5
6 It is assumed that most construction activities would occur during the day, when noise is
7 better tolerated, than at night because of the masking effects of background noise. In addition,
8 construction activities for a utility-scale facility are temporary (typically a few years).
9 Construction at the Wah Wah Valley SEZ would cause negligible impacts on nearby
10 communities due to considerable separation distances. However, construction would cause
11 unavoidable but localized short-term noise impacts on the nearest residences, for activities
12 occurring near the northern SEZ boundary.

13
14 Construction activities could result in various degrees of ground vibration, depending
15 on the equipment used and construction methods employed. All construction equipment causes
16 ground vibration to some degree, but activities that typically generate the most severe vibrations
17 are high-explosive detonations and impact pile driving. As is the case for noise, vibration would
18 diminish in strength with distance. For example, vibration levels at receptors beyond 140 ft
19 (43 m) from a large bulldozer (87 VdB at 25 ft [7.6 m]) would diminish below the threshold of
20 perception for humans, which is about 65 VdB (Hanson et al. 2006). During the construction
21 phase, no major construction equipment that can cause ground vibration would be used, and no
22 residences or sensitive structures are close. Therefore, no adverse vibration impacts are
23 anticipated from construction activities, including from pile driving for dish engines.

24
25 Transmission lines within a designated ROW would be constructed to connect to the
26 nearest regional grid. A regional 138-kV transmission line is located about 42 mi (68 km)
27 southeast of the Wah Wah Valley SEZ; thus, construction of a transmission line over this
28 relatively long distance would be needed if that line were used to connect to the regional grid.
29 For construction of transmission lines, noise sources and their noise levels might be similar to
30 construction noise at an industrial facility of comparable size. Transmission line construction
31 from the Wah Wah Valley SEZ could be performed over about three years. However, the
32 construction site along the transmission line ROW would move continuously, thus no particular
33 area would be exposed to noise for a prolonged period. Therefore, potential noise impacts on
34 nearby residences along the transmission line ROW, if any, would be minor and temporary in
35 nature.

36 37 38 ***13.3.15.2.2 Operations***

39
40 Noise sources common to all or most types of solar technologies include equipment
41 motion from solar tracking; maintenance and repair activities (e.g., washing mirrors or replacing
42 broken mirrors) at the solar array area; commuter/visitor/support/delivery traffic within and
43 around the solar facility; and control/administrative buildings, warehouses, and other auxiliary
44 buildings/structures. Diesel-fired emergency power generators and firewater pump engines
45 would be additional sources of noise, but their operations would be limited to several hours per
46 month (for preventive maintenance testing).

1
2 With respect to the main solar energy technologies, noise-generating activities in the
3 PV solar array area would be minimal, related mainly to solar tracking, if used. On the other
4 hand, dish engine technology, which employs collector and converter devices in a single unit,
5 generally has the strongest noise sources.
6

7 For the parabolic trough and power tower technologies, most noise sources during
8 operations would be in the power block area, including the turbine generator (typically in an
9 enclosure), pumps, boilers, and dry- or wet-cooling systems. The power block is typically
10 located in the center of the facility. On the basis of a 250-MW parabolic trough facility with a
11 cooling tower (Beacon Solar, LLC 2008), simple noise modeling indicates that noise levels
12 around the power block would be more than 85 dBA, but about 51 dBA at the facility boundary,
13 about 0.5 mi (0.8 km) from the power block area. For a facility located near the northern SEZ
14 boundary, the predicted noise level would be about 51 dBA at the nearest residences, just next to
15 the SEZ boundary; this is comparable to the Iron County regulation of 50 dBA, and above the
16 typical daytime mean rural background level of 40 dBA. If TES were not used (i.e., if the
17 operation were limited to daytime, 12 hours only²¹), the EPA guideline level of 55 dBA (as L_{dn}
18 for residential areas) would occur at about 1,370 ft (420 m) from the power block area and thus
19 would not be exceeded outside of the proposed SEZ boundary. At the nearest residences, about
20 49 dBA L_{dn} would be estimated, which is lower than the EPA guideline of 55 dBA L_{dn} for
21 residential areas. However, if TES were used during nighttime hours, day-night average noise
22 levels higher than those estimated above by using simple noise modeling would be anticipated,
23 as explained below and in Section 4.13.1.
24

25 On a calm, clear night, typical of the proposed Wah Wah Valley SEZ setting, the
26 air temperature would likely increase with height (temperature inversion) because of strong
27 radiative cooling. Such a temperature profile tends to focus noise downward toward the ground.
28 There would be little, if any, shadow zone²² within 1 or 2 mi (1.6 or 3 km) of the noise source
29 in the presence of a strong temperature inversion (Beranek 1988). In particular, such conditions
30 add to the effect of noise being more discernable during nighttime hours, when the background
31 noise levels are the lowest. To estimate the day-night average sound level (L_{dn}), six-hour
32 nighttime generation with TES is assumed after 12-hour daytime generation. For nighttime
33 hours under temperature inversion, 10 dB is added to sound levels estimated from the uniform
34 atmosphere (see Section 4.13.1). On the basis of these assumptions, the estimated nighttime
35 noise level at the nearest residences (just next to the northern SEZ boundary and about 0.5 mi
36 [0.8 km] from the power block area) would be 61 dBA, which is higher than both the Iron
37 County regulation of 50 dBA and the typical nighttime mean rural background level of 30 dBA.
38 The day-night average noise level is estimated to be about 63 dBA L_{dn} , which is higher than the
39 EPA guideline of 55 dBA L_{dn} for residential areas. The assumptions are conservative in terms of
40 operating hours, and no credit was given to other attenuation mechanisms; thus, it is likely that
41 sound levels would be lower than 63 dBA L_{dn} at the nearest residences, even if TES were used at

21 Maximum possible operating hours at the summer solstice, but limited to seven to eight hours at the winter solstice.

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

1 a solar facility. Consequently, operating parabolic trough or power tower facilities using TES
2 and located near the northern SEZ boundary could result in adverse noise impacts at the nearest
3 residences, depending on background noise levels and meteorological conditions. In the
4 permitting process, refined noise propagation modeling would be warranted along with
5 measurement of background noise levels.
6

7 The solar dish engine is unique among CSP technologies because it generates electricity
8 directly and does not require a power block. A single, large solar dish engine has relatively low
9 noise levels, but a solar facility might employ tens of thousands of dish engines, which would
10 cause high noise levels around such a facility. For example, the proposed 750-MW SES Solar
11 Two dish engine facility in California would employ as many as 30,000 dish engines (SES Solar
12 Two, LLC 2008). At the Wah Wah Valley SEZ, on the basis of the assumption of dish engine
13 facilities of up to 542-MW total capacity (covering 80% of the total area, or 4,878 acres
14 [19.7 km²]), up to 21,680 25-kW dish engines could be employed. In addition, for a large dish
15 engine facility, several hundred step-up transformers would be embedded in the dish engine solar
16 field, along with a substation; however, the noise from these sources would be masked by dish
17 engine noise.
18

19 The composite noise level of a single dish engine would be about 88 dBA at a distance of
20 3 ft (0.9 m) (SES Solar Two, LLC 2008). This noise level would be attenuated to about 40 dBA
21 (typical of the mean rural daytime environment) within 330 ft (100 m). However, the combined
22 noise level from tens of thousands of dish engines operating simultaneously would be high in the
23 immediate vicinity of the facility, for example, about 49 dBA at 1.0 mi (1.6 km) and 44 dBA at
24 2 mi (3 km) from the boundary of the squarely shaped dish engine solar field, both of which are
25 lower than the Iron County regulation of 50 dBA for a solar facility but higher than the typical
26 daytime mean rural background level of 40 dBA. Noise levels would be higher than the Iron
27 County regulation up to 0.8 mi (1.3 km) from a dish engine facility. However, the 50-dBA
28 level would occur at a distance somewhat shorter than the aforementioned 0.8 mi (1.3 km),
29 considering noise attenuation by atmospheric absorption and temperature lapse during daytime
30 hours. To estimate noise levels at the nearest residences, it was assumed dish engines were
31 placed over 80% of the Wah Wah Valley SEZ at intervals of 98 ft (30 m). Under this
32 assumption, the estimated noise level at the nearest residences just next to the northern
33 boundary of the SEZ would be about 58 dBA, which is higher than both the Iron County
34 regulation of 50 dBA for a solar facility and the typical daytime mean rural background level
35 of 40 dBA. If a 12-hour daytime operation is assumed, the estimated 55 dBA L_{dn} at these
36 residences is equivalent to the EPA guideline for residential areas. A dish engine facility near
37 the northern SEZ boundary, close to the nearest residences, could result in adverse impacts on
38 the nearest residences, depending on background noise levels and meteorological conditions.
39 Thus, consideration of minimizing noise impacts is very important in the siting of dish engine
40 facilities. Direct mitigation of dish engine noise through noise control engineering could also
41 limit noise impacts.
42

43 During operations, no major ground-vibrating equipment would be used. In addition,
44 no sensitive structures are close enough to the Wah Wah Valley SEZ to experience physical
45 damage. Therefore, during operation of any solar facility, potential vibration impacts on
46 surrounding communities and vibration-sensitive structures would be minimal.

1
2 Transformer-generated humming noise and switchyard impulsive noises would be
3 generated during the operation of solar facilities. These noise sources would be located near the
4 power block area, typically near the center of a solar facility. Noise from these sources would
5 generally be limited within the facility boundary and not be heard at the nearest residences,
6 assuming a 0.5-mi (0.8-km) distance (at least 0.5 mi [0.8 km] to the facility boundary and no
7 buffer to the nearest residences). Accordingly, potential impacts of these noise sources on the
8 nearest residences would be minimal.

9
10 For impacts from transmission line corona discharge noise (Section 5.13.1.5)
11 during rainfall events, the noise level at 50 ft (15 m) and 300 ft (91 m) from the center of a
12 230-kV transmission line tower would be about 39 and 31 dBA (Lee et al. 1996), respectively,
13 typical of daytime and nighttime mean background noise levels in rural environments. Corona
14 noise includes high-frequency components, which may be judged to be more annoying than other
15 environmental noises. However, corona noise would not likely cause impacts, unless a residence
16 was located close to it (e.g., within 500 ft [152 m] of a 230-kV transmission line). The proposed
17 Wah Wah Valley SEZ is located in an arid desert environment, and incidents of corona discharge
18 are infrequent. Therefore, potential impacts on nearby residents along the transmission line
19 ROW, if any, would be negligible.

20 21 22 **13.3.15.2.3 Decommissioning/Reclamation**

23
24 Decommissioning/reclamation requires many of the same procedures and equipment
25 used in traditional construction. Decommissioning/reclamation would include dismantling of
26 solar facilities and support facilities such as buildings/structures and mechanical/electrical
27 installations; disposal of debris; grading; and revegetation as needed. Activities for
28 decommissioning would be similar to those for construction, but more limited. Potential
29 noise impacts on surrounding communities would be correspondingly lower than those for
30 construction activities. Decommissioning activities would be of short duration, and their
31 potential impacts would be minor and temporary in nature. The same mitigation measures
32 adopted during the construction phase could also be implemented during the decommissioning
33 phase.

34
35 Similarly, potential vibration impacts on surrounding communities and vibration-
36 sensitive structures during decommissioning of any solar facility would be lower than those
37 during construction, and thus, minimal.

38 39 40 **13.3.15.3 SEZ-Specific Design Features and Design Feature Effectiveness**

41
42 The implementation of required programmatic design features described in Appendix A,
43 Section A.2.2, would greatly reduce or eliminate the potential for noise impacts from
44 development and operation of solar energy facilities. While some SEZ-specific design features
45
46

1 are best established when specific project details are being considered, measures that can be
2 identified at this time include the following:

- 3
4 • Noise levels from cooling systems equipped with TES should be managed so
5 that levels at the nearest residences adjacent to the northern SEZ boundary are
6 kept within applicable guidelines. This could be accomplished in several
7 ways, for example, through placing the power block approximately 1 to 2 mi
8 (1.6 to 3 km) or more from residences, limiting operations to a few hours after
9 sunset, and/or installing fan silencers.
- 10
11 • Dish engine facilities within the Wah Wah Valley SEZ should be located
12 more than 1 to 2 mi (1.6 to 3 km) from the nearest residences (i.e., the
13 facilities should be located in the lower half of the proposed SEZ). Direct
14 noise control measures applied to individual dish engine systems could also
15 be used to reduce noise impacts at nearby residences.
16

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1 **13.3.16 Paleontological Resources**

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3
4 **13.3.16.1 Affected Environment**

5
6 The Wah Wah Valley SEZ is 100% covered in Quaternary alluvium (classified as Qa
7 on geological maps). This Quaternary deposit is classified as PFYC Class 2 on the basis of the
8 PFYC map from the Utah State Office (Murphey and Daitch 2007). Class 2 indicates that the
9 potential for occurrence of significant fossil material is low (see Section 4.14 for a discussion
10 of the PFYC system).
11

12
13 **13.3.16.2 Impacts**

14
15 Few, if any, impacts on significant paleontological resources are likely to occur in the
16 proposed SEZ. Vertebrate paleontological resources have been found in ancient lacustrine
17 deposits associated with ancient Lake Bonneville, particularly in caves (Madsen 2000).
18 Therefore, a more detailed look at the geological deposits of the SEZ is needed to determine
19 whether a paleontological survey is warranted. If the geological deposits are determined to be as
20 described above and remain classified as PFYC Class 2, further assessment of paleontological
21 resources is not likely to be necessary. Important resources could exist; if identified, they would
22 need to be managed on a case-by-case basis. Section 5.14 discusses the types of impacts that
23 could occur to any significant paleontological resources found within the Wah Wah Valley SEZ.
24 Impacts will be minimized through the implementation of applicable general mitigation
25 measures listed in Section 5.14 as well as required programmatic design features described in
26 Appendix A, Section A.2.2.
27

28 Indirect impacts on paleontological resources, such as looting or vandalism, are not
29 likely for a PFYC Class 2 area. Programmatic design features for controlling water runoff and
30 sedimentation would prevent erosion-related impacts on buried deposits outside of the SEZ.
31

32 No new roads are anticipated to be needed to access the Wah Wah Valley SEZ, assuming
33 existing roads would be used. Approximately 42 mi (68 km) of transmission line is anticipated
34 be needed to connect to the nearest existing line, resulting in approximately 1,273 acres
35 (5.2 km²) of disturbance, also in areas predominantly classified as PFYC Class 2, as well as in
36 PFYC Class 1 areas (Murphey and Daitch 2007). Class 1 indicates that the occurrence of
37 significant fossils is nonexistent or extremely rare. Few, if any, impacts on paleontological
38 resources are anticipated in areas of PFYC Class 1 and 2 deposits related to these additional
39 ROWs. However, similar to the SEZ footprint, important resources could exist; and if identified,
40 they would need to be managed on a case-by-case basis. Impacts on paleontological resources
41 related to the creation of new corridors not assessed in this PEIS would be evaluated at the
42 project-specific level if new road or transmission construction or line upgrades are to occur.
43
44
45

1 **13.3.16.3 SEZ-Specific Design Features and Design Feature Effectiveness**
2

3 Impacts would be minimized through the implementation of required programmatic
4 design features as described in Appendix A, Section A.2.2. If the geological deposits are
5 determined to be as described above and remain classified as PFYC Classes 1 or 2, SEZ-specific
6 design features for mitigating impacts on paleontological resources within the Wah Wah Valley
7 SEZ and associated ROW are not likely to be necessary.
8

1 **13.3.17 Cultural Resources**

2
3
4 **13.3.17.1 Affected Environment**

5
6
7 **13.3.17.1.1 Prehistory**

8
9 The proposed Wah Wah Valley SEZ is located in a valley adjacent to the Escalante
10 Desert of southwest Utah and follows a similar prehistoric sequence as was presented for the
11 proposed Escalante Valley SEZ in Section 13.1.17.1.1.
12

13
14 **13.3.17.1.2 Ethnohistory**

15
16 The Wah Wah Valley is located within the traditional use area generally attributed to the
17 Numic-speaking Southern Paiute, although their linguistically related neighbors, the Utes and
18 Western Shoshone, probably traversed the area as well. The proposed Wah Wah Valley SEZ lies
19 within *Yanawant*, the traditional eastern subdivision of the Southern Paiute traditional territory
20 (Stoffle et al. 1997). It is nominally within the territory of the Southern Paiute Beaver group
21 (Kelly 1934). The traditional use area of the Beaver group overlaps with that of the Pahvant
22 Band of Utes, who ranged from their core territory around Sevier Lake almost to the present
23 Nevada border (Callaway et al. 1986; Duncan 2010). The Western Shoshone and Goshute core
24 territories were located to the northwest and north of the valley (Crum 1994; Defa 2010). The
25 Wah Wah Valley is situated between the area that the Indian Claims Commission ruled was the
26 traditional territory of the Southern Paiutes and the area the commission determined was the
27 traditional territory of the Uintah Utes (Royster 2008). The ethnohistory of these tribes is
28 discussed in Section 13.1.17.1.2.
29

30
31 **13.3.17.1.3 History**

32
33 The historic framework for the proposed Wah Wah Valley SEZ follows closely with that
34 of all of the Utah SEZs and is summarized in Section 13.1.17.1.3 for the proposed Escalante
35 Valley SEZ. Items of particular relevance to the Wah Wah Valley SEZ are added below,
36 including a summary of Beaver County history as relevant for both the Milford Flats South and
37 the Wah Wah Valley SEZs (only Iron County history is summarized for the Escalante Valley
38 SEZ).
39

40 The area of Beaver County was explored by the Mormon, Albert Carrington. Beaver
41 County growth was based on a blend of agriculture, livestock, mining, transportation, and trade.
42 The Lincoln Mine, 5 mi (8 km) outside of Minersville, was the first lead mine to open in Utah
43 (1858); it produced lead that was shipped to Salt Lake to make ammunition (University of
44 Utah 2009a). The Horn Silver Mine was discovered in 1875. The mining camp/boomtown of
45 Frisco was established to support it in 1876. The mine was an important producer of both silver
46 and lead. Between 1875 and 1910, the mine produced more than \$74 million worth of materials

1 (Carr 1972). By 1920, Frisco was deserted. The charcoal kilns that supported the mine smelter
2 are still standing and are listed in the NRHP. The town of Milford was established in 1870,
3 predominantly for mining and cattle raising; by 1880, when the Utah Southern Railroad arrived,
4 it had become a regional transportation center for shipping ore and livestock. When the railroad
5 line was extended to Frisco, Milford also became a supply center and shipping station for local
6 mines (University of Utah 2009a).

7
8 Situated just 2 mi (3.5 km) east of the proposed Wah Wah Valley SEZ is the Newhouse
9 town site. Periodic silver mining in the San Francisco Mountains occurred for several decades
10 before the Cactus Mine was bought by Samuel Newhouse in 1900. Newhouse provided the
11 necessary capital to extract the ore from the mine, and a community developed around the mine,
12 initially referred to as “Tent-town.” By 1905, permanent buildings, such as a library, hospital,
13 livery stable, opera house and dance hall were constructed in the town as it was assumed that the
14 mine would be prosperous and sustainable; the city adopted the Newhouse name the same year.
15 A railroad depot associated with the Utah Southern Extension Railroad was also erected in the
16 town. Newhouse was unique in that the community refused to allow a saloon or red-light district
17 to operate within the city limits, a sharp contrast to the “Wild West” mentality that prevailed in
18 many other mining towns. The Cactus Mine stopped producing in 1910, and the town quickly
19 folded. Most of the buildings were either moved to Milford or abandoned; however, the local
20 café continued to operate until it burned down in 1921 (Carr 1972).

21
22 Railroad lines are discussed in Section 13.1.17.1.3; the Utah Southern Railroad spur that
23 ran from Milford to Frisco near the proposed Wah Wah Valley SEZ no longer exists.

24 25 26 **13.3.17.1.4 Traditional Cultural Properties**

27
28 The Southern Paiute see themselves as persisting in a cultural landscape composed of
29 many culturally significant features bound together into the land called *Puaxant Tuvi*, (sacred
30 land or power land). They see themselves as having been created by a supernatural being who
31 established a birthright relationship between them and the land where they were created.
32 Especially important features, such as the mountain *Nuvagntu* (Mount Charleston in
33 southwestern Nevada), have meaning for all Southern Paiutes (Stoffle et al. 1997), while other
34 sites have local significance. Traditional cultural properties that are significant to the Southern
35 Paiute culture could be present or within sight of the proposed Wah Wah Valley SEZ.

36
37 Government-to-government consultation is ongoing with the Southern Paiutes and
38 neighboring Tribes, who also traditionally used the Wah Wah Valley, so that their concerns,
39 including any potential impacts on traditional cultural properties, can be adequately addressed
40 in this PEIS (see also Section 13.3.18 on Native American Concerns and Chapter 14 and
41 Appendix K for a summary of government-to-government consultation).

42
43 To date, no traditional cultural properties have been identified within the proposed
44 Wah Wah Valley SEZ, nor have concerns been raised regarding traditional cultural properties
45 or sacred areas located in the vicinity of the SEZ. However, in the past, the Southern Paiutes
46 have identified mountains, springs, clay and rock sources, burial sites, rock art, trails, shrines,

1 ceremonial areas, and former habitation sites as sites of cultural importance (Stoffle and
2 Dobyms 1983) (see also Section 13.3.18). Identification of traditional cultural properties may be
3 considered sensitive and therefore may not be fully described or disclosed in this PEIS.
4
5

6 ***13.3.17.1.5 Cultural Surveys and Known Archaeological and Historic Resources*** 7

8 Only one small 2-acre (0.01-km²) survey for a gravel pit has been conducted within the
9 proposed Wah Wah Valley SEZ; consequently, no archaeological sites have been recorded by
10 the BLM in the SEZ (Dalley 2009). However, the Utah Division of State History GIS database
11 indicates one site near the western boundary of the SEZ; no data are available on the site at this
12 time (Utah SHPO 2009). Of several other surveys in the valley—conducted for seismic projects,
13 fence lines, pipelines, sample units for a proposed MX missile system, and land exchange
14 parcels—few sites have been recorded on the valley floor. Known sites in the area predominantly
15 start at the base of the slopes and proceed into the higher elevations, predominantly along washes
16 or gulches. Within 5 mi (8 km) of the SEZ, only four additional sites have been recorded.
17

18 The SEZ has the potential to contain significant cultural resources, although the potential
19 is relatively low. An old power line that was noted during a preliminary site visit should be
20 investigated as the line is still strung and some transformers are still in place; the line appears to
21 have supplied power from Milford to the Rocky Mountain Research Station Desert Experimental
22 Range, located nearby to the west. The line runs just south of Utah State Route 21. Additional
23 artifacts also could be encountered in the area.
24
25

26 ***National Register of Historic Places*** 27

28 None of the 115 properties currently listed in the NRHP for Beaver County are located
29 within the SEZ or within a 5-mi (8-km) radius of the SEZ. The gold mining towns of Frisco and
30 Newhouse are located in relatively close proximity to the proposed Wah Wah Valley SEZ in the
31 San Francisco Mountains east of the valley, but of these properties, only the Frisco Charcoal
32 Kilns (6 mi [10 km] from the SEZ) are listed in the NRHP. The Desert Experimental Range
33 Station is listed in the NRHP as a historic district and is located about 18 mi (29 km) northwest
34 of the proposed SEZ on the other side of the Wah Wah Mountains.
35
36

37 **13.3.17.2 Impacts** 38

39 No adverse impacts are currently anticipated in the proposed Wah Wah Valley SEZ, but
40 such could be possible if significant cultural resources are found in the area during the survey. A
41 cultural resource survey of the entire area of potential effect, including consultation with
42 affected Native American Tribes, would first need to be conducted to identify archaeological
43 sites, historic structures and features, and traditional cultural properties, and an evaluation
44 would need to follow to determine whether any are eligible for listing in the NRHP as historic
45 properties. Section 5.15 discusses the types of impacts that could occur on any significant
46 cultural resources found to be present within the proposed Wah Wah Valley SEZ. Impacts

1 would be minimized through the implementation of applicable general mitigation measures
2 listed in Section 5.15 and required programmatic design features described in Appendix A,
3 Section A.2.2. Programmatic design features assume that the necessary surveys, evaluations, and
4 consultations will occur. No traditional cultural properties have been identified to date within the
5 vicinity of the SEZ. The low density of sites recorded in basin interiors in this region suggests
6 that the possibility of significant sites within the SEZ is low (Dalley 2009).

7
8 Indirect impacts on cultural resources that result from erosion outside of the SEZ
9 boundary (including along ROWs) are unlikely, assuming programmatic design features to
10 reduce water runoff and sedimentation are implemented (as described in Appendix A,
11 Section A.2.2). Indirect impacts, such as from looting or vandalism on nearby sites is possible,
12 but would be reduced with programmatic design features to educate the workforce on the
13 importance of the resources and the consequences of disturbing them. If indirect impacts are
14 likely to occur on the setting of historic properties, then these should be examined and mitigated
15 in an appropriate manner at the project-specific level.

16
17 No new roads are anticipated to be needed to access the proposed Wah Wah Valley SEZ,
18 assuming existing roads would be used. Approximately 42 mi (68 km) of transmission line is
19 anticipated to be needed to connect to the nearest existing line, resulting in approximately 1,273
20 acres (5.2 km²) of disturbance. Impacts on cultural resources are possible in areas related to the
21 associated ROW, as new areas of potential cultural significance could be directly impacted by
22 construction or opened to increased access due to transmission ROW construction and use.
23 Indirect impacts are also possible from unauthorized surface collection, depending on the
24 proximity of the ROW to potential archaeological sites. Impacts on cultural resources related to
25 the creation of new corridors not assessed in this PEIS would be evaluated at the project-specific
26 level, if new road or transmission construction or line upgrades are to occur. Programmatic
27 design features assume that the necessary surveys, evaluations, and consultations will occur with
28 the transmission line, as with the SEZ footprint.

31 **13.3.17.3 SEZ-Specific Design Features and Design Feature Effectiveness**

32
33 Programmatic design features to mitigate adverse effects on significant cultural
34 resources, such as avoidance of significant sites and features, cultural awareness training for the
35 workforce, and measures for addressing possible looting/vandalism issues through formalized
36 agreement documents, are provided in Appendix A, Section A.2.2.

37
38 SEZ-specific design features would be determined during consultations with the Utah
39 SHPO and affected Tribes, and would depend on the findings of cultural surveys.

1 **13.3.18 Native American Concerns**
2

3 Native Americans share many environmental and socioeconomic concerns with other
4 ethnic groups. For a discussion of issues of possible Native American concern shared with the
5 population as a whole, several sections in this PEIS should be consulted. General topics of
6 concern are addressed in Section 4.16. Specifically for the proposed Wah Wah Valley SEZ,
7 Section 13.3.17 discusses archaeological sites, structures, landscapes, and traditional cultural
8 properties; Section 13.3.8 discusses mineral resources; Section 13.3.9.1.3 discusses water rights
9 and water use; Section 13.3.10 discusses plant species; Section 13.3.11 discusses wildlife
10 species, including wildlife migration patterns; Section 13.3.13 discusses air quality;
11 Section 13.3.14 discusses visual resources; Sections 13.3.19 and 13.3.20 discuss socioeconomics
12 and environmental justice, respectively; and issues of human health and safety are discussed in
13 Section 5.21. This section focuses on concerns that are specific to Native Americans and to
14 which Native Americans bring a distinct perspective.
15

16
17 **13.3.18.1 Affected Environment**
18

19 The three Utah SEZs are clustered in the valleys and deserts of west-central Utah. They
20 fall within a Tribal traditional use area generally attributed to the Southern Paiute. The proposed
21 Wah Wah Valley SEZ lies between the area so recognized by the courts and the judicially
22 established Uintah-Ute territory (Royster 2008). It is also close to the traditional ranges of the
23 Western Shoshone and the Goshutes, with whom the Southern Paiute interacted. It is likely
24 that members of all these Tribes were present from time to time within the SEZ. All federally
25 recognized Tribes with Southern Paiute roots or possible associations with the Utah SEZs have
26 been contacted and provided an opportunity to comment or consult regarding this PEIS. They are
27 listed in Table 13.3.18.1-1. A listing of all federally recognized Tribes contacted for this PEIS
28 can be found in Appendix K.
29

30
31 ***13.3.18.1.1 Territorial Boundaries***
32

33 The traditional territorial boundaries of the Southern Paiutes, the Western Shoshone
34 (including the Goshutes), and the Utes are discussed in Section 13.1.18.1.1.
35

36
37 ***13.3.18.1.2 Plant Resources***
38

39 The vegetation present at the proposed Wah Wah Valley SEZ is described in
40 Section 13.3.10. The cover types present at the SEZ are from the Inter-Mountain Basins series.
41 They are mostly Semi-Desert Shrub-Steppe and Mixed Salt Desert Scrub. There are smaller
42 areas of Greasewood Flat and Big Sagebrush Shrubland. Greasewood and sagebrush are
43 dominant species. Native Americans made use of these plants for medicinal purposes, and
44 greasewood seeds were harvested for food. As shown in Table 13.3.18.1-2, very few of the many
45 other known plant species traditionally used by Native Americans for food (Stoffle et al. 1999;
46 Stoffle and Dobyns 1983) are likely to be present in the SEZ.

TABLE 13.3.18.1-1 Federally Recognized Tribes with Traditional Ties to the Utah SEZs

Tribe	Location	State
Chemehuevi Indian Tribe	Havasu Lake	California
Colorado River Indian Tribes	Parker	Arizona
Confederated Tribes of the Goshute Reservation	Ibapah	Utah
Ely Shoshone Tribe	Ely	Nevada
Hopi Tribe	Kykotsmovi	Arizona
Kaibab Paiute Tribe	Fredonia	Arizona
Las Vegas Paiute Tribe	Las Vegas	Nevada
Moapa Band of Paiutes	Moapa	Nevada
Pahrump Paiute Tribe	Pahrump	Nevada
Paiute Indian Tribe of Utah	Cedar City	Utah
Cedar Band	Cedar City	Utah
Indian Peak Band	Cedar City	Utah
Kanosh Band	Kanosh	Utah
Koosharem Band	Cedar City	Utah
Shivwits Band	Ivins	Utah
San Juan Southern Paiute Tribe	Tuba City	Arizona
Skull Valley Band of Goshute Indians	Grantsville	Utah
Ute Indian Tribe	Fort Duchesne	Utah
Ute Mountain Ute Tribe	Towaoc	Colorado

1
2

TABLE 13.3.18.1-2 Plant Species Important to Native Americans Observed or Likely To Be Present in the Proposed Wah Wah Valley SEZ

Common Name	Scientific Name	Status
Food		
Chokecherry	<i>Prunus virginiana</i>	Possible
Dropseed	<i>Sporobolus</i> spp.	Possible
Greasewood	<i>Sarcobatus vermiculatus</i>	Observed
Indian ricegrass	<i>Achnatherum hymenoides</i>	Observed
Prickly Pear	<i>Opuntia</i> sp.	Observed
Saltbush	<i>Atriplex</i> spp.	Observed
Saltgrass	<i>Distichlis spicata</i>	Possible
Wolfberry	<i>Lycium andersonii</i>	Possible
Medicine		
Greasewood	<i>Sarcobatus vermiculatus</i>	Observed
Mormon Tea	<i>Ephedra nevadensis</i>	Observed
Rabbitbrush	<i>Ericameria nauseosa</i>	Observed
Sagebrush	<i>Artemisia</i> spp.	Observed

Sources: Field visit and USGS (2005a).

3

1 **13.3.18.1.3 Other Resources**
2

3 Wildlife likely to be found in the proposed Wah Wah Valley SEZ is described in
4 Section 13.3.11. Due to the general aridity of the SEZ, there are few game species traditionally
5 important to Native Americans within the SEZ. The most important are the black-tailed
6 jackrabbit (*Lepus californicus*) and the pronghorn antelope (*Antilocapra americana*) (Stoffle
7 and Dobyns 1983; Kelly and Fowler 1986). Of the large game species, mule deer (*Odocoileus*
8 *hemionus*) occur in the surrounding mountains, but they are less common on the desert floor.
9 Smaller game important to Native Americans found in the SEZ include cottontails (*Sylvilagus*
10 *audubonii*), chipmunks (*Neotamias minimus*), and woodrats (*Neotoma lepida*).
11

12 Other animals traditionally important to the Southern Paiute include lizards, seven
13 species of which are likely to occur in the SEZ, and the golden eagle (*Aquila chrysaetos*).
14 The SEZ falls within the range of the wide-ranging eagle. Table 13.3.18.1-3 lists animal
15 species of traditional importance to Native American Tribes.
16

17 No surface water, springs, or wetlands were observed at the SEZ. However, Wah Wah
18 Springs is located less than 2 mi (3 km) west of the SEZ.
19

20 Other natural resources traditionally important to the Southern Paiute include salt, clay
21 for pottery, and naturally occurring mineral pigments for the decoration and protection of the
22 skin (Stoffle and Dobyns 1983).
23
24

25 **13.3.18.2 Impacts**
26

27 In the past, Southern Paiutes and the Western Shoshone have expressed concern over
28 project impacts on a variety of resources. They tend to take a holistic view of their traditional
29 homelands. For them, both cultural and natural features are inextricably bound together. Effects
30 on one part have ripple effects on the whole. Western distinctions between the sacred and the
31 secular have no meaning in their traditional worldview (Stoffle and Dobyns 1983). While no
32 comments specific to the proposed Wah Wah Valley SEZ have been received from Native
33 American Tribes to date, the Paiute Indian Tribe of Utah and the Skull Valley Band of Goshute
34 Indians have asked to be kept informed of project developments. During energy development
35 projects in adjacent areas, Southern Paiutes have expressed concern over adverse effects on a
36 wide range of resources. Geophysical features and physical cultural remains are listed in
37 Section 13.3.17.1.4. However, these places are often seen as important because they are the
38 location of or have ready access to a range of plant, animal, and mineral resources
39 (Stoffle et al. 1997). Resources mentioned as important include food plants, medicinal plants,
40 plants used in basketry, and plants used in construction; large game animals, small game
41 animals, and birds; and sources of clay, salt, and pigments (Stoffle and Dobyns 1983). Those
42 likely to be found within the proposed Wah Wah Valley SEZ are discussed in Section 3.1.18.1.2.
43 Traditional plant knowledge is found most abundantly in Tribal elders, especially female elders
44 (Stoffle et al. 1999).
45

TABLE 13.3.18.1-3 Animal Species used by Native Americans as Food Whose Range Includes the Proposed Wah Wah Valley SEZ

Common Name	Scientific Name	Status
Mammals		
Black-tailed jackrabbit	<i>Lepus californicus.</i>	All year
Chipmunks	Various species	All year
Coyote	<i>Canis latrans</i>	All year
Desert cottontail	<i>Sylvilagus audubonii</i>	All year
Great Basin pocket mouse	<i>Perognathus parvus</i>	All year
Kangaroo rat	<i>Dipodomys ordii</i>	All year
Kit fox	<i>Vulpes macotis</i>	All year
Mule deer	<i>Odocoileus hemionus</i>	All year
Mountain cottontail	<i>Sylvilagus nuttallii</i>	All year
Mountain lion	<i>Puma concolor</i>	All year
Pocket gophers	<i>Thomomys spp.</i>	All year
Porcupine	<i>Erethizon dorsatum</i>	All year
Pronghorn	<i>Antilocarpa americana</i>	All year
Rock squirrel	<i>Spermophilus variegates</i>	All year
White-tailed antelope squirrel	<i>Ammospermophilus leucurus</i>	All year
Woodrats	<i>Neotoma spp.</i>	All year
Birds		
Burrowing owl	<i>Athene cunicularia</i>	Summer
Common raven	<i>Corvus corax</i>	All year
Ferruginous hawk	<i>Buteo regalis</i>	Summer
Golden eagle	<i>Aquila chrysaetos</i>	All year
Great horned owl	<i>Bubo virginianus</i>	All year
Horned lark	<i>Eremophila alpestris</i>	All year
Mourning dove	<i>Zenaida macroura</i>	All year
Northern mockingbird	<i>Mimus polyglottos</i>	All year
Piñon jay	<i>Gymnorhinus cyanocephalus</i>	All year
Prairie falcon	<i>Falco mexicanus</i>	All year
Red-tailed hawk	<i>Buteo jamaicensis</i>	All year
Rough-legged hawk	<i>Buteo lagopus</i>	Winter
Swainson's hawk	<i>Buteo swainsoni</i>	Summer
Western meadow lark	<i>Sturnella neglecta</i>	All year
Reptiles		
Horned lizard	<i>Phrynosoma platyrhinos</i>	All year
Large lizards	Various species	All year
Western rattlesnake	<i>Crotalis viridis</i>	All year

Sources: USGS (2005b); Fowler (1986).

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1 The Wah Wah Valley is adjacent to the Escalante Desert, which appears to have been a
2 no-man’s-land that, for the most part, was rarely used by the surrounding Native American
3 groups. While it includes some plant species traditionally important to Native Americans, these
4 species appear to be relatively scant. The most important traditionally collected resource is
5 likely to be the black-tailed jackrabbit. Development of utility-scale solar energy facilities in
6 the proposed SEZ would result in the loss of some plants that are traditionally important to
7 Native Americans, as well as the associated habitat of traditionally important animals. As
8 discussed in Sections 13.3.10 and 13.3.11, the impacts of these losses are expected to be small
9 because the plants and associated animals are widely distributed beyond the SEZ, and because
10 required programmatic design features would mitigate some effects. However, project specific
11 consultation with the affected Tribes will be necessary to verify that effects would be small.

12
13 As consultation with the Tribes continues and project-specific analyses are undertaken,
14 it is possible that Native American concerns will be expressed over potential visual and other
15 effects of solar energy development within the SEZ, on specific resources, and any culturally
16 important landscape.

17
18 Implementation of programmatic design features, as discussed in Appendix A,
19 Section A.2.2, should eliminate impacts on Tribes’ reserved water rights and the potential for
20 groundwater contamination issues.

21
22 Whether there are any issues relative to socioeconomic, environmental justice, or health
23 and safety relative to Native American populations, has yet to be determined.

24 25 26 **13.3.18.3 SEZ-Specific Design Features and Design Feature Effectiveness**

27
28 Programmatic design features to address impacts of potential concern to Native
29 Americans, such as avoidance of sacred sites, water sources, and tribally important plant
30 and animal species, are provided in Appendix A, Section A.2.2.

31
32 The need for and nature of SEZ-specific design features regarding potential issues of
33 concern would be determined during government-to-government consultation with affected
34 Tribes listed in Table 13.3.18.1-1.

35
36 Mitigation of impacts on archaeological sites and traditional cultural properties is
37 discussed in Section 13.3.17.3, in addition to the design features for historic properties discussed
38 in Section A.2.2 in Appendix A.

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1 **13.3.19 Socioeconomics**

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3
4 **13.3.19.1 Affected Environment**

5
6 This section describes current socioeconomic conditions and local community services
7 within the ROI surrounding the proposed Wah Wah Valley SEZ. The ROI consists of Beaver,
8 Iron, and Millard Counties in Utah. It encompasses the area in which workers are expected
9 to spend most of their salaries and in which a portion of site purchases and non-payroll
10 expenditures from the construction, operation, and decommissioning phases of solar facility
11 development within the proposed SEZ are expected to take place.
12

13
14 **13.3.19.1.1 ROI Employment**

15
16 In 2008, employment in the ROI stood at 29,232 (Table 13.3.19.1-1). Over the period
17 1999 to 2008, annual average employment growth rates were highest in Iron County (3.4%),
18 followed by Millard County (2.9%), and then Beaver County (2.5%). At 3.2%, growth rates in
19 the ROI as a whole were somewhat higher than the average state rate for Utah (2.1%).
20

21 In 2006, the service sector provided the highest percentage of employment in the ROI
22 at 34.3%, followed by wholesale and retail trade with 19.6%, and agriculture with 16.2%
23 (Table 13.3.19.1-2). Smaller employment shares were held by manufacturing (9.8%);
24 transportation and public utilities (5.2%); and finance, insurance, and real estate (4.1%). Within
25 the individual counties, the distribution of employment across sectors varies from that in the ROI
26 as a whole, with a higher percentage of employment in agriculture in Beaver County (41.7%)
27 and Millard County (32.5%), and a lower percentage in Iron County (7.0%). Employment shares
28 in Iron County in construction (13.8%), manufacturing (13.1%), and services (38.2%) are higher
29 than in the ROI as a whole.
30
31

**TABLE 13.3.19.1-1 Employment in the ROI
Surrounding the Proposed Wah Wah Valley SEZ**

SEZ and Location	1999	2008	Average Annual Growth Rate, 1999–2008 (%)
Beaver County	2,369	3,025	2.5
Iron County	14,571	20,300	3.4
Millard County	4,443	5,907	2.9
ROI	21,383	29,232	3.2
Utah	1,080,441	1,336,556	2.1

Sources: U.S. Department of Labor (2009a,b).

TABLE 13.3.19.1-2 Employment, by Sector, in 2006 in the ROI Surrounding the Proposed Wah Wah Valley SEZ

	Beaver County		Iron County		Millard County		ROI	
	Employment	% of Total	Employment	% of Total	Employment	% of Total	Employment	% of Total
Agriculture ^a	927	41.7	934	7.0	1,271	32.5	3,132	16.2
Mining	60	2.7	10	0.1	60	1.5	130	0.7
Construction	60	2.7	1,829	13.8	60	1.5	1,949	10.1
Manufacturing	10	0.4	1,732	13.1	163	4.2	1,905	9.8
Transportation and public utilities	216	9.7	363	2.7	435	11.1	1,014	5.2
Wholesale and retail trade	368	16.5	2,650	20.0	785	20.1	3,803	19.6
Finance, insurance, and real estate	70	3.1	646	4.9	70	1.8	786	4.1
Services	551	24.8	5,068	38.2	1,041	26.6	6,660	34.3
Other	0	0.0	10	0.1	10	0.3	20	0.1
Total	2,225		13,250		3,915		19,390	

^a Agricultural employment includes 2007 data for hired farmworkers.

Sources: U.S. Bureau of the Census (2009a); USDA (2009a).

1 **13.3.19.1.2 ROI Unemployment**
2

3 Unemployment rates have varied slightly across the three counties in the ROI. Over
4 the period 1999 to 2008, the average rate in Iron County over this period was 4.1%, with
5 slightly lower rates in Beaver and Millard Counties (3.9%) (Table 13.3.19.1-3). The average
6 rate in the ROI over this period was 4.0%, slightly lower than the average rate for Utah (4.1%).
7 Unemployment rates for the first five months of 2009 contrast somewhat with rates for 2008 as a
8 whole; in Iron County the unemployment rate increased to 6.4%, while rates reached 5.5% and
9 4.5% in Beaver and Millard Counties, respectively. The average rate for the ROI (5.9%), and
10 Utah (5.2%) were also higher during this period than the corresponding average rates for 2008.
11

12
13 **13.3.19.1.3 ROI Urban Population**
14

15 The population of the ROI in 2006 to 2008 was 80% urban, with a group of cities and
16 towns centered around Cedar City in the southwestern portion of Iron County, and along the I-15
17 corridor in eastern Beaver County and Millard County.
18

19 The largest urban area in Iron County, Cedar City, had an estimated 2008 population
20 of 28,439; other cities in the county include Enoch (5,076) and Parowan (2,606)
21 (Table 13.3.19.1-4). In addition, there are three other urban areas in the county; Paragonah (477),
22 Kannaraville (314), and Brian Head (126). Most of these cities and towns are about 30 mi
23 (48 km) from the site of the proposed SEZ. Population growth rates among these cities and
24 towns have varied over the period 2000 to 2008. Enoch grew at an annual rate of 4.9% during
25 this period, with higher than average growth also experienced in Cedar City (4.2%). The cities of
26
27

**TABLE 13.3.19.1-3 Unemployment Rates
(%) in the ROI Surrounding the Proposed
Wah Wah Valley SEZ in Utah**

Location	1999–2008 (average)	2008	2009 ^a
Beaver County	3.9	3.4	5.5
Iron County	4.1	4.2	6.4
Millard County	3.9	3.2	4.5
ROI	4.0	3.9	5.9
Utah	4.1	3.4	5.2

^a Rates for 2009 are the average for January through May.

Sources: U.S. Department of Labor (2009a–c).

1 Brian Head (0.8%), Parowan (0.2%), and Kannaraville (0.1%) experienced lower growth rates
2 between 2000 and 2008.

3
4 In Beaver County, in addition to Beaver City, with a 2008 population of 2,604, there are
5 two urban areas, Milford (1,405) and Minersville (822). Population growth between 2000 and
6 2008 has been low in Beaver City (0.7%), with annual growth rates of 0.1% in Minersville
7 and -0.4% in Milford. These urban areas are less than 20 mi (32 km) from the proposed
8 SEZ. There are two cities in Millard County—Delta City (3,176) and Fillmore (2,137)—with
9 2008 populations of more than 1,000 people, and seven other towns with between 206 and
10 710 inhabitants. Population growth between 2000 and 2008 has been low in urban areas
11 in Millard County, with an annual growth rate of 0.3% in Scipio and 0.2% in Hinckley, and
12 negative growth in the remaining seven urban areas. These cities and towns are between
13 40 and 100 mi (64 and 161 km) from the proposed SEZ.

14 15 16 **13.2.19.1.4 ROI Urban Income**

17
18 Median household incomes varied considerably across cities and towns in the ROI.
19 One city, Oak City (\$60,996), had median incomes in 1999 that were higher than the average
20 for the state (\$58,873), while incomes in Brian Head (\$56,732) were only slightly lower than the
21 average (Table 13.3.19.1-4). The cities of Fillmore (\$40,839), Scipio (\$38,918), and Meadow
22 (\$33,797) had relatively low median incomes in 1999.

23
24 Data on median household incomes for the period 2006 to 2008 were only available for
25 one city in the ROI. The median income growth rate for the periods 1999 and 2006 to 2008 for
26 Cedar City declined slightly (-0.1%). The average median household income growth rate for the
27 state as a whole over this period was -0.5%.

28 29 30 **13.3.19.1.5 ROI Population**

31
32 Table 13.3.19.1-5 presents recent and projected populations for the ROI surrounding the
33 proposed SEZ and for the state as a whole for the period 2000 to 2008. The growth rate for the
34 ROI (3.2%) was higher than the rate for the state of Utah as a whole (2.5%) during that time
35 frame.

36
37 Beaver County and Iron County have experienced growth in population since 2000, while
38 population in Millard County has declined slightly. Populations in each county are expected to
39 increase through 2023 (Governor's Office of Planning and Budget 2009).

40 41 42 **13.3.19.1.6 ROI Income**

43
44 Personal income in the ROI stood at \$1.4 billion in 2007 and has grown at an annual
45 average rate of 2.8% over the period 1998 to 2007 (Table 13.3.10.1-6). ROI personal income per
46 capita also rose over the same period at a rate of 0.7%, increasing from \$21,960 to \$23,591. Per

TABLE 13.3.19.1-4 Urban Population and Income for the Proposed Wah Wah Valley SEZ ROI

City	Population			Median Household Income (\$ 2008)		
	2000	2008	Average Annual Growth Rate, 2000–2008 (%)	1999	2006–2008	Average Annual Growth Rate, 1999 and 2006–2008 (%) ^a
Cedar City	20,527	28,439	4.2	41,719	41,318	-0.1
Enoch	3,467	5,076	4.9	48,112	NA ^b	NA
Delta City	3,209	3,176	-0.1	48,633	NA	NA
Parowan	2,565	2,606	0.2	41,749	NA	NA
Beaver City	2,454	2,604	0.7	43,320	NA	NA
Filmore	2,253	2,137	-0.7	40,839	NA	NA
Milford	1,451	1,405	-0.4	47,075	NA	NA
Minersville	817	822	0.1	46,105	NA	NA
Hinckley	698	710	0.2	45,868	NA	NA
Oak City	650	606	-0.9	60,996	NA	NA
Paragonah	470	477	0.2	43,721	NA	NA
Kanosh	485	472	-0.3	41,730	NA	NA
Holden	400	372	-0.9	43,776	NA	NA
Kannaraville	311	314	0.1	44,258	NA	NA
Scipio	290	298	0.3	38,918	NA	NA
Meadow	NA	237	NA	33,797	NA	NA
Leamington	217	206	-0.6	55,524	NA	NA
Brian Head	118	126	0.8	56,732	NA	NA

^a Data are averages for the period 2006 to 2008.

^b NA = data not available.

Source: U.S. Bureau of the Census (2009b–d).

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3 capita incomes were slightly higher in Beaver County (\$28,154) in 2007 than in Millard County
4 (\$27,342) and Iron County (\$21,922). Personal income growth rates were higher in Iron County
5 (3.5%), and lower in Beaver County (2.0%), and Millard County (1.5%) than for the state as a
6 whole (2.9%). Personal income per capita was higher in Utah (\$30,927) in 2007 than in the ROI
7 as a whole.

8
9 Median household income in the ROI in 2006 to 2008 varied from \$42,687 in Iron
10 County to \$46,580 in Millard County (U.S. Bureau of the Census 2009d).

11
12
13 **13.3.19.1.7 ROI Housing**

14
15 In 2007, nearly 26,000 housing units were located in the Wah Wah Valley ROI
16 (Table 13.3.19.1-7). Owner-occupied units constituted 80% of the occupied units.

TABLE 13.3.19.1-5 Population in the ROI Surrounding the Proposed Wah Wah Valley SEZ

Location	2000	2008	Average Annual Growth Rate, 2000–2008 (%)	2021	2023
Beaver County	6,005	6,182	0.4	11,770	12,213
Iron, County	33,779	44,194	3.4	66,796	69,173
Millard County	12,405	12,095	–0.3	18,791	19,602
ROI	52,189	62,471	2.3	97,357	100,987
Utah	2,233,169	2,727,343	2.5	3,546,228	3,666,248

Sources: U.S. Bureau of the Census (2009e,f); Governor’s Office of Planning and Budget (2009).

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TABLE 13.3.19.1-6 Personal Income in the ROI Surrounding the Proposed Wah Wah Valley SEZ

Location	1998	2007	Annual Average Growth Rate, 1998–2007 (%)
Beaver County			
Total income ^a	0.1	0.2	2.0
Per capita income	23,734	28,154	1.7
Iron County			
Total income ^a	0.7	0.9	3.5
Per capita income	21,352	21,922	0.3
Millard County			
Total income ^a	0.3	0.3	1.5
Per capita income	22,677	27,342	1.9
ROI			
Total income ^a	1.1	1.4	2.8
Per capita income	21,960	23,591	0.7
Utah			
Total income ^a	61.9	82.4	2.9
Per capita income	28,567	30,927	0.8

^a Unless indicated otherwise, values are reported in \$ billion 2008.

Sources: U.S. Department of Commerce (2009); U.S. Bureau of the Census (2009e,f).

3

TABLE 13.3.19.1-7 Housing Characteristics in the ROI Surrounding the Proposed Wah Wah Valley SEZ

Parameter	2000	2007 ^a
Beaver County		
Owner-occupied	1,566	1,691
Rental	416	449
Vacant units	678	732
Seasonal and recreational use	399	NA ^b
Total units	2,660	2,872
Iron County		
Owner-occupied	7,040	8,387
Rental	3,587	5,387
Vacant units	2,991	4,202
Seasonal and recreational use	1,986	NA
Total units	13,618	17,976
Millard County		
Owner-occupied	3,062	3,277
Rental	778	833
Vacant units	682	730
Seasonal and recreational use	217	NA
Total units	4,522	4,839
ROI		
Owner-occupied	11,668	13,354
Rental	4,781	6,669
Vacant units	4,351	5,664
Seasonal and recreational use	2,602	NA
Total units	20,800	25,687

^a 2007 data for number of owner-occupied, rental, and vacant units for Beaver Counties were not available; 2007 data are based on total housing units and 2000 data on housing tenure.

^b NA = data not available.

Sources: U.S. Bureau of the Census (2009h-j).

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The housing vacancy rate in 2007 in the ROI was 22.1%. In 2007, an estimated 1,886 rental units would have been available to construction workers in the ROI surrounding the proposed Wah Wah Valley SEZ. There were 2,602 seasonal, recreational, or occasional-use units vacant at the time of the 2000 Census. Housing stock in the Wah Wah Valley ROI as a whole grew at the annual rate of 3.1% over the period 2000 to 2007.

The median value of owner-occupied housing in 2006 to 2008 varied between \$84,700 in Millard County and \$112,200 in Iron County (U.S. Bureau of the Census 2009g).

1 **13.3.19.1.8 ROI Local Government Organizations**
2

3 The various local and county government organizations in the ROI are listed in
4 Table 13.3.19.1-8. In addition, there is one Tribal government located in the ROI, and there
5 may be members of other Tribal groups located in the ROI whose Tribal governments are
6 located in adjacent states.
7

8
9 **13.3.19.1.9 ROI Community and Social Services**
10

11 This section describes educational, healthcare, law enforcement, and firefighting
12 resources in the ROI for the proposed Wah Wah Valley SEZ.
13

14
15 **Schools**
16

17 In 2007, there were a total of 35 public and private elementary, middle, and high schools
18 in the three-county ROI (NCES 2009). Table 13.3.19.1-9 provides summary statistics for
19 enrollment, educational staffing, and two indices of educational quality—student-teacher ratios
20
21

TABLE 13.3.19.1-8 Local Government Organizations and Social Institutions in the ROI Surrounding the Proposed Wah Wah Valley SEZ

Governments	
City	
Cedar City	Oak City
Enoch	Paragonah
Delta City	Kanosh
Parowah	Holden
Beaver City	Scipio
Filmore	Meadow
Milford	Leamington
Minersville	Brian Head
Hinckley	
County	
Beaver County	Millard County
Iron County	
Tribal	
Paiute Indian Tribe of Utah	

Sources: U.S. Bureau of the Census (2009b);
U.S. Department of the Interior (2010).

TABLE 13.3.19.1-9 School District Data in 2007 for the ROI Surrounding the Proposed Wah Wah Valley SEZ

Location	Number of Students	Number of Teachers	Student-Teacher Ratio	Level of Service ^a
Beaver County	1,568	70	22.3	11.6
Iron County	8,522	402	21.2	9.3
Millard County	3,067	156	19.6	13.1
ROI	13,157	629	20.9	10.3

^a Number of teachers per 1,000 population.

Source: NCES (2009).

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and levels of service (number of teachers per 1,000 population). The student-teacher ratio in Beaver County schools (22.3) is slightly higher than for schools in Iron County (21.2) and Millard County (19.6). The level of service is slightly higher in Millard County (13.1) than in Beaver County (11.6) and Iron County (9.3).

Health Care

Although Iron County has a much larger number of physicians (55), the number of doctors per 1,000 population in Iron County (1.3) is only slightly higher than in Beaver County (1.2) and Millard County (0.8) (Table 13.3.19.1-10). The smaller numbers of healthcare professionals in Beaver and Millard Counties may mean that residents of those counties have poorer access to specialized health care; a substantial number of county residents might also travel to Iron County for their medical care.

TABLE 13.3.19.1-10 Physicians in 2007 in the ROI Surrounding the Proposed Wah Wah Valley SEZ

Location	Number of Primary Care Physicians	Level of Service ^a
Beaver County	7	1.2
Iron County	55	1.3
Millard County	9	0.8
ROI	71	1.2

^a Number of physicians per 1,000 population.

Source: AMA (2009).

1 **Public Safety**

2
3 Several state, county, and local police departments provide law enforcement in the ROI
4 (Table 13.3.19.1-11). Beaver County has 16 officers and would provide law enforcement
5 services to the SEZ, while Iron County and Millard County have 31 and 39 officers, respectively.
6 Levels of service in police protection in Iron County (0.7) are significantly lower than for the
7 other two counties. Iron County currently has eight professional firefighters, while Beaver and
8 Millard Counties have only volunteers (Table 13.3.19.1-11).

9
10
11 **13.3.19.1.10 ROI Social Structure and Social Change**

12
13 Community social structures and other forms of social organization within the ROI are
14 related to various factors, including historical development, major economic activities and
15 sources of employment, income levels, race and ethnicity, and forms of local political
16 organization. Although an analysis of the character of community social structures is beyond the
17 scope of the current programmatic analysis, project-level NEPA analyses would include a
18 description of ROI social structures, contributing factors, their uniqueness, and consequently, the
19 susceptibility of local communities to various forms of social disruption and social change.

20
21 Various energy development studies have suggested that once the annual growth in
22 population is between 5 and 15% in smaller rural communities, alcoholism, depression, suicide,
23 social conflict, divorce, and delinquency would increase and levels of community satisfaction
24 would deteriorate (BLM 1980, 1983b, 1996, 2007). Data on violent crime and property crime
25 rates and on alcoholism and illicit drug use, mental health, and divorce, which might be used as
26 indicators of social change, are presented in Tables 13.3.19.1-12 and 13.3.19-1.13.

27
28 **TABLE 13.3.19.1-11 Public Safety Employment in the ROI Surrounding
the Proposed Wah Wah Valley SEZ**

Location	Number of Police Officers ^a	Level of Service ^b	Number of Firefighters ^c	Level of Service
Beaver County	16	2.6	0	0.0
Iron County	31	0.7	8	0.2
Millard County	39	3.3	0	0.0
ROI	86	1.4	8	0.1

^a 2007 data.

^b Number per 1,000 population.

^c 2008 data; number does not include volunteers.

Sources: Fire Departments Network (2009); U.S. Department of Justice (2008).

TABLE 13.3.19.1-12 County and ROI Crime Rates for the Proposed Wah Wah Valley SEZ^a

	Violent Crime ^b		Property Crime ^c		All Crime	
	Offenses	Rate	Offenses	Rate	Offenses	Rate
Beaver County	9	1.2	74	10.2	83	11.4
Iron County	56	1.2	1,085	23.7	1,141	24.9
Millard County	20	1.4	265	19.1	285	20.6
ROI	85	1.3	1,424	21.3	1,509	22.6

^a Rates are the number of crimes per 1,000 population.

^b Violent crime includes murder and non-negligent manslaughter, forcible rape, robbery, and aggravated assault.

^c Property crime includes burglary, larceny, theft, motor vehicle theft, and arson.

Sources: U.S. Department of Justice (2009a,b).

1
2

TABLE 13.3.19.1-13 Alcoholism, Drug Use, Mental Health, and Divorce in the Proposed Wah Wah Valley SEZ ROI^a

Geographic Area	Alcoholism	Illicit Drug Use	Mental Health ^b	Divorce ^c
Utah Southwest Region (includes Beaver County, Iron County, and Millard County)	5.6	2.5	11.3	— ^d
Utah				3.6

^a Data for alcoholism and drug use represent percentage of the population over 12 years of age with dependence or abuse of alcohol or illicit drugs. Data are averages for 2004 to 2006.

^b Data for mental health represent percentage of the population over 18 years of age suffering from serious psychological distress. Data are averages for 2002 to 2004.

^c Divorce rates are the number of divorces per 1,000 population. Data are for 2007.

^d A dash indicates not applicable.

Sources: SAMHSA (2009); CDC (2009).

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There is some variation in the level of crime across the ROI, with slightly higher rates of violent crime in Millard County (1.4 crimes per 1,000 population) than in the other two counties, and higher rates of property crime in Iron County (23.7) than elsewhere in the ROI (Table 13.3.19.1-12). The overall crime rate in the ROI was 22.6 offenses per 1,000 population.

1 Other measures of social change—alcoholism, illicit drug use, and mental health—are
 2 not available at the county level and thus are presented for the SAMHSA region in which the
 3 ROI is located (Table 13.3.19.1-13).

4
 5
 6 **13.3.19.1.11 ROI Recreation**

7
 8 Various areas in the vicinity of the proposed SEZ are used for recreational purposes.
 9 Natural, ecological, and cultural resources in the ROI attract visitors for such activities as
 10 hunting, fishing, boating, canoeing, wildlife watching, camping, hiking, horseback riding,
 11 mountain climbing, and sightseeing. These activities are discussed in Section 13.3.5.

12
 13 Because the number of visitors using state and federal lands for recreational activities is
 14 not available from the various administering agencies, the value of recreational resources in these
 15 areas, based solely on the number of recorded visitors, is likely to be an underestimation. In
 16 addition to visitation rates, the economic valuation of certain natural resources can also be
 17 assessed in terms of the potential recreational destination for current and future users, that is,
 18 their nonmarket value (see Section 5.17.1.1.1).

19
 20 Another method of assessing recreational value is to estimate the economic impact of the
 21 various recreational activities supported by natural resources on public land (by identifying
 22 sectors in the economy in which expenditures on recreational activities occur). Not all activities
 23 in these sectors are directly related to recreation on state and federal lands, with some activity
 24 occurring on private land (e.g., dude ranches, golf courses, bowling alleys, and movie theaters).
 25 Expenditures associated with recreational activities form an important part of the economy of the
 26 ROI. In 2007, 3,033 people were employed in the ROI in the various sectors identified as
 27 recreation, constituting 10.3% of total ROI employment (Table 13.3.19.1-14). The primary
 28
 29

TABLE 13.3.19.1-14 Recreation Sector Activity in the Proposed Wah Wah Valley SEZ ROI, 2007

Activity	Employment	Income (\$ million)
Amusement and recreation services	383	5.5
Automotive rental	7	0.3
Eating and drinking places	2,061	26.8
Hotels and lodging places	340	6.4
Museums and historic sites	— ^a	—
Recreational vehicle parks and campsites	49	2.0
Scenic tours	33	1.7
Sporting goods retailers	160	2.4
Total ROI	3,033	45.1

^a A dash indicates not applicable.

Source: MIG, Inc. (2010).

1 sources of recreation-related employment were eating and drinking places. Recreation spending
2 produced an estimated \$45.1 million in income in the ROI in 2007.

3 4 5 **13.3.19.2 Impacts**

6
7 The following analysis begins with a description of the common impacts of solar
8 development, including common impacts on recreation and on social change. These impacts
9 would occur regardless of the solar technology developed in the SEZ. The impacts of
10 developments employing various solar energy technologies are analyzed in detail in
11 subsequent sections.

12 13 14 ***13.3.19.2.1 Common Impacts***

15
16 Construction and operation of a solar energy facility at the proposed Wah Wah Valley
17 SEZ would produce direct and indirect economic impacts. Direct impacts would occur as a
18 result of expenditures on wages and salaries, procurement of goods and services required for
19 project construction and operation, and the collection of state sales and income taxes. Indirect
20 impacts would occur as project wages and salaries, procurement expenditures, and tax revenues
21 subsequently circulate through the economy of the area, thereby creating additional employment,
22 income, and tax revenues. Facility construction and operation would also require in-migration
23 of workers and their families into the ROI surrounding the site, which would affect population,
24 rental housing, health service employment, and public safety employment. Socioeconomic
25 impacts common to all utility-scale solar energy developments are discussed in detail in
26 Section 5.17. Those impacts would be minimized through the implementation of programmatic
27 design features described in Appendix A, Section A.2.2.

28 29 30 **Recreation Impacts**

31
32 Estimating the impact of solar facilities on recreation is problematic because it
33 is not clear how solar development in the SEZ would affect recreational visitation and
34 nonmarket values (i.e., the value of recreational resources for potential or future visits;
35 see Section 5.17.1.2.3). While it is clear that some land in the ROI would no longer be
36 accessible for recreation, the majority of popular recreational locations would be precluded from
37 solar development. It is also possible that solar development in the ROI would be visible from
38 popular recreation locations, and that construction workers residing temporarily in the ROI
39 would occupy accommodation otherwise used for recreational visits; thus, reducing visitation
40 and consequently affecting the economy of the ROI.

41 42 43 **Social Change**

44
45 Although an extensive literature in sociology documents the most significant components
46 of social change in energy boomtowns, the nature and magnitude of the social impact of energy

1 developments in small, rural communities are still unclear (see Section 5.17.1.1.4). While some
2 degree of social disruption is likely to accompany large-scale in-migration during the boom
3 phase, there is insufficient evidence to predict the extent to which specific communities are
4 likely to be impacted, which population groups within each community are likely to be most
5 affected, and the extent to which social disruption is likely to persist beyond the end of the boom
6 period (Smith et al. 2001). Accordingly, because of the lack of adequate social baseline data, it
7 has been suggested that social disruption is likely to occur once an arbitrary population growth
8 rate associated with solar energy development projects has been reached, with an annual rate of
9 between 5 and 10% growth in population assumed to result in a breakdown in social structures,
10 with a consequent increase in alcoholism, depression, suicide, social conflict, divorce,
11 delinquency, and deterioration in levels of community satisfaction (BLM 1980, 1983a,b).

12
13 In overall terms, the in-migration of workers and their families into the ROI would
14 represent an increase of 1.9% in ROI population during construction of the trough technology
15 (with smaller increases for the power tower, dish engine, and photovoltaic technologies) and
16 during the operation of each technology. While it is possible that some construction and
17 operations workers will choose to locate in communities closer to the SEZ, the lack of available
18 housing to accommodate all in-migrating workers and families in smaller rural communities in
19 the ROI, and an insufficient range of housing choices to suit all solar occupations, many workers
20 are likely to commute to the SEZ from larger communities elsewhere in the ROI, reducing the
21 potential impact of solar development on social change. Regardless of the pace of population
22 growth associated with the commercial development of solar resources, and the likely residential
23 location of in-migrating workers and families in communities some distance from the SEZ itself,
24 the number of new residents from outside the region of influence is likely to lead to some
25 demographic and social change in small rural communities in the ROI. Communities hosting
26 solar facilities are likely to be required to adapt to a different quality of life, with a transition
27 away from a more traditional lifestyle involving ranching and taking place in small, isolated,
28 close-knit, homogenous communities with a strong orientation toward personal and family
29 relationships, toward a more urban lifestyle, with increasing cultural and ethnic diversity and
30 increasing dependence on formal social relationships within the community.

31 32 33 **Livestock Grazing Impacts**

34
35 Cattle ranching and farming supported 251 jobs, and \$3.2 million in income in the ROI in
36 2007 (MIG, Inc. 2010). The construction and operation of solar facilities in the Wah Wah Valley
37 SEZ could result in a decline in the amount of land available for livestock grazing, resulting in
38 total (direct plus indirect) impacts of the loss of two jobs and less than \$0.1 million in income in
39 the ROI. There would also be a decline in grazing fees payable to the BLM and to the USFS by
40 individual permittees based on the number of AUMs required to support livestock on public
41 land. Assuming the 2008 fee of \$1.35 per AUM, grazing fee losses would amount to
42 \$298 annually on land dedicated to solar facilities in the SEZ.

1 **Transmission Line Impacts**
2

3 The impacts of transmission line construction could include the addition of 183 jobs
4 in the ROI (including direct and indirect impacts) in the peak year of construction
5 (Table 13.3.19.2-1). Construction activities in the peak year would constitute less than 1% of
6 total ROI employment. A transmission line would also produce \$7.4 million in ROI income.
7 Direct sales taxes would be \$0.1 million and direct sales taxes would be \$0.2 million in the peak
8 year.
9

10 Given the likelihood of local worker availability in the required occupational categories,
11 construction of a transmission line would mean that some in-migration of workers and their
12 families from outside the ROI would be required, with 222 persons in-migrating into the Wah
13 Wah Valley ROI during the peak construction year. Although in-migration may potentially
14 affect local housing markets, the relatively small number of in-migrants and the availability of
15 temporary accommodation (hotels, motels, and mobile home parks) would mean that the impact
16 of solar facility construction on the number of vacant rental housing units would not be expected
17 to be large, with 111 rental units expected to be occupied in the Wah Wah Valley ROI. This
18 occupancy rate would represent less than 1% of the vacant rental units expected to be available
19 in the ROI in the peak year.
20

21 In addition to the potential impact on housing markets, in-migration would affect
22 community service employment (education, health, and public safety). An increase in such
23 employment would be required to meet existing levels of service in the ROI. Accordingly,
24 two new teachers would be required in the ROI.
25

26 Total operations employment impacts in the ROI (including direct and indirect impacts)
27 of a transmission line would be one job during the first year of operation (Table 13.3.19.2-1)
28 and would produce less than \$0.1 million in income. Direct sales taxes would be less than
29 \$0.1 million in the first year, with direct income taxes of less than \$0.1 million.
30

31 Operation of a transmission line would not require the in-migration of workers and their
32 families from outside the ROI; consequently, no impacts on housing markets in the ROI would
33 be expected, and no new community service employment would be required to meet existing
34 levels of service in the ROI.
35

36
37 **13.3.19.2.2 Technology-Specific Impacts**
38

39 The economic impacts of solar energy development in the proposed SEZ were measured
40 in terms of employment, income, state tax revenues (sales and income), population in-migration,
41 housing, and community service employment (education, health, and public safety). More
42 information on the data and methods used in the analysis are provided in Appendix M.
43

44 The assessment of the impact of the construction and operation of each technology was
45 based on SEZ acreage, assuming 80% of the area could be developed, with one solar project
46 assumed to be constructed within a given year, and assumed to disturb up to 3,000 acres

**TABLE 13.3.19.2-1 Proposed Wah Wah Valley SEZ ROI
Socioeconomic Impacts of a 230-kV Transmission Line^a**

Parameter	Wah Wah Valley	
	Construction	Operations
Employment (no.)		
Direct	87	<1
Total	183	1
Income ^b		
Total	7.4	<0.1
Direct state taxes ^b		
Sales	0.1	<0.1
Income	0.2	<0.1
In-migrants (no.)	222	0
Vacant housing ^c (no.)	111	0
Local community service employment		
Teachers (no.)	2	0
Physicians (no.)	0	0
Public safety (no.)	0	0

^a Construction impacts assume 42 mi (67 km) of transmission line are required for the Wah Wah Valley SEZ. Construction impacts are assessed for the peak year of construction.

^b Unless indicated otherwise, values are reported in \$ million 2008.

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

1
2
3 (12 km²) of land. To capture a range of possible impacts, solar facility size was assessed
4 according to the land requirements of various solar technologies, assuming that 9 acres/MW
5 (0.04 km²/MW) would be required for power tower, dish engine, and PV technologies and
6 5 acres/MW (0.02 km²/MW) for solar trough technologies. Impacts of multiple facilities
7 employing a given technology at each SEZ were assumed to be the same as impacts for a single
8 facility with the same total capacity. Construction impacts were assessed for a representative
9 peak year of construction, assumed to be 2021 for each technology. For operations impacts, a
10 representative first year of operations was assumed to be 2023 for trough and power tower; 2022
11 was assumed for the minimum facility size for dish engine and PV, and 2023 for the maximum
12 facility size for these technologies. The years of construction and operations were selected as
13 representative of the entire 20-year study period because they are the approximate midpoint;
14 construction and operations could begin earlier.
15

1 **Solar Trough**
2
3

4 **Construction.** Total construction employment impacts in the ROI (including direct
5 and indirect impacts) from the use of solar trough technologies would be up to 2,817 jobs
6 (Table 13.3.19.2-2). Construction activities would constitute 6.6% of total ROI employment.
7 Construction of a solar facility would also produce \$148.0 million in income. Direct sales
8 taxes would be \$0.1 million, and direct income taxes, \$5.9 million.
9

10 Given the scale of construction activities and the likelihood of local worker availability
11 in the required occupational categories, construction of a solar facility would mean that some
12 in-migration of workers and their families from outside the ROI would be required, with
13 1,827 persons in-migrating into the ROI. Although in-migration may potentially affect local
14 housing markets, the relatively small number of in-migrants and the availability of temporary
15 accommodations (hotels, motels, and mobile home parks) mean that the impact of solar facility
16 construction on the number of vacant rental housing units would not be expected to be large,
17 with 914 rental units expected to be occupied in the ROI. This occupancy rate would represent
18 32.4% of the vacant rental units expected to be available in the ROI.
19

20 In addition to the potential impact on housing markets, in-migration would affect
21 community service employment (education, health, and public safety). An increase in such
22 employment would be required to meet existing levels of service in the ROI. Accordingly,
23 19 new teachers, two physicians, and three public safety employees (career firefighters and
24 uniformed police officers) would be required in the ROI. These increases would represent 1.9%
25 of total ROI employment expected in these occupations.
26
27

28 **Operations.** Total operations employment impacts in the ROI (including direct
29 and indirect impacts) of a build-out using solar trough technologies would be 328 jobs
30 (Table 13.3.19.2-2). Such a solar facility would also produce \$10.0 million in income.
31 Direct sales taxes would be \$0.1 million, and direct income taxes, \$0.3 million. Based on fees
32 established by the BLM in its Solar Energy Interim Rental Policy (BLM 2010c), acreage rental
33 payments would be \$0.8 million, and solar generating capacity payments would total at least
34 \$6.4 million.
35

36 Given the likelihood of local worker availability in the required occupational categories,
37 operation of a solar facility would mean that some in-migration of workers and their families
38 from outside the ROI would be required, with 135 persons in-migrating into the ROI. Although
39 in-migration may potentially affect local housing markets, the relatively small number of
40 in-migrants and the availability of temporary accommodations (hotels, motels, and mobile home
41 parks) mean that the impact of solar facility operation on the number of vacant owner-occupied
42 housing units would not be expected to be large, with 122 owner-occupied units expected to be
43 occupied in the ROI.
44
45

TABLE 13.3.19.2-2 ROI Socioeconomic Impacts Assuming Full Build-out of the Proposed Wah Wah Valley SEZ with Trough Facilities^a

Parameter	Maximum Annual Construction Impacts	Operations Impacts
Employment (no.)		
Direct	1,641	213
Total	2,817	328
Income ^b		
Total	148.0	10.0
Direct state taxes ^b		
Sales	0.1	0.1
Income	5.9	0.3
BLM Payments (\$ million 2008)		
Rental	NA ^d	0.8
Capacity ^c	NA	6.4
In-migrants (no.)	1,827	135
Vacant housing ^e (no.)	914	122
Local community service employment		
Teachers (no.)	19	1
Physicians (no.)	2	0
Public safety (no.)	3	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 600 MW (corresponding to 3,000 acres [12 km²] of land disturbance) could be built. Operations impacts were based on full build-out of the site, producing a total output of 976 MW. Construction impacts were assessed for a single representative year, 2021.

^b Unless indicated otherwise, values are reported in \$ million 2008.

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

^d NA = not applicable.

^e 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 (health, education, and public safety) employment. An increase in such
3 employment would be required to meet existing levels of service in the provision of these
4 services in the ROI. Accordingly, one new teacher would be required in the ROI.
5
6

7 **Power Tower**

8
9

10 **Construction.** Total construction employment impacts in the ROI (including direct
11 and indirect impacts) from the use of power tower technologies would be up to 1,137 jobs
12 (Table 13.3.19.2-3). Construction activities would constitute 2.6% of total ROI employment.
13 Such a solar facility would also produce \$58.9 million in income. Direct sales taxes would be
14 less than \$0.1 million, with direct income taxes of \$2.4 million.
15

16 Given the scale of construction activities and the likelihood of local worker availability
17 in the required occupational categories, construction of a solar facility would mean that some
18 in-migration of workers and their families from outside the ROI would be required, with
19 728 persons in-migrating into the ROI. Although in-migration may potentially affect local
20 housing markets, the relatively small number of in-migrants and the availability of temporary
21 accommodations (hotels, motels, and mobile home parks) mean that the impact of solar facility
22 construction on the number of vacant rental housing units would not be expected to be large,
23 with 364 rental units expected to be occupied in the ROI. This occupancy rate would represent
24 12.9% of the vacant rental units expected to be available 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 seven new teachers, one physician, and one public safety employee would be required in the
30 ROI. These increases would represent less than 0.7% of total ROI employment that is expected
31 in these occupations.
32
33

34 **Operations.** Total operations employment impacts in the ROI (including direct and
35 indirect impacts) of a build-out using power tower technologies would be 153 jobs
36 (Table 13.3.19.2-3). Such a solar facility would also produce \$4.6 million in income. Direct
37 sales taxes would be less than \$0.1 million, and direct income taxes \$0.2 million. Based on fees
38 established by the BLM in its Solar Energy Interim Rental Policy (BLM 2010c), acreage rental
39 payments would be \$0.8 million, and solar generating capacity payments would total at least
40 \$3.6 million.
41

42 Given the likelihood of local worker availability in the required occupational categories,
43 operation of a solar facility means that some in-migration of workers and their families from
44 outside the ROI would be required, with 70 persons in-migrating into the ROI. Although
45 in-migration may potentially affect local housing markets, the relatively small number of
46 in-migrants and the availability of temporary accommodations (hotels, motels, and mobile

TABLE 13.3.19.2-3 ROI Socioeconomic Impacts Assuming Full Build-out of the Proposed Wah Wah Valley SEZ with Power Tower Facilities^a

Parameter	Maximum Annual Construction Impacts	Operations Impacts
Employment (no.)		
Direct	654	110
Total	1,137	153
Income ^b		
Total	58.9	4.6
Direct state taxes ^b		
Sales	<0.1	<0.1
Income	2.4	0.2
BLM Payments (\$ million 2008)		
Rental	NA ^d	0.8
Capacity ^c	NA	3.6
In-migrants (no.)	728	70
Vacant housing ^e (no.)	364	63
Local community service employment		
Teachers (no.)	7	1
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 333 MW (corresponding to 3,000 acres [12 km²] of land disturbance) could be built. Operations impacts were based on full build-out of the site, producing a total output of 542 MW. Construction impacts were assessed for a single representative year, 2021.

^b Unless indicated otherwise, values are reported in \$ million 2008.

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

^d NA = not applicable.

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

1 home parks) mean that the impact of solar facility operation on the number of vacant
2 owner-occupied housing units would not be expected to be large, with 63 owner-occupied
3 units expected to be required in the ROI.
4

5 In addition to the potential impact on housing markets, in-migration would affect
6 community service (health, education, and public safety) employment. An increase in such
7 employment would be required to maintain existing levels of service in the ROI. Accordingly,
8 one new teacher would be required in the ROI.
9

10 **Dish Engine**

11
12
13
14 **Construction.** Total construction employment impacts in the ROI (including direct
15 and indirect impacts) from the use of dish engine technologies would be up to 456 jobs
16 (Table 13.3.19.2-4). Construction activities would constitute 1.1% of total ROI employment.
17 Such a solar facility would also produce \$24.0 million in income. Direct sales taxes would be
18 less than \$1.0 million, and direct income taxes, \$1.0 million.
19

20 Given the scale of construction activities and the likelihood of local worker availability in
21 the required occupational categories, construction of a solar facility would mean that some
22 in-migration of workers and their families from outside the ROI would be required, with
23 296 persons in-migrating into the ROI. Although in-migration may potentially affect local
24 housing markets, the relatively small number of in-migrants and the availability of temporary
25 accommodations (hotels, motels, and mobile home parks) mean that the impact of solar facility
26 construction on the number of vacant rental housing units would not be expected to be large,
27 with 148 rental units expected to be occupied in the ROI. This occupancy rate would represent
28 5.2% of the vacant rental units expected to be available in the ROI.
29

30 In addition to the potential impact on housing markets, in-migration would affect
31 community service (education, health, and public safety) employment. An increase in such
32 employment would be required to maintain existing levels of service in the ROI. Accordingly,
33 three new teachers would be required in the ROI. This increase would represent 0.3% of total
34 ROI employment expected in this occupation.
35

36
37 **Operations.** Total operations employment impacts in the ROI (including direct
38 and indirect impacts) of a build-out using dish engine technologies would be 149 jobs
39 (Table 13.3.19.2-4). Such a solar facility would also produce \$4.5 million in income.
40 Direct sales taxes would be less than \$0.1 million, and direct income taxes, \$0.2 million. Based
41 on fees established by the BLM in its Solar Energy Interim Rental Policy (BLM 2010c), acreage
42 rental payments would be \$0.8 million, and solar generating capacity payments would total at
43 least \$3.6 million.
44
45

TABLE 13.3.19.2-4 ROI Socioeconomic Impacts Assuming Full Build-out of the Proposed Wah Wah Valley SEZ with Dish Engine Facilities^a

Parameter	Maximum Annual Construction Impacts	Operations Impacts
Employment (no.)		
Direct	266	107
Total	456	149
Income ^b		
Total	24.0	4.5
Direct state taxes ^b		
Sales	<0.1	<0.1
Income	1.0	0.2
BLM Payments (\$ million 2008)		
Rental	NA ^d	0.8
Capacity ^c	NA	3.6
In-migrants (no.)	296	68
Vacant housing ^e (no.)	148	61
Local community service employment		
Teachers (no.)	3	1
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 333 MW (corresponding to 3,000 acres [12 km²] of land disturbance) could be built. Operations impacts were based on full build-out of the site, producing a total output of 542 MW. Construction impacts were assessed for a single representative year, 2021.

^b Unless indicated otherwise, values are reported in \$ million 2008.

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

^d NA = not applicable.

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

1 Given the likelihood of local worker availability in the required occupational categories,
2 operation of a dish engine solar facility means that some in-migration of workers and their
3 families from outside the ROI would be required, with 68 persons in-migrating into the ROI.
4 Although in-migration may potentially affect local housing markets, the relatively small number
5 of in-migrants and the availability of temporary accommodations (hotels, motels, and mobile
6 home parks) mean that the impact of solar facility operation on the number of vacant owner-
7 occupied housing units would not be expected to be large, with 61 owner-occupied units
8 expected to be required in the ROI.
9

10 In addition to the potential impact on housing markets, in-migration would affect
11 community service (health, education, and public safety) employment. An increase in such
12 employment would be required to maintain existing levels of service in the ROI. Accordingly,
13 one new teacher would be required in the ROI.
14

15 **Photovoltaic**

16 **Construction.** Total construction employment impacts in the ROI (including direct and
17 indirect impacts) from the use of PV technologies would be up to 213 jobs (Table 13.3.19.2-5).
18 Construction activities would constitute 0.5 % of total ROI employment. Such a solar
19 development would also produce \$11.2 million in income. Direct sales taxes would be less
20 than \$0.1 million, and direct income taxes \$0.5 million.
21

22 Given the scale of construction activities and the likelihood of local worker availability
23 in the required occupational categories, construction of a solar facility would mean that some
24 in-migration of workers and their families from outside the ROI would be required, with
25 138 persons in-migrating into the ROI. Although in-migration may potentially affect local
26 housing markets, the relatively small number of in-migrants and the availability of temporary
27 accommodations (hotels, motels, and mobile home parks) mean that the impact of solar facility
28 construction on the number of vacant rental housing units would not be expected to be large,
29 with 69 rental units expected to be occupied in the ROI. This occupancy rate would represent
30 2.4% of the vacant rental units expected to be available in the ROI.
31

32 In addition to the potential impact on housing markets, in-migration would affect
33 community service (education, health, and public safety) employment. An increase in such
34 employment would be required to maintain existing levels of service in the ROI. Accordingly,
35 one new teacher would be required in the ROI. This increase would represent less than 0.1% of
36 total ROI employment expected in this occupation.
37

38 **Operations.** Total operations employment impacts in the ROI (including direct and
39 indirect impacts) of a build-out using PV technologies would be 15 jobs (Table 13.3.19.2-5).
40 Such a solar facility would also produce \$0.4 million in income. Direct sales taxes and direct
41 income taxes each would be less than \$0.1 million. Based on fees established by the BLM in
42 its Solar Energy Interim Rental Policy (BLM 2010c), acreage rental payments would be
43 \$0.8 million, and solar generating capacity payments would total at least \$3.0 million.
44

TABLE 13.3.19.2-5 ROI Socioeconomic Impacts Assuming Full Build-out of the Proposed Wah Wah Valley SEZ with PV Facilities^a

Parameter	Maximum Annual Construction Impacts	Operations Impacts
Employment (no.)		
Direct	124	11
Total	213	15
Income ^b		
Total	11.2	0.4
Direct state taxes ^b		
Sales	<0.1	<0.1
Income	0.5	<0.1
BLM Payments (\$ million 2008)		
Rental	NA ^d	0.8
Capacity ^c	NA	3.0
In-migrants (no.)	138	7
Vacant housing ^e (no.)	69	6
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 333 MW (corresponding to 3,000 acres [12 km²] of land disturbance) could be built. Operations impacts were based on full build-out of the site, producing a total output of 542 MW. Construction impacts were assessed for a single representative year, 2021.

^b Unless indicated otherwise, values are reported in \$ million 2008.

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

^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 2010c), assuming full build-out of the site.

1 Given the likelihood of local worker availability in the required occupational categories,
2 operation of a solar facility would mean that some in-migration of workers and their families
3 from outside the ROI would be required, with seven persons in-migrating into the ROI. Although
4 in-migration may potentially affect local housing markets, the relatively small number of
5 in-migrants and the availability of temporary accommodations (hotels, motels, and mobile home
6 parks) mean that the impact of solar facility operation on the number of vacant owner-occupied
7 housing units would not be expected to be large, with six owner-occupied units expected to be
8 required in the ROI.

9
10 No new community service employment would be required to maintain existing levels of
11 service in the ROI.

12 13 14 **13.3.19.3 SEZ-Specific Design Features and Design Feature Effectiveness**

15
16 No SEZ-specific design features addressing socioeconomic impacts have been identified
17 for the proposed Wah Wah Valley SEZ. Implementing the programmatic design features
18 described in Appendix A, Section A.2.2, as required under BLM's Solar Energy Program, would
19 reduce the potential for socioeconomic impacts during all project phases.
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1 **13.3.20 Environmental Justice**

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4 **13.3.20.1 Affected Environment**

5
6 Executive Order 12898, “Federal Actions to Address Environmental Justice in
7 Minority Populations and Low-Income Populations” (*Federal Register*, Vol. 59, page 7629,
8 Feb. 11, 1994) formally requires federal agencies to incorporate environmental justice as part
9 of their missions. Specifically, it directs them to address, as appropriate, any disproportionately
10 high and adverse human health or environmental effects of their actions, programs, or policies
11 on minority and low-income populations.

12
13 The analysis of the impacts of solar energy projects on environmental justice issues
14 follows guidelines described in the Council on Environmental Quality’s (CEQ’s) *Environmental*
15 *Justice Guidance under the National Environmental Policy Act* (CEQ 1997). The analysis
16 method has three parts: (1) a description of the geographic distribution of low-income and
17 minority populations in the affected area is undertaken; (2) an assessment to determine whether
18 construction and operation would produce impacts that are high and adverse is conducted; and
19 (3) if impacts are high and adverse, a determination as to whether these impacts
20 disproportionately affect minority and low-income populations is made.

21
22 Construction and operation of solar energy projects in the proposed Wah Wah Valley
23 SEZ could affect environmental justice if any adverse health and environmental impacts
24 resulting from any phase of development are significantly high and if these impacts
25 disproportionately affect minority and low-income populations. If the analysis determines that
26 health and environmental impacts are not significant, there can be no disproportionate impacts
27 on minority and low-income populations. In the event impacts are significant, disproportionality
28 would be determined by comparing the proximity of any high and adverse impacts with the
29 location of low-income and minority populations.

30
31 The analysis of environmental justice issues associated with the development of solar
32 facilities considered impacts within the SEZ and in an associated 50-mi (80-km) radius around
33 the boundary of the SEZ. A description of the geographic distribution of minority and low-
34 income groups in the affected area was based on demographic data from the 2000 Census
35 (U.S. Bureau of the Census 2009k,1). The following definitions were used to define minority
36 and low-income population groups:

- 37
38 • **Minority.** Persons are included in the minority category if they identify
39 themselves as belonging to any of the following racial groups: (1) Hispanic,
40 (2) Black (not of Hispanic origin) or African American, (3) American Indian
41 or Alaska Native, (4) Asian, or (5) Native Hawaiian or Other Pacific Islander.

42
43 Beginning with the 2000 Census, where appropriate, the census form allows
44 individuals to designate multiple population group categories to reflect their
45 ethnic or racial origins. In addition, persons who classify themselves as being
46 of multiple racial origin may choose up to six racial groups as the basis of

1 their racial origins. The term minority includes all persons, including those
2 classifying themselves in multiple racial categories, except those who classify
3 themselves as not of Hispanic origin and as White or “Other Race”
4 (U.S. Bureau of the Census 2009k).

5
6 The CEQ guidance proposed that minority populations be identified where
7 either (1) the minority population of the affected area exceeds 50% or (2) the
8 minority population percentage of the affected area is meaningfully greater
9 than the minority population percentage in the general population or other
10 appropriate unit of geographic analysis.

11
12 The PEIS applies both criteria in using the Census Bureau data for census
13 block groups, wherein consideration is given to the minority population that
14 is both greater than 50% and 20 percentage points higher than in the state
15 (the reference geographic unit).

- 16
17 • **Low-Income.** Individuals are included in the low-income category if they fall
18 below the poverty line. The poverty line takes into account family size and
19 age of individuals in the family. In 1999, for example, the poverty line for a
20 family of five with three children below the age of 18 was \$19,882. For any
21 given family below the poverty line, all family members are considered as
22 being below the poverty line for the purposes of analysis (U.S. Bureau of the
23 Census 2009l).

24
25 Table 13.3.20.1-1 shows the minority and low-income composition of the total
26 population located in the proposed Wah Wah Valley SEZ based on 2000 Census data and CEQ
27 guidelines. Individuals identifying themselves as Hispanic or Latino are included in the table as
28 a separate entry. However, because Hispanics can be of any race, this number also includes
29 individuals also identifying themselves as being part of one or more of the population groups
30 listed in the table.

31
32 A relatively small number of minority and low-income individuals are located in the
33 50-mi (80-km) radius surrounding the boundary of the SEZ. When census data are averaged
34 across all the block groups within the 50-mi (80-km) radius, 23.2% of the population is classified
35 as minority within the Nevada portion, and 7.9% of the population is classified as minority
36 within the Utah portion. Because the minority population does not exceed 50% of the total
37 population in either portion of the 50-mi (80-km) radius, and because the minority population
38 does not exceed the state average by 20 percentage points in either portion of the 50-mi (80-km)
39 radius, these states do not have minority populations within the 50-mi (80-km) radius according
40 to 2000 Census data and CEQ guidelines. In addition, there are no minority populations within
41 individual census block groups in this area based on CEQ guidelines.

42
43 When census data are averaged across all the block groups within the 50-mi (80-km)
44 radius, 10.7% of the population is classified as low-income within the Nevada portion, and,
45 13.5% is classified as low-income within the Utah portion. Because the number of low-income
46 individuals does not exceed the state average by 20 percentage points or more, and because it

TABLE 13.3.20.1-1 Minority and Low-Income Populations within the 50-mi (80-km) Radius Surrounding the Proposed Wah Wah Valley SEZ

Parameter	Nevada	Utah
Total population	3,555	24,405
White, non-Hispanic	2,732	22,483
Hispanic or Latino	353	1,118
Non-Hispanic or Latino minorities	470	804
One race	435	571
Black or African American	357	57
American Indian or Alaskan Native	56	383
Asian	16	83
Native Hawaiian or other Pacific Islander	3	29
Some other race	3	19
Two or more races	35	233
Total minority	823	1,922
Total low-income	382	3,295
Percent minority	23.2	7.9
Percent low-income	10.7	13.5
State percent minority	34.8	14.7
State percent low-income	10.5	9.4

Source: U.S. Bureau of the Census (2009k,l).

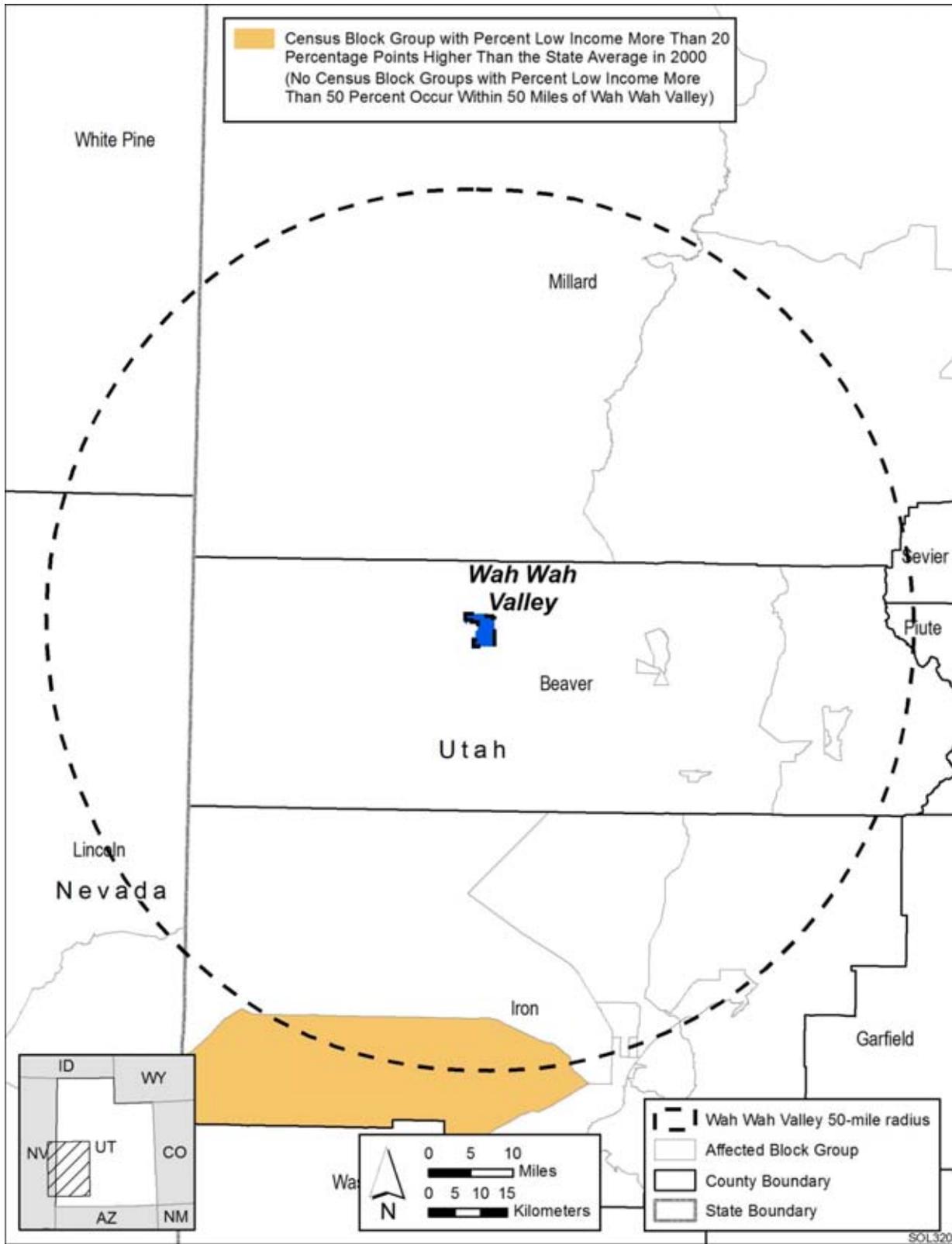
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does not exceed 50% of the total population in either state, there are no low-income populations within the 50-mi (80-km) radius of the proposed Wah Wah Valley SEZ.

Figure 13.3.20.1-1 shows the locations of low-income population groups within the 50-mi (80-km) area around the boundary of the SEZ. At the individual block group level, there are low-income populations in one census block group within the 50-mi (80-km) radius. This block group is located in Iron County, to the west of Cedar City. It includes the towns of Newcastle and Modena and has a low-income population that is more than 20 percentage points higher than the state average.

13.3.20.2 Impacts

Environmental justice concerns common to all utility-scale solar energy developments are described in detail in Section 5.18. These impacts would be minimized through the implementation of programmatic design features described in Appendix A, Section A.2.2, which



1

2 **FIGURE 13.3.20.1-1 Low-Income Population Groups within the 50-mi (80-km) Radius**
 3 **Surrounding the Proposed Wah Wah Valley SEZ**

1 address the underlying environmental impacts contributing to the concerns. The potentially
2 relevant environmental impacts associated with solar development within the proposed Wah
3 Wah Valley SEZ include noise and dust emissions during the construction of solar facilities;
4 noise and EMF effects associated with solar project operations; the visual impacts of solar
5 generation and auxiliary facilities, including transmission lines; access to land used for
6 economic, cultural, or religious purposes; and effects on property values. These are areas of
7 concern that might potentially affect minority and low-income populations.
8

9 Potential impacts on low-income and minority populations could be incurred as a result
10 of the construction and operation of solar development involving each of the four technologies.
11 Although impacts are likely to be small, and therefore unlikely to produce disproportionate
12 impacts, there are low-income populations defined by CEQ guidelines (see Section 13.3.20.1.1)
13 in one census block group within the 50-mi (80-km) radius of the SEZ, meaning that any adverse
14 impacts of solar projects would disproportionately affect low-income populations. There would
15 be no impacts on minority populations, however, because there are no minority populations
16 within the 50-mi (80-km) radius of the SEZ, according to CEQ guidelines.
17
18

19 **13.3.20.3 SEZ-Specific Design Features and Design Feature Effectiveness**

20

21 No SEZ-specific design features addressing environmental justice impacts have been
22 identified for the proposed Wah Wah Valley SEZ. Implementing the programmatic design
23 features described in Appendix A, Section A.2.2, as required under BLM's Solar Energy
24 Program, would reduce the potential for environmental justice impacts during all project phases.
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1 **13.3.21 Transportation**
2

3 The proposed Wah Wah Valley SEZ is accessible by road and rail. One major railroad
4 and one state highway serve the immediate area. Three small airports serve the region. General
5 transportation considerations and impacts are discussed in Sections 3.4 and 5.19, respectively.
6

7
8 **13.3.21.1 Affected Environment**
9

10 The proposed Wah Wah Valley SEZ is bisected by State Route 21, which connects
11 Milford, 23 mi (37 km) to the southeast, with Garrison, about 50 mi (80 km) to the
12 northwest. Two unimproved dirt roads cross the SEZ and intersect State Route 21, as seen in
13 Figure 13.3.21.1-1. The average number of vehicles traveling along State Route 21 just west of
14 the SEZ was 245 per day in 2008, down to 85 vehicles per day closer to Garrison (UDOT 2009).
15 To the east of the SEZ, traffic counts reach up to approximately 2,485 vehicles per day on
16 average on the western edge of Milford and 2,590 per day at the junction with State Route 257 in
17 Milford. Farther east on State Route 21, AADT values range between 1,400 and 1,900 vehicles
18 per day out to I-15. State Route 130 south of Milford averages about 900 vehicles per day.
19 The SEZ area has not been designated for vehicle travel in a BLM land use plan but will be
20 considered in the upcoming revision of the land use plans in the Cedar City Field Office.
21 Table 13.3.21.1-1 shows the annual coverage day traffic on major roads near the proposed
22 Wah Wah Valley SEZ.
23

24 The UP Railroad serves the area. The main line connecting Las Vegas and Salt Lake City
25 passes through Milford, where the nearest rail access is located.
26

27 The nearest public airport is the Milford Municipal Airport, located 5 mi (8 km) north of
28 Milford, about a 25-mi (40-km) drive from the SEZ. The airport has a 5,000-ft (1,524-m) asphalt
29 runway in good condition that is equipped with landing lights (FAA 2009). There is no control
30 tower, but the airport is staffed during daylight hours. An average of approximately 125 aircraft
31 operations (takeoffs/landings) occur on a weekly basis (Milford 2009).
32

33 The other public airports in the area are in Beaver and Cedar City, about 50 mi (80 km)
34 and 75 mi (120 km) to the east–southeast and south–southeast, respectively. The Beaver
35 Municipal Airport has two runways—a 4,984-ft (1,519-m) asphalt runway in fair condition
36 with landing lights and a 2,150-ft (655-m) dirt runway in fair condition without landing lights
37 (FAA 2009). This latter airport is unattended (Beaver 2009). Cedar City Regional Airport has
38 two runways, one in good condition with a length of 4,822 ft (1,470 m), and the other in fair
39 condition with a length of 8,653 ft (2,637 m) (FAA 2009). The airport is served by one regional
40 carrier, Skywest Airlines, with scheduled service between Cedar City and Salt Lake City
41 (Cedar City 2009). In 2008, approximately 7,800 passengers departed from Cedar City and
42 1,900 passengers arrived at Cedar City. About 133,000 lb (60,300 kg) of freight departed and
43 159,000 lb (72,100 kg) arrived at the airport in 2008 (BTS 2008).
44

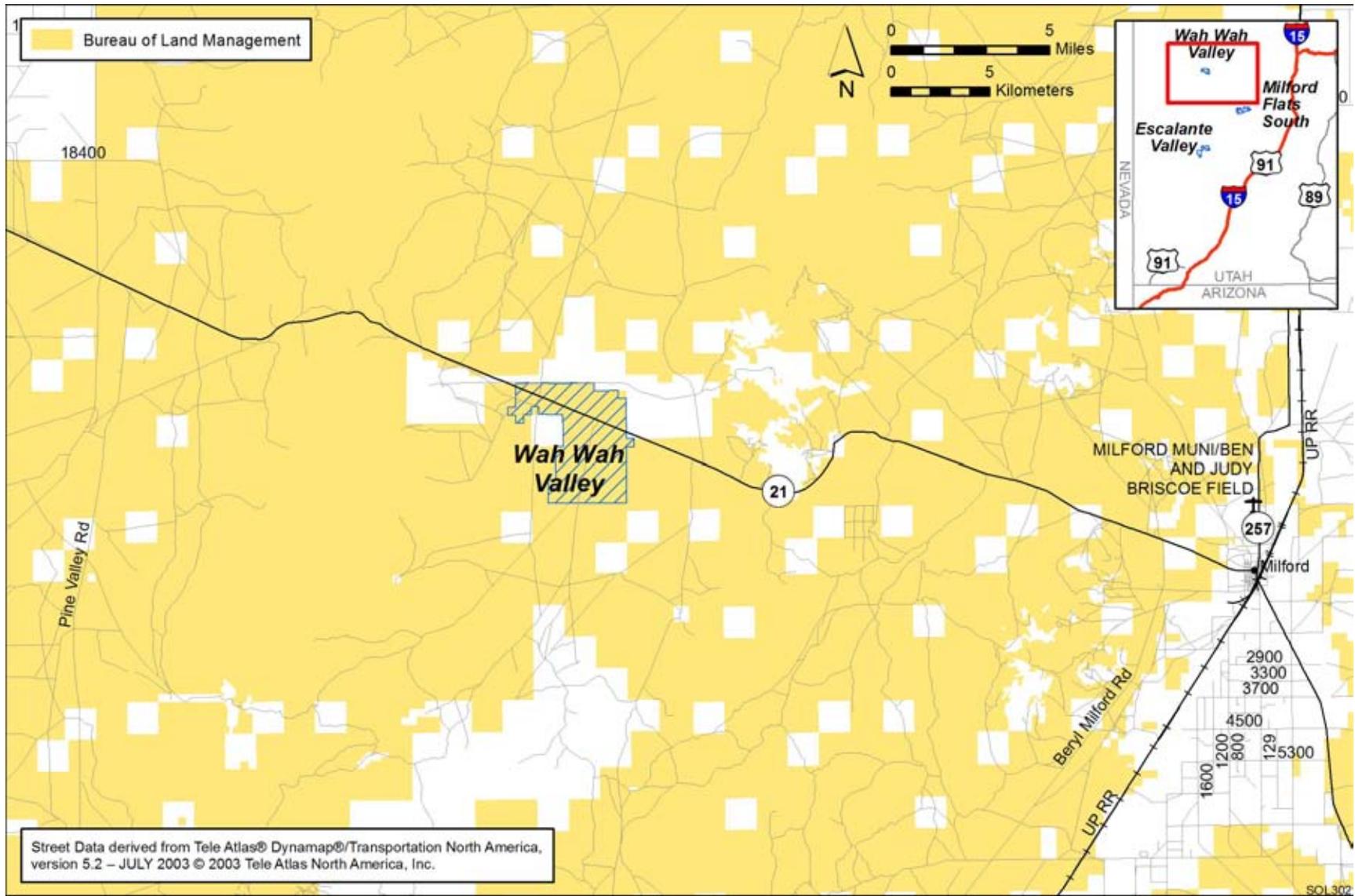


FIGURE 13.3.21.1-1 Local Transportation Network Serving the Proposed Wah Wah Valley SEZ

TABLE 13.3.21.1-1 AADT on Major Roads near the Proposed Wah Wah Valley SEZ for 2008

Road	General Direction	Location	AADT (Vehicles)
I-15	North-south	Junction with I-70	11,885
		South of Beaver	15,395
State Route 21	North-south/east-west	South of Garrison	85
		West of Wah Wah Valley SEZ	245
		West side of Milford	2,485
		Junction with State Route 257	2,590
		South of Milford	1,760
		North of Minersville	1,440
State Route 129	North-South	South of Milford	515
		West of junction with State Route 130	690
		Between Minersville and Cedar City	900

Source: UDOT (2009).

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13.3.21.2 Impacts

As discussed in Section 5.19, the primary transportation impacts are anticipated to be from commuting worker traffic. Single projects could involve up to 1,000 workers each day, with an additional 2,000 vehicle trips per day (maximum). The volume of traffic on State Route 21 and other regional corridors would be more than double the current values near the SEZ. Local road improvements would be necessary on any portion of State Route 21 that might be developed so as not to overwhelm the local access roads near any site access point(s). Dependent on the locations of the worker population, upgrades to roads connecting to State Route 21 may also require upgrades (e.g., State Route 130). Potential existing site access roads would require improvements, including asphalt pavement.

Solar development within the SEZ would affect public access along OHV routes designated open and available for public use. If there are any routes designated as open within the proposed SEZ, such routes crossing areas granted ROWs for solar facilities would be re-designated as closed (see Section 5.5.1 for more details on how routes coinciding with proposed solar facilities would be treated).

1 **13.3.21.3 SEZ-Specific Design Features and Design Feature Effectiveness**
2

3 No SEZ-specific design features have been identified related to impacts on transportation
4 systems around the proposed Wah Wah Valley SEZ. The programmatic design features
5 described in Appendix A, Section A.2.2, including local road improvements, multiple site access
6 locations, staggered work schedules, and ride-sharing, would all provide some relief to traffic
7 congestion on local roads leading to the site. Depending on the location of solar facilities within
8 the SEZ, more specific access locations and local road improvements could be implemented.
9

1 **13.3.22 Cumulative Impacts**
2

3 The analysis presented in this section addresses the potential cumulative impacts in the
4 vicinity of the proposed Wah Wah Valley SEZ in Beaver County in southwestern Utah. The
5 CEQ guidelines for implementing NEPA define cumulative impacts as environmental impacts
6 resulting from the incremental effects of an action when added to other past, present, and
7 reasonably foreseeable future actions (40 CFR 1508.7). The impacts of other actions are
8 considered without regard to the agency (federal or nonfederal), organization, or person that
9 undertakes them. The time frame of this cumulative impacts assessment could appropriately
10 include activities that would occur up to 20 years in the future (the general time frame for PEIS
11 analyses), but little or no information is available for projects that could occur further than five to
12 10 years in the future.
13

14 The largest nearby town is Cedar City, located about 50 mi (80 km) to the southeast in
15 Iron County. The town of Milford is located about 23 mi (37 km) to the east. The surrounding
16 land is rural. There is a ranch with some land under irrigation on the northern boundary of the
17 site. Farther away, the Fishlake National Forest is located 40 mi (64 km) to the east, and the
18 Great Basin NP is 45 mi (72 km) to the northwest. In addition, the proposed Wah Wah Valley
19 SEZ is located close to both the Milford Flats South and Escalante Valley proposed SEZs, and
20 in some areas, impacts from the three SEZs overlap.
21

22 The geographic extent of the cumulative impacts analysis for potentially affected
23 resources near the Wah Wah Valley SEZ is identified in Section 13.3.22.1. An overview of
24 ongoing and reasonably foreseeable future actions is presented in Section 13.3.22.2. General
25 trends in population growth, energy demand, water availability, and climate change are
26 discussed in Section 13.31.22.3. Cumulative impacts for each resource area are discussed in
27 Section 13.3.22.4.
28
29

30 **13.3.22.1 Geographic Extent of the Cumulative Impacts Analysis**
31

32 Table 13.3.22.1-1 presents the geographic extent of the cumulative impacts analysis for
33 potentially affected resources near the Wah Wah Valley SEZ. These geographic areas define the
34 boundaries encompassing potentially affected resources. Their extent varies on the basis of the
35 nature of the resource being evaluated and the distance at which an impact may occur (thus, for
36 example, the evaluation of air quality may have a greater regional extent of impact than visual
37 resources). Lands around the SEZ are State or privately owned, administered by the USFS, or
38 administered by the BLM. The BLM administers approximately 75% of the lands within a 50-mi
39 (80-km) radius of the SEZ.
40
41

42 **13.3.22.2 Overview of Ongoing and Reasonably Foreseeable Future Actions**
43

44 The future actions described below are those that are “reasonably foreseeable”; that is,
45 they have already occurred, are ongoing, are funded for future implementation, or are included in
46 firm near-term plans. Types of proposals with firm near-term plans are as follows:

**TABLE 13.3.22.1-1 Geographic Extent of the Cumulative Impacts Analysis by Resource Area:
Proposed Wah Wah Valley SEZ**

Resource Area	Geographic Extent
Lands and Realty	Wah Wah Valley
Specially Designated Areas and Lands with Wilderness Characteristics	Wah Wah Valley
Rangeland Resources	Wah Wah Valley
Recreation	Wah Wah Valley
Military and Civilian Aviation	Wah Wah Valley
Soil Resources	Areas within and adjacent to the Wah Wah Valley SEZ
Minerals	Wah Wah Valley
Water Resources Surface Water Groundwater	Wah Wah Wash, Wah Wah Valley Hardpan, Sevier Lake Wah Wah Valley, regional carbonate-rock aquifer
Vegetation, Wildlife and Aquatic Biota, Special Status Species	Known or potential occurrences within a 50-mi (80-km) radius of the Wah Wah Valley SEZ
Air Quality and Climate	Wah Wah Valley and beyond
Visual Resources	Viewshed within a 25-mi (40-km) radius of the Wah Wah Valley SEZ
Acoustic Environment (noise)	Areas adjacent to the Wah Wah Valley SEZ
Paleontological Resources	Areas within and adjacent to the Wah Wah Valley SEZ
Cultural Resources	Areas within and adjacent to the Wah Wah Valley SEZ for archaeological sites; viewshed within a 25-mi (40-km) radius of the Wah Wah Valley SEZ for other properties, such as historic trails and traditional cultural properties
Native American Concerns	Wah Wah Valley and surrounding mountains; viewshed within a 25-mi (40-km) radius of the Wah Wah Valley SEZ
Socioeconomics	Beaver, Iron, and Millard Counties
Environmental Justice	Beaver, Iron, and Millard Counties
Transportation	State Route 21

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- 1 • Proposals in a detailed design phase;
- 2
- 3 • Proposals listed in formal NOIs published in the Federal Register or state
- 4 publications;
- 5
- 6 • Proposals for which enabling legislation has been passed; and
- 7
- 8 • Proposals that have been submitted to federal, state, or county regulators to
- 9 begin a permitting process.
- 10

11 Projects in the bidding or research phase, or that have been put on hold, were not
12 included in the cumulative impacts analysis.

13
14 The ongoing and reasonably foreseeable future actions described below are grouped
15 into two categories: (1) actions that relate to energy production and distribution, including
16 potential solar energy projects under the proposed action (Section 13.3.22.2.1), and (2) other
17 ongoing and reasonably foreseeable actions, including those related to mining and mineral
18 processing, grazing management, transportation, recreation, water management, and
19 conservation (Section 13.3.22.2.2). Together, these actions have the potential to affect human
20 and environmental receptors within the geographic range of potential impacts over the next
21 20 years.

22 23 24 ***13.3.22.2.1 Energy Production and Distribution***

25
26 Recent developments in the state of Utah have emphasized more future reliance on
27 renewable sources for energy production. In 2008, Utah enacted the Energy Resource and
28 Carbon Emission Reduction Initiative (Senate Bill 202), which established a voluntary RPG of
29 20% by 2025. This bill is similar to those in states that have adopted RPSs; however, this bill
30 requires that utilities pursue renewable energy only to the extent that it is “cost-effective” to do
31 so. The voluntary renewable goals are being addressed by companies that intend to be energy
32 producers, possibly resulting in several projects being sited in the same geographic areas of
33 southwestern Utah during the same time frame.

34
35 Reasonably foreseeable future actions related to energy development and distribution in
36 the vicinity of the proposed Wah Wah Valley SEZ are identified in Table 13.3.22.2-1 and are
37 described in the following sections. Renewable energy projects identified include wind and
38 geothermal projects, but no foreseeable solar energy projects have been identified.

39 40 41 **Wind Energy Development**

42
43 The Milford Wind Corridor Project, Phases I–V, which are either planned, under way, or
44 ongoing, is currently the only reasonably foreseeable wind energy development within a 50-mi
45 (80-km) radius of the proposed Wah Wah Valley SEZ. This development is administered under
46 three BLM ROW applications, as listed in Table 13.3.22.2-1. The footprints of these and
47 numerous other renewable energy ROW applications in various stages of authorization are

TABLE 13.3.22.2-1 Reasonably Foreseeable Future Actions Related to Energy Development and Distribution near the Proposed Wah Wah Valley SEZ

Description	Status	Resources Affected	Primary Impact Location
<i>Renewable Energy Development</i>			
Milford Wind (UTU 82972)	Ongoing	Land use, ecological resources, visual	About 25 mi (40 km) east-northeast of Wah Wah Valley SEZ (Beaver and Millard Counties)
Milford Wind Phase II (UTU 83073)	Underway	Land use, ecological resources, visual	About 25 mi (40 km) east-northeast of Wah Wah Valley SEZ (Beaver and Millard Counties)
Milford Wind Phases III–V (UTU 8307301)	Planned	Land use, ecological resources, visual	About 25 mi (40 km) east-northeast of Wah Wah Valley SEZ (Beaver and Millard Counties)
Geothermal Energy Project UTU 66583O	Authorized	Land use, groundwater, terrestrial habitats, visual	About 30 mi (50 km) east of Wah Wah Valley SEZ (Beaver County)
Geothermal Energy Project UTU 66583X	Authorized	Land use, groundwater, terrestrial habitats, visual	About 30 mi (50 km) east of Wah Wah Valley SEZ (Beaver County)
Blundell Geothermal Power Station	Ongoing	Land use, groundwater, terrestrial habitats, visual	About 30 mi (50 km) northeast of Wah Wah Valley SEZ (Beaver County)
<i>Transmission and Distribution System</i>			
Sigurd to Red Butte No. 2 345-kV Transmission Line Project	Planned	Land use, ecological resources, visual	About 17 mi (27 km) east of Wah Wah SEZ
Energy Gateway South 500 kV AC Transmission Line Project	Planned	Land use, ecological resources, visual	About 17 mi (27 km) east of Wah Wah SEZ
TransWest Express 600 kV DC Transmission Line Project	Planned	Land use, ecological resources, visual	About 17 mi (27 km) east of Wah Wah SEZ
UNEV liquid Fuel Pipeline (UTU-79766)	FEIS April 2010	Disturbed areas, terrestrial habitats along pipeline ROW	About 17 mi (27 km) east of Wah Wah SEZ

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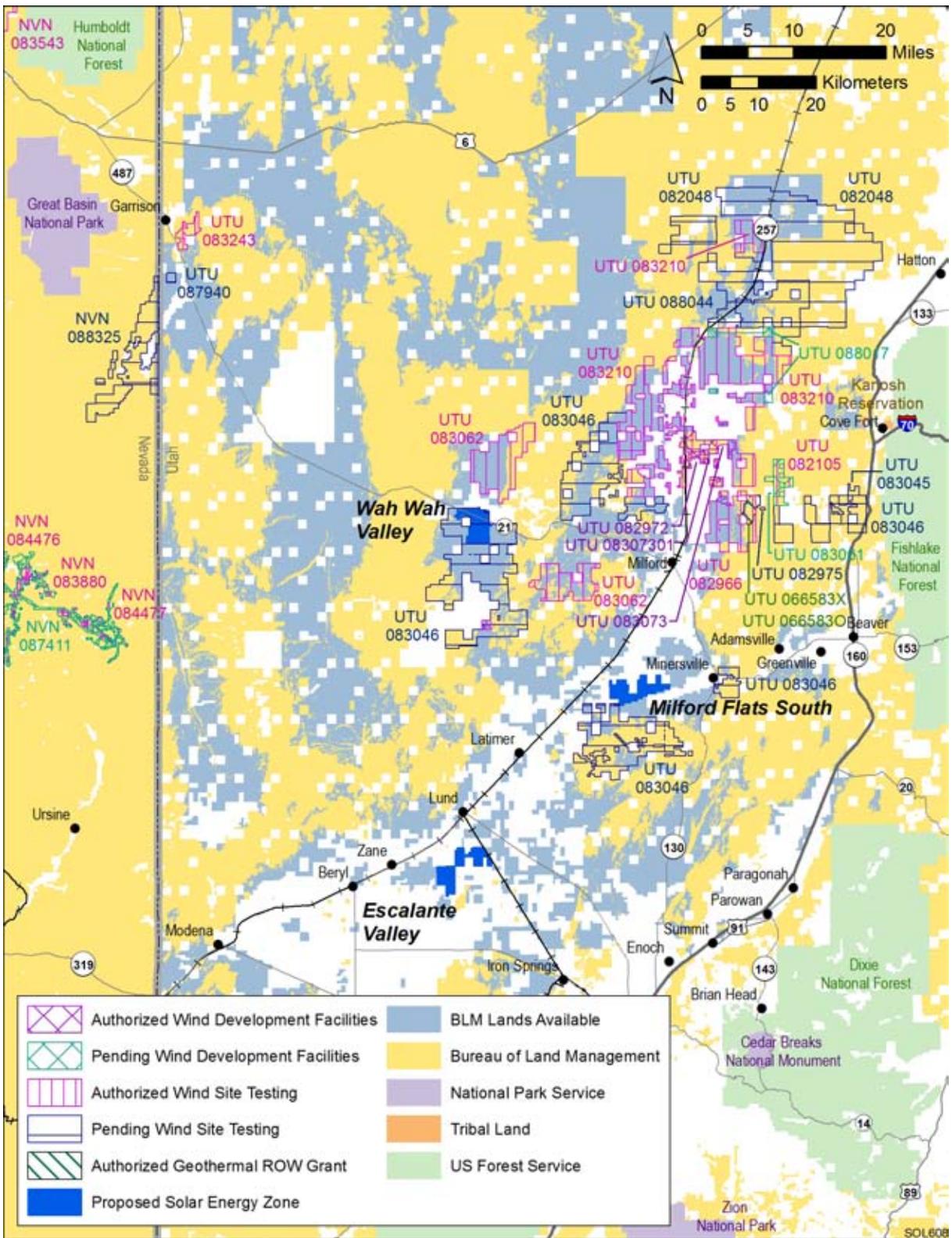
1 shown in Figure 13.3.22.2-1. The identified reasonably foreseeable energy development and
2 distribution projects are discussed in the following subsections, followed by a brief discussion
3 of pending wind applications, also shown in Figure 13.3.22.2-1, which are considered to
4 represent potential, if not foreseeable, projects at this time.

- 5
6 • *Milford Wind Phase I (UTU 82972)*. Phase I of the Milford Wind Corridor
7 Project, a 203.5-MW facility, began operations in October 2009. At least
8 four more phases will follow. The facility is located about 10 mi (16 km)
9 northeast of Milford, east of State Route 287 and on 25,000 acres (103 km²),
10 covering land in both Beaver and Millard Counties. The facility has 97 wind
11 turbines, including 58 Clipper Liberty 2.5-MW wind turbines and 39 GE
12 1.5-MW wind turbines. Power from this facility is being purchased by the
13 Southern California Public Power Authority. The project also includes a new
14 transmission line connecting the facility to the existing Intermountain Power
15 Project substation near Delta, Utah. Milford Wind is the first wind energy
16 facility permitted under the BLM Wind Energy Programmatic Environmental
17 Impact Statement for western states (First Wind 2009).
18
- 19 • *Milford Wind Phases II, III, IV, and V*. Four additional phases of the Milford
20 Wind Corridor Project, adjacent to Milford Wind Phase I, are in development.
21 Construction of Milford Wind II (UTU 83073) is under way. Each of the four
22 projects will be a 200-MW wind energy facility (First Wind 2009).
23

24 As discussed in Section 13.3.1.2, there is a designated but unoccupied transmission
25 corridor that passes through the proposed Wah Wah Valley SEZ. It is likely that there would be
26 development on this corridor or elsewhere on or near the SEZ to transmit the electricity
27 generated by the potential future solar facilities on the SEZ. The land use conflicts and other
28 cumulative impacts associated with such development would have to be considered when these
29 facilities are proposed and constructed.

30
31
32 ***Pending Wind ROW Applications on BLM-Administered Lands.*** Applications for right-
33 of-way grants that have been submitted to the BLM include six pending authorizations for wind
34 site testing, eight authorized for wind testing, and three pending authorizations for development
35 of wind facilities that would be located within 50 mi (80 km) of the SEZ as of May 14, 2010
36 (BLM and USFS 2010). Table 13.3.22.2-2 lists these applications and Figure 13.3.22.2-1 shows
37 their locations.

38
39 The likelihood of any of the pending wind ROW application projects actually being
40 developed is uncertain, but it is generally assumed that applications authorized for wind testing
41 are closer to fruition. However, wind testing alone is not considered a sufficient basis to classify
42 these as reasonably foreseeable projects. The pending applications are listed in Table 13.3.22.2-2
43 for completeness and as an indication of the level of interest in development of wind energy in
44 the region. Some number of these applications would be expected to result in actual projects.
45 Thus, the cumulative impacts of these potential projects are analyzed in their aggregate effects.
46



1
 2 **FIGURE 13.3.22.2-1 Locations of Renewable Energy Proposals within a 50-mi (80-km) Radius of**
 3 **the Proposed Wah Wah Valley SEZ**

TABLE 13.3.22.2-2 Pending Wind Energy Project ROW Applications on BLM-Administered Land within 50 mi (80 km) of the Proposed Wah Wah Valley SEZ^a

Serial No	Technology	Status	Field Office
<i>Pending Wind Site Testing</i>			
UTU 082048	Wind	Pending	Fillmore
UTU 082975	Wind	Pending	Cedar City
UTU 083045	Wind	Pending	Cedar City
UTU 083046	Wind	Pending	Cedar City
UTU 085819	Wind	Pending	Cedar City
UTU 088044	Wind	Pending	Cedar City
<i>Authorized for Wind Site Testing</i>			
UTU 082105	Wind	Site Testing	Cedar City
UTU 082966	Wind	Site Testing	Cedar City/Fillmore
UTU 083062	Wind	Site Testing	Cedar City/Fillmore
UTU 083210	Wind	Site Testing	Cedar City/Fillmore
UTU 083243	Wind	Site Testing	Fillmore
NVN 083380	Wind	Site Testing	Ely
NVN 084476	Wind	Site Testing	Ely
NVN 084477	Wind	Site Testing	Ely
<i>Pending Wind Development Facilities</i>			
UTU 083061	Wind	Pending	Cedar City
UTU 088017	Wind	Pending	Cedar City
NVN 087411	Wind	Pending	Cedar City

^a Pending wind applications information downloaded from *GeoCommunicator* (BLM and USFS 2010).

1
2
3 Wind testing would involve some relatively minor activities that could have some
4 environmental effects, mainly the erection of meteorological towers and monitoring of wind
5 conditions. These towers may or may not employ guy wires and may be 200 ft (60 m) high.
6
7

8 **Geothermal Energy Development**

9
10 Two applications for the development of geothermal energy facilities within 50 mi
11 (80 km) of the proposed SEZ have geothermal agreements authorized by the BLM, as listed in
12 Table 13.3.22.2-1 and shown in Figure 13.3.22.2-1. The two applications are located in close
13 proximity to each other and are located about 30 mi (50 km) east of the SEZ and about 10 mi
14 (16 km) northeast of Milford. These projects are considered only minimally reasonably
15 foreseeable because applications have received only authorized geothermal agreements
16 (BLM and USFS 2010). One operating facility, the Blundell Geothermal Power Station, lies
17 about 30 mi (50 km) northeast of the SEZ and has been in operation since 1984.
18
19

1 **Blundell Geothermal Power Station.** Utah Power has operated the power station since
2 1984, which is located 9 mi (14 km) north of Milford in Beaver County. The plant produces
3 geothermal brine from wells that tap a geothermal resource in fractured, crystalline rock at
4 depths generally between 2,100 and 6,000 ft (640 and 1,830 m) and temperatures typically
5 between 520 and 600°F (271 and 316°C). Spent geothermal brine is sent back into the reservoir
6 through gravity-fed injection wells, while the steam fraction is directed into the power plant at
7 temperatures between 350 and 400°F (177 and 204°C) with steam pressure approaching 109 psi
8 (7.66 kg/cm²).
9

10 **Transmission and Distribution Systems**

11 Existing and proposed electric transmission lines are considered in the cumulative impact
12 analysis related to solar energy project development in the proposed Utah SEZs. Several
13 transmission line projects and a petroleum pipeline project occur or are planned within the
14 geographic extent of effects for the proposed Wah Wah SEZ.
15
16

- 17
18 • *Sigurd to Red Butte No. 2, 345-kV Transmission Line.* Rocky Mountain Power
19 submitted a preliminary ROW application form to the BLM (i.e., Form 299)
20 along with a Plan of Development for the project in December 2008. The
21 project would traverse public lands administered by the BLM and the USFS
22 and private lands over a distance of 150 to 160 mi (241 to 258 km) from the
23 Sigurd Substation in Sevier County near Richfield, Utah, to the Red Butte
24 Substation in southwestern Utah near the town of Central in Washington
25 County. Transmission towers would be steel H-frame design spaced about
26 1,000 to 1,200 ft (305 to 366 m) apart. The transmission line would need to
27 be operating by 2012 to meet the expected energy demands of southwestern
28 Utah because of population growth in the St. George area and surrounding
29 communities. The proposed route and alternative segments under
30 consideration by Rocky Mountain Power would pass near Milford
31 (BLM 2009a).
32
- 33 • *Energy Gateway South 500-kV AC Line.* PacifiCorp, as part of its Energy
34 Gateway Transmission Expansion Project, is planning to build a high-voltage
35 transmission line, known as the Gateway South segment, from the Aeolus
36 substation in southeastern Wyoming into the new Clover substation near
37 Mona, Utah. An additional segment would continue from the new Clover
38 substation to the existing Crystal substation north of Las Vegas. The larger
39 Gateway Transmission Expansion Project would provide a broad regional
40 expansion of transmission capacity in the West, in part to connect new
41 renewable energy sources to load centers. The Gateway South portion is in the
42 early planning, siting, and permitting stages. Rights of way and an EIS are
43 expected to be completed by 2015, while PacifiCorp projects an in-service
44 date of 2017 to 2019 (PacifiCorp 2010).
45

- 1 • *TransWest Express 600-kV DC Line.* The TransWest Express LLC is
2 proposing a 600-kV DC transmission line that would deliver 3,000 MW of
3 wind energy from Wyoming to the desert southwest by way of Las Vegas.
4 The proposed route would cover 725 mi (1160 km) and pass through
5 southwestern Utah, about 20 mi (32 km) northwest of Cedar City in the
6 vicinity of the three proposed Utah SEZs and within or adjacent to federally
7 designated or proposed utility corridors, or parallel to existing transmission
8 lines or pipelines. The project is in the planning, permitting, and design stages.
9 Project proponents entered the project into the Western Electricity
10 Coordinating Council's rating process for grid integration in January 2008
11 jointly with PacifiCorp's Gateway South project and anticipate a path rating
12 by 2011. An EIS to be prepared by BLM and the Western Area Power
13 Administration is expected to be completed by 2013 and the line is expected
14 to be in service in 2015 (TransWest 2010).
15
- 16 • *UNEV Pipeline Project.* Holly Energy Partners proposes to construct and
17 operate a 399-mi (640-km) long, 12-in (0.3-m) petroleum products (gasoline
18 and diesel fuel) pipeline that will originate at the Holly Corporation's Woods
19 Cross, Utah, refinery near Salt Lake City and terminate near the Apex
20 Industrial Park northeast of Las Vegas, Nevada. The pipeline would run along
21 the same route as the proposed TransWest Express transmission line described
22 above, passing about 20 mi (32 km) northwest of Cedar City, Utah, and would
23 include a lateral pipeline from the main line to a pressure reduction station at a
24 terminal about 10 mi (16 km) northwest of Cedar City. Access roads would be
25 built to all aboveground infrastructures. BLM issued a Final EIS for the
26 project in April 2010 (BLM 2010b).
27
28

29 ***13.3.22.2.2 Other Actions***

30 **Grazing Allotments**

31
32
33
34 Grazing is a common use of the lands in the vicinity of the proposed Wah Wah Valley
35 SEZ. The management authority for grazing allotments on these lands rests with BLM's Cedar
36 City Field Office. Some of the allotments currently in effect or under review by the BLM in the
37 area include Wah Wah Lawson, Beaver Lake, and Smithson (BLM 2009a). While many factors
38 could influence the level of authorized use, including livestock market conditions, natural
39 drought cycles, increasing nonagricultural land development, and long-term climate change, it
40 is anticipated that the current level of use will continue in the near term. A long-term reduction
41 in federal authorized grazing use would affect the value of the private grazing lands.
42
43
44

1 **Other Projects**

2
3 Many projects requesting ROW grant approvals on BLM and USFS lands are under
4 review or have received recent BLM approval for locations in Beaver, Iron, and Millard
5 Counties. These projects include initiatives such as minerals mining, communication tower
6 construction or modification, habitat improvement, and vegetation removal for fire control. The
7 following is a summary of larger projects in the vicinity of the three proposed SEZs in Utah
8 (because of the close proximity of the three proposed SEZs in Utah and overlapping geographic
9 extent of boundaries for various resource areas, the projects described in this section apply to all
10 three SEZs in Utah). A list of projects is included in Table 13.3.22.2-3. The list was derived from
11 the BLM Web site for the State of Utah on projects recently approved or under review for ROW
12 permits (BLM 2009a).

- 13
14 • *Blawn Mountain Stewardship.* The BLM implemented a project in
15 January 2009 to improve wildlife habitat in the south end of the Wah Wah
16 Mountains, about 33 mi (53.1 km) southwest of Milford. The largest part of
17 the project area is dominated by pinyon-juniper stands, where understory
18 species are in decline. The objectives are to improve forage for wild horses
19 and provide good deer habitat. An estimated 1,065 acres (4.3 km²) was to be
20 improved by cutting, lopping, and scattering juniper while retaining most of
21 the pinyon pine. Riparian habitat improvement includes removing the danger
22 of crown fire in ponderosa pine, which can threaten survival of pinyon pine,
23 and improving habitat around springs and where perennial water occurs. The
24 desired condition is to have a patchy density of shrublands, forbs, and grasses
25 to support wildlife. The project also plans to thin up to 3,180 acres (12.9 km²)
26 of pinyon-juniper stands that surround the Blawn Mountain Chainings. All
27 other actions would be to improve the overall forest health and suitability
28 for wildlife.
29
- 30 • *Paradise Mountain Stewardship.* The BLM initiated a NEPA review in
31 January 2009 on 8,850 acres (35.8 km²) of montane vegetation in the Paradise
32 Mountains near the Utah–Nevada border to evaluate the impacts of vegetation
33 removal and selective thinning to improve wildlife habitat and reduce fire
34 hazards in the area. The project objectives are to improve forest health;
35 improve wildlife habitat; improve and maintain shrub, grass, and forb habitats
36 in meadow and riparian areas; and decrease the probability of crown fires,
37 which would eliminate individual stands. The Paradise Mountains are located
38 10 mi (16.1 km) northwest of the town of Modena, about 50 mi (80.5 km)
39 southwest of the proposed Wah Wah Valley SEZ.

40
41 Sevier Lake Potash Competitive Potash Leasing (DOI-BLM-UT-W020-2010-
42 014-EA). BLM’s Fillmore Field Office is considering leasing Sevier Dry Lake
43 in Millard County, about 20 mi (32 km) northeast of the Wah Wah SEZ, for
44 solid leasable minerals, specifically, the extraction of potassium-rich brines
45 from the surface and subsurface of the Sevier Lake Playa. Extraction
46 techniques could include surface ditches to extract shallow brines and wells to

TABLE 13.3.22.2-3 Other Projects in the Vicinity of the Proposed Wah Wah Valley SEZ

Project Name	Description	Status	County	Location
AirCell, LLC, Communication Site	Communication tower	Approved Nov. 2009	Beaver	Frisco Peak, San Francisco Mountains
Utah Alunite, LLC, Potassium Prospecting Permit Applications	Request to conduct prospect mining for potassium minerals	Applications received Sept. 2009; scoping Dec. 2008	Iron	Vicinity of Bible, Typhoid, and Mountain Springs
Utah Copper Company Hidden Treasure Mine	Amendment to change some mine facilities, haul road change, and perimeter disturbances on BLM and private lands	Approved Jan. 2009	Beaver	5 to 10 mi (8 to 16 km) northwest of Milford, south end of Rocky Range and Beaver Lake Mountains
Copper Ranch Knoll Exploration Plan of Operation	Authorization requested to initiate a copper reserve delineation project on the Marguerite No. 15 and Jewel Mine patented claims	EA completed Jan. 2009, signed Jan. 28, 2009	Beaver	About 7 mi (11.3 km) northwest of Milford on and around Copper Ranch Knoll, about halfway between west side of Rocky Range and the southeast edge of Beaver Lake Mountains
Clark Livestock Pipeline ROW Renewal	Renewal of permit to transport water to livestock along a 17,253-ft (5,258.7-m) long ROW across about 3,950 acres (16 km ²) of BLM lands	Approved Aug. 7, 2008	Iron	Iron Springs/Big Hollow Wash about 10 mi (16.1 km) northwest of Cedar City, Utah
Highway 56 Fuels Reduction	Decrease fire hazard by removal of up to 1,000 acres (4 km ²) of standing pinyon-juniper; project would involve controlled burning, seeding, controlled grazing	Categorical Exclusion prepared in 2008	Iron	Adjacent to residential and outlying properties near Newcastle in southwestern Iron County
Bible Spring Complex Wild Horse Gather and Removal	Removal of about 380 wild horses through capture; information gained used to update Herd Management Area Plans	EA approved June 30, 2009	Beaver, Iron	Wah Wah and Peak Mountain Ranges
Kern River Gas Transportation Co. Apex Expansion Temporary Use Permit	Request to conduct four geotechnical borings for a proposed compressor site; borings to be conducted early June 2009	No information found	Beaver	Northwest of Minersville

TABLE 13.3.22.2-3 (Cont.)

Project Name	Description	Status	County	Location
Sunrise Exploration Project	Exploration to evaluate grade, depth, and thickness of in-place copper to allow delineation of mineable reserves; 100 to 200 rotary drill holes would occur over about 160 acres (0.67 km ²)	Finding of No Significant Impact (FONSI) and Decision Record approved Sept. 24, 2009	Beaver	Located about 4 mi (6.4 km) northwest of the City of Milford at the southern extent of the Rocky Range
Mineral Mountain Communication Site	Upgrade requested for existing communication site; upgrades expand existing site from 45 ft × 35 ft (14 m × 11 m) to 80 ft × 35 ft (24 m × 11 m); internal building modifications; new 70-ft (21-m) tall steel lattice tower	Application to the BLM received in June 2009; EA checklist received in Sept. 2009	Beaver	Township 26S, Range 8W, Section 30
Hamlin Valley Habitat Improvement	Improve vegetation conditions in Hamlin Valley Project Area; goals include habitat improvements in sagebrush-steppe, pinyon-juniper woodlands, and riparian areas; techniques include harrowing of sagebrush and seeding, thinning of pinyon juniper	EA started in Nov. 2005	Beaver, Iron	Project involves parts of Modena, Spanish George, Rosebud, Butcher, Stateline, Indian Peak, Atchison, South Pine Valley, North Pine Valley, and Indian Peak Grazing Allotments

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extract deeper brines. Brines would be concentrated using solar evaporation to precipitate marketable minerals. The process would evaporate an estimated 120,000 ac-ft/yr (148 million m³/yr) of brine and consume 900 ac-ft/yr (1.11 million m³/yr) of fresh water over the life of the project. Leases would stipulate that lessees replace water consumed. In addition, up to 300 mi (483 km) of ditches, 250 mi (402 km) of berms, and 47,000 acres (190 km²) of ponds could be constructed within the floodplain of the dry lakebed. A NEPA Environmental Assessment was issued in September 2010 (BLM 2010b).

- *Clark, Lincoln, and White Pine Counties Groundwater Development Project.* The Southern Nevada Water Authority (SNWA) proposes to construct a groundwater development project that will be capable of transporting as much as 200,000 ac-ft/yr (247 million m³/yr) of groundwater, including 11,584 ac-ft/yr (14 million m³/yr) of water rights in the Dry Lake Valley groundwater basin. The proposed facilities include production wells, water pipelines, pumping stations, water treatment, power, and other appurtenant

1 facilities. The project would draw groundwater from the Snake Valley aquifer
 2 in western Millard County and the adjacent Spring Valley aquifer in Nevada,
 3 as well as the Cave Valley and Dry Lake Valley basins to the southwest. A
 4 DEIS is expected in 2010 (SNWA 2010).
 5
 6

7 **13.3.22.3 General Trends**
 8

9 General trends of population growth, energy demand, water availability, and climate
 10 change are similar for all three SEZs in Utah and are presented together in this section.
 11 Table 13.3.22.3-1 lists the relevant impacting factors for the trends.
 12
 13

14 **13.3.22.3.1 Population Growth**
 15

16 Over the period 2000 to 2008, the population grew annually by 3.2% in the ROI for the
 17 Wah Wah Valley SEZ (see Section 13.3.10.1). The annual population growth rates for the
 18 Escalante Valley and Milford Flats proposed SEZs in the same period were 5.7 and 3.7%,
 19 respectively. The annual growth rate for the state of Utah as a whole was 2.5% and for Beaver
 20 County was 2.4%. Populations are expected to continue to increase over the period 2010 to 2023
 21 (Governor’s Office of Planning and Budget 2009).
 22
 23

TABLE 13.3.22.3-1 General Trends Relevant to the Proposed SEZs in Utah

General Trend	Impacting Factors
Population growth	Urbanization Increased use of roads and traffic Land use modification Employment Education and training Increased resource use (e.g., water and energy) Tax revenue
Energy demand	Increased resource use Energy development (including alternative energy sources) Energy transmission and distribution
Water availability	Drought conditions and water loss Conservation practices Changes in water distribution
Climate change	Water cycle changes Increased wildland fires Habitat changes Changes in farming production and costs

1 **13.3.22.3.2 Energy Demand**
2

3 The growth in energy demand is related to population growth through increases in
4 housing, commercial floorspace, transportation, manufacturing, and services. Given that
5 population growth is expected in the three-SEZ area in Utah (by as much as 19% between 2006
6 and 2016), an increase in energy demand is also expected. However, the EIA projects a decline
7 in per-capita energy use through 2030, mainly because of improvements in energy efficiency
8 and the high cost of oil throughout the projection period. Primary energy consumption in the
9 United States between 2007 and 2030 is expected to grow by about 0.5% each year, with the
10 fastest growth projected for the commercial sector (at 1.1% each year). Transportation,
11 residential, and industrial energy consumption are expected to grow by about 0.5, 0.4, and
12 0.1% each year, respectively (EIA 2009).
13

14 **13.3.22.3.3 Water Availability**
15

16 As described in Section 13.3.9.1.2, groundwater beneath the proposed Wah Wah SEZ lies
17 in the Wah Wah Valley basin-fill aquifer. In 2005, water withdrawals from surface waters and
18 groundwater in Beaver County were 102,350 ac-ft/yr (126 million m³/yr), of which 52% came
19 from surface waters and 48% came from groundwater. The largest water use category was for
20 agricultural irrigation, at 89,000 ac-ft/yr (110 million m³/yr). The remaining water use categories
21 were for thermoelectric energy production (6%), livestock (3%), public supply and domestic uses
22 (2%), and industrial purposes (2%) (Kenny et al. 2009). Little is known about the groundwater
23 resources in the Wah Wah Valley SEZ. The Wah Wah Valley contains only one ranch
24 supporting agriculture, and its water is supplied via an aqueduct from Wah Wah Spring. The
25 rest of the Wah Wah Valley is used primarily for livestock grazing (Stephens 1974). A total of
26 66 water rights have been approved for the Wah Wah Valley and Sevier Lake Area in western
27 Beaver and south-central Millard Counties. Most are for applications less than 2 ac-ft/yr
28 (2,500 m³) for a single-family home with a few livestock (Utah DWR 2004b). There are
29 currently two pending water right applications that are seeking substantial amounts of
30 groundwater. The Central Iron County Water Conservancy District (CICWCD) has applied for
31 the use of 12,000 ac-ft/yr (14.8 million m³/yr) to be extracted from 20 wells within the Wah Wah
32 Valley that would range from 100 to 2,000 ft (31 to 610 m) in depth (Utah DWR 2010;
33 application number A76677). Beaver County has applied for the use of 6,650 ac-ft/yr
34 (8.2 million m³/yr) to be extracted from 17 wells within the Wah Wah Valley that range from
35 500 to 1,000 ft (152 to 305 m) in proposed depths (Utah DWR 2010; application number
36 A78814). Both of these groundwater applications are under review by the Utah DWR, and
37 together have the potential to withdraw groundwater quantities that exceed the estimated value
38 of groundwater recharge for the basin.
39

40 Groundwater use in the Milford area of the Escalante Valley about 20 mi (32 km) east of
41 the SEZ has increased in recent years. The total of estimated withdrawals in the Milford area in
42 2008 was about 51,000 ac-ft (62.9 million m³), which is 2,000 ac-ft (2.5 million m³) more than
43 was reported for 2007 and 6,000 ac-ft (7.4 million m³) more than the average annual withdrawal
44 for 1998 to 2007. The increase was due mainly to increased industrial water use. Groundwater
45 use was primarily for agriculture (79%) in 2008 (Burden et al. 2009). The majority of the
46

1 agricultural water use occurs between the towns of Milford and Minersville. The Utah DWR
2 reports that 4,009 water rights have been approved in the Milford area of the Escalante Valley.
3 Almost all of the area is closed to new water appropriations (Utah DWR 2004a).

6 ***13.3.22.3.4 Climate Change***

7
8 The Governor’s Blue Ribbon Advisory Council on Climate Change conducted a study of
9 climate change and its effects on Utah (BRAC 2007). The report, generated by scientists from the
10 three major universities in Utah, summarized present scientific understanding of climate change and
11 its potential impacts on Utah and the western United States. Excerpts of researchers’ findings and
12 conclusions from the report follow:

- 14 • *Temperature Change.* In Utah, the average temperature during the past decade
15 was higher than observed during any comparable period of the past century
16 and roughly 2°F (1°C) higher than the 100-year average. Precipitation in Utah
17 during the twentieth century was unusually high; droughts during other
18 centuries have been more severe, prolonged, and widespread. Declines in
19 low-elevation mountain snowpack have been observed over the past several
20 decades in the Pacific Northwest and California. However, clear trends in
21 snowpack levels in Utah’s mountains from temperature increases cannot be
22 developed at this time based on recent historic data. Climate models suggest
23 that the earth’s average surface temperature will increase between 3 and 7°F
24 (2 and 4°C). GHG emissions at current rates will continue to exacerbate
25 climate change and associated impacts. For Utah, the projected change in
26 annual mean temperature under the 2.5 times increase in CO₂ concentrations
27 by the end of this century is about 8°F (5°C), which is comparable to the
28 present difference in annual mean temperature between Park City (44°F
29 [24°C]) and Salt Lake City (52°F [29°C]).
- 30
31 • *Impacts of Climate Change in Utah.* Utah is projected to warm more than the
32 average for the entire globe and more than coastal regions of the contiguous
33 United States. The expected consequences of this warming are fewer frost
34 days, longer growing seasons, and more heat waves. Agricultural impacts
35 anticipated include (1) an increase in crop productivity, assuming that water
36 use for irrigation remains relatively constant and more precipitation falls as
37 rain than as snow; (2) grazing use decreases on nonirrigated lands because
38 there is less forage for livestock; and (3) changes in insect and other animal
39 populations which, in turn, affect pollination and crop damage.

40
41 Snowpack, water supply, and drought potential are predicted to be affected by GHG
42 emissions holding at current levels or increasing. Year-to-year variations in snowfall will
43 continue to dominate mountain snowpack, streamflow, and water supply during the next couple
44 of decades. As temperature increases, it is likely that a greater fraction of precipitation will fall
45 as rain rather than as snow, and the length of the snow accumulation season will decrease.
46 Projected trends likely to occur in the twenty-first century are as follows:

- 1 • A reduction in natural snowpack and snowfall in the early and late winter for
2 the winter recreation industry, particularly in low- to mid-elevation mountain
3 areas (trends in high-elevation areas are unclear);
- 4
- 5 • An earlier and less intense average spring runoff for reservoir recharge;
- 6
- 7 • Increased demand for agricultural and residential irrigation due to more rapid
8 drying of soils; and
- 9
- 10 • Warming of lakes and rivers with associated changes on aquatic life, including
11 increased algal abundance and upstream shifts of fish.
- 12

13 Increasing temperatures will cause soils to dry more rapidly and likely increase soil
14 vulnerability to wind erosion. Increased dust transport during high wind events would likely
15 occur, particularly from salt flats and dry lakebeds such as Sevier Lake. Dust deposited on
16 mountain snowpack would also accelerate spring snowmelt.

17

18 Forests, desert communities, and wildlife will likely be affected by increasing
19 temperatures and associated climate change. Drier conditions would result in changes in plant
20 distribution, quality of wildlife habitat, and increased potential for and intensity of wildfires.
21 Plant distribution may change such that species occupy higher elevations.

22

23 The three proposed SEZs in Utah are in dry areas that experience drought conditions
24 that will become worse with temperature increases and climate-induced changes on rainfall
25 amounts and patterns. Groundwater availability for agriculture and livestock grazing on BLM-
26 administered and private lands in southwestern Utah will likely be adversely affected by
27 climate change.

28

29

30 **13.3.22.4 Cumulative Impacts on Resources**

31

32 This section addresses potential cumulative impacts in the proposed Wah Wah Valley
33 SEZ on the basis of the following assumptions: (1) because of the relatively small size of the
34 proposed SEZ (less than 10,000 acres [40.5 km²]), only one project would be constructed at a
35 time, and (2) maximum total disturbance over 20 years would be about 4,878 acres (19.7 km²)
36 (80% of the entire proposed SEZ). For purposes of analysis, it was also assumed that no more
37 than 3,000 acres (12.1 km²) would be disturbed per project annually and 250 acres (1.01 km²)
38 monthly on the basis of construction schedules planned in current applications. In addition,
39 because the closest transmission line is about 42 mi (68 km) away, either a connection of that
40 length would have be established to the existing transmission line or a new transmission line
41 closer to the SEZ would be required to connect the solar facilities on the proposed SEZ to the
42 grid. If a connecting line to the existing transmission line were to be constructed, approximately
43 1,273 acres (5.2 km²) of land would be affected. Regarding site access, State Route 21 runs
44 through the northern half of the proposed SEZ. Therefore, other than certain improvements at
45 intersections of State Route 21 and access roads to the SEZ and local roads on the SEZ, no new
46 road construction would be necessary.

1 Cumulative impacts that would result from the construction, operation, and
2 decommissioning of solar energy development projects within the proposed SEZ when added to
3 other past, present, and reasonably foreseeable future actions described in the previous section in
4 each resource area are discussed below. At this stage of development, because of the uncertain
5 nature of the future projects in terms of location within the proposed SEZ, size, number, and the
6 types of technology that would be employed, the impacts are discussed qualitatively or semi-
7 quantitatively, with ranges given as appropriate. More detailed analyses of cumulative impacts
8 would be performed in the environmental reviews for the specific projects in relation to all other
9 existing and proposed projects in the geographic areas.

10 11 12 ***13.3.22.4.1 Lands and Realty*** 13

14 The area covered by the proposed Wah Wah Valley SEZ is largely undeveloped. In
15 general, the areas surrounding the SEZ are rural in nature. Numerous dirt/ranch roads provide
16 access throughout the SEZ.
17

18 Development of the SEZ for utility-scale solar energy production would establish a large
19 industrial area that would exclude many existing and potential uses of the land, perhaps in
20 perpetuity. Access to such areas by both the general public and much wildlife would be
21 eliminated. Traditional uses of public lands would no longer be allowed. Utility-scale solar
22 energy development would be a new and discordant land use in the area. It also is possible that
23 similar development of state and private lands located adjacent to the SEZ would be induced by
24 development on public lands and might include additional industrial or support facilities and
25 activities.
26

27 In addition, numerous wind energy projects are proposed within a 50-mi (80-km) radius
28 of the proposed Wah Wah Valley SEZ. As shown in Table 13.3.22.2-1 and Figure 13.3.22.2-1,
29 in addition to the ongoing Milford Wind Corridor Project 25 mi (40 km) to the northeast, there
30 are six pending authorization for wind site testing, eight authorized for wind testing, and three
31 pending authorization for development of wind facilities within this distance. The majority of
32 these wind applications are within 50 mi (80 km) of the SEZ to the east-northeast; the nearest
33 authorized for wind site testing is about 3 mi (5 km) north, while the nearest pending wind
34 testing application overlaps the proposed SEZ. An operating geothermal facility and two
35 adjacent geothermal authorized geothermal leases are located about 30 mi (48 km) to the
36 northeast and east, respectively. There are currently no solar applications within 50 mi (80 km)
37 of the SEZ (Figure 13.2.22.2-1), but the proposed Milford Flats South SEZ is about 42 mi
38 (68 km) to the east, and the proposed Escalante Valley SEZ is about 33 mi (53 km) to the south.
39

40 The cumulative effects on land use of development of utility-scale solar projects on
41 public lands on the proposed Wah Wah Valley SEZ in combination with ongoing and
42 foreseeable actions within the geographic extent of effects, nominally 50 mi (80 km), would be
43 small to moderate. Most other actions outside of the proposed SEZ are wind energy projects,
44 which would allow many current land uses to continue, including farming. However, the number
45 and sizes of such projects could result in cumulative effects, especially if the SEZ is fully
46 developed, or all three Utah SEZs are fully developed, with solar projects.

1 **13.3.22.4.2 Specially Designated Areas and Lands with Wilderness Characteristics**
2

3 There are two WSAs (Wah Wah Mountains and King Top) and other areas with
4 wilderness characteristics near the proposed Wah Wah Valley SEZ. The potential exists for
5 cumulative visual impacts on these areas from the construction of utility-scale solar energy
6 facilities within the SEZ and the construction of transmissions lines outside the SEZ. The exact
7 nature of cumulative visual impacts on the users of these areas would depend on the specific
8 solar technologies employed in the SEZ and the locations selected within the SEZ for solar
9 facilities and outside the SEZ for transmission lines. Other identified reasonably foreseeable
10 energy projects identified within 50 mi (80 km) of the proposed SEZ—Milford Wind, Blundell
11 Geothermal, and two authorized geothermal applications—located about 25 to 30 mi (40 to
12 50 km) to the east-northeast, are likely too far away to be seen from the visually sensitive areas
13 near the SEZ.
14

15
16 **13.3.22.4.3 Rangeland Resources**
17

18 Currently, there is one grazing allotment in the proposed Wah Wah Valley SEZ. If utility-
19 scale solar facilities were constructed on the SEZ, those areas occupied by the solar projects
20 would be excluded from grazing. Depending on the number and size of potential projects, the
21 impact on the ranger(s) who currently utilize the same lands could be significant. Construction
22 of transmission lines would not have a significant effect on the rangers. The effects of other
23 renewable energy projects within the geographic extent of effects, including Milford Wind,
24 Blundell Geothermal, and two authorized geothermal applications within 50 mi (80 km) of the
25 SEZ, would not likely result in cumulative impacts on grazing due to their distance from the
26 proposed SEZ. Any impacts from pending wind applications, if developed, would be small, as
27 wind facilities are generally compatible with grazing.
28

29 Because the proposed SEZ is more than 3 mi (5 km) from any wild horse and burro
30 HMA managed by the BLM and more than 50 mi (80 km) from any wild horse and burro
31 territory administered by the USFS, solar energy development within the SEZ would not
32 contribute to cumulative impacts on wild horses and burros managed by the BLM or the USFS.
33

34
35 **13.3.22.4.4 Recreation**
36

37 Limited outdoor recreation (e.g., backcountry driving, OHV use, and hunting for both
38 small and big game) occurs on or in the immediate vicinity of the SEZ. Construction of utility-
39 scale solar projects on the SEZ would preclude recreational use of the affected lands for the
40 duration of the projects. However, improvements to or additional access roads could increase the
41 amount of recreational use in unaffected areas of the SEZ or in the immediate vicinity. There
42 would be a potential for visual impacts on recreational users of the two WSAs and areas with
43 wilderness characteristics near the SEZ (Section 13.3.22.3.2). Since the area of the proposed SEZ
44 has low current recreational use, while major foreseeable actions, primarily wind and geothermal
45 projects located 25 to 30 mi (40 to 50 km) to the east, would similarly affect areas of low

1 recreational use, cumulative impacts on recreation within the geographic extent of effects, would
2 be small.

3 4 5 ***13.3.22.4.5 Military and Civilian Aviation*** 6

7 The proposed Wah Wah Valley SEZ is located about 100 mi (161 km) away from the
8 closest military installation. The closest civilian municipal aviation facility is the Milford
9 Municipal Airport, located 23 mi (37 km) east of the SEZ. Recent information from the DoD
10 indicates that there are no concerns about solar development in the SEZ. Thus, solar energy
11 development in the proposed SEZ would not contribute to cumulative impacts on military or
12 civilian aviation.

13 14 15 ***13.3.22.4.6 Soil Resources*** 16

17 Ground-disturbing activities (e.g., grading, excavating, and drilling) during the
18 construction phase of a solar project, including any associated transmission line connections
19 and new roads, would contribute to soil loss due to wind erosion. Road use during construction,
20 operations, and decommissioning of the solar facilities would further contribute to soil loss.
21 Programmatic design features would be employed to minimize erosion and loss. Residual soil
22 losses with mitigations in place would be in addition to losses from construction of other
23 renewable energy facilities, recreational uses, and agricultural. Overall, the cumulative impacts
24 on soil resources would be small, however, because of the generally low level of soil disturbance
25 associated with wind and geothermal facilities, the main foreseeable development within the
26 geographic extent of effects, and the distance to the authorized projects.

27
28 Landscaping of solar energy facility areas could alter drainage patterns and lead to
29 increased siltation of surface water streambeds, in addition to that from other development
30 activities and agriculture. However, with the required programmatic design features in place,
31 cumulative impacts would be small.

32 33 34 ***13.3.22.4.7 Minerals (Fluids, Solids, and Geothermal Resources)*** 35

36 As discussed in Section 13.3.8, currently there are no oil and gas leases within or near the
37 proposed Wah Wah Valley SEZ. There are no mining claims or proposals for geothermal energy
38 development either. Because of the generally low level of mineral production in the proposed
39 SEZ and surrounding area and the expected low impact on mineral accessibility of other
40 foreseeable actions within the geographic extent of effects, mainly wind and geothermal
41 facilities, cumulative impacts on mineral resources would be small.

1 **13.3.22.4.8 Water Resources**
2

3 The water requirements for various technologies if they were to be employed on the
4 proposed SEZ to develop utility-scale solar energy facilities are described in Section 13.3.9.2.
5 It is stated that if the SEZ were to be fully developed over 80% of its available land area, the
6 amount of water needed during the peak construction year for all evaluated solar technologies
7 would be 885 to 1,261 ac-ft (1.1 million to 1.6 million m³). During operations, the amount of
8 water needed for all evaluated solar technologies would range from 28 to 14,647 ac-ft/yr (33,000
9 to 18 million m³). The amount of water needed during decommissioning would be similar to or
10 less than the amount used during construction. As discussed in Section 13.3.22.2.3, the amount
11 of water used in Beaver County in 2005 was 102,350 ac-ft/yr (126 million m³/yr), of which
12 52% came from surface waters and 48% came from groundwater. Therefore, cumulatively
13 the additional water resource needed for solar facilities in the SEZ during operations would
14 constitute from a relatively small (0.03%) to a relatively large (14%) increment (the ratio of
15 the annual operations water requirement to the annual amount withdrawn in Beaver County)
16 depending on the solar technology used (PV technology at the low end and the wet-cooled
17 parabolic technology at the high end). However, as discussed in Section 13.3.9.1.3, the water
18 resources in the area are not fully appropriated, while depth to groundwater is typically greater
19 than 600 ft (183 m) below the surface. New groundwater diversion applications are typically
20 granted for small farming applications (less than 1 acre [0.004 km²] of irrigation), and all other
21 groundwater applications are considered on a case-by-case basis (Utah DWR 2004a). Solar
22 development of the proposed SEZ with water-intensive wet-cooled technologies would present
23 a major increase in water use in the Wah Wah Valley. Such an increase could draw down
24 groundwater levels, which have been fairly constant since the mid-1970s (Section 13.3.9.1.2),
25 and at the high end could affect the movement of groundwater within the regional groundwater
26 system. While such use would represent a major impact to groundwater in the Wah Wah Valley,
27 further cumulative impacts could occur as a result of current and new water rights being sought
28 for municipal uses and other purposes.
29

30 Small quantities of sanitary wastewater would be generated during the construction
31 and operation of the potential utility-scale solar energy facilities. The amount generated from
32 solar facilities would be in the range of 9 to 74 ac-ft (11,000 to 91,000 m³) during the peak
33 construction year and would range from less than 1 to 14 ac-ft/yr (up to 17,000 m³/yr) during
34 operations. Because of the small quantity, the sanitary wastewater generated by the solar energy
35 facilities would not be expected to put undue strain on available sanitary wastewater treatment
36 facilities in the general area of the SEZ. For technologies that rely on conventional wet- or dry-
37 cooling systems, there would also be from 154 to 277 ac-ft/yr (190,000 to 342,000 m³) of
38 blowdown water from cooling towers. Blowdown water would need to be either treated on-site
39 or sent to an off-site facility. Any on-site treatment of wastewater would have to ensure that
40 treatment ponds are effectively lined in order to prevent any groundwater contamination. Thus,
41 blowdown water would not contribute to cumulative effects on treatment systems or on
42 groundwater.
43
44
45

1 **13.3.22.4.9 Vegetation**
2

3 The proposed Wah Wah Valley SEZ is located entirely within the Shadscale-dominated
4 Saline Basins ecoregion, which primarily supports a sparse saltbush-greasewood shrub
5 community. These plant community types generally have a wide distribution within the Wah
6 Wah Valley area, and thus other ongoing and reasonably foreseeable future actions would have
7 a cumulative effect on them. Because of the long history of livestock grazing, the plant
8 communities present within the SEZ have likely been affected by grazing. If utility-scale solar
9 energy projects were to be constructed within the SEZ, all vegetation within the footprints of the
10 facilities would likely be removed during land-clearing and land-grading operations. There are
11 no known wetlands within the proposed SEZ; however, any wetland or riparian habitats outside
12 of the SEZ that are supported by groundwater discharge could be affected by hydrologic changes
13 resulting from project activities. The fugitive dust generated during the construction of the solar
14 facilities could increase the dust loading in habitats outside a solar project area, in combination
15 with that from other construction, agriculture, recreation, and transportation. The cumulative
16 dust loading could result in reduced productivity or changes in plant community composition.
17 Similarly, surface runoff from project areas after heavy rains could increase sedimentation and
18 siltation in areas downstream. Mitigation measures would be used to reduce the impacts from
19 solar energy projects and thus reduce the overall cumulative impacts on plant communities and
20 habitats. Other ongoing and reasonably foreseeable future actions would affect the same plant
21 species affected by development within the SEZ. However, cumulative effects would be small
22 due to the abundance of the affected species and the relatively low impact on vegetation of
23 other major actions, mainly wind and geothermal energy facilities, located 25 mi (40 km) or
24 more away.
25
26

27 **13.3.22.4.10 Wildlife and Aquatic Biota**
28

29 Wildlife species that can potentially be affected by the development of utility-scale solar
30 energy facilities in the proposed SEZ include amphibians, reptiles, birds, and mammals. The
31 construction of utility-scale solar energy projects in the SEZ and any associated transmission
32 lines and roads in or near the SEZ would have an impact on wildlife through habitat disturbance
33 (i.e., habitat reduction, fragmentation, and alteration), wildlife disturbance, and wildlife injury or
34 mortality. In general, affected species with broad distributions and a variety of habitats would be
35 less affected than species with a narrowly defined habitat within a restricted area. The use of
36 mitigation measures would reduce the severity of impacts on wildlife. These mitigation measures
37 may include pre-disturbance biological surveys to identify key habitat areas used by wildlife
38 followed by avoidance or minimization of disturbance to those habitats (e.g., areas of crucial
39 habitat for pronghorn).
40

41 Other ongoing and reasonably foreseeable future actions within 50 mi (80 km) of the
42 proposed SEZ are dominated by wind and geothermal energy projects (Section 13.2.22.2). The
43 majority of these projects are 9 to 50 mi (14 to 80 km) north (Figure 13.2.22.2-1). The Milford
44 Flats and Escalante SEZs are also located within this distance. Since many of the wildlife species
45 present within the proposed SEZ that could be affected by other actions have extensive available
46 habitat within the affected counties (e.g., mule deer and pronghorn) and most of the major

1 actions would be at some distance from the proposed SEZ and would have low to moderate
2 impacts on most species, cumulative impacts on wildlife within the geographic extent of effects
3 would be small to moderate.
4

5 Surface water within the proposed Wah Wah Valley SEZ is typically limited to
6 intermittent washes and dry lakebeds that contain water only for short periods during or
7 following precipitation events; no perennial surface water bodies, seeps, or springs are present
8 within the boundaries of the proposed SEZ. Similarly, wetlands are uncommon on the proposed
9 SEZ (Section 13.3.11.1), and there are no perennial streams in close proximity. Thus, potential
10 contributions to cumulative impacts on aquatic biota and habitats resulting from groundwater
11 drawdown or soil transport to surface streams from solar facilities within the SEZ would be
12 minimal. Further, foreseeable geothermal facilities, which are the major actions that would use
13 groundwater for operations, are located more than 25 mi (40 km) away. Thus, cumulative
14 impacts on aquatic species would be small.
15

16 ***13.3.22.4.11 Special Status Species (Threatened, Endangered, Sensitive, and*** 17 ***Rare Species)*** 18

19
20 As many as 22 special status species could occur within the Wah Wah Valley SEZ based
21 on suitable habitat. Thirteen of these species have been recorded within or near the SEZ: bald
22 eagle, ferruginous hawk, greater sage-grouse, long-billed curlew, northern goshawk, short-eared
23 owl, western burrowing owl, dark kangaroo mouse, fringed myotis, kit fox, pygmy rabbit,
24 spotted bat, and Townsend's big-eared bat. The Utah prairie dog, an ESA-listed species, has the
25 potential to occur within the affected area of the proposed SEZ. Numerous additional species
26 occurring on or in the vicinity of the SEZ are listed as threatened or endangered by the states of
27 Utah and Nevada or listed as a sensitive species by the BLM (see Section 13.3.12.1). Potential
28 mitigation measures that could be used to reduce or eliminate the potential for effects on these
29 species from the construction and operation of utility-scale solar energy projects in the SEZs and
30 related developments (e.g., access roads and transmission line connections) outside the SEZ
31 include avoidance of habitat and minimization of erosion, sedimentation, and dust deposition.
32 Ongoing effects on special status species include those from roads, transmission lines, grazing,
33 mineral prospecting, agriculture, and recreational activities in the area, while foreseeable actions
34 are dominated by proposed wind and geothermal projects 25 mi (40 km) or more to the east. A
35 number of pending wind applications lie closer to the proposed SEZ but are not yet considered
36 foreseeable. Many of the special status species present on the SEZ are also likely to be present at
37 the locations of these other foreseeable or potential actions where the same habitats exist. Thus,
38 depending on where other projects are actually built, small cumulative impacts on protected
39 species could occur within the geographic extent of effects. Projects would employ mitigation
40 measures to limit such effects.
41

42 ***13.3.22.4.12 Air Quality and Climate*** 43

44
45 While solar energy generates minimal emissions compared with fossil fuels, the site
46 preparation and construction activities associated with solar energy facilities would be

1 responsible for some amount of air pollutants. Most of the emissions would be particulate matter
2 (fugitive dust) and emissions from vehicles and construction equipment. When these emissions
3 are combined with those from other projects near solar energy development or when they are
4 added to natural dust generation from winds and windstorms, the air quality in the general
5 vicinity of the projects could be temporarily degraded. For example, the maximum 24-hour
6 PM₁₀ concentration at or near the SEZ boundaries could at times exceed the applicable standard
7 of 150 µg/m³. The dust generation from the construction activities can be controlled by
8 implementing aggressive dust control measures, such as increased watering frequency or road
9 paving or treatment.

10
11 Because the area proposed for the SEZ is rural and undeveloped land, there are no
12 significant industrial sources of air emissions in the area. The only type of air pollutant of
13 concern is dust generated by winds. Other ongoing and reasonably foreseeable future activities
14 in the general vicinity of the SEZ are described in Section 13.3.22.2. Because the major other
15 foreseeable actions that could produce fugitive dust emissions are located 25 mi (40 km) or more
16 away from the proposed SEZ, cumulative air quality effects due to dust emissions during any
17 overlapping construction periods would be small.

18
19 Over the long term and across the region, the development of solar energy may have
20 beneficial cumulative impacts on the air quality and atmospheric values by offsetting the need
21 for energy production that results in higher levels of emissions, such as coal, oil, and natural gas.
22 As discussed in Section 13.3.13, air emissions from operating solar energy facilities are
23 relatively minor, while the displacement of criteria air pollutants, VOCs, TAPs, and GHG
24 emissions currently produced from fossil fuels could be significant. For example, if the Wah
25 Wah Valley SEZ were fully developed (80% of its acreage) with solar facilities, the quantity of
26 pollutants avoided could be as large as 4.6% of all emissions from the current electric power
27 systems in Utah.

30 ***13.3.22.4.13 Visual Resources***

31
32 The proposed Wah Wah Valley SEZ is within a relatively flat, treeless valley floor. The
33 SEZ is visible from upper elevations of the Wah Wah Mountains to the west and south, and
34 the San Francisco Mountains to the east. The area is sparsely inhabited, remote, and rural in
35 character. Other than State Route 21, a few dirt roads and some livestock management-related
36 modifications such as wire fences, normally dry livestock ponds, and cattle trails, there is little
37 evidence of cultural modifications that detract from the area's natural scenic quality.
38 Construction of utility-scale solar facilities on the SEZ and associated transmission lines outside
39 the SEZ would significantly alter the natural scenic quality of the area. If other reasonably
40 foreseeable activities as described in Section 13.3.22.2 take place, they would cumulatively
41 affect the visual resources in the area. Additional impacts would occur as a result of the
42 construction, operation, and decommissioning/reclamation of related facilities, such as access
43 roads and electric transmission line connections.

44
45 Visual impacts resulting from solar energy development within the SEZ would be in
46 addition to impacts caused by other potential projects in the area, such as the Sigurd to Red

1 Butte, Energy Gateway South, and TransWest Express transmission line projects and Sevier
2 Lake potash leasing operations. Milford Wind, an operating geothermal project, and two
3 authorized geothermal applications lie within 50 mi (80 km), while six applications pending
4 authorization for wind site testing, eight authorized for wind testing, and three pending
5 authorization for development of wind facilities on public lands are within 50 mi (80 km) of the
6 SEZ, most located to the east-northeast (Figure 13.2.22.2-1). The Milford Flats and Escalante
7 SEZs are also located within 50 mi (80 km) of the Wah Wah Valley SEZ. While the contribution
8 to cumulative impacts in the area of these potential projects would depend on the number and
9 locations that are actually built, it may be concluded that the general visual character of the
10 landscape within this distance could be altered by the presence of solar facilities and wind mills
11 from what is currently rural desert. Because of the topography of the region, solar facilities
12 within the SEZ and wind facilities located in basin flats would be visible at great distances from
13 surrounding mountains, which include sensitive viewsheds. It is possible that two or more
14 facilities might be viewable from a single location. Also, facilities would be located near major
15 roads, and thus would be viewable by motorists, who would also be viewing transmission line
16 corridors, towns, and other infrastructure, as well as the road system itself.

17
18 As additional facilities are added, several projects might become visible from one
19 location, or in succession, as viewers move through the landscape, such as driving on local
20 roads. In general, the new developments would not be expected to be consistent in terms of their
21 appearance, and depending on the number and type of facilities, the resulting visual disharmony
22 could exceed the visual absorption capability of the landscape and add significantly to the
23 cumulative visual impact. Considering all of the above, the overall cumulative visual impacts
24 within the geographic extent of effects from solar, wind, and other developments could be in the
25 range of small to moderate.

26 27 28 ***13.3.22.4.14 Acoustic Environment*** 29

30 The areas around the proposed Wah Wah Valley SEZ are relatively quiet. The existing
31 noise sources around the SEZ include road traffic, aircraft flyover, and agricultural activities.
32 Other noise sources associated with current land use around the SEZ include grazing, outdoor
33 recreation, backcountry and OHV driving, and hunting. The construction of solar energy
34 facilities could increase the noise levels periodically for up to three years per facility, but there
35 would be little or minor noise impacts during operation of solar facilities. The exception is
36 that noise from solar dish engine facilities and from parabolic trough or power tower facilities
37 using TES could affect the nearest residences if solar facilities are located near the northern SEZ
38 boundary.

39
40 Other ongoing and reasonably foreseeable future activities in the general vicinity of the
41 SEZ are described in Section 13.3.22.2. Because proposed projects are far from the SEZ and the
42 area is sparsely populated, cumulative noise effects during the construction or operation of solar
43 facilities are unlikely.
44
45
46

1 **13.3.22.4.15 Paleontological Resources**
2

3 The proposed Wah Wah Valley SEZ has low potential for the occurrence of significant
4 fossil material (Section 13.3.16.1). While impacts on significant paleontological resources are
5 unlikely to occur in the SEZ, the specific sites selected for future projects would be investigated
6 to determine if a paleontological survey is needed. Any paleontological resources encountered
7 would be mitigated to the extent possible as determined through consultation with the BLM. No
8 significant cumulative impacts on paleontological resources are expected.
9

10 **13.3.22.4.16 Cultural Resources**
11

12 The Wah Wah Valley is rich in cultural history with settlements dating as far back as
13 12,000 years. The area covered by the proposed Wah Wah Valley SEZ has the potential to
14 contain significant cultural resources; however, this potential is relatively low. It is possible, but
15 unlikely, that the development of utility-scale solar energy projects in the SEZ, when added to
16 other potential projects likely to occur in the area, could contribute cumulatively to cultural
17 resource impacts occurring in the region. However, only the Milford wind project and one
18 operating geothermal facility lie within the 25-mi (40-km) geographic extent of effects, while
19 several pending wind applications lie within this distance. The proposed Milford Flats South
20 SEZ also lies about 20 mi (32 km) to the southwest and the proposed Escalante Valley SEZ lies
21 about 33 mi (53 km) to the south, but neither currently has any solar applications pending. In
22 addition, the specific sites selected for future projects would be surveyed, and historic properties
23 encountered would be avoided or mitigated to the extent possible. Through ongoing consultation
24 with the Utah SHPO and appropriate Native American governments, it is likely that most
25 adverse effects on significant resources in the region could be mitigated to some degree. In
26 addition, given what is currently known archaeologically about the valley floors in this area of
27 Utah, it is unlikely that any sites recorded in the SEZ would be of such individual significance
28 that, if properly mitigated, development would cumulatively cause an irretrievable loss of
29 information about a significant resource type.
30
31
32

33 **13.3.22.4.17 Native American Concerns**
34

35 It is, however, possible that cumulative impacts of concern to Native Americans, such
36 as visual and acoustic impacts on landscapes, could result from combined developments in the
37 region, including solar and wind energy facilities. Government-to-government consultation is
38 under way with federally recognized Native American Tribes with possible traditional ties to the
39 Wah Wah Valley area. All federally recognized Tribes with Southern Paiute roots or possible
40 associations with the Utah SEZs have been contacted and provided an opportunity to comment
41 or consult regarding this PEIS. To date, no specific concerns regarding the proposed Wah Wah
42 Valley SEZ have been raised to the BLM. Continued consultation with the affected Tribes is
43 necessary to effectively consider and address the Tribes' concerns tied to solar energy
44 development in the Wah Wah Valley.
45
46

1 **13.3.22.4.18 Socioeconomics**
2

3 Solar energy development projects in the proposed Wah Wah Valley SEZ could
4 cumulatively contribute to socioeconomic effects in the immediate vicinity of the SEZs and in
5 the surrounding multicounty ROI. The effects could be positive (e.g., creation of jobs and
6 generation of extra income, increased revenues to local governmental organizations through
7 additional taxes paid by the developers and workers) or negative (e.g., added strain on social
8 institutions such as schools, police protection, and healthcare facilities). Impacts from solar
9 development would be most intense during facility construction, but of greatest duration
10 during operations. Construction would temporarily increase the number of workers in the area
11 needing housing and services in combination with temporary workers involved in other new
12 developments in the area, including other renewable energy development. The number of
13 workers involved in the construction of solar projects in the peak construction year (including
14 the transmission lines) could range from about 120 to 1,600 depending on the technology being
15 employed, with solar PV facilities at the low end and solar trough facilities at the high end. The
16 total number of jobs created in the area could range from approximately 210 (solar PV) to as
17 high as 3,000 (solar trough). Cumulative socioeconomic effects in the ROI from construction
18 of solar facilities would occur to the extent that multiple construction projects of any type
19 were ongoing at the same time. It is a reasonable expectation that this condition would occur
20 within a 50-mi (890-km) radius of the SEZ occasionally over the 20-or-more year solar
21 development period.
22

23 Annual impacts during the operation of solar facilities would be less, but of 20- to
24 30-year duration, and could combine with those from other new developments in the area.
25 The number of workers needed at the solar facilities would be in the range of 11 to 210, with
26 approximately 15 to 330 total jobs created in the region. Population increases would contribute
27 to the general upward trends in the region in recent years. The socioeconomic impacts overall
28 would be positive, through the creation of additional jobs and income. The negative impacts,
29 including some short-term disruption of rural community quality of life, would not be considered
30 large enough to require specific mitigation measures.
31
32

33 **13.3.22.4.19 Environmental Justice**
34

35 Low-income populations have been identified within 50 mi (80 km) of the proposed
36 SEZ in both Utah and Nevada; no minority populations are present. Any impacts from solar
37 development could have cumulative impacts on low-income populations in combination with
38 other development in the area. Such impacts could be both positive, such as from increased
39 economic activity, and negative, such as visual impacts, noise, and exposure to fugitive dust.
40 Actual impacts would depend on where low-income populations are located relative to solar and
41 other proposed facilities and on the geographic range of effects. Overall, effects from facilities
42 within the SEZ are expected to be small, while other major foreseeable actions are 25 mi (40 km)
43 or more away from the proposed SEZ and would not likely combine with effects from the SEZ
44 on low-income populations. If needed, mitigation measures can be employed to reduce the
45 impacts on the population in the vicinity of the SEZ, including the low-income populations.

1 Thus, it is not expected that the proposed Wah Wah Valley SEZ would contribute to cumulative
2 impacts on low-income populations.
3

4
5 ***13.3.22.4.20 Transportation***
6

7 Utah State Route 21 runs through the northern part of the proposed Wah Wah Valley
8 SEZ. The closest airport is the Milford Municipal Airport, located 23 mi (37 km) east of
9 the SEZ. The closest railroad access is the UP Railroad stop also in Milford. The AADT on
10 State Route 21 near the proposed SEZ is less than 300; however, near Milford, the AADT
11 on State Route 21 increases to about 2,500. During construction of utility-scale solar energy
12 facilities, there could be up to 1,000 workers commuting to the construction site at the SEZ,
13 which could increase the AADT on these roads by 2,000 vehicle trips. This increase in highway
14 traffic from construction workers could have moderate cumulative impacts in combination with
15 existing traffic levels and increases from additional future developments in the area should
16 construction schedules overlap. Local road improvements may be necessary on State Route 21,
17 at turn-off points into the SEZ. Any impacts during construction activities would be temporary.
18 The impacts can also be mitigated to some degree by staggered work schedules and ride-sharing
19 programs. Traffic increases during operation would be relatively small because of the low
20 number of workers needed to operate the solar facilities and would have little contribution to
21 cumulative impacts.
22

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1 **13.3.23 References**

2
3 *Note to Reader:* This list of references identifies Web pages and associated URLs where
4 reference data were obtained for the analyses presented in this PEIS. It is likely that at the time
5 of publication of this PEIS, some of these Web pages may no longer be available or their URL
6 addresses may have changed. The original information has been retained and is available through
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