NOTATION

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

GENERAL ACRONYMS AND ABBREVIATIONS

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

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

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

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

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

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

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

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

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

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

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

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

CHEMICALS

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

UNITS OF MEASURE

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

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

13 UPDATE TO AFFECTED ENVIRONMENT AND IMPACT ASSESSMENT FOR PROPOSED SOLAR ENERGY ZONES IN UTAH

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

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

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

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

It is the BLM's goal to compile all data, information, and analyses for SEZs from the Draft Solar PEIS, the Supplement to the Draft, and this Final PEIS into a single location accessible via the project Web site (http://solareis.anl.gov) for ease of use by applicants and the BLM and other agency staff.

This chapter is an update to the information on Utah SEZs presented in the Draft Solar PEIS. The information presented supplements and updates, but does not replace, the information provided in the corresponding Chapter 13 on proposed SEZs in Utah in the Draft Solar PEIS. Corrections to incorrect information in Sections 13.1, 13.2, and 13.3 of the Draft Solar PEIS and in Sections C.6.1, C.6.2, and C.6.3 of the Supplement to the Draft are provided in Sections 13.1.26, 13.2.26, and 13.3.26 of this Final Solar PEIS.

13.1 ESCALANTE VALLEY

13.1.1 Background and Summary of Impacts

13.1.1.1 General Information

The proposed Escalante Valley solar energy zone (SEZ) is located in Iron County in southwestern Utah. In 2008, the county population was 45,833. The largest nearby town is Cedar City on Interstate 15 (I-15) in Iron County; Cedar City had a 2008 population of 28,667 and is located about 30 mi (48 km) to the east-southeast. Several small towns are located closer to the SEZ; Lund is about 4 mi (6 km) to the north, and Zane is about 5 mi (8 km) to the west.

The nearest major road is State Route 56, about 15 mi (24 km) south of the SEZ. Access to the Escalante Valley SEZ is via county road; Lund Highway passes northeast of the SEZ. Access to the interior of the SEZ is by dirt roads. The Union Pacific (UP) Railroad passes to the west and has a rail stop in Lund. A rail spur off the main line at Lund passes through the northeastern edge of the SEZ. As of October 28, 2011, there were no pending right-of-way (ROW) applications for solar projects within the SEZ.

As published in the Draft Solar PEIS, the proposed Escalante Valley SEZ had a total area of 6,614 acres (27 km^2) (Figure 13.1.1.1-1). In the Supplement to the Draft Solar PEIS (BLM and DOE 2011), no boundary revisions were identified for the proposed SEZ. However, areas specified for non-development were mapped, where data were available. For the proposed Escalante Valley SEZ, 12 acres (0.05 km^2) of dry lake area and 69 acres (0.28 km^2) of dune area were identified as non-development areas (Figure 13.1.1.1-2). The remaining developable area within the SEZ is 6,533 acres (26.4 km^2).

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

13.1.1.2 Development Assumptions for the Impact Analysis

Maximum solar development of the proposed Escalante Valley SEZ was assumed to be 80% of the developable SEZ area over a period of 20 years, a maximum of 5,226 acres (21 km^2).

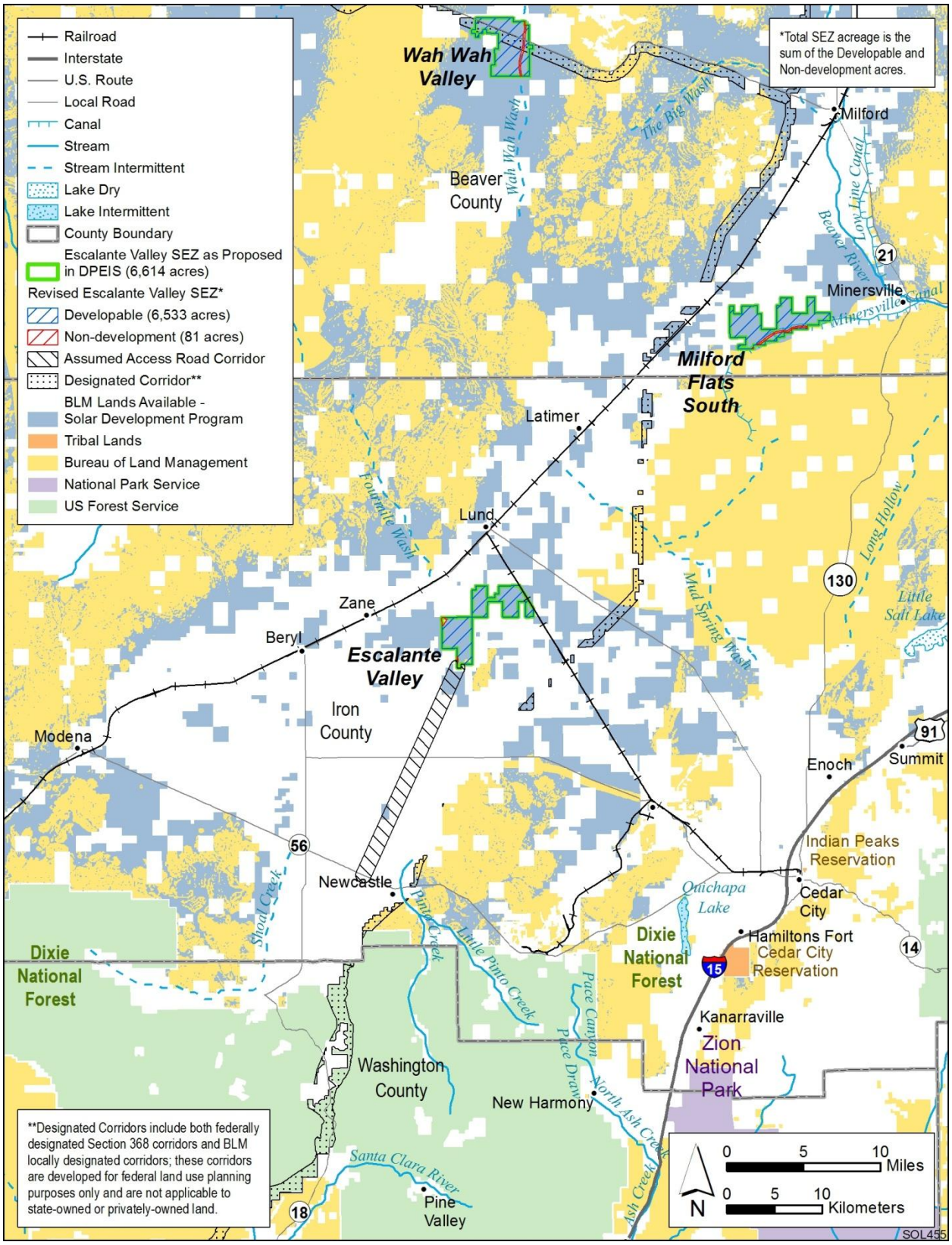

FIGURE 13.1.1.1-1 Proposed Escalante Valley SEZ as Revised

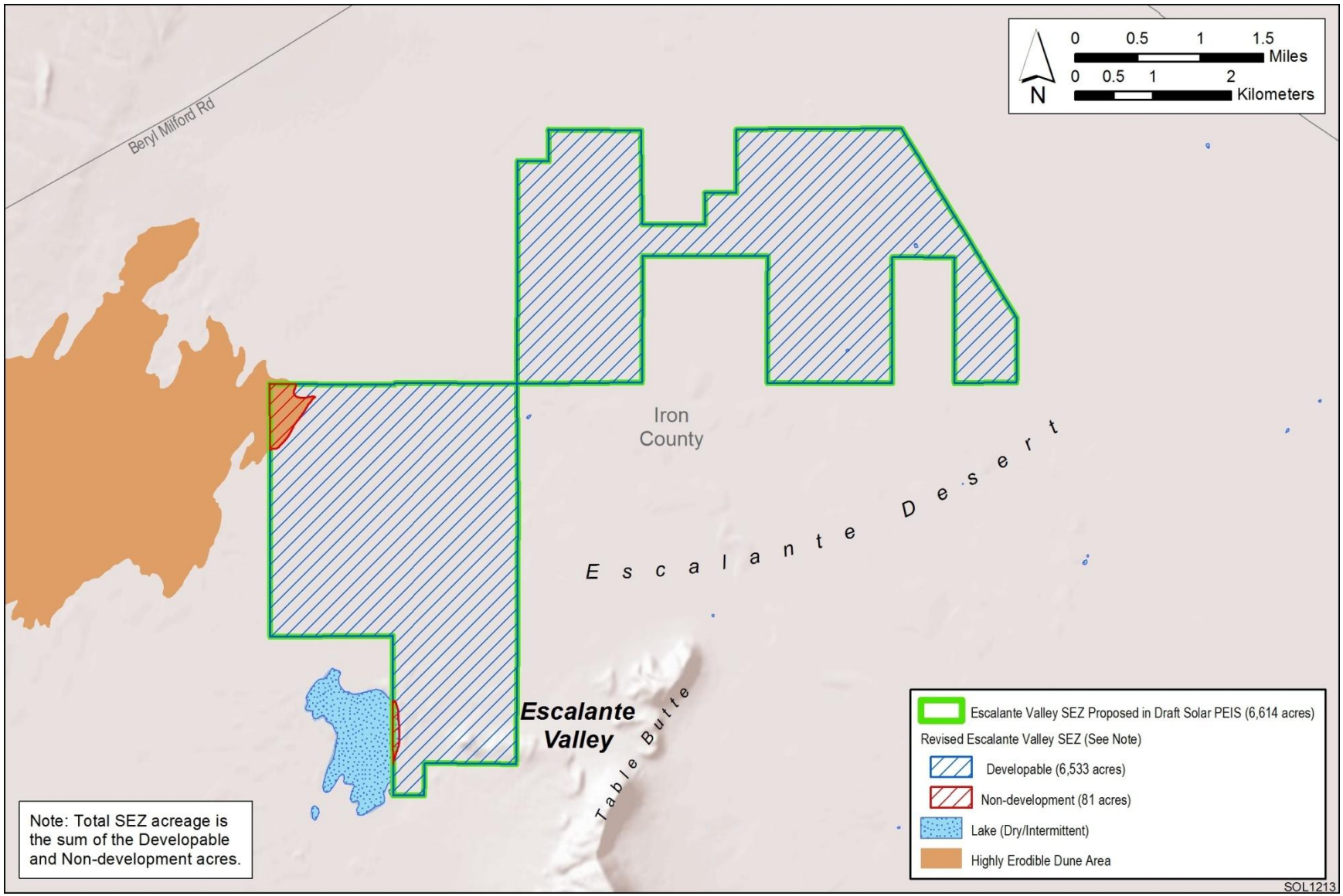

FIGURE 13.1.1.1-2 Developable and Non-development Areas for the Proposed Escalante Valley SEZ as Revised

Full development of the Escalante Valley SEZ would allow development of facilities with an estimated total of between 581 MW (power tower, dish engine, or photovoltaic [PV]), assuming 9 acres/MW [0.04 km^2/MW]) and 1,045 MW (solar trough technologies, 5 acres/MW [0.02 km^2/MW]) of electrical power capacity.

Availability of transmission from SEZs to load centers will be an important consideration for future development in SEZs. For the proposed Escalante Valley SEZ, the nearest existing transmission line as identified in the Draft Solar PEIS is a 138-kV line 3 mi (5 km) southeast of the SEZ. It is possible that a new line could be constructed from the SEZ to this existing line, but the capacity of the line would be inadequate for the possible 581 to 1,045 MW of new capacity. Therefore, at full build-out capacity, new transmission and/or upgrades of existing transmission lines would be required to bring electricity from the proposed Escalante Valley SEZ to load centers. An assessment of the most likely load center destinations for power generated at the Escalante Valley SEZ and a general assessment of the impacts of constructing and operating new transmission facilities to those load centers is provided in Section 13.1.23. In addition, the generic impacts of transmission and associated infrastructure construction and of line upgrades for various resources are discussed in Chapter 5 of this Final Solar PEIS. Project-specific analyses would also be required to identify the specific impacts of new transmission construction and line upgrades for any projects proposed within the SEZ.

The transmission assessment for the Escalante Valley SEZ has been updated, and the hypothetical transmission corridor assessed in the Draft Solar PEIS is no longer applicable. For this Final Solar PEIS, the 91 acres (0.37 km^2) of land disturbance for a hypothetical transmission corridor to the existing transmission line is no longer assumed (although the impacts of required new transmission overall are addressed in Section 13.1.23).

For the proposed Escalante Valley SEZ, State Route 56 lies about 15 mi (24 km) to the southeast of the SEZ. Assuming construction of a new access road to reach State Route 56 would be needed to support construction and operation of solar facilities, approximately 109 acres (0.44 km^2) of land disturbance would occur (a 60-ft [18.3-m] wide ROW is assumed), as summarized in Table 13.1.1.2-1.

13.1.1.3 Programmatic and SEZ-Specific Design Features

The proposed programmatic design features for each resource area to be required under the U.S. Department of the Interior Bureau of Land Management's (BLM's) Solar Energy Program are presented in Section A.2.2 of Appendix A of this Final Solar PEIS. These programmatic design features are intended to avoid, reduce, and/or mitigate adverse impacts of solar energy development on all BLM-administered lands, including SEZ and non-SEZ lands.

The discussions below addressing potential impacts of solar energy development on specific resource areas (Sections 13.1.2 through 13.1.22) also provide an assessment of the effectiveness of the programmatic design features in mitigating adverse impacts from solar development within the SEZ. SEZ-specific design features to address impacts specific to the proposed Escalante Valley SEZ may be required in addition to the programmatic design features.

TABLE 13.1.1.2-1 Assumed Development Acreages, Solar MW Output, and Nearest Major Access Road and Transmission Line for the Proposed Escalante Valley SEZ as Revised

Total Developable Acreage and Assumed Developed Acreage (80% of Total)	Assumed Maximum SEZ Output for Various Solar Technologies	Distance to Nearest State, U.S. or Interstate Highway	Distance and Capacity of Nearest Existing Transmission Line	Assumed Area of Road ROW	Distance to Nearest Designated Transmission Corridor[e]
6,533 acres[a] and 5,226 acres	581 MW[b] 1,045 MW[c]	State Route 56: 15 mi[d]	3 mi and 138 kV	109 acres	4 mi

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

[b] Maximum power output if the SEZ were fully developed using power tower, dish engine, or PV technologies, assuming 9 acres/MW (0.04 km^2/MW) of land required.

[c] Maximum power output if the SEZ were fully developed using solar trough technologies, assuming 5 acres/MW (0.02 km^2/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.

The proposed SEZ-specific design features for the Escalante Valley SEZ have been updated on the basis of revisions to the SEZ since the Draft Solar PEIS (such as boundary changes and the identification of non-development areas) and on the basis of comments received on the Draft and Supplement to the Draft. All applicable SEZ-specific design features identified to date (including those from the Draft Solar PEIS that are still applicable) are presented in Sections 13.1.2 through 13.1.22.

13.1.2 Lands and Realty

13.1.2.1 Affected Environment

The boundary of the Escalante Valley SEZ proposed in the Draft Solar PEIS is unchanged. Eight-one acres (0.3 km^2) of dry lake and dune area have been identified as non-development areas. The remaining description of the SEZ in the Draft Solar PEIS is still valid.

13.1.2.2 Impacts

Full development of the SEZ would disturb up to 5,226 acres (21.1 km^2) and would exclude many existing and potential uses of the public land. Because the area is rural and

undeveloped, utility-scale solar energy development would introduce a new and discordant land use into the area. The remaining analysis of impacts in the Draft Solar PEIS remains valid.

13.1.2.3 SEZ-Specific Design Features and Design Feature Effectiveness

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

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

- Priority consideration should be given to utilizing existing roads to provide construction and operational access to the SEZ.

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

13.1.3 Specially Designated Areas and Lands with Wilderness Characteristics

13.1.3.1 Affected Environment

Two specially designated areas, the Old Spanish National Historic Trail and the Three Peaks SRMA, are located within 13 mi (21 km) of the proposed SEZ. The description of the area in the Draft Solar PEIS remains valid.

13.1.3.2 Impacts

Although there may be some visibility of solar facilities constructed within the SEZ from the Old Spanish National Historic Trail and the Three Peaks SRMA no significant impacts on these specially designated areas are anticipated. The analysis in the Draft Solar PEIS remains valid.

13.1.3.3 SEZ-Specific Design Features and Design Feature Effectiveness

Required programmatic design features that would reduce impacts on specially designated areas are described in Section A.2.2 of Appendix A of this Final Solar PEIS.

Implementing the programmatic design features will provide adequate mitigation for the identified impacts.

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

13.1.4 Rangeland Resources

13.1.4.1 Livestock Grazing

13.1.4.1.1 Affected Environment

One perennial grazing allotment overlies the proposed Escalante Valley SEZ. The description of the area in the Draft Solar PEIS remains valid.

13.1.4.1.2 Impacts

It is estimated that 20% of the animal unit months (AUMs) of livestock forage would be lost from the Butte allotment. The discussion of impacts on grazing in the Draft Solar PEIS indicated that the anticipated loss of 109 AUMs would not be significant; this is not correct. While the specific situation of the grazing permittee is not known, it is clear that the loss of 20% of the AUMs from the grazing permit would be a significant adverse impact.

Economic impacts of the loss of grazing capacity must be determined at the allotment-specific level. For most public land grazing operations, any loss of grazing capacity is an economic concern, but it is not possible to assess the extent of that specific impact at this programmatic level. For that reason, only a general assessment is made based on the projected loss of livestock AUMs; this assessment does not consider potential impacts on management costs, on reducing the scale of an operation, or on the value of the ranch, including private land values and other grazing associated assets.

The remaining discussion of impacts in Draft Solar PEIS is still valid.

13.1.4.1.3 SEZ-Specific Design Features and Design Feature Effectiveness

Required programmatic design features that would reduce impacts on livestock grazing are described in Section A.2.2 of Appendix A of this Final Solar PEIS. Implementing the programmatic design features will provide some mitigation for identified impacts, but they

would not mitigate the loss of livestock AUMs or the loss of value in ranching operations including private land values.

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

13.1.4.2 Wild Horses and Burros

13.1.4.2.1 Affected Environment

As presented in the Draft Solar PEIS, there are no wild horse or burro herd management areas (HMAs) within the proposed Escalante Valley.

13.1.4.2.2 Impacts

Solar energy development within the proposed Escalante Valley SEZ would not affect wild horses and burros.

13.1.4.2.3 SEZ-Specific Design Features and Design Feature Effectiveness

Because solar energy development within the proposed Escalante Valley SEZ would not affect wild horses and burros, no SEZ-specific design features to address wild horses and burros have been identified in this Final Solar PEIS.

13.1.5 Recreation

13.1.5.1 Affected Environment

The proposed Escalante Valley SEZ offers little potential for extensive recreational use, although it is likely that local residents do use it for general recreational purposes. The description in the Draft Solar PEIS remains valid.

13.1.5.2 Impacts

Recreational users would be excluded from any portions of the SEZ developed for solar energy production. The discussion of impacts in the Draft Solar PEIS remains valid.

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

13.1.5.3 SEZ-Specific Design Features and Design Feature Effectiveness

Required programmatic design features that would reduce impacts on recreational resources are described in Section A.2.2 of Appendix A of this Final Solar PEIS. Implementing the programmatic design features will provide some mitigation for identified impacts with the exception of the exclusion of recreational users from developed portions of the SEZ.

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

13.1.6 Military and Civilian Aviation

13.1.6.1 Affected Environment

There are no identified military or civilian aviation uses in near proximity to the proposed Escalante Valley SEZ.

13.1.6.2 Impacts

There are no identified impacts on military or civilian aviation facilities associated with the proposed the Escalante Valley SEZ.

13.1.6.3 SEZ-Specific Design Features and Design Feature Effectiveness

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

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

13.1.7 Geologic Setting and Soil Resources

13.1.7.1 Affected Environment

13.1.7.1.1 Geologic Setting

Data provided in the Draft Solar PEIS remain valid. The boundaries of the proposed Escalante Valley SEZ remain the same, but about 12 acres (0.049 km^2) of dry lake and 69 acres (0.28 km^2) of dune area have now been identified as non-development areas.

13.1.7.1.2 Soil Resources

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

- Table 13.1.7.1-1 provides revised areas for soil map units taking into account non-development areas within the proposed Escalante Valley SEZ as revised.

- Biological soil crusts are likely present within the proposed Escalante Valley SEZ as revised.

13.1.7.2 Impacts

Impacts on soil resources would occur mainly as a result of ground-disturbing activities (e.g., grading, excavating, and drilling), especially during the construction phase of a solar project. Because the developable area of the SEZ has changed by less than 5%, the assessment of impacts provided in the Draft Solar PEIS remains valid, with the following updates:

- Impacts related to wind erodibility are somewhat reduced because the identification of non-development areas eliminates 69 acres (0.28 km^2) of highly erodible soils from development (the playa areas are not rated for wind erodibility).

- Impacts related to water erodibility are somewhat reduced because the identification of non-development areas eliminates 69 acres (0.28 km^2) of

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

Map Unit Symbol[a]	Map Unit Name	Erosion Potential		Description	Area in Acres[d] (Percentage of SEZ)
		Water[b]	Wind[c]		
483859	Bullion–Antelope Springs complex (0 to 2% slopes)	Severe	Moderate (WEG 4)[e]	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 (33.1)
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 (27.4)
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.	1,599 (24.2)
483862	Bullion–Taylorsflat 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).	580 (8.8)

TABLE 13.1.7.1-1 (Cont.)

Map Unit Symbol[a]	Map Unit Name	Erosion Potential		Description	Area in Acres[d] (Percentage of SEZ)
		Water[b]	Wind[c]		
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.[f] Severe rutting hazard. Used for livestock grazing and cultivation.	166 (2.5)
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 (1.1)
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 (1.0)[g]
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.[f] Severe rutting hazard. Used for livestock grazing and cultivation.	68 (1.0)
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 (<1.0)[h]

TABLE 13.1.7.1-1 (Cont.)

Map Unit Symbol[a]	Map Unit Name	Erosion Potential		Description	Area in Acres[d] (Percentage of SEZ)
		Water[b]	Wind[c]		
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 (<1.0)
484020	Sevy–Taylorsflat 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 (<1.0)
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 (<1.0)

[a] Map unit symbols are shown in Figure 13.1.7.1-5 of the Draft Solar PEIS

[b] Water erosion potential rates the hazard of soil loss from off-road and off-trail areas after disturbance activities that expose the soil surface. The ratings are based on slope and soil erosion factor K (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 "moderate" indicates that erosion could be expected 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.

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

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

Footnotes continued on next page.

TABLE 13.1.7.1-1 (Cont.)

[e] WEGs are based on soil texture, content of organic matter, effervescence of carbonates, content of rock fragments, and mineralogy, and 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 National Resources Conservation Service (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 1, 220 tons (200 metric tons) per acre (4,000 m^2) per year (average); WEG 2, 134 tons (122 metric tons) per acre per year; WEGs 3 and 4 (and 4L), 86 tons (78 metric tons) per acre per year; WEG 5, 56 tons (51 metric tons) per acre (4,000 m^2) per year; WEG 6, 48 tons (44 metric tons) per acre per year; WEG 7, 38 tons (34 metric tons) per acre (4,000 m^2) per year; and WEG 8, 0 tons (0 metric tons) per acre (4,000 m^2) per year.

[f] 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 the NRCS's land capability Classes 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.

[g] All of the Berent loamy fine sand (a total of 69 acres [0.28 km^2]) in the western portion of the SEZ is currently categorized as a "non-development" area.

[h] A total of 12 acres (0.049 km^2) within the playa areas in the southern portion of the SEZ is currently categorized as "non-development" areas.

Source: NRCS (2010).

moderately erodible soils from development (the playa areas are not rated for water erosion potential).

13.1.7.3 SEZ-Specific Design Features and Design Feature Effectiveness

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

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

13.1.8 Minerals (Fluids, Solids, and Geothermal Resources)

A mineral potential assessment for the proposed Escalante Valley SEZ has been prepared and reviewed by BLM mineral specialists knowledgeable about the region where the SEZ is located (BLM 2012a). The BLM is proposing to withdraw the SEZ from settlement, sale, location, or entry under the general land laws, including the mining laws, for a period of 20 years (see Section 2.2.2.2.4 of the Final Solar PEIS). The potential impacts of this withdrawal are discussed in Section 13.1.24.

13.1.8.1 Affected Environment

No locatable mining claims or geothermal leases occur on the proposed Escalante Valley SEZ. There are four oil and gas leases that are identified as nonproducing that cover most of the SEZ. The description in the Draft Solar PEIS remains valid.

13.1.8.2 Impacts

The description of impacts on the proposed SEZ in the Draft Solar PEIS remains valid. If the area is identified as an SEZ, it will continue to be closed to all incompatible forms of mineral development with the exception of valid existing rights. The oil and gas leases located within the SEZ are prior existing rights and may conflict with solar energy development. Future development of oil and gas resources beneath the SEZ would be possible from the existing leases or from offset drilling from lands outside the SEZ. Production of common minerals could take place in areas not directly developed for solar energy production.

13.1.8.3 SEZ-Specific Design Features and Design Feature Effectiveness

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

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

13.1.9 Water Resources

13.1.9.1 Affected Environment

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

The Escalante Valley SEZ is within the Escalante Desert–Sevier Lake subregion of the Great Basin hydrologic region. The SEZ is located in the Beryl-Enterprise area in the southern Escalante Desert Valley, which is surrounded by low hills to the east and west, the Bull Valley Mountains and Antelope Range to the south, and the Indian Peak Range and Wah Wah Mountains to the north. The average precipitation in the valley is estimated to be approximately 8 in./yr (20 cm/yr) and the average pan evaporation rate is estimated to be 71 in./yr (180 cm/yr). No perennial surface water features or wetlands have been identified within the SEZ. The Dick Palmer Wash is an intermittent/ephemeral stream that flows north through the southeastern part of the SEZ. A dry lakebed is located west of Table Butte in the southwestern portion of the SEZ. The area surrounding the SEZ has not been examined for flood risks; however, high-intensity rainstorms have caused significant flooding and damage to populated areas in the past. The Escalante Valley SEZ is within the Beryl-Enterprise groundwater basin in the southern Escalante Valley, a basin-fill aquifer that consists of unconfined alluvium and lacustrine deposits of mainly silts and clays; it is approximately 1,000 ft (305 m) thick at the valley center. Groundwater recharge has been estimated to be on the order of 34,000 ac-ft/yr (42 million m^3/yr), which includes mountain front recharge, groundwater inflow from adjacent basins, and irrigation return flow. Groundwater wells near the SEZ indicated a depth to groundwater of 20 to 25 ft (6 to 8 m), but the Beryl-Enterprise groundwater basin has experienced declining groundwater levels and land subsidence associated with excessive groundwater withdrawals. The groundwater generally flows from the southwest to the northeast, and the groundwater quality within the SEZ is generally good; however, in the surrounding areas, some wells exceed the maximum contaminant level (MCL) for arsenic and the secondary MCL for sulfate.

In Utah, water resources are considered public, and water rights are allocated by the Utah Division of Water Rights (Utah DWR). The Beryl-Enterprise basin is under the jurisdiction of the southwestern region office of the Utah DWR and is located in Policy Area 71 (Escalante Valley). Surface water rights are fully appropriated, and no new groundwater diversions are allowed because of the land subsidence and declining groundwater table in the region. Solar developers would need to obtain water right transfers, which are considered by the Utah DWR on a case-by-case basis.

In addition to the water resources information provided in the Draft Solar PEIS, this section provides a planning-level inventory of available climate, surface water, and groundwater monitoring stations within the immediate vicinity of the Escalante Valley SEZ and surrounding basin. Additional data regarding climate, surface water, and groundwater conditions are presented in Tables 13.1.9.1-1 through 13.1.9.1-7 and in Figures 13.1.9.1-1 and 13.1.9.1-2. Fieldwork and hydrologic analyses needed to determine 100-year floodplains and jurisdictional water bodies would need to be coordinated with appropriate federal, state, and local agencies. Areas within the Escalante Valley SEZ that are found to be within a 100-year floodplain will be identified as non-development areas. Any water features within the Escalante Valley SEZ determined to be jurisdictional will be subject to the permitting process described in the Clean Water Act (CWA).

13.1.9.2 Impacts

13.1.9.2.1 Land Disturbance Impacts on Water Resources

The discussion of land disturbance effects on water resources in the Draft Solar PEIS remains valid. As stated in the Draft Solar PEIS, land disturbance activities could potentially affect drainage patterns, along with groundwater recharge and discharge processes. In particular, land disturbance impacts in the vicinity of the proposed Escalante Valley SEZ could result in increased erosion and sedimentation along the Dick Palmer Wash and the dry lakebed areas

TABLE 13.1.9.1-1 Watershed and Water Management Basin Information Relevant to the Proposed Escalante Valley SEZ as Revised

Basin	Name	Area (acres)[b]
Subregion (HUC4)[a]	Escalante Desert–Sevier Lake (1603)	10,448,948
Cataloging unit (HUC8)	Escalante Desert (16030006)	2,120,534
Groundwater basin	Beryl-Enterprise	512,000
SEZ	Escalante Valley	6,614

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

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

TABLE 13.1.9.1-2 Climate Station Information Relevant to the Proposed Escalante Valley SEZ as Revised

Climate Station (COOP ID[a])	Elevation[b] (ft)[c]	Distance to SEZ (mi)[d]	Period of Record	Mean Annual Precipitation (in.)[e]	Mean Annual Snowfall (in.)
Cedar City FAA Airport, Utah (421267)	5,630	24	1948–2011	10.72	45.10
Enterprise, Utah (422558)	5,320	28	1905–2011	14.62	33.00
Summit, Utah (428456)	6,000	29	1951–2011	12.27	22.90

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

[b] Surface elevations for the proposed Escalante Valley SEZ range from 5,094 to 5,845 ft.

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

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

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

Source: NOAA (2012).

TABLE 13.1.9.1-3 Total Lengths of Selected Streams at the Subregion, Cataloging Unit, and SEZ Scale Relevant to the Proposed Escalante Valley SEZ as Revised

Water Feature	Subregion, HUC4 (ft)[a]	Cataloging Unit, HUC8 (ft)	SEZ (ft)
Unclassified streams	0	0	0
Perennial streams	14,121,714	1,193,771	0
Intermittent/ephemeral streams	160,714,376	34,639,751	26,981
Canals	10,978,835	389,615	0

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

Source: USGS (2012a).

located in the northwest and southwest portions of the SEZ. The identification of the dry lakebed areas within the Escalante Valley SEZ as non-development areas (Figure 13.1.1.1-2) reduces the potential for adverse impacts associated with land disturbance activities.

Land clearing, land leveling, and vegetation removal during the development of the SEZ have the potential to disrupt intermittent/ephemeral stream channels. Several programmatic design features described in Section A.2.2 of Appendix A of this Final Solar PEIS would avoid, minimize, and/or mitigate impacts associated with the disruption of intermittent/ephemeral water features. Additional analyses of intermittent/ephemeral streams are presented in this update, including an evaluation of functional aspects of stream channels with respect to groundwater recharge, flood conveyance, sediment transport, geomorphology, and ecological habitats. Only a

TABLE 13.1.9.1-4 Stream Discharge Information Relevant to the Proposed Escalante Valley SEZ as Revised

Parameter	Monitoring Station (USGS ID) Santa Clara–Pinto Diversion near Pinto, Utah (09408500)
Period of record	1954–1995
No. of observations	34
Discharge, median (ft^3/s)[a]	68
Discharge, range (ft^3/s)	3–229
Discharge, most recent observation (ft^3/s)	86
Distance to SEZ (mi)[b]	32

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

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

Source: USGS (2012b).

TABLE 13.1.9.1-5 Surface Water Quality Data Relevant to the Proposed Escalante Valley SEZ as Revised

Parameter	Station (USGS ID)[a]			
	09408500	374450113132301	10242300	373904113313401
Period of record	1973–1991	1974	2010–2011	2010–2011
No. of records	75	1	17	37
Temperature (°C)[b]	8 (0.5–19.5)	15	11.9 (4.3–23.2)	20.2 (14.9–24.8)
Total dissolved solids (mg/L)	58	2,100	NA	NA
Dissolved oxygen (mg/L)	10.4	NA	7 (6.5–10.1)	6.9 (0.1–10.5)
pH	7.7	NA	7.7 (7.7–8.4)	8.6 (7.4–9)
Nitrate + nitrite (mg/L as N)	<0.100	0.05	0.04 (0.04–0.05)	<0.04 (<0.02–0.16)
Phosphate (mg/L)	0.12	0.06	0.279 (0.254–0.378)	0.076 (0.051–0.599)
Organic carbon (mg/L)	NA[c]	NA	2.85 (2.1–67.9)	6.1 (5.4–39.9)
Calcium (mg/L)	7.8	210	NA	NA
Magnesium (mg/L)	1.9	180	NA	NA
Sodium (mg/L)	2.9	230	NA	NA
Chloride (mg/L)	1.9	380	NA	NA
Sulfate (mg/L)	6	830	NA	NA
Arsenic (µg/L)	NA	NA	NA	NA

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

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

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

Source: USGS (2012b).

TABLE 13.1.9.1-6 Water Quality Data from Groundwater Samples Relevant to the Proposed Escalante Valley SEZ as Revised

Parameter	Station (USGS ID)[a]	
	380204113190301	380220113184101
Period of record	1923	1976–1978
No. of records	1	2
Temperature (°C)[b]	NA[c]	15.75 (15–16.5)
Total dissolved solids (mg/L)	668	NA
Dissolved oxygen (mg/L)	NA	NA
pH	NA	7.7 (7.7–7.7)
Nitrate + nitrite (mg/L as N)	NA	0.77 (0.67–0.87)
Phosphate (mg/L)	NA	0.09 (0.09–0.09)
Organic carbon (mg/L)	NA	NA
Calcium (mg/L)	77	77.5 (76–79)
Magnesium (mg/L)	41	46 (45–47)
Sodium (mg/L)	NA	55.5 (54–57)
Chloride (mg/L)	74	56 (55–57)
Sulfate (mg/L)	254	240
Arsenic (µg/L)	NA	NA

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

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

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

Source: USGS (2012b).

summary of the results from these surface water analyses is presented in this section; more information on methods and results is presented in Appendix O.

The study region considered for the intermittent/ephemeral stream evaluation relevant to the Escalante Valley SEZ is a subset of the Escalante Desert watershed (HUC8), for which information regarding stream channels is presented in Tables 13.1.9.1-3 and 13.1.9.1-4 of this Final Solar PEIS. The results of the intermittent/ephemeral stream evaluation are shown in Figure 13.1.9.2-1, which depicts a subset of flow lines from the National Hydrography Dataset (USGS 2012a) labeled as having low, moderate, or high sensitivity to land disturbance (Figure 13.1.9.2-1). The analysis indicated that within the study area, 24% of the total length of the intermittent/ephemeral stream channel reaches had low sensitivity and 76% had moderate sensitivity to land disturbance. Four intermittent/ephemeral channels within the Escalante Valley SEZ were classified as having low sensitivity to disturbance. Any alterations to intermittent/ephemeral stream channels in the SEZ would be subject to review by the Utah DWR's Stream Alteration program, which considers natural streams features that receive enough water for sustaining ecosystems that can be observed primarily by vegetation patterns (Utah DWR 2004).

TABLE 13.1.9.1-7 Groundwater Surface Elevations Relevant to the Proposed Escalante Valley SEZ as Revised

	Station (USGS ID)				
Parameter	375245113290001	375754113274501	375952113260601	380204113190301	380220113184101
Period of record	1976–2011	1976–2011	1937–2013	1938–2014	1976–1978
No. of observations	56	58	120	90	18
Surface elevation (ft)[a]	5,103	5,109	5,083	5,105	5,106
Well depth (ft)	250	NA[c]	35	340	308
Depth to water, median (ft)	6.78	20.09	3.64	38.41	40.69
Depth to water, range (ft)	4.89–20.61	19.09–24.1	2.34–5.71	36.39–39.54	40.22–91.83
Depth to water, most recent observation (ft)	20.61	22.38	5.64	39.54	41.86
Distance to SEZ (mi)[b]	4	3	5	10	11

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

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

[c] NA = data not available.

Source: USGS (2012b).

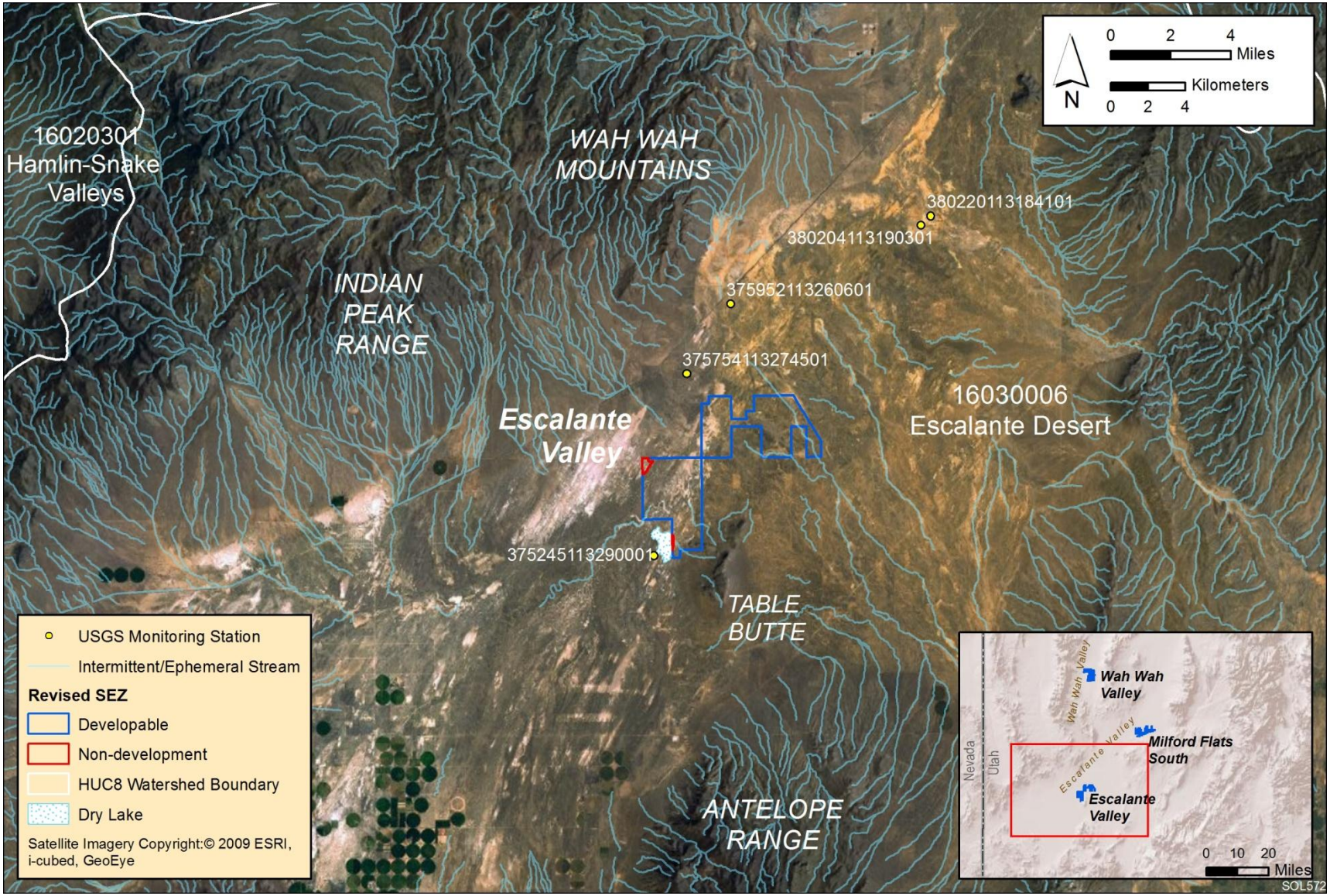

FIGURE 13.1.9.1-1 Water Features near the Proposed Escalante Valley SEZ as Revised

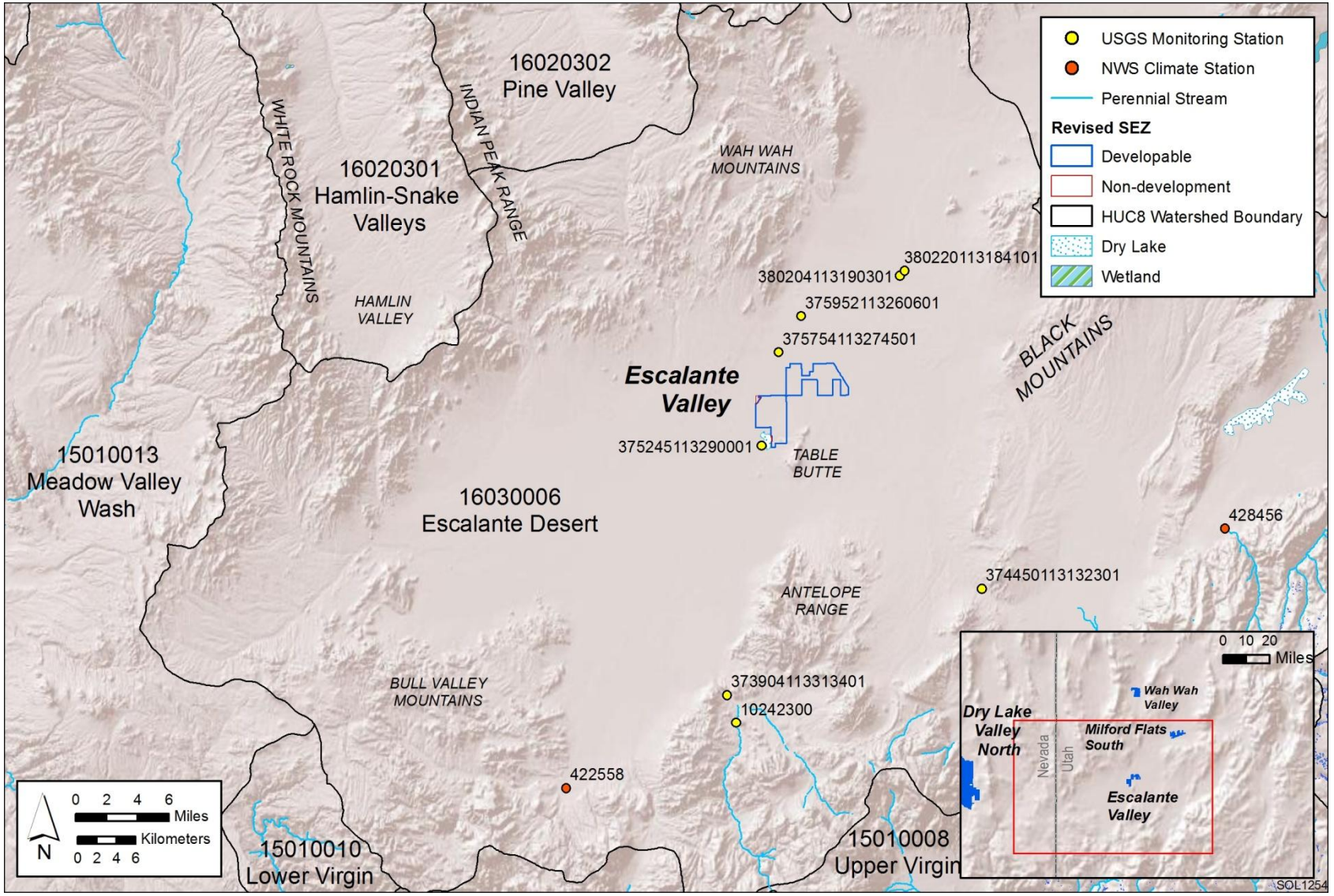

FIGURE 13.1.9.1-2 Water Features within the Escalante Desert Watershed, Which Includes the Proposed Escalante Valley SEZ as Revised

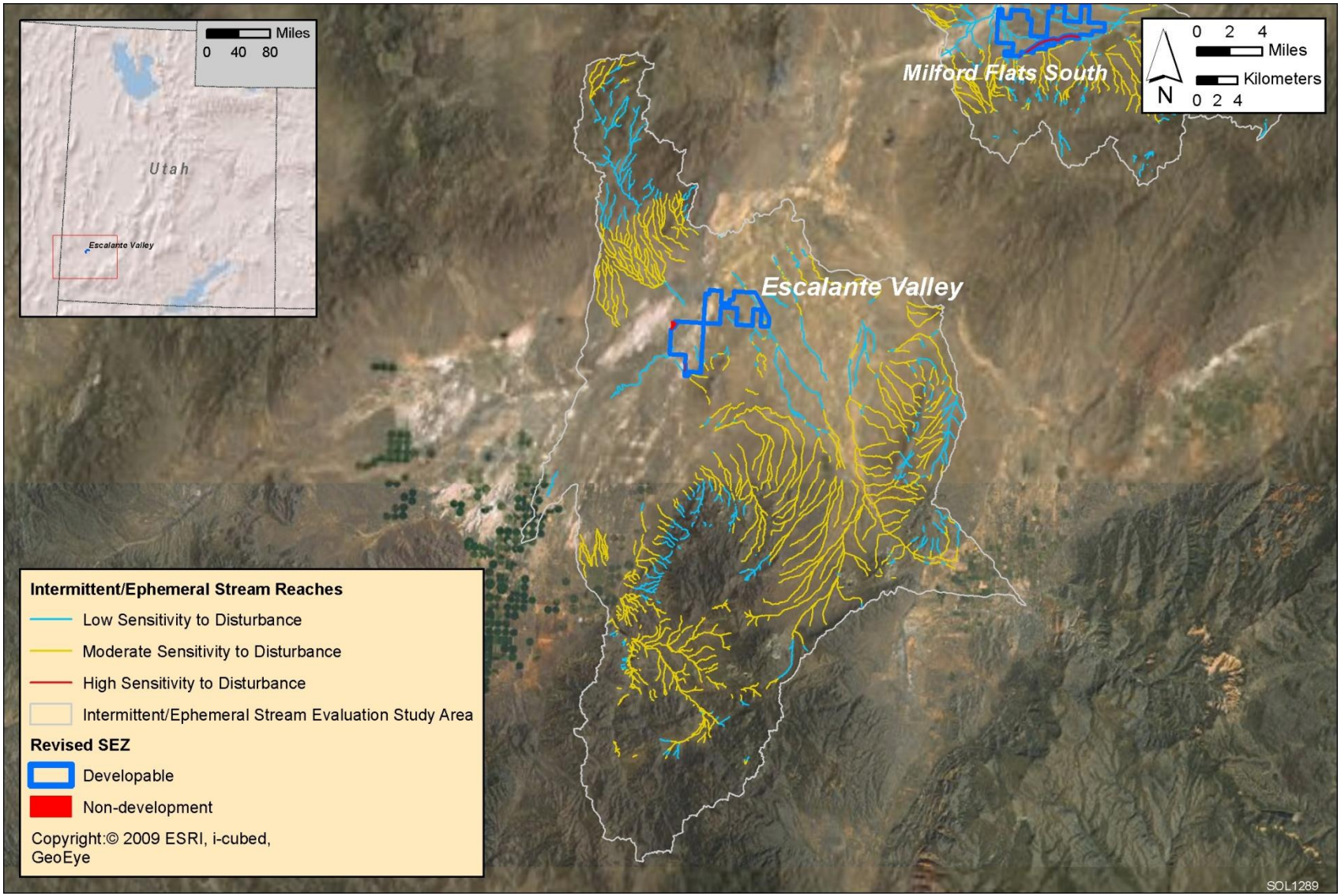

FIGURE 13.1.9.2-1 Intermittent/Ephemeral Stream Channel Sensitivity to Surface Disturbances in the Vicinity of the Proposed Escalante Valley SEZ as Revised

13.1.9.2.2 Water Use Requirements for Solar Energy Technologies

The water use requirements for full build-out scenarios of the Escalante Valley SEZ have not changed from the values presented in the Draft Solar PEIS (see Tables 13.1.9.2-1 and 13.1.9.2-2 in the Draft Solar PEIS). This section presents additional analyses of groundwater, including a basin-scale groundwater budget and a simplified, one-dimensional groundwater model of potential groundwater drawdown in the vicinity of the SEZ. Only a summary of the results from these groundwater analyses is presented in this section; more information on methods and results is presented in Appendix O.

The Escalante Valley SEZ is located in the Beryl-Enterprise portion of the Escalante Desert groundwater basin, although Durbin and Loy (2010) refer to this portion of the basin as the Escalante Desert basin. A basin-scale groundwater budget was assembled using available data on groundwater inputs, outputs, and storage (Table 13.1.9.2-1) for comparison with water use estimates relating to solar energy development. The estimated total water use requirements during the peak construction year are as high as 1,261 ac-ft/yr (1.6 million m^3/yr), a minor portion of the average annual inputs to the basin and a very small portion of current groundwater withdrawals and estimated groundwater storage in the Beryl-Enterprise basin. Given the short duration of construction activities, the water use estimate for construction is not a primary concern to water resources in the basin.

TABLE 13.1.9.2-1 Groundwater Budget for the Beryl-Enterprise Groundwater Basin, Which Includes the Proposed Escalante Valley SEZ as Revised

Process	Amount
Inputs	
Groundwater recharge (valley) (ac-ft/yr)[a]	500
Underflow from adjacent basins (ac-ft/yr)	300
Underflow from mountains (ac-ft/yr)	31,000
Irrigation recharge (ac-ft/yr)	16,300
Outputs	
Total withdrawals (ac-ft/yr)	90,000[b]
Underflow to Milford area (ac-ft/yr)	1,000
Evapotranspiration (ac-ft/yr)	6,000
Storage	
Aquifer storage (ac-ft)	72,000,000

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

[b] Total withdrawals for 2010 from Burden (2011).

Source: Mower and Sandberg (1982).

The long duration of groundwater pumping during operations (20 years) poses a greater threat to groundwater resources. This analysis considered low, medium, and high groundwater pumping scenarios that represent full build-out of the SEZ, assuming PV, dry-cooled parabolic trough, and wet-cooled parabolic trough, respectively (a 30% operational time was considered for all solar facility types on the basis of operations estimates for proposed utility-scale solar energy facilities). The low, medium, and high pumping scenarios result in groundwater withdrawals that range from 30 to 5,306 ac-ft/yr (0.037 to 6.5 million m^3/yr) or 600 to 106,120 ac-ft (0.74 to 131 million m^3) over the 20-year operational period. From a groundwater budgeting perspective, the high pumping scenario would represent 10% of the estimate of total annual groundwater inputs to the basin and less than 1% of the estimated groundwater storage over the 20-year operational period. However, given the current imbalance between groundwater inputs and outputs (Table 13.1.9.2-1), this groundwater withdrawal rate could potentially result in a 3% decrease in the estimated aquifer storage over the 20-year operational period. The medium pumping scenario has annual withdrawals that represent about 1%, and the low pumping scenario would be much less than 1% of the estimated groundwater inputs for the basin (Table 13.1.9.2-1).

A draft groundwater management plan has recently been released for the Beryl-Enterprise basin that designates the basin safe yield as 34,000 ac-ft/yr (42 million m^3/yr) (Utah DWR 2011). The plan identifies the current withdrawals in the basin as exceeding the basin safe yield by 31,000 ac-ft/yr (38 million m^3/yr) and points out that the withdrawals in the basin have exceeded safe yield for more than 40 years. The plan proposes a regulation schedule that calls for 5% reductions in groundwater withdrawals from the basin every 20 years for the first 40 years, and every 10 years thereafter. This would result in a cumulative reduction of 31,000 ac-ft/yr (38 million m^3/yr) by the year 2130. The Utah DWR intends to use this plan in an adaptive management mode to monitor rates of groundwater level declines in the basin.

Groundwater budgeting allows for quantification of complex groundwater processes at the basin scale, but it ignores the temporal and spatial components of how groundwater withdrawals affect groundwater surface elevations, groundwater flow rates, and connectivity to surface water features such as streams, wetlands, playas, and riparian vegetation. A one dimensional groundwater modeling analysis was performed to present a simplified depiction of the spatial and temporal effects of groundwater withdrawals by examining groundwater drawdown in a radial direction around the center of the SEZ for the low, medium, and high pumping scenarios. A detailed discussion of the groundwater modeling analysis is presented in Appendix O. It should be noted, however, that the aquifer parameters used for the one-dimensional groundwater model (Table 13.1.9.2-2) represent available literature data, and that the model aggregates these value ranges into a simplistic representation of the aquifer.

Currently, the depth to groundwater ranges between 5 and 42 ft (1.5 and 12.8 m) in the vicinity of the SEZ (Table 13.1.9.1-7). The modeling results suggest that groundwater withdrawals for solar energy development would result in groundwater drawdown in the vicinity of the SEZ (approximately a 3-mi [5-km] radius) ranging from about 7 to 50 ft (2.1 to 15.2 m) for the high pumping scenario, 1 to 8 ft (0.3 to 2.4 m) for the medium pumping scenario, and less than 1 ft (0.3 m) for the low pumping scenario (Figure 13.1.9.2-2). The modeled groundwater drawdown for the high pumping scenario suggests a potential for 7 ft (2.1 m) of drawdown at a

TABLE 13.1.9.2-2 Aquifer Characteristics and Assumptions Used in the One-Dimensional Groundwater Model for the Proposed Escalante Valley SEZ as Revised

Parameter	Value
Aquifer type/conditions	Basin fill/Unconfined
Aquifer thickness (ft)	1,000[b]
Transmissivity (ft^2/day)[a]	10,000[b]
Specific yield	0.15[c]
Analysis period (yr)	20
High pumping scenario (ac-ft/yr)[d]	5,306
Medium pumping scenario (ac-ft/yr)	756
Low pumping scenario (ac-ft/yr)	30

[a] To convert ft^2 to m^2, multiply by 0.0929.

[b] Source: Mower and Sandberg (1982).

[c] Source: Durbin and Loy (2010).

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

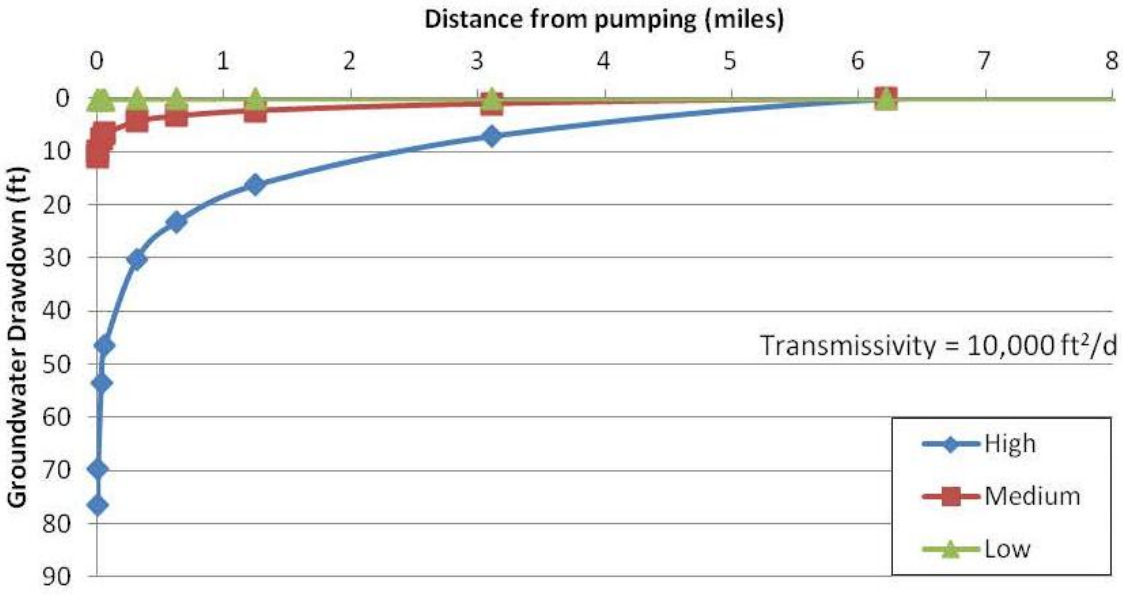

FIGURE 13.1.9.2-2 Estimated One-Dimensional Groundwater Drawdown Resulting from High, Medium, and Low Groundwater Pumping Scenarios over the 20-Year Operational Period at the Proposed Escalante Valley SEZ as Revised

distance of 3 mi (5 km) from the center of the SEZ, which could impair groundwater–surface water connectivity via infiltration processes during channel inundation, along with alterations to the riparian vegetation along Dick Palmer Wash, which flows through the eastern portion of the SEZ; Fourmile Wash, north of the SEZ; the unnamed washes that flow through the SEZ; and the dry lake along the southwestern edge of the SEZ.

13.1.9.2.3 Off-Site Impacts: Roads and Transmission Lines

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

13.1.9.2.4 Summary of Impacts on Water Resources

The additional information and analyses of water resources presented in this update agree with the information provided in the Draft Solar PEIS, which indicates that the Escalante Valley SEZ is located in a high-elevation desert valley with predominately intermittent/ephemeral surface water features and groundwater in a basin-fill aquifer. Historical groundwater use in the region led to groundwater declines of up to 150 ft (46 m) between 1948 and 2009 because of excessive groundwater withdrawal in the southwestern portion of the basin (Burden 2011). These baseline conditions suggest that water resources are vulnerable in the vicinity of the Escalante Valley SEZ, and that the primary potential for impacts resulting from solar energy development comes from surface disturbances and groundwater use.

The areas identified as non-development regions within the SEZ contain portions of the dry lake along the southwestern edge of the SEZ and a sand dune area along the western edge of the SEZ. These changes in the SEZ boundaries have reduced potential impacts associated with surface disturbance of surface water features. Disturbance to intermittent/ephemeral stream channels within the Escalante Valley SEZ should not have a significant impact on the critical functions of groundwater recharge, sediment transport, flood conveyance, and ecological habit, given the relatively small footprint of the Escalante Valley SEZ with respect to the study area, along with the sensitivity of identified intermittent/ephemeral streams. Disturbance to intermittent/ephemeral stream channels in the southwest portion of the Escalante Valley SEZ could potentially affect groundwater recharge; this area surrounding Table Butte has been identified as an important recharge area for the Beryl-Enterprise basin (Thomas and Lowe 2007). However, the intermittent/ephemeral stream evaluation suggests that all intermittent/ephemeral streams crossing the SEZ have a low sensitivity to land disturbances. Several design features described in Section A.2.2 of Appendix A of this Final Solar PEIS specify measures to reduce impacts regarding intermittent/ephemeral water features, and drainage alterations associated with

stormwater management should focus on maintaining groundwater recharge functionality. Additional protection for intermittent/ephemeral streams is provided by the Utah DWR's Stream Allocation permitting program (Utah DWR 2004).

The proposed water use for full build-out scenarios at the Escalante Valley SEZ indicates that the low and medium pumping scenarios are preferable, given that the high pumping scenario has the potential to greatly affect both the annual and long-term groundwater budget given the current level of groundwater use in the basin. In addition, the high pumping scenario may impair potential groundwater–surface water connectivity in Dick Palmer Wash, which flows through the eastern portion of the SEZ; Fourmile Wash, north of the SEZ; the unnamed washes that flow through the SEZ; and the dry lake along the southwestern edge of the SEZ.

Predicting impacts associated with groundwater withdrawal in desert regions is often difficult given the heterogeneity of aquifer characteristics, the long time period between the onset of pumping and its effects, and limited data. One of the primary mitigation measures to protect water resources is the implementation of long-term monitoring and adaptive management (see Section A.2.4 of Appendix A). For groundwater, this requires the combination of monitoring and modeling to fully identify the temporal and spatial extent of potential impacts. The groundwater modeling framework developed by Durbin and Loy (2010) in this region should be used as a basis to evaluate project-specific development plans, along with supporting long-term monitoring and adaptive management plans for the Escalante Valley SEZ. In addition, groundwater management planning within the Beryl-Enterprise basin is currently being developed, and updates to this process can be found on the Utah DWR Web site (http://www.waterrights.utah.gov/groundwater/ManagementReports/BerylEnt/berylEnterprise.asp).

13.1.9.3 SEZ-Specific Design Features and Design Feature Effectiveness

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

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

- Groundwater analyses suggest that full build-out of wet-cooled technologies is not feasible; for mixed-technology development scenarios, any proposed wet-cooled projects should utilize water conservation practices.

- During site characterization, coordination and permitting with the Utah DWR regarding Utah's Stream Alteration Program would be required for any proposed alterations to surface water features.

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

13.1.10 Vegetation

13.1.10.1 Affected Environment

Twelve acres (0.05 km^2) of dry lake area in the southwest corner of the proposed Escalante Valley SEZ and 69 acres (0.28 km^2) of highly erodible dunes in the western portion were identified as non-development areas.

As presented in the Draft Solar PEIS, 12 cover types were identified within the area of the proposed Escalante Valley SEZ, while 18 cover types were identified within the area of indirect impacts, including the assumed access road and transmission line corridors and within 5 mi (8 km) of the SEZ boundary. For this updated assessment, a specifically located hypothetical transmission line is no longer being assumed (see Section 13.1.23 for an updated transmission assessment for this SEZ). Sensitive habitats on the SEZ include sand dune, dry wash, and playa habitats. Figure 13.1.10.1-1 shows the cover types within the affected area of the Escalante Valley SEZ as revised.

13.1.10.2 Impacts

As presented in the Draft Solar PEIS, the construction of solar energy facilities within the proposed Escalante Valley SEZ would result in direct impacts on plant communities because of the removal of vegetation within the facility footprint during land-clearing and land-grading operations. Approximately 80% of the SEZ would be expected to be cleared with full development of the SEZ. As a result of the exclusion area, approximately 5,226 acres (21.1 km^2) would be cleared.

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

13.1.10.2.1 Impacts on Native Species

The analysis presented in the Draft Solar PEIS, for the original Escalante Valley SEZ developable area, indicated that development would result in a moderate impact on two land cover types and a small impact on all other land cover types occurring within the SEZ (Table 13.1.10.1-1 in the Draft Solar PEIS). Development within the revised Escalante Valley SEZ could still directly affect all of the cover types evaluated in the Draft Solar PEIS. The reduction in the developable area would result in reduced impact levels on some land cover types in the affected area, but the impact magnitudes would remain unchanged compared to original estimates in the Draft Solar PEIS.

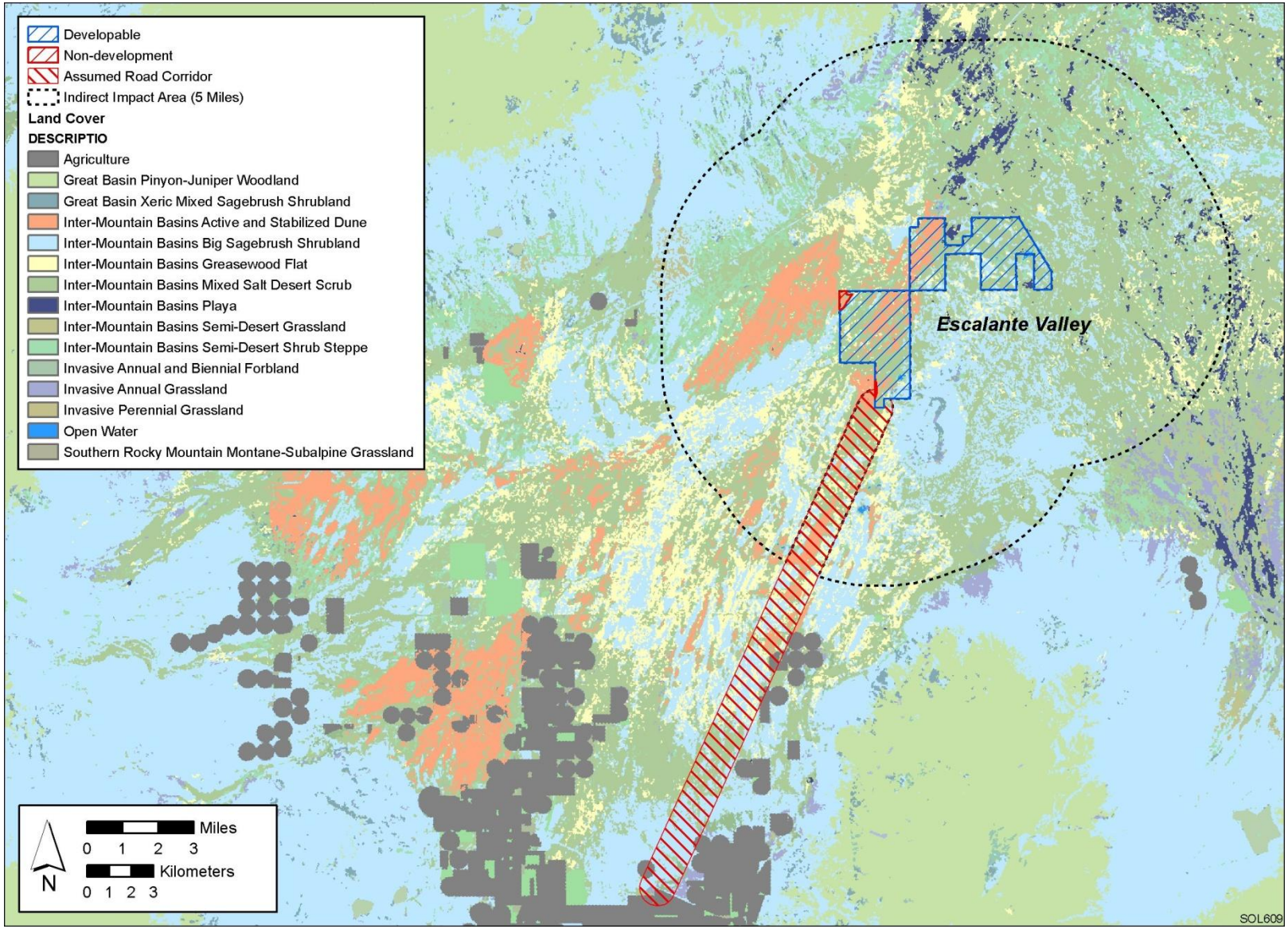

FIGURE 13.1.10.1-1 Land Cover Types within the Proposed Escalante Valley SEZ as Revised

Direct impacts on the dry lake or the dunes that occur within the non-developable portion of the SEZ would not occur. However, direct and indirect impacts on plant communities associated with playa habitats, greasewood flats, or other intermittently flooded areas, dunes, or dry washes, within or near the SEZ, as described in the Draft Solar PEIS, could still occur. Direct or indirect impacts on wetlands that may occur in or near the access road ROW, as described in the Draft Solar PEIS, could also occur.

13.1.10.2.2 Impacts from Noxious Weeds and Invasive Plant Species

As presented in the Draft Solar PEIS, land disturbance from project activities and indirect effects of construction and operation within the Escalante Valley SEZ could potentially result in the establishment or expansion of noxious weeds and invasive species populations, potentially including those species listed in Section 13.1.10.1 in the Draft Solar PEIS. Impacts such as reduced restoration success and possible widespread habitat degradation could still occur; however, a small reduction in the potential for such impacts would result from the reduced developable area of the SEZ.

13.1.10.3 SEZ-Specific Design Features and Design Feature Effectiveness

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

- All playa, dry wash, and sand dune habitats, and sand transport areas shall be avoided to the extent practicable, and any impacts minimized and mitigated in consultation with appropriate agencies. A buffer area shall be maintained around playas and dry washes to reduce the potential for impacts on these habitats on or near the SEZ.

- Appropriate engineering controls shall be used to minimize impacts on dry wash, playa, greasewood flat, and dry lake habitats, including downstream occurrences, that result from surface water runoff, erosion, sedimentation, altered hydrology, accidental spills, or fugitive dust deposition on these habitats. Appropriate buffers, best management practices, and engineering controls will be determined through agency consultation.

It is anticipated that the implementation of these programmatic design features will reduce a high potential for impacts from invasive species and impacts on dry washes, playas, flats, dunes, and dry lakes to a minimal potential for impact.

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

13.1.11 Wildlife and Aquatic Biota

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

13.1.11.1 Amphibians and Reptiles

13.1.11.1.1 Affected Environment

As presented in the Draft Solar PEIS, representative amphibian and reptile species expected to occur within the Escalante Valley SEZ include the Great Basin spadefoot (*Spea intermontana*), the Great Plains toad (*Bufo cognatus*), desert horned lizard (*Phrynosoma platyrhinos*), common sagebrush lizard (*Sceloporus graciosus*), desert horned lizard (*Phrynosoma platyrhinos*), eastern fence lizard (*S. undulatus*), gophersnake (*Pituophis catenifer*), greater short-horned lizard (*Phrynosoma hernandesi*), long-nosed leopard lizard (*Gambelia wislizenii*), nightsnake (*Hypsiglena torquata*), tiger whiptail (*Aspidoscelis tigris*), and wandering gartersnake (*Thamnophis elegans vagrans*, a subspecies of terrestrial gartersnake).

13.1.11.1.2 Impacts

As presented in the Draft Solar PEIS, solar energy development within the Escalante Valley SEZ could affect potentially suitable habitats for the representative amphibian and reptile species. The analysis presented in the Draft Solar PEIS indicated that development would result in a small overall impact on the representative amphibian and reptile species (Table 13.1.11.1-1 in the Draft Solar PEIS). The reduction in the developable area of the Escalante Valley SEZ would result in reduced habitat impacts for all representative amphibian and reptile species; the resultant impact levels for all of the representative species would still be small.

13.1.11.1.3 SEZ-Specific Design Features and Design Feature Effectiveness

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

Because of the changes in the developable areas within the SEZ boundaries, the SEZ-specific design feature identified in Section 131.1.11.1.3 of the Draft Solar PEIS (i.e., the dry lakebed in the southwestern portion of the SEZ should be avoided) is no longer applicable. The following portion of the SEZ-specific design features is still applicable:

- Ephemeral washes shall be avoided.

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

13.1.11.2 Birds

13.1.11.2.1 Affected Environment

As presented in the Draft Solar PEIS, a large number of bird species could occur or have potentially suitable habitat within the affected area of the proposed Escalante Valley SEZ. Representative bird species identified in the Draft Solar PEIS included (1) passerines: Bewick's wren (*Thryomanes bewickii*), Brewer's sparrow (*Spizella breweri*), common raven (*Corvus corax*), gray flycatcher (*Empidonax wrightii*), greater roadrunner (*Geococcyx californianus*), horned lark (*Eremophila alpestris*), Le Conte's thrasher (*Toxostoma leconteii*), loggerhead shrike (*Lanius ludovicianus*), rock wren (*Salpinctes obsoletus*), sage sparrow (*Amphispiza belli*), sage thrasher (*Oreoscoptes montanus*), vesper sparrow (*Pooecetes gramineus*), and western kingbird (*Tyrannus verticalis*); (2) raptors: American kestrel (*Falco sparverius*), golden eagle (*Aquila chrysaetos*), red-tailed hawk (*Buteo jamaicensis*), rough-legged hawk (*Buteo lagopus*, only during winter), Swainson's hawk (*Buteo swainsoni*), and turkey vulture (*Cathartes aura*); and (3) upland gamebirds: chukar (*Alectoris chukar*), mourning dove (*Zenaida macroura*), and wild turkey (*Meleagris gallopavo*).

13.1.11.2.2 Impacts

Solar energy development within the Escalante Valley SEZ could affect potentially suitable bird habitats. The analysis presented in the Draft Solar PEIS indicated that development would result in a small overall impact on most representative bird species and a moderate impact on the Le Conte's thrasher (Table 13.1.11.2-1 in the Draft Solar PEIS). The reduction in the developable area of the Escalante Valley SEZ would result in reduced habitat impacts for all representative bird species; however, the resultant impact levels for the representative bird species would still be the same as described in the Draft Solar PEIS.

13.1.11.2.3 SEZ-Specific Design Features and Design Feature Effectiveness

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

Because of the reduction in the developable areas within the boundaries of the SEZ, one of the SEZ-specific design features identified in Section 13.1.11.2.3 of the Draft Solar PEIS is no longer applicable (i.e., the dry lakebed in the southwestern portion of the SEZ should be avoided).

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

- The steps outlined in the Utah Field Office Guidelines for Raptor Protection from Human and Land Use Disturbances (Romin and Muck 1999) shall be followed.

- Ephemeral washes shall be avoided.

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

13.1.11.3 Mammals

13.1.11.3.1 Affected Environment

As presented in Section 13.1.11.3.1 of the Draft Solar PEIS, a large number of mammal species were identified that could occur or have potentially suitable habitat within the affected area of the proposed Escalante Valley SEZ. Representative mammal species identified in the Draft Solar PEIS included (1) big game species: American black bear (*Ursus americanus*), cougar (*Puma concolor*), elk (*Cervis canadensis*), mule deer (*Odocoileus hemionus*), and pronghorn (*Antilocapra americana*); (2) furbearers and small game species: American badger (*Taxidea taxus*), black-tailed jackrabbit (*Lepus californicus*), coyote (*Canis latrans*), and desert cottontail (*Sylvilagus audubonii*); and (3) small nongame species: desert woodrat (*Neotoma lepida*), Great Basin pocket mouse (*Perognathus parvus*), least chipmunk (*Neotamias minimus*), northern grasshopper mouse (*Onychomys leucogaster*), sagebrush vole (*Lemmiscus curtatus*), and white-tailed antelope squirrel (*Ammospermophilus leucurus*). Bat species that may occur within the area of the SEZ include the Brazilian free-tailed bat (*Tadarida brasiliensis*), little brown myotis (*Myotis lucifugus*), long-legged myotis (*M. volans*), and western pipistrelle (*Parastrellus hesperus*). However, roost sites for the bat species (e.g., caves, hollow trees, rock crevices, or buildings) would be limited to absent within the SEZ.

13.1.11.3.2 Impacts

As presented in the Draft Solar PEIS, solar energy development within the Escalante Valley SEZ could affect potentially suitable habitats of mammal species. The analysis presented in the Draft Solar PEIS based on the original Escalante Valley SEZ boundaries indicated that development would result in a small overall impact on the representative mammal species analyzed (Table 13.1.11.3-1 in the Draft Solar PEIS). The reduction in the developable area of the Escalante Valley SEZ would result in reduced habitat impacts for all representative mammal species; resultant impact levels for all of the representative mammal species would still be small. On the basis of mapped activity areas, direct potential loss of crucial pronghorn habitat would be reduced from 5,291 to 5,226 acres (21.5 to 21.1 km^2). The direct impact level for the crucial pronghorn habitat would still be small. No mapped activity areas for the other big game species occur within the original or revised boundaries of the SEZ.

13.1.11.3.3 SEZ-Specific Design Features and Design Feature Effectiveness

Required programmatic design features that would reduce impacts on mammal species are described in Section A.2.2 of Appendix A of this Final Solar PEIS. With the implementation of required programmatic design features and the applicable SEZ-specific design features, impacts on mammal species will be reduced.

Because of the changes in the developable areas within the boundaries of the SEZ, one of the SEZ-specific design features identified in Section 13.1.11.3.3 of the Draft Solar PEIS is no longer applicable (i.e., the dry lakebed in the southwestern portion of the SEZ should be avoided).

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

- Ephemeral washes shall be avoided.

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

13.1.11.4 Aquatic Biota

13.1.11.4.1 Affected Environment

No natural intermittent or perennial streams, water bodies, seeps, or springs are present on the proposed Escalante Valley SEZ or on the hypothetical access road. Because the

boundaries of the Escalante Valley SEZ given in the Draft Solar PEIS have not changed, the amount of surface water features within the area of direct and indirect effects (within 5 mi [8 km] of the SEZ) is still valid. Updates to the Draft Solar PEIS include the following:

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

- 81 acres (0.33 km^2) of the Escalante Valley SEZ has been designated as a non-development area.

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

13.1.11.4.2 Impacts

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

13.1.11.4.3 SEZ-Specific Design Features and Design Feature Effectiveness

Required programmatic design features that would reduce impacts on aquatic biota are described in Section A.2.2 of Appendix A of this Final Solar PEIS.

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

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

13.1.12 Special Status Species

13.1.12.1 Affected Environment

Eighteen special status species were identified in the Draft Solar PEIS that could occur or have potentially suitable habitat within the affected area of the proposed Escalante Valley SEZ.

The reduction in the developable area of the Escalante Valley SEZ does not alter the potential for special status species to occur in the affected area.

Following publication of the Draft Solar PEIS, one additional special status species (dark kangaroo mouse [*Microdiposops megacephalus*]) was identified that could occur in the affected area based on recorded occurrences and the presence of potentially suitable habitat. This species is discussed in the remainder of this section.

The dark kangaroo mouse is listed by the BLM as a sensitive species. This species was not evaluated in the Draft Solar PEIS for the Escalante Valley SEZ. The dark kangaroo mouse occurs in the Great Basin region in areas dominated by sagebrush and saltbrush and is known to occur within the Escalante Valley SEZ region. Quad-level occurrences for this species are known from 5 mi (8 km) west of the SEZ. According to the SWReGAP habitat suitability model, potentially suitable habitat for this species does not occur in the affected area of the Escalante Valley SEZ. However, land cover types (such as Intermountain Basin Salt Desert Scrub) that may represent potentially suitable habitat for this species may occur in the affected area (Table 13.1.12.1-1).

13.1.12.2 Impacts

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

As presented in the Draft Solar PEIS, solar energy development within the Escalante Valley SEZ could affect potentially suitable habitats of special status species. The analysis presented in the Draft Solar PEIS for the Escalante Valley SEZ indicated that development would result in no impact or a small overall impact on all special status species (Table 13.1.12.1-1 in the Draft Solar PEIS). Development within the SEZ could still affect the same 18 species evaluated in the Draft Solar PEIS; however, the reduction in the developable area would result in reduced (but still small) impact levels compared to original estimates in the Draft Solar PEIS.

Impacts on the dark kangaroo mouse, identified as an additional special status species to evaluate following publication of the Draft Solar PEIS, are discussed below and in Table 13.1.12.1-1. The impact assessment for this species was carried out in the same way as for those species analyzed in the Draft Solar PEIS (Section 13.1.12.2 of the Draft Solar PEIS).

The dark kangaroo mouse is considered to be a year-round resident within the Escalante Valley SEZ region where it is known to occur in sandy regions dominated by sagebrush and saltbrush. Approximately 4,800 acres (19 km^2) of potentially suitable habitat on the SEZ and 70 acres (0.3 km^2) of potentially suitable foraging habitat in the assumed access road corridor could be directly affected by construction and operations (Table 13.1.12.1-1). This direct effects

TABLE 13.1.12.1-1 Habitats, Potential Impacts, and Potential Mitigation for Special Status Species That Could Be Affected by Solar Energy Development on the Proposed Escalante Valley SEZ as Revised[a]

Common Name	Scientific Name	Listing Status[b]	Habitat[c]	Maximum Area of Potential Habitat Affected[d]: Within SEZ (Direct Effects)[e]	Maximum Area of Potential Habitat Affected[d]: Access Road (Direct Effects)[f]	Maximum Area of Potential Habitat Affected[d]: Outside SEZ (Indirect Effects)[g]	Overall Impact Magnitude[h] and Species-Specific Mitigation[i]
Mammals							
Dark kangaroo mouse	*Microdiposops megacephalus*	BLM-S; FWS-SC; UT-S2	Inhabits Great Basin sagebrush, salt desert shrub, and mixed shrub communities at elevations between 5,000 and 8,400 ft.[j] Nocturnally active during warm weather, the species remains in underground burrows during the day and cold winter months. Nearest recorded quad-level occurrence is 5 mi[k] west of the SEZ. About 1,950,000 acres[l] of potentially suitable habitat occurs within the SEZ region.	4,800 acres of potentially suitable habitat lost (0.2% of available potentially suitable habitat)	70 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	94,150 acres of potentially suitable habitat (4.8% of available potentially suitable habitat)	Small overall impact. Pre-disturbance surveys and avoidance or minimization of disturbance of occupied habitats in the areas of direct effects, or compensatory mitigation of direct effects on occupied habitats could reduce impacts.

[a] The species presented in this table represents a new species identified following publication of the Draft Solar PEIS or a re-evaluation of those species that were determined to have moderate or large impacts in the Draft Solar PEIS. The other special status species for this SEZ are identified in Table 13.1.12.1-1 of the Draft Solar PEIS.

[b] BLM-S = listed as sensitive by the BLM; FWS-SC = USFWS species of concern; UT-S2 = ranked as S2 by the State of Utah.

[c] Potentially suitable habitat was obtained from NatureServe (2010) and quantified using SWReGAP land cover types (USGS 2004, 2007). Area of potentially suitable habitat is presented for the SEZ region, which is defined as the area within 50 mi (80 km) of the SEZ center.

[d] Maximum area of potentially suitable habitat that could be affected relative to availability within the SEZ region. Habitat availability within the region was determined by using SWReGAP land cover types (USGS 2004, 2007). This approach probably overestimates the amount of suitable habitat in the project area.

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

[f] 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.

Footnotes continued on next page.

TABLE 13.1.12.1-1 (Cont.)

[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 within 1 mi (1.6 km) of the assumed access road 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.

[h] Overall impact magnitude categories were based on professional judgment and are as follows: (1) *small*: ≤1% of the population or its habitat would be lost and the activity would not result in a measurable change in carrying capacity or population size in the affected area; (2) *moderate*: >1 but ≤10% of the population or its habitat would be lost and the activity would result in a measurable but moderate (not destabilizing) change in carrying capacity or population size in the affected area; and (3) *large*: >10% of a population or its habitat would be lost and the activity would result in a large, measurable, and destabilizing change in carrying capacity or population size in the affected area. Note that much greater weight was given to the magnitude of direct effects because those effects would be difficult to mitigate. Design features would reduce most indirect effects to negligible levels.

[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 1.6093.

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

area represents about 0.2% of available suitable habitat in the SEZ region. About 94,150 acres (381 km^2) of potentially suitable foraging habitat occurs in the area of potential indirect effects; this area represents about 4.8% of the available suitable habitat in the SEZ region (Table 13.1.12.1-1).

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

The avoidance of all potentially suitable habitats to mitigate impacts on the dark kangaroo mouse is not feasible because potentially suitable sagebrush and shrubland habitats are widespread throughout the area of direct effects. However, pre-disturbance surveys and avoidance or minimization of disturbance of occupied habitats in the area of direct effects could reduce impacts. If avoidance is not a feasible option, a compensatory mitigation plan could be developed and implemented to mitigate direct effects on occupied habitats. Compensation could involve the protection and enhancement of existing occupied or suitable habitats to compensate for habitats lost to development. A comprehensive mitigation strategy that uses one or both of these options could be designed to completely offset the impacts of development.

13.1.12.3 SEZ-Specific Design Features and Design Feature Effectiveness

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

- Pre-disturbance surveys shall be conducted in the area of direct effects to determine the presence and abundance of special status species, including those identified in Table 13.1.12.1-1 of the Draft Solar PEIS, as well as those additional species presented in Table 13.1.12.1-1 of this update for the Final Solar PEIS. Disturbance to occupied habitats for these species shall be avoided or minimized to the extent practicable. If avoiding or minimizing impacts on occupied habitats is not possible, translocation of individuals from areas of direct effects or compensatory mitigation of direct effects on occupied habitats may be used to reduce impacts. A comprehensive mitigation strategy for special status species that uses one or more of these options to offset the impacts of projects shall be developed in coordination with the appropriate federal and state agencies.

- Avoiding or minimizing disturbance of pinyon-juniper and oak/mahogany woodlands in the area of direct effects could reduce impacts on the Nevada willowherb and nesting habitat of the northern goshawk.

- Consultation with the U.S. Fish and Wildlife Service (USFWS) and the Utah Division of Wildlife Resources (UDWR) shall be conducted to address the potential for impacts on the Utah prairie dog, a species listed as threatened under the Endangered Species Act of 1973 (ESA). Consultation will identify an appropriate survey protocol, avoidance measures, and, if appropriate, reasonable and prudent alternatives, reasonable and prudent measures, and terms and conditions for incidental take statements.

- Coordination with the USFWS and the UDWR shall be conducted to address the potential for impacts on the greater sage-grouse, a candidate species for listing under the ESA. Coordination will identify an appropriate pre-disturbance survey protocol, avoidance measures, and any potential compensatory mitigation actions.

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

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

13.1.13 Air Quality and Climate

13.1.13.1 Affected Environment

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

13.1.13.1.1 Existing Air Emissions

The Draft Solar PEIS presented Iron County emissions data for 2002. More recent data for 2008 (UDEQ 2010) were reviewed. The two emissions inventories are from different sources and have differing assumptions. In the more recent data, emissions of sulfur dioxide (SO_2), nitrogen oxides (NO_x), carbon monoxide (CO), and volatile organic compounds (VOCs) were lower, while emissions for particular matter with a diameter of 10 μm or less and 2.5 μm or less (PM_{10} and $PM_{2.5}$) were higher. These changes would not affect modeled air quality impacts presented in this update.

13.1.13.1.2 Air Quality

The calendar quarterly average National Ambient Air Quality Standard (NAAQS) of 1.5 µg/m^3 for lead (Pb) presented in Table 13.1.13.1-2 of the Draft Solar PEIS has been replaced by the rolling 3-month standard (0.15 µg/m^3). The federal 24-hour and annual SO_2, 1-hour ozone (O_3), and annual PM_{10} standards (particulate matter with a diameter of 10 µm or less) have been revoked as well (EPA 2011). Utah adopts the NAAQS; thus Utah State Ambient Air Quality Standards (SAAQS) will reflect the same changes. These changes will not affect the modeled air quality impacts presented in this update.

Since the boundaries of the proposed Escalante Valley SEZ have not changed, the updated distances to the nearest Class I areas are the same as those presented in the Draft Solar PEIS.

13.1.13.2 Impacts

13.1.13.2.1 Construction

Methods and Assumptions

The methods and modeling assumptions remain the same as presented in the Draft Solar PEIS. The area of the proposed Escalante Valley SEZ was reduced by less than 2% from 6,614 acres (26.8 km^2) to 6,533 acres (26.4 km^2). This small reduction would have a negligible impact on air quality; thus, impacts were not remodeled.

Results

Because the annual PM_{10} standard has been rescinded, the discussion of annual PM_{10} impacts in the Draft Solar PEIS is no longer applicable, and Table 13.1.13.2-1 has been updated for this Final Solar PEIS. The tabulated concentrations as presented in the Draft Solar PEIS remain valid.

Because the air quality impacts remain the same as those presented in the Draft Solar PEIS, the conclusions presented in the Draft remain valid.[1] Predicted 24-hour PM_{10} and 24-hour

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

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

			Concentration ($\mu g/m^3$)				Percentage of NAAQS	
Pollutant[a]	Averaging Time	Rank[b]	Maximum Increment[b]	Background[c]	Total	NAAQS	Increment	Total
PM_{10}	24 hour	H6H	622	83	705	150	414	470
$PM_{2.5}$	24 hour	H8H	42.4	18	60.4	35	121	172
	Annual	NA[d]	11.3	8	19.3	15.0	75	129

[a] $PM_{2.5}$ = particulate matter with a diameter of ≤2.5 μm; PM_{10} = particulate matter with a diameter of ≤10 μm.

[b] Concentrations for attainment demonstration are presented. H6H = highest of the sixth-highest concentrations at each receptor over the 5-year period. H8H = highest of the multiyear average of the eighth-highest concentrations at each receptor over the 5-year period. For the annual average, multiyear averages of annual means over the 5-year period are presented. Maximum concentrations are predicted to occur at the site boundaries.

[c] See Table 13.1.13.1-2 of the Draft Solar PEIS (Prey 2009).

[d] NA = not applicable.

and annual $PM_{2.5}$ concentration levels could exceed the standard levels at the SEZ boundaries and in the immediate surrounding areas during the construction of solar facilities. To reduce potential impacts on ambient air quality and in compliance with programmatic design features, aggressive dust control measures would be used. Potential air quality impacts on nearby residences and cities would be lower. Modeling indicates that emissions from construction activities are not anticipated to exceed Class I Prevention of Significant Deterioration (PSD) PM_{10} increments at the nearest federal Class I area (Zion NP). Construction activities are not subject to the PSD program, and the comparison provides only a screen to gauge the size of the impact. Accordingly, it is anticipated that impacts of construction activities on ambient air quality would be moderate and temporary.

Because the same area is assumed to be disturbed both in the Draft Solar PEIS and this update, emissions from construction equipment and vehicles would be the same as those discussed in the Draft Solar PEIS. Construction emissions from the engine exhaust from heavy equipment and vehicles could cause impacts on air quality–related values (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. Construction-related emissions are temporary in nature and thus would cause some unavoidable but short-term impacts.

13.1.13.2.2 Operations

The reduction in the developable area of the proposed Escalante Valley SEZ by less than 2%, from 6,614 to 6,533 acres (26.8 to 26.4 km^2), decreases the generating capacity and annual power generation, and thus the potentially avoided emissions presented in the Draft Solar PEIS. Total revised power generation capacity ranging from 581 to 1,045 MW is estimated for the Escalante Valley SEZ for various solar technologies. As explained in the Draft Solar PEIS, the estimated amount of emissions avoided for the solar technologies evaluated depends only on the megawatts of conventional fossil fuel–generated power avoided.

Table 13.1.13.2-2 in the Draft Solar PEIS provided estimates for emissions potentially avoided by a solar facility. These estimates were updated by reducing the tabulated estimates by 1.22% as shown in the revised Table 11.13.1.13.2-2. For example, for the technologies estimated to require 9 acres/MW (power tower, dish engine, and PV), up to 1,936 tons of NO_x per year (= 98.78% × the value of 1,960 tons per year tabulated in the Draft Solar PEIS) could be avoided by full solar development of the revised area of the proposed Escalante Valley SEZ. Since the total emissions potentially avoided by full solar development of the proposed Escalante Valley SEZ are about the same as those presented in the Draft Solar PEIS, the conclusions presented in the Draft remain valid. Full solar development of the proposed Escalante Valley SEZ could result in substantial avoided emissions. Solar facilities to be built in the Escalante Valley SEZ could avoid relatively more fossil fuel emissions than those built in other states that rely less on fossil fuel–generated power.

13.1.13.2.3 Decommissioning and Reclamation

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

13.1.13.3 SEZ-Specific Design Features and Design Feature Effectiveness

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

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

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

Area Size (acres)	Capacity (MW)[a]	Power Generation (GWh/yr)[b]	Emissions Avoided (tons/yr; 10^3 tons/yr for CO_2)[c]			
			SO_2	NO_x	Hg	CO_2
6,533	581–1,045	1,017–1,831	1,012–1,822	1,936–3,485	0.004–0.007	1,098–1,976
Percentage of total emissions from electric power systems in the state of 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 the state of Utah[e]			1.8–3.3%	0.79–1.4%	–[f]	1.5–2.7%
Percentage of total emissions from electric power systems in the six-state study area[d]			0.40–0.73%	0.52–0.94%	0.14–0.24%	0.42–0.75%
Percentage of total emissions from all source categories in the six-state study area[e]			0.21–0.39%	0.07–0.13%	–	0.13–0.24%

[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 km^2) per MW (for parabolic trough technology) to 9 acres (0.036 km^2) per MW (power tower, dish engine, and PV technologies) would be required.

[b] Assumed a capacity factor of 20%.

[c] Composite combustion-related emission factors for SO_2, NO_x, mercury (Hg), and carbon dioxide (CO_2) 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 SO_2 and NO_x are for 2002, while those for CO_2 are for 2005.

[f] A dash indicates not estimated.

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

13.1.14 Visual Resources

13.1.14.1 Affected Environment

No boundary revisions were identified for the proposed Escalante Valley SEZ in the Supplement to the Draft Solar PEIS; however, 12 acres (0.05 km^2) of dry lake area and 69 acres (0.28 km^2) of dune area were identified as non-development areas. The remaining developable area within the SEZ is 6,533 acres (26.4 km^2).

13.1.14.2 Impacts

The summary of impacts provided in the Draft Solar PEIS remains valid, as follows. 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.

Utility-scale solar energy development within the 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 (Newcastle) is about 15 mi (24 km) from the SEZ and is likely to experience minimal visual impacts from solar development within the SEZ. The communities of Modena and Enterprise are also located within the 25-mi (40-km) viewshed of the SEZ. Visual impacts on these communities would be expected to be minimal.

13.1.14.3 SEZ-Specific Design Features and Design Feature Effectiveness

Required programmatic design features that would reduce impacts on visual resources are described in Section A.2.2 of Appendix A of this Final Solar PEIS. While application of the programmatic design features would reduce potential visual impacts somewhat, the degree of effectiveness of these design features can only be assessed at the site- and project-specific level. With the large scale, reflective surfaces, and strong regular geometry of utility-scale solar energy facilities and the lack of screening vegetation and landforms within the SEZ viewshed, siting the facilities away from sensitive visual resource areas and other sensitive viewing areas would be the primary means of mitigating visual impacts. The effectiveness of other visual impact mitigation measures generally would be limited.

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

13.1.15 Acoustic Environment

13.1.15.1 Affected Environment

The developable area of the proposed Escalante Valley SEZ was reduced by less than 2% from 6,614 to 6,533 acres (26.8 km^2 to 26.4 km^2). The boundaries of the SEZ were not changed, and thus the information for acoustic environment remains the same as that presented in the Draft Solar PEIS.

13.1.15.2 Impacts

The small reduction in the developable area of the SEZ would cause only a negligible reduction in predicted noise levels from construction and operations. The conclusions presented in the Draft Solar PEIS remain valid.

13.1.15.2.1 Construction

The conclusions in the Draft Solar PEIS remain valid.

For construction activities occurring near the northwestern SEZ boundary, noise levels would be about 42 dBA at the nearest residences (about 1.1 mi [1.8 km] northwest of the SEZ's northwestern corner), a level below the 50 dBA in the Iron County noise regulation and comparable to the typical daytime mean rural background level of 40 dBA. The U.S. Environmental Protection Agency (EPA) guideline of 55 dBA L_{dn} for residential areas would also be met at these residences and is estimated to be 42 dBA L_{dn}.

No specially designated areas occur within 5 mi (8 km) of the Escalante Valley SEZ, which is the farthest distance at which noise, other than extremely loud noise, would be discernible. Thus, no noise impact analysis for specially designated areas was conducted.

Construction could cause some unavoidable but localized short-term noise impacts on neighboring communities, particularly for activities occurring near the northwestern SEZ boundary, close to the nearest residences.

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

13.1.15.2.2 Operations

Because of the small reduction in developable area, the conclusions presented in the Draft Solar PEIS remain valid.

Parabolic Trough and Power Tower

For operating parabolic trough and power tower technologies, both the Iron County level of 50 dBA and the EPA guideline of 55 dBA L_{dn} would be met at the nearest residences if thermal energy storage (TES) were not used. However, use of TES at a solar facility located near the northwestern SEZ boundary could produce nighttime noise levels much higher than the typical nighttime mean rural background level of 30 dBA and thus result in adverse noise impacts at the nearest residences, depending on background noise levels and meteorological conditions. In the permitting process, refined noise propagation modeling would be warranted along with measurement of background noise levels.

Dish Engines

For operating dish engines, the estimated noise level at the nearest residences is about 45 dBA, below the Iron County regulation level of 50 dBA, but higher than the typical daytime mean rural background level of 40 dBA. For a 12-hour daytime operation, the predicted 44 dBA L_{dn} is well below the EPA guideline of 55 dBA L_{dn} for residential areas. Depending on background noise levels and meteorological conditions, noise from dish engines could have adverse impacts on the nearest residences. Thus, consideration of minimizing noise impacts is very important during the siting of dish engine facilities. Direct mitigation of dish engine noise through noise control engineering could also limit noise impacts.

During operation of any solar facility, potential vibration impacts on surrounding communities and vibration-sensitive structures would be minimal.

The discussions of vibration, transformer and switchyard noise, and transmission line corona discharge presented in the Draft Solar PEIS remain valid. Noise impacts from these sources would be negligible.

13.1.15.2.3 Decommissioning and Reclamation

The discussion in the Draft Solar PEIS remains valid. Decommissioning and reclamation activities would be of short duration, and their potential noise impacts would be minor and temporary. Potential noise and vibration impacts on surrounding communities would be minimal.

13.1.15.3 SEZ-Specific Design Features and Design Feature Effectiveness

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

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

13.1.16 Paleontological Resources

13.1.16.1 Affected Environment

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

- The BLM Regional Paleontologist may have additional information regarding the paleontological potential of the SEZ and be able to verify the potential fossil yield classification (PFYC) of the SEZ as Class 2 as used in the Draft Solar PEIS.

13.1.16.2 Impacts

Few, if any, impacts on significant paleontological resources are likely to occur in the proposed Escalante Valley SEZ. However, a more detailed look at the geological deposits of the SEZ is needed to determine whether a paleontological survey is warranted. The assessment provided in the Draft Solar PEIS remains valid.

13.1.16.3 SEZ-Specific Design Features and Design Feature Effectiveness

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

On the basis of impact analyses conducted for the Draft Solar PEIS and consideration of comments received as applicable, no SEZ-specific design features for paleontological resources have been identified. If the geological deposits are determined to be as described in the Draft Solar PEIS and are classified as PFYC Class 2, SEZ-specific design features for mitigating impacts on paleontological resources within the proposed Escalante Valley SEZ and associated ROWs are not likely to be necessary. The need for and nature of any SEZ-specific design features for the remaining portion of the SEZ would depend on the results of future paleontological investigations. Some SEZ-specific design features may be identified through the process of preparing parcels for competitive offer and subsequent project-specific analysis.

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

13.1.17 Cultural Resources

13.1.17.1 Affected Environment

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

- The designation of some dune and dry lake areas as non-developable in the SEZ will exclude some areas of high cultural resource potential from

development; however, the potential for significant cultural resources still exists in the SEZ.

- A tribally approved ethnographic study of the proposed Escalante Valley SEZ was conducted (SWCA and University of Arizona 2011), and a summary of that study was presented in the Supplement to the Draft Solar PEIS. A number of new cultural landscapes, important water sources, and traditional plants and animals were identified (see Section 13.1.18 for a description of the latter). The completed ethnographic study is available in its entirety on the Solar PEIS Web site (http://solarpeis.anl.gov).

- Tribal representatives of the Confederated Tribes of the Goshute Reservation and the Paiute Indian Tribe of Utah identified the Escalante Valley as part of a large ceremonial and healing landscape that includes important geological features such as Table Butte, Eagle Rock, and Sulfur Spring.

- Additional information may be available to characterize the area surrounding the proposed SEZ in the future (after the Final Solar PEIS is completed), as follows:
  - Results of a Class I literature file search to better understand (1) the site distribution pattern in the vicinity of the SEZ, (2) trail networks through existing ethnographic reports, and (3) overall cultural sensitivity of the landscape.
  - Results of a Class II reconnaissance-level stratified random sample survey of the SEZ with a goal of achieving a 10% sample (roughly 653 acres [2.64 km^2]) as funding to support additional Class II sample inventories in the SEZ becomes available. If the roughly 265 acres (1.0 km^2) previously surveyed meets current survey standards, then approximately 388 acres (1.57 km^2) of survey could satisfy a 10% sample. Areas of interest as determined through a Class I review should also be identified prior to establishing the survey design and sampling strategy. If appropriate, subsurface testing of dune and/or colluvium areas should be considered in the sampling strategies of future surveys. The sample inventory combined with the Class I review would be used to project cultural sensitivity as an aid in planning future solar development.
  - Identification of high-potential segments of the Old Spanish National Historic Trail and viewshed analyses from key points along the Trail. The closest point is within 6 mi (9.7 km) but is obscured from view at that location by Table Butte. The Dominguez-Escalante Trail is not a National Historic Trail, but it is an important historic trail that should potentially be investigated further.
  - Continuation of government-to-government consultation as described in Section 2.4.3 of the Supplement to the Draft Solar PEIS and Instruction Memorandum (IM) 2012-032 (BLM 2011a), including follow-up to recent ethnographic studies with tribes not included in the original studies to determine whether those tribes have similar concerns.

13.1.17.2 Impacts

As stated in the Draft Solar PEIS, direct impacts on significant cultural resources could occur in the proposed Escalante Valley SEZ; however, further investigation is needed. The following updates are based on the non-developable dune areas that have been removed from the developable portions of the SEZ:

- Because some of the dune area in the southwestern portion of the SEZ has been determined non-developable, impacts on some significant cultural resources may be minimized; however, the potential still exists for sites in the areas in close proximity to the dunes.

- The potential for significant historical sites is possible in the SEZ.

- Visual impacts on the Old Spanish National Historic Trail could occur with solar energy development in the SEZ.

13.1.17.3 SEZ-Specific Design Features and Design Feature Effectiveness

Required programmatic design features that would reduce impacts on cultural resources are described in Section A.2.2 of Appendix A of this Final Solar PEIS. Programmatic design features assume that the necessary surveys, evaluations, and consultations will occur.

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

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

Other SEZ-specific design features, if needed, would be determined in consultation with the Utah State Historic Preservation Office (SHPO) and affected tribes and would depend on the results of future investigations. Information in the ethnographic reports would suggest that impacts on the Escalante Valley, Table Butte, Eagle Rock, Sulfur Spring, and culturally sensitive plant and animal species would need to be avoided, minimized, or otherwise mitigated if solar energy development were to be initiated in the proposed Escalante Valley SEZ. The need for additional SEZ-specific design features will be identified through the process of preparing parcels for competitive offer and subsequent project-specific analysis.

13.1.18 Native American Concerns

13.1.18.1 Affected Environment

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

- A tribally approved ethnographic study of the proposed Escalante Valley SEZ was conducted (SWCA and University of Arizona 2011), and a summary of that study was presented in the Supplement to the Draft Solar PEIS. A number of new cultural landscapes, important water sources, and traditional plants and animals were identified. The completed ethnographic study is available in its entirety on the Solar PEIS Web site (http://solareis.anl.gov).

- The tribal representatives from both the Confederated Tribe of the Goshute Reservation and the Paiute Indian Tribe of Utah believe that all the cultural resources and landscapes within the proposed Escalante Valley SEZ are important in helping both tribes to understand their past, present, and future.

- Tribal representatives of the Confederated Tribes of the Goshute Reservation and the Paiute Indian Tribe of Utah identified the Escalante Valley as part of a large ceremonial and healing landscape that includes important geological features such as Table Butte, Eagle Rock, and Sulfur Spring.

- Matters of particular concern to both tribes include the amount of water needed to sustain a solar energy plant; the potential effects on the natural environment by artificially harnessing the sun's energy; and the potential destruction of archaeological sites, some possibly related to the ceremonial/healing complex.

- The tribal representatives of the Confederated Tribes of the Goshute Reservation and the Paiute Indian Tribe of Utah believe the area including and surrounding the proposed Escalante Valley SEZ should be managed as a spiritual cultural landscape and that significant areas (e.g., The Eagle Rock Ceremonial Complex, Thermo Hot Springs, Table Butte, and Parowan Gap) should be nominated as traditional cultural properties. Both tribes would like to work with the BLM in restricting access to the Eagle Rock area and would like to develop and participate in a monitoring program for the area (SWCA and University of Arizona 2011).

- The Eagle Rock Ceremonial Complex has been identified by both tribes as a particularly important place of power and medicine. Geological features thought to be associated with this complex are Eagle Rock, Sulfur Spring, Mountain Spring, and Mountain Spring Peak. The most important of these features is Eagle Rock, the doctor rock.

- Thermo Hot Springs has been identified as an important place of ceremonial activity. The sulfuric muds and mineralized water of Thermo Hot Springs were used in curing ceremonies, while others used the springs to purify themselves before participating in ceremonial activities such as vision questing.

- Parowan Gap has been identified as an important place of spiritual importance. It is associated with a Southern Paiute creation story that identifies the origin of the geological feature and the associated rock art found on its walls.

- Areas that contain evidence of volcanic activity have been identified as culturally important parts of the landscape. Volcanic events are thought to bring new *Puha* (or power) to the surface of the Earth. *Puha* follows the flow of magma, as it does with water, connecting places and elements. Major evidence of volcanic activity is found mostly north of the proposed SEZ, although volcanic rock is likely present throughout the proposed SEZ footprint.

- Table Butte has been identified as an important geological feature that is associated with ceremonial activities and supports important medicinal plants.

- Indian Peaks has been identified by ethnographers as a likely "Region of Refuge"; that is, an area where Native Americans retreated when Europeans began encroaching on their traditional lands.

- Several historic events in and around the Escalante Valley have contributed to the history of both tribes. These include the first recorded encounter between Paiute peoples and the Dominguez–Escalante Expedition; the period of travel and exploration beginning with the establishment of the Old Spanish Trail and continuing with the influx of ranches, mining communities, roads, and railroads; the forced abandonment of the tribal horticultural way of life into a herding and ranching life style; and the spread of European diseases which decimated Native American populations.

- The following traditional plants have been identified in addition to those listed in Table 13.1.18.1-2 of the Draft Solar PEIS: big sagebrush (*Artemisia tridentate*), bud sagebrush (*Picrothamnus dessertorum*), desert globemallow (*Sphaeralcea ambigua*), locoweed (*Astragalus sp*.), northwestern Indian paintbrush (*Castilleja* angustifolia), penstemon (*Penstemon* sp.), sego lily (*Calochortus nuttallii*), shadscale (*Atriplex confertifolia*), singleleaf pinyon (*Pinus monophylla*), tulip pricklypear (*Opuntia phaecantha*), Utah juniper (*Juniperus osteoperma*), winterfat (*Krascheninnikovia lanata*), and western tansymustard (*Descurainia pinnata*).

- The following traditional animals have been identified in addition to those listed in Table 13.1.18.1-3 of the Draft Solar PEIS: American black bear (*Ursus americanus*), American badger (*Taxidea taxus*), elk (*Cervis Canadensis*), American kestrel (*Falco sparverius*), loggerhead shrike (*Lanius ludovicianus*), turkey vulture (*Cathartes aura*), and western kingbird (*Tyrannus verticalis*).

13.1.18.2 Impacts

The description of potential concerns provided in the Draft Solar PEIS remains valid. During past project-related consultation, the Southern Paiutes have expressed concerns over project impacts on a variety of resources. Potential impacts on important resources such as food plants, medicinal plants, plants used in basketry, plants used in construction, large and small game animals, birds, and sources of clay, salt, and pigments (Stoffle and Dobyns 1983). The construction of utility-scale solar energy facilities within the proposed SEZ would result in the destruction of some plants important to Native Americans and the habitat of some traditionally important animals.

In addition to the impacts discussed in the Draft Solar PEIS, the ethnographic study conducted for the proposed Escalante Valley SEZ identified the following impacts:

- Tribal representatives believe that solar energy development within the proposed Escalante Valley SEZ will adversely affect identified and unidentified archaeological sites, water sources, culturally important geological features, and traditional plant, mineral, and animal resources (SWCA and University of Arizona 2011).

- Development within the proposed Escalante Valley SEZ could result in visual impacts on Thermo Hot Springs; Table Butte; Sulfur Spring; Mountain Spring Peak; and the Indian Peak Range, which contains Eagle Rock. Possible visual impacts could occur to Parowan Gap.

- Development within the proposed Escalante Valley SEZ may affect the spiritual connection both tribes have to water and *Puha*. This is especially true for developments near spiritual water sources such as Sulfur Spring and Thermo Hot Springs and any prominent volcanic feature located within the SEZ.

- Development within the proposed Escalante Valley SEZ will directly affect culturally important plant and animal resources as it will likely require the grading of the project area.

13.1.18.3 SEZ-Specific Design Features and Design Feature Effectiveness

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

On the basis of impact analyses conducted for the Draft Solar PEIS and consideration of comments received as applicable, no SEZ-specific design features to address Native American concerns have been identified. The need for and nature of SEZ-specific design features would be determined during government to government consultation with affected tribes as part of the process of preparing parcels for competitive offer and subsequent project-specific analysis. Potentially significant sites and landscapes in the vicinity of the SEZ associated with Table Butte, Eagle Rock (doctor rock), Parowan Gap, and Thermo Hot Springs, as well as important water sources, clay and rock resources, ceremonial areas and healing places, and traditionally important plant and animal species, should be considered and discussed during consultation.

13.1.19 Socioeconomics

13.1.19.1 Affected Environment

The boundaries of the Escalante Valley SEZ have not changed. The socioeconomic region of influence (ROI), the area in which site employees would live and spend their wages and salaries, and into which any in-migration would occur, includes the same counties and communities as described in the Draft Solar PEIS, meaning that no updates to the affected environment information given in the Draft Solar PEIS are required.

13.1.19.2 Impacts

Socioeconomic resources in the ROI around the SEZ could be affected by solar energy development through the creation of direct and indirect employment and income, the generation of direct sales and income taxes, SEZ acreage rental and capacity payments to the BLM, the in-migration of solar facility workers and their families, and impacts on local housing markets and on local community service employment. Since the boundaries of the proposed Escalante Valley SEZ remain unchanged and the reduction of the developable area was small (less than 2%), the impacts for full build-out of the SEZ estimated in the Draft Solar PEIS remain essentially unchanged. During construction, between 264 and 3,518 jobs and between $13.4 million and $178 million in income could be associated with solar development in the SEZ. During operations at full build-out, between 16 373 jobs and between $0.5 million and $11 million in income could be produced. In-migration of workers and their families would mean between 35 and 458 rental housing units would be needed during construction, and between 2 and 46 owner-occupied units during operations.

13.1.19.3 SEZ-Specific Design Features and Design Feature Effectiveness

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

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

13.1.20 Environmental Justice

13.1.20.1 Affected Environment

The data presented in the Draft Solar PEIS for the proposed Escalante Valley SEZ have not substantially changed. There are no minority or low-income populations in the Nevada or Utah portions of the 50-mi (80-km) radius of the SEZ taken as a whole. At the individual block group level, there are low-income populations in specific census block groups located in two block groups in Iron County, in Cedar City itself, and to the west of Cedar City.

13.1.20.2 Impacts

Potential impacts (e.g., from noise and dust during construction and operations, visual impacts, cultural impacts, and effects on property values) on low-income and minority populations could be incurred as a result of the construction and operation of solar facilities involving each of the four technologies. Impacts are likely to be small, and there are no minority populations defined by Council on Environmental Quality (CEQ) guidelines (CEQ 1997) (see Section 13.1.20.1 of the Draft Solar PEIS) within the 50-mi (80-km) radius around the boundary of the SEZ. This means that any adverse impacts of solar projects would not disproportionately affect minority populations. Because there are no low-income populations within the 50-mi (80-km) radius as a whole, there would be no impacts on low-income populations.

13.1.20.3 SEZ-Specific Design Features and Design Feature Effectiveness

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

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

13.1.21 Transportation

13.1.21.1 Affected Environment

The reduction in developable area of the proposed Escalante Valley SEZ of less than 2% does not change the information on affected environment for transportation provided in the Draft Solar PEIS.

13.1.21.2 Impacts

As stated in the Draft Solar PEIS, 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 regional corridors would be more than double the current values in most cases. 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 off-highway vehicle (OHV) routes that are designated open and available for public use. Although open routes crossing areas granted ROWs for solar facilities could be redesignated as closed (see Section 5.5.1 of the Draft Solar PEIS), a programmatic design feature has been included under Recreation (Section A.2.2.6.1 of Appendix A) that requires consideration of replacement of lost OHV route acreage and of access across and to public lands.

13.1.21.3 SEZ-Specific Design Features and Design Feature Effectiveness

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

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

13.1.22 Cumulative Impacts

The analysis of potential impacts in the vicinity of the proposed Escalante Valley SEZ presented in the Draft Solar PEIS is still generally applicable for this Final Solar PEIS. The size of the developable area of the proposed SEZ has been reduced by less than 2%. The following sections include an update to the information presented in the Draft Solar PEIS regarding cumulative effects for the proposed Escalante Valley SEZ.

13.1.22.1 Geographic Extent of the Cumulative Impact Analysis

The geographic extent of the cumulative impact analysis has not changed. The extent varies on the basis of the nature of the resource being evaluated and the distance at which an impact may occur (e.g., air quality impacts may have a greater geographical extent than visual resources impacts). Most of the lands around the SEZ are state owned, administered by the U.S. Forest Service (USFS), or administered by the BLM. The BLM administers about 56% of the lands within a 50-mi (80-km) radius of the SEZ.

13.1.22.2 Overview of Ongoing and Reasonably Foreseeable Future Actions

The Draft Solar PEIS included two other proposed SEZs in southwestern Utah, Milford Flats South and Wah Wah Valley; these areas remain proposed as SEZs.

13.2.22.2.1 Energy Production and Distribution

The list of reasonably foreseeable future actions related to energy development and distribution near the proposed Escalante Valley SEZ has been updated and is presented in Table 13.1.22.2-1. Projects listed in the table are shown in Figure 13.1.22.2-1.

13.2.22.2.2 Other Actions

Only two of the other major ongoing and foreseeable actions within 50 mi (80 km) of the proposed Escalante Valley SEZ that were listed in Table 13.1.22.2-3 of the Draft Solar PEIS have had a change in their status: Utah's Copper Company Hidden Treasure Mine has filed for Chapter 11 and has suspended operation (Overbeck 2010), and the Hamlin Valley Habitat Improvement Environmental Assessment was issued on February 22, 2011 (BLM 2012b).

13.1.22.3 General Trends

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

TABLE 13.1.22.2-1 Ongoing and Reasonably Foreseeable Future Actions Related to Energy Development and Distribution near the Proposed Escalante Valley SEZ as Revised[a]

Description	Status	Resources Affected	Primary Impact Location
Renewable Energy Development			
Milford Wind Phase I (UTU 82972) **97 turbines, 204 MW[b]**	**Operating since Nov. 2009[b]**	Land use, ecological resources, visual	About 50 mi[c] northeast of the Escalante Valley SEZ (Beaver County)
Milford Wind Phase II (UTU 83073) **68 turbines, 102 MW[b]**	**Operating since May 2011[b]**	Land use, ecological resources, visual	About 50 mi northeast of the Escalante Valley SEZ (Beaver and Millard Counties)
Milford Wind Phases III (UTU 8307301) **140 turbines, 16,068 acres (private)**	**Draft Environmental Assessment Report Oct. 2011[d]**	Land use, ecological resources, visual	About 50 mi northeast of the Escalante Valley SEZ (Beaver County)
Milford Wind Phases IV–V (UTU 8307301)	Planned	Land use, ecological resources, visual	About 50 mi northeast of the Escalante Valley SEZ (Beaver County)
Geothermal Energy Project UTU 66583O	Authorized	Land use, groundwater, terrestrial habitats, visual	About 45 mi northeast of the Escalante Valley SEZ (Beaver County)
Geothermal Energy Project UTU 66583X	Authorized	Land use, groundwater terrestrial habitats, visual	About 45 mi northeast of the Escalante Valley SEZ (Beaver County)
Transmission and Distribution System			
Sigurd to Red Butte No. 2, 345-kV Transmission Line Project	**DEIS May 2011[e]**	Land use, ecological resources, visual	East of the Milford Flats South and Escalante Valley SEZs
Three Peaks, 138-kV Transmission Line Project	Planned	Land use, ecological resources, visual	Southeast of the Escalante Valley SEZ
Energy Gateway South 500-kV AC Transmission Line Project	**ROW modified and no longer within 50 mi (80 km) of the SEZ[f]**		

TABLE 13.1.22.2-1 (Cont.)

Description	Status	Resources Affected	Primary Impact Location
TransWest Express, 600-kV DC Transmission Line Project	**Scoping Report July 2011**[g]	Land use, ecological resources, visual	About 5 mi southeast of the Escalante Valley SEZ and 3 mi west of the Milford Flats South SEZ
UNEV Liquid Fuel Pipeline (UTU-79766)	**ROD July 1, 2010**[h]	Disturbed areas, terrestrial habitats along pipeline ROW	About 5 mi southeast of the Escalante Valley SEZ and 3 mi west of the 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.

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

[b] See FirstWind (2011) for details.

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

[d] See CH2MHILL (2011) for details.

[e] See BLM (2011b) for details.

[f] See BLM (2011c) for details.

[g] See BLM and Western (2011) for details.

[h] See BLM (2010) for details.

13.1.22.4 Cumulative Impacts on Resources

Total disturbance over 20 years in the proposed Escalante Valley SEZ would be about 5,226 acres (21.1 km^2) (80% of the entire proposed SEZ). This development would contribute incrementally to the impacts from other past, present, and reasonably foreseeable future actions in the region as described in the Draft Solar PEIS. Primary impacts from development in the Escalante Valley SEZ may include impacts on water quantity and quality, air quality, ecological resources such as habitat and species, cultural and visual resources, and specially designated lands.

No additional major actions have been identified within 50 mi (80 km) of the SEZ. Therefore, the incremental cumulative impacts associated with development in the proposed Escalante Valley SEZ during construction, operation, and decommissioning are expected to be the same as those discussed in the Draft Solar PEIS.

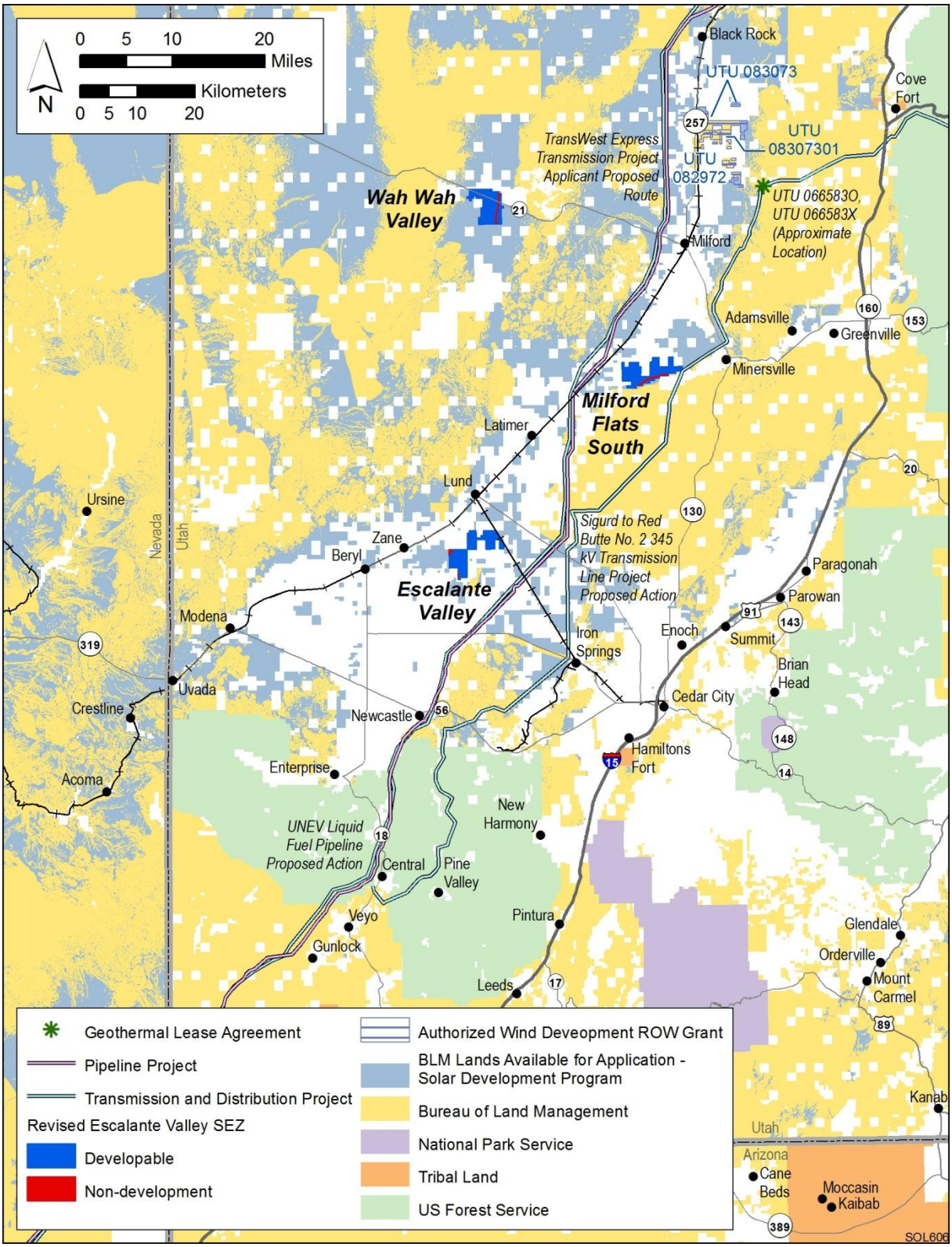

FIGURE 13.1.22.2-1 Locations of Existing and Reasonably Foreseeable Renewable Energy Projects on Public Land within a 50-mi (80-km) Radius of the Proposed Escalante Valley SEZ as Revised

13.1.23 Transmission Analysis

The methodology for this transmission analysis is described in Appendix G of this Final Solar PEIS. This section presents the results of the transmission analysis for the Escalante Valley SEZ, including the identification of potential load areas to be served by power generated at the SEZ and the results of the dedicated-line-transmission (DLT) analysis. Unlike Sections 13.1.2 through 13.1.22, this section is not an update of previous analysis for the Escalante Valley SEZ; this analysis was not presented in the Draft Solar PEIS. However, the methodology and a test case analysis were presented in the Supplement to the Draft Solar PEIS. Comments received on the material presented in the Supplement were used to improve the methodology for the assessment presented in this Final Solar PEIS.

On the basis of its size, the assumption of a minimum of 5 acres (0.02 km^2) of land required per MW, and the assumption of a maximum of 80% of the land area developed, the Escalante Valley SEZ is estimated to have the potential to generate 1,045 MW of marketable solar power at full build-out.

13.1.23.1 Identification and Characterization of Load Areas

The primary candidates for Escalante Valley SEZ load areas are the major surrounding cities. Figure 13.1.23.1-1 shows the possible load areas for the Escalante Valley SEZ and the estimated portion of their market that could be served by solar generation. Possible load areas for the Escalante Valley SEZ include St. George and Salt Lake City, Utah; Las Vegas, Nevada; and the major cities in San Bernardino and Riverside Counties, California.

The two load area groups examined for the Escalante Valley SEZ are as follows:

1. St. George, Utah; Las Vegas, Nevada; and San Bernardino–Riverside County load II, California; and

2. St. George, Utah; San Bernardino–Riverside County load II, and San Bernardino–Riverside County load I, California; and Salt Lake City, Utah.

Figure 13.1.23.1-2 shows the most economically viable transmission schemes for the Escalante Valley SEZ (transmission scheme 1), and Figure 13.1.23.1-3 shows an alternative transmission scheme (transmission scheme 2) that represents a logical choice should transmission scheme 1 be infeasible. As described in Appendix G, the alternative shown in transmission scheme 2 represents the optimum choice if one or more of the primary linkages in transmission scheme 1 are excluded from consideration.. The groups provide for linking loads along alternative routes so that the SEZ's output of 1,045 MW could be fully allocated.

Table 13.1.23.1-1 summarizes and groups the load areas according to their associated transmission scheme and provides details on how the megawatt load for each area was estimated.

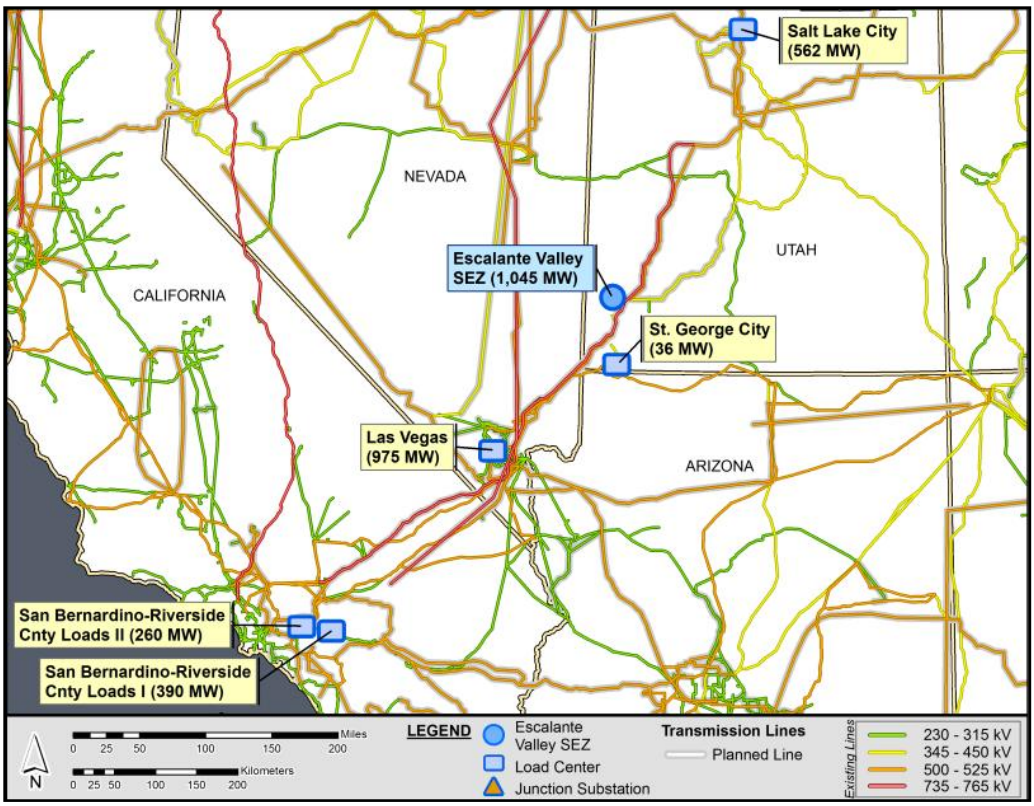

FIGURE 13.1.23.1-1 Location of the Proposed Escalante Valley SEZ and Possible Load Areas (Source for background map: Platts 2011)

13.1.23.2 Findings for the DLT Analysis

The DLT analysis approach assumes that the Escalante Valley SEZ will require all new construction for transmission lines (i.e., dedicated lines) and substations. The new transmission lines(s) would directly convey the 1,045-MW output of the Escalante Valley SEZ to the prospective load areas for each possible transmission scheme. The approach also assumes that all existing transmission lines in the Western Electricity Coordinating Council (WECC) region are saturated and have little or no available capacity to accommodate the SEZ's output throughout the entire 10-year study horizon.

Figures 13.1.23.1-2 and 13.1.23.1-3 display the pathways that new dedicated lines might follow to distribute solar power generated at the Escalante Valley SEZ via the two identified transmission schemes described in Table 13.1.23.1-1. These pathways parallel existing 500-, 345-kV, and/or lower voltage lines. The intent of following existing lines is to avoid pathways that may be infeasible due to topographical limitations or other concerns.

For transmission scheme 1, serving load centers to the south, a new line would be constructed to connect with St. George (36 MW), Las Vegas (975 MW), and San Bernardino–Riverside County load II (260 MW), so that the 1,045-MW output of the Escalante Valley SEZ

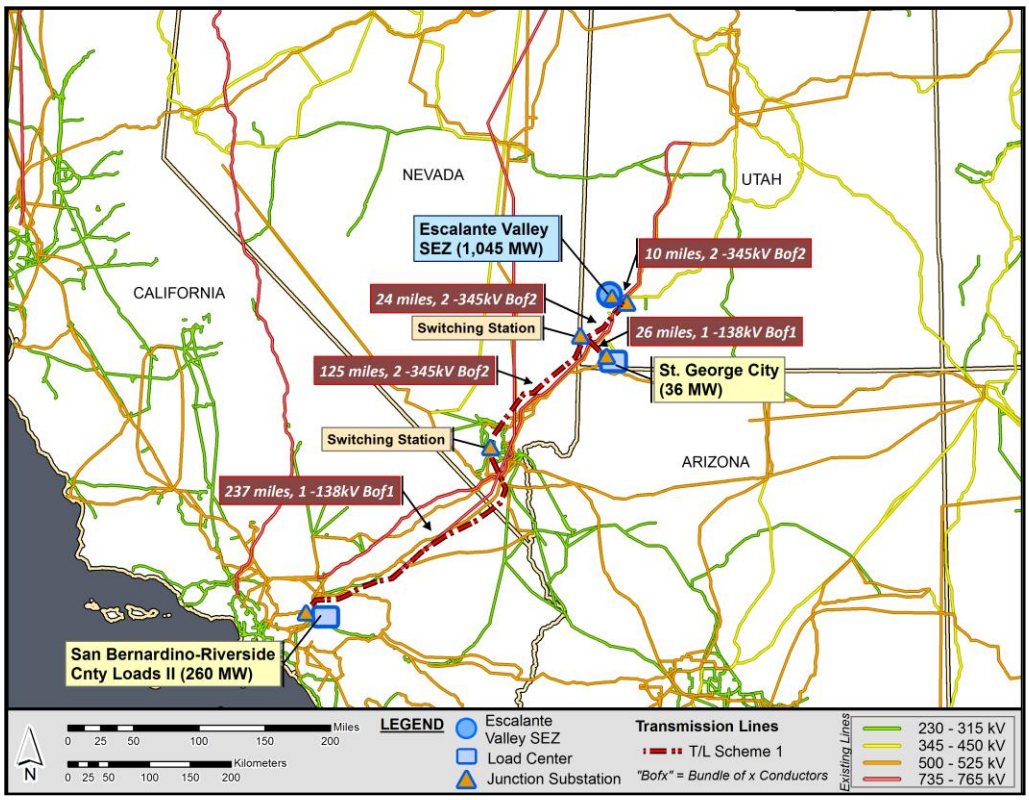

FIGURE 13.1.23.1-2 Transmission Scheme 1 for the Proposed Escalante Valley SEZ (Source for background map: Platts 2011)

could be fully utilized (Figure 13.1.23.1-2). This particular scheme has five segments. The first segment extends to the southwest from the SEZ to the first switching station over a distance of about 10 mi (16 km). On the basis of engineering and operational considerations, this segment would require a double-circuit 345-kV (2–345 kV) bundle of two conductors (Bof2) transmission line design. The second leg runs about 24 mi (39 km) from the first switching station to the second switching station and forms as a tap point for the line going to St. George. The third leg extends from the second switching station about 26 mi (42 km) to St. George (36 MW). The fourth segment runs from the second switching station (0 MW) to Las Vegas for a distance of 125 mi (201 km). The fifth and final leg joins Las Vegas with the San Bernardino–Riverside County load II (260 MW). In general, the transmission configuration options were determined by using the line "loadability" curve provided in American Electric Power's *Transmission Facts* (AEP 2010). Appendix G documents the line options used for this analysis and describes how the load area groupings were determined.

Transmission scheme 2, which assumes the Las Vegas market is not available, serves load centers to the southwest and northwest. Figure 13.1.23.1-3 shows that new lines would be constructed to connect with Salt Lake City (562 MW), St. George (36 MW), San Bernardino–Riverside load II (260 MW) and San Bernardino–Riverside load I (390 MW), so that the 1,045-MW output of the Escalante Valley SEZ could be fully utilized. This scheme has seven segments. The first segment extends to the southwest from the SEZ to the first switching station

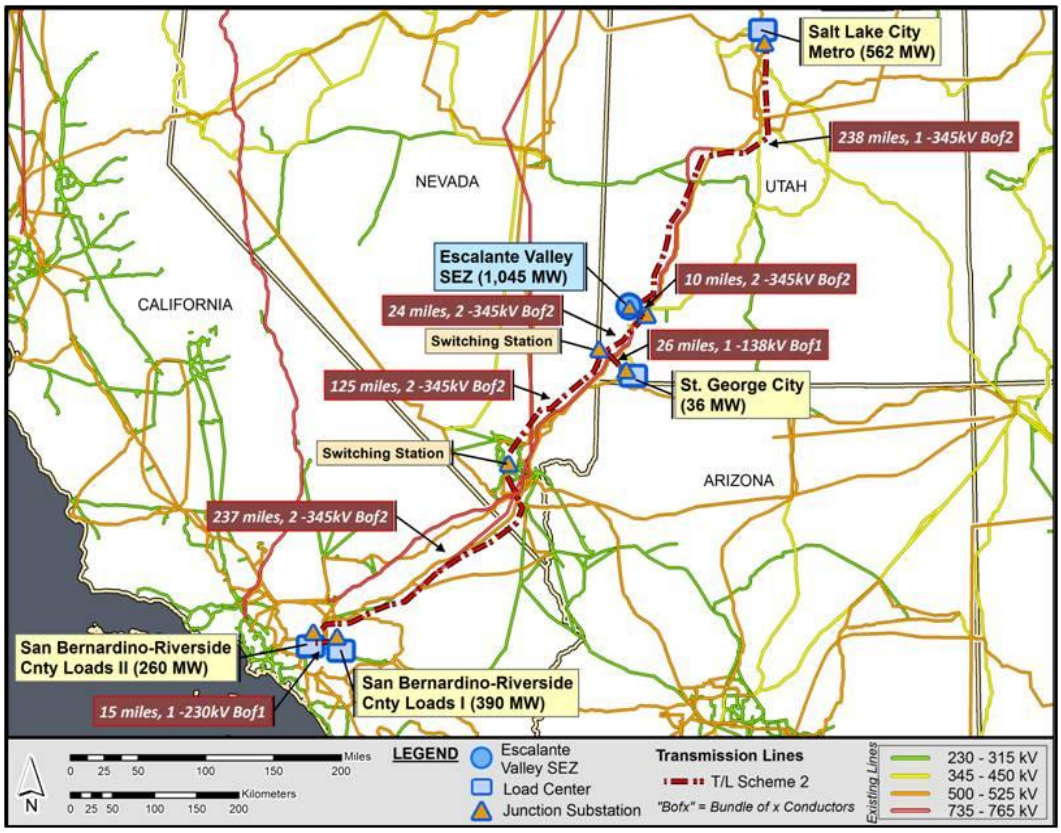

FIGURE 13.1.23.1-3 Transmission Scheme 2 for the Proposed Escalante Valley SEZ (Source for background map: Platts 2011)

over a distance of about 10 mi (16 km). This segment would require a double-circuit 345-kV (2-345 kV) bundle of two (Bof2) transmission line design. The second leg runs about 24 mi (39 km) from the first switching station to the second switching station and forms as a tap point for the line going to St. George. The third leg extends from the second switching station about 26 mi (42 km) to St. George (36 MW). The fourth segment runs from the second switching station to the Las Vegas switching station for a distance of 125 mi (201 km). The fifth leg joins the Las Vegas switching station with the San Bernardino–Riverside County load II (260 MW) via a 237-mi (381-km) line, while the sixth leg extends past San Bernardino–Riverside County load II to San Bernardino–Riverside County load I (390 MW) via a 15-mi (24-km) line. The seventh leg extends northeastern from the first switching station near the SEZ to Salt Lake City (562 MW) over a distance of 238 mi (383 km).

Table 13.1.23.2-1 summarizes the distances to the various load areas over which new transmission lines would need to be constructed, as well as the assumed number of substations that would be required. One substation is assumed to be installed at each load area and an additional one at the SEZ. In general, the total number of substations per scheme is simply equal to the number of load areas associated with the scheme plus one. Substations at the load areas would consist of one or more step-down transformers, while the originating substation at the SEZ would consist of several step-up transformers. The originating substation would have a

TABLE 13.1.23.1-1 Candidate Load Area Characteristics for the Proposed Escalante Valley SEZ

Transmission Scheme	City/Load Area Name	Position Relative to SEZ	2010 Population[e]	Estimated Total Peak Load (MW)	Estimated Peak Solar Market (MW)
1	St. George, Utah[a]	Southeast	72,000	180	36
	Las Vegas, Nevada[b]	South	1,951,269	4,878	975
	San Bernardino–Riverside County load II, California[c]	Southwest	524,993	1,312	260
2	St. George, Utah[a]	Southeast	72,000	180	36
	San Bernardino–Riverside County load II, California[c]	Southwest	524,993	1,312	260
	San Bernardino–Riverside County load I, California[d]	South	786,971	1,967	390
	Salt Lake City, Utah[b]	Northeast	1,124,197	2,810	562

[a] The load area represents the city named.

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

[c] The San Bernardino–Riverside County load II area includes the communities of Fontana, Ontario, and Rancho Cucamonga.

[d] The San Bernardino–Riverside County load I area includes the communities of Colton, Riverside, San Bernardino, Redlands, Highland, and Rialto.[e] City and metropolitan area population data are from 2010 Census data (U.S. Bureau of the Census 2010).

rating of at least 1,045 MW (to match the plant's output), while the combined load substations would have a similar total rating of 1,045 MW. For schemes that require the branching of the lines, a switching substation is assumed to be constructed at the appropriate junction. In general, switching stations carry no local load but are assumed to be equipped with switching gears (e.g., circuit breakers and connecting switches) to reroute power as well as, in some cases, with additional equipment to regulate voltage.

Table 13.1.23.2-2 provides an estimate of the total land area disturbed for construction of new transmission facilities under each of the schemes evaluated. The most favorable transmission scheme with respect to minimizing costs and the area disturbed would be scheme 1, which serves the cities of St. George, Las Vegas, and San Bernardino–Riverside County load II. This scheme is estimated to potentially disturb about 5,948 acres (24.1 km^2) of land. The less favorable transmission scheme with respect to minimizing costs and the area disturbed would be scheme 2 (serving the Salt Lake Metro area in addition to St. George and the San Bernardino–Riverside County loads but excluding Las Vegas). For this scheme, the construction of new transmission lines and substations is estimated to disturb land area on the order of 13,998 acres (56.7 km^2).

TABLE 13.1.23.2-1 Potential Transmission Schemes, Estimated Solar Markets, and Distances to Load Areas for the Proposed Escalante Valley SEZ

Transmission Scheme	City/Load Area Name	Estimated Peak Solar Market (MW)[e]	Total Solar Market (MW)	Sequential Distance (mi)[f]	Total Distance (mi)[f]	Line Voltage (kV)	No. of Substations
1	St. George, Utah[a]	36	1,271	60	422	345,	6
	Las Vegas, Nevada[b]	975		125		138	
	San Bernardino County load II, California[c]	260		237			
2	St. George, Utah[a]	36	1,248	60	675	345,	8
	San Bernardino–Riverside load II, California[c]	260		362		230	
	San Bernardino–Riverside load I, California[d]	390		15		138	
	Salt Lake City, Utah[b]	562		238			

[a] The load area represents the city named.

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

[c] The San Bernardino–Riverside County load II area includes the communities of Fontana, Ontario, and Rancho Cucamonga.

[d] The San Bernardino–Riverside County load I area includes the communities of Colton, Riverside, San Bernardino, Redlands, Highland, and Rialto.

[e] From Table 13.1.23.1-1.

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

Table 13.1.23.2-3 shows the estimated net present value (NPV) of both transmission schemes and takes into account the cost of constructing the lines, the substations, and the projected revenue stream over the 10-year horizon. A positive NPV indicates that revenue more than offsets investments. This calculation does not include the cost of producing electricity.

The most economically attractive configuration (transmission scheme 1) has the highest positive NPV and serves Las Vegas. The secondary case (transmission scheme 2) excludes the Las Vegas market and is less economically attractive. For the assumed utilization factor of 20%, scheme 2 exhibits a negative NPV, implying that this option may not be economically viable under the current assumptions. Scheme 2 is also the less favorable option in terms of the amount of land disturbed.

Table 13.1.23.2-4 shows the effect of varying the value of the utilization factor on the NPV of the transmission schemes. The table shows that at about 30% utilization, the NPVs for both schemes are positive. It also shows that as the utilization factor is increased, the economic viability of the lines also increases. Utilization factors can be raised by allowing the new dedicated lines to market other power generation outputs in the region in addition to that of its associated SEZ.

TABLE 13.1.23.2-2 Comparison of the Various Transmission Line Configurations with Respect to Land Use Requirements for the Proposed Escalante Valley SEZ

Transmission Scheme	City/Load Area Name	Total Distance (mi)[e]	No. of Substations	Land Use (acres)[f]		
				Transmission Line	Substation	Total
1	St. George, Utah[a] Las Vegas, Nevada[b] San Bernardino–Riverside County load II, California[c]	422	6	5,923.0	25.1	5,948.1
2	St. George, Utah[a] San Bernardino–Riverside County load II, California[c] San Bernardino–Riverside County load I, California[d] Salt Lake City, Utah[e]	675	8	13,973.3	25.1	13,998.4

[a] The load area represents the city named.

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

[c] The San Bernardino–Riverside County load II area includes the communities of Fontana, Ontario, and Rancho Cucamonga.

[d] The San Bernardino–Riverside County load I area includes the communities of Colton, Riverside, San Bernardino, Redlands, Highland, and Rialto.

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

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

The findings of the DLT analysis for the proposed Escalante Valley SEZ are as follows:

- Transmission scheme 1, which identifies Las Vegas as the primary market and also serves St. George and San Bernardino–Riverside County load II, represents the most favorable option based on NPV and land use requirements. This configuration would result in new land disturbance of about 5,948 acres (24.1 km^2).

- Transmission scheme 2, which represents an alternative configuration if Las Vegas is excluded, serves St. George, the major cities in San Bernardino and Riverside Counties, and Salt Lake City. This configuration would result in new land disturbance of about 13,998 acres (56.7 km^2).

- Other load area configurations are possible but would be less favorable than scheme 1 in terms of NPV and, in most cases, also in terms of land use requirements. If new electricity generation at the proposed Escalante Valley

TABLE 13.1.23.2-3 Comparison of Potential Transmission Lines with Respect to NPV (Base Case) for the Proposed Escalante Valley SEZ

Transmission Scheme	City/Load Area Name	Present Value Transmission Line Cost ($ million)	Present Value Substation Cost ($ million)	Annual Sales Revenue ($ million)	Present Worth of Revenue Stream ($ million)	NPV ($ million)
1	St. George, Utah[a] Las Vegas, Nevada[b] San Bernardino–Riverside County load II, California[c]	558.2	69.0	183.1	1,413.7	786.5
2	St. George, Utah[a] San Bernardino–Riverside County load II, California[c] San Bernardino–Riverside County load I, California[d] Salt Lake City, Utah[b]	1,546.0	69.0	183.1	1,413.7	−201.2

[a] The load area represents the city named.

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

[c] The San Bernardino–Riverside County load II area includes the communities of Fontana, Ontario, and Rancho Cucamonga.

[d] The San Bernardino–Riverside County load I area includes the communities of Colton, Riverside, San Bernardino, Redlands, Highland, and Rialto.

SEZ is not sent to either of the two markets identified above, the potential upper-bound impacts in terms of cost would be greater.

- The analysis of transmission requirements for the proposed Escalante Valley SEZ would be expected to show lower costs and less land disturbance if solar-eligible load assumptions were increased, although the magnitude of those changes would vary due to a number of factors. In general, for cases such as the Escalante Valley SEZ that show multiple load areas being served to accommodate the specified capacity, the estimated costs and land disturbance would be affected by increasing the solar-eligible load assumption. By increasing the eligible loads at all load areas, the transmission routing and configuration solutions can take advantage of shorter line distances and deliveries to fewer load areas, thus reducing costs and lands disturbed. In general, SEZs that show the greatest number of load areas served and greatest distances required for new transmission lines (e.g., Riverside East) would show the greatest decrease in impacts as a result of increasing the solar-eligible load assumption from 20% to a higher percentage.

TABLE 13.1.23.2-4 Effect of Varying the Utilization Factor on the NPV of the Transmission Schemes for the Proposed Escalante Valley SEZ

Transmission Scheme	City/Load Area Name[a]	NPV ($ million) at Different Utilization Factors					
		20%	30%	40%	50%	60%	70%
1	St. George, Utah[a] Las Vegas, Nevada[b] San Bernardino–Riverside County load II, California[c]	786.5	1,493.4	2,200.3	2,907.1	3,614.0	4,320.9
2	St. George, Utah[a] San Bernardino–Riverside County load II, California[c] San Bernardino–Riverside County load I, California[d] Salt Lake City, Utah[b]	–201.2	505.6	1,212.5	1,919.4	2,626.3	3,333.1

[a] The load area represents the city named.

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

[c] The San Bernardino–Riverside County load II area includes the communities of Fontana, Ontario, and Rancho Cucamonga.

[d] The San Bernardino–Riverside County load I area includes the communities of Colton, Riverside, San Bernardino, Redlands, Highland, and Rialto.

13.1.24 Impacts of the Withdrawal

The BLM is proposing to withdraw the 6,614 acres (27 km^2) of public land comprising the proposed Escalante Valley SEZ from settlement, sale, location, or entry under the general land laws, including the mining laws, for a period of 20 years (see Section 2.2.2.2.4 of the Final Solar PEIS). The public lands would be withdrawn, subject to valid existing rights, from settlement, sale, location, or entry under the general land laws, including the mining laws. This means that the lands could not be appropriated, sold, or exchanged during the term of the withdrawal, and new mining claims could not be filed on the withdrawn lands. Mining claims filed prior to the segregation or withdrawal of the identified lands would take precedence over future solar energy development. The withdrawn lands would remain open to the mineral leasing, geothermal leasing, and mineral material laws, and the BLM could elect to lease the oil, gas, coal, or geothermal steam resources, or to sell common-variety mineral materials, such as sand and gravel, contained in the withdrawn lands. In addition, the BLM would retain the discretion to authorize linear and renewable energy ROWs on the withdrawn lands.

The purpose of the proposed land withdrawal is to minimize the potential for conflicts between mineral development and solar energy development for the proposed 20-year withdrawal period. Under the land withdrawal, there would be no mining-related surface development, such as the establishment of open pit mining, construction of roads for hauling

materials, extraction of ores from tunnels or adits, or construction of facilities to process the material mined, that could preclude use of the SEZ for solar energy development. For the Escalante Valley SEZ, the impacts of the proposed withdrawal on mineral resources and related economic activity and employment are expected to be negligible because the mineral potential of the lands within the SEZ is low (BLM 2012a). There has been no documented mining within the SEZ, and there are no known locatable mineral deposits within the land withdrawal area. According to the Legacy Rehost 2000 System (LR2000) (accessed in February 2012), there are no recorded mining claims within the land withdrawal area.

Although the mineral potential of the lands within the Escalante Valley SEZ is low, the proposed withdrawal of lands within the SEZ would preclude many types of mining activity over a 20-year period, resulting in the avoidance of potential mining-related adverse impacts. Impacts commonly related to mining development include increased soil erosion and sedimentation, water use, generation of contaminated water in need of treatment, creation of lagoons and ponds (hazardous to wildlife), toxic runoff, air pollution, establishment of noxious weeds and invasive species, habitat destruction or fragmentation, disturbance of wildlife, blockage of migration corridors, increased visual contrast, noise, destruction of cultural artifacts and fossils and/or their context, disruption of landscapes and sacred places of interest to tribes, increased traffic and related emissions, and conflicts with other land uses (e.g., recreational).

13.1.25 References

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

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13.1.26 Errata for the Proposed Escalante Valley SEZ

This section presents corrections to material presented in the Draft Solar PEIS and the Supplement to the Draft. The need for these corrections was identified in several ways: through comments received on the Draft Solar PEIS and the Supplement to the Draft (and verified by the authors), through new information obtained by the authors subsequent to publication of the Draft Solar PEIS and the Supplement to the Draft, or through additional review of the original material by the authors. Table 13.1.26-1 provides corrections to information presented in the Draft Solar PEIS and the Supplement to the Draft.

TABLE 13.1.26-1 Errata for the Proposed Escalante Valley SEZ (Section 13.1 of the Draft Solar PEIS and Section C.6.1 of the Supplement to the Draft Solar PEIS)

Section No.	Page No.	Line No.	Figure No.	Table No.	Correction
13.1.11.2					All uses of the term "neotropical migrants" in the text and tables of this section should be replaced with the term "passerines."
13.1.14.1	13.1-175	2			The word "middleground" should not be included.

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