FES 12-24 • DOE/EIS-0403

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

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

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

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

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

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

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

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

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

SOLAR PEIS CONTENTS

SOLAR PEIS CONTENTS (Cont.)

VOLUME 5 CONTENTS

CONTENTS (Cont.)

CONTENTS (Cont.)

CONTENTS (Cont.)

CONTENTS (Cont.)

CONTENTS (Cont.)

CONTENTS (Cont.)

CONTENTS (Cont.)

CONTENTS (Cont.)

CONTENTS (Cont.)

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FIGURES

FIGURES (Cont.)

FIGURES (Cont.)

FIGURES (Cont.)

TABLES

TABLES (Cont.)

TABLES (Cont.)

TABLES (Cont.)

TABLES (Cont.)

TABLES (Cont.)

TABLES (Cont.)

TABLES (Cont.)

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

UNITS OF MEASURE

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

ENGLISH/METRIC AND METRIC/ENGLISH EQUIVALENTS

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

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

12 UPDATE TO AFFECTED ENVIRONMENT AND IMPACT ASSESSMENT FOR PROPOSED SOLAR ENERGY ZONES IN NEW MEXICO

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 SEZ in New Mexico, Afton, as well as summaries of the Mason Draw and Red Sands SEZs and why they were eliminated from further consideration. The SEZ-specific analyses provide documentation from which the BLM will tier future project authorizations, thereby limiting the required scope and effort of project-specific National Environmental Policy Act of 1969 (NEPA) analyses.

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

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

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

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

This chapter is an update to the information on New Mexico SEZs presented in the Draft Solar PEIS. As stated previously, the Mason Draw and Red Sands SEZs were dropped from further consideration through the Supplement to the Draft. For the remaining New Mexico SEZ, Afton, the information presented in this chapter supplements and updates, but does not replace, the information provided in the corresponding Chapter 12 on proposed SEZs in New Mexico in the Draft Solar PEIS. Corrections to incorrect information in Section 12.1 of the Draft Solar PEIS and in Section C.5.1 of the Supplement to the Draft are provided in Section 12.1.26 of this Final Solar PEIS.

12.1 AFTON

12.1.1 Background and Summary of Impacts

12.1.1.1 General Information

The proposed Afton SEZ is located in Doña Ana County in southern New Mexico. The nearest town is San Miguel, located along the Rio Grande River valley about 4 mi (6 km) east of the SEZ. Las Cruces is the largest nearby town with a population of approximately 90,000; it is located about 10 mi (16 km) northeast of the SEZ. The nearest major road access to the SEZ is via Interstate-10 (I-10), which runs east–west about 3 mi (5 km) north of the Afton SEZ. The Burlington Northern Santa Fe (BNSF) Railroad runs east of the proposed SEZ with stops in Las Cruces, Mesilla Park, Mesquite, Vado, and Berino, all within about 1 to 5 mi (1.6 to 8 km) of the SEZ. As of October 28, 2011, there was one pending right-of-way (ROW) application for a solar project within the SEZ.

As published in the Draft Solar PEIS, the proposed Afton SEZ had a total area of 77,623 acres (314 km^2). In the Supplement to the Draft, the size of the SEZ was reduced, eliminating 46,917 acres (190 km^2) of land (see Figure 12.1.1.1-1). Lands that have been eliminated are at the north, northeast, southeast, and southwest boundaries. The rationale for the changes was to focus potential solar development in the area along the existing Section 368 corridor,[1] where development already exists. In addition, 742 acres (3 km^2) of floodplain and intermittent and dry lake areas within the remaining SEZ boundaries have been identified as non-development areas (see Figure 12.1.1.1-2). The remaining developable area within the SEZ is 29,964 acres (121.2 km^2).

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[1] Section 368 of the Energy Policy Act of 2005 (Public Law 109-58) required federal agencies to engage in transmission corridor planning (see Section 1.6.2.1 of the Draft Solar PEIS). As a result of this mandate, the U.S. Department of the Interior Bureau of Land Management (BLM), U.S. Department of Energy (DOE), U.S. Forest Service (USFS), and U.S. Department of Defense (DoD) prepared a PEIS to evaluate the designation of energy corridors on federal lands in 11 western states, including the 6 states evaluated in this study (DOE and DOI 2008). The BLM and USFS issued Records of Decision (RODs) to amend their respective land use plans to designate numerous corridors, often referred to as Section 368 corridors.

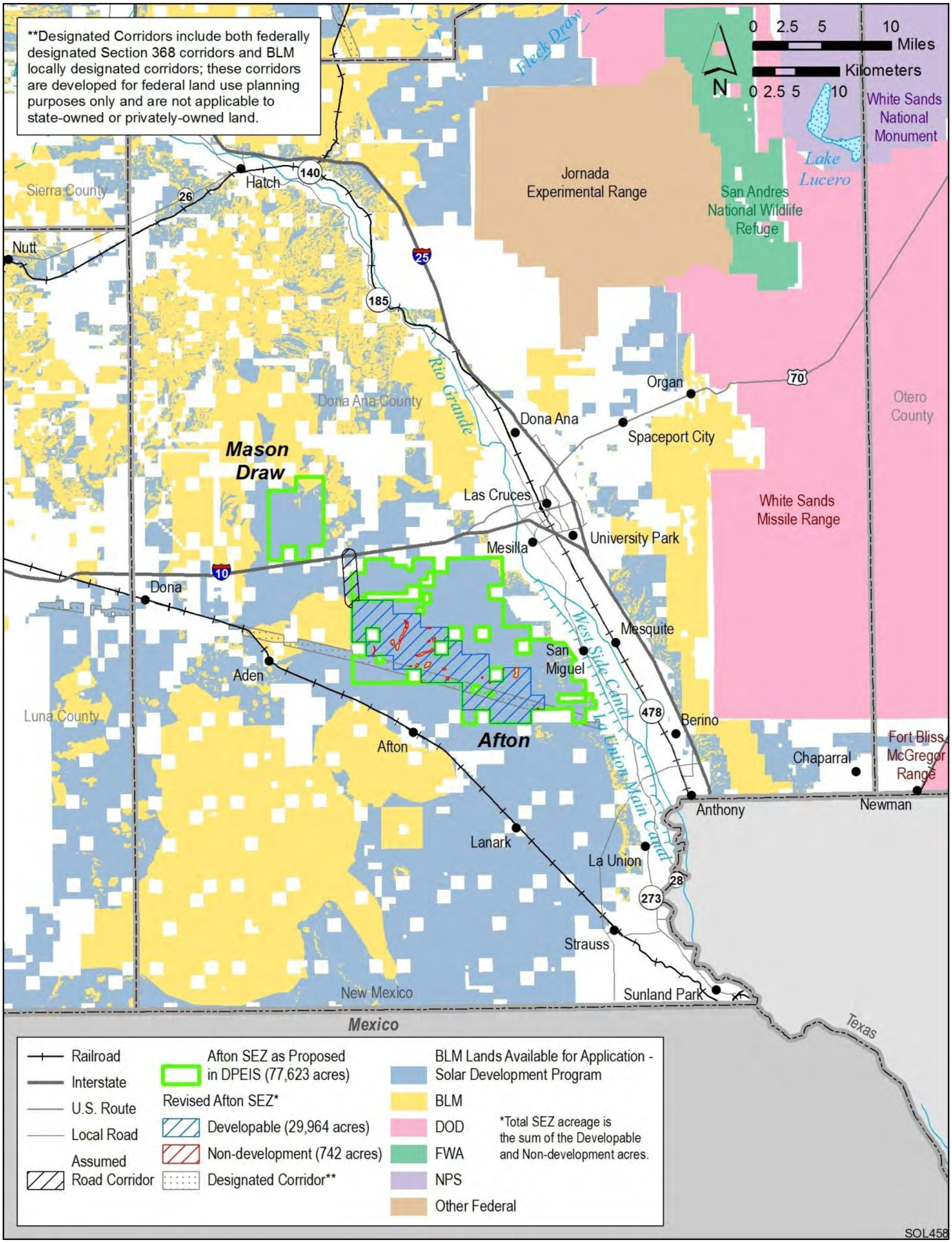

FIGURE 12.1.1.1-1 Proposed Afton SEZ as Revised

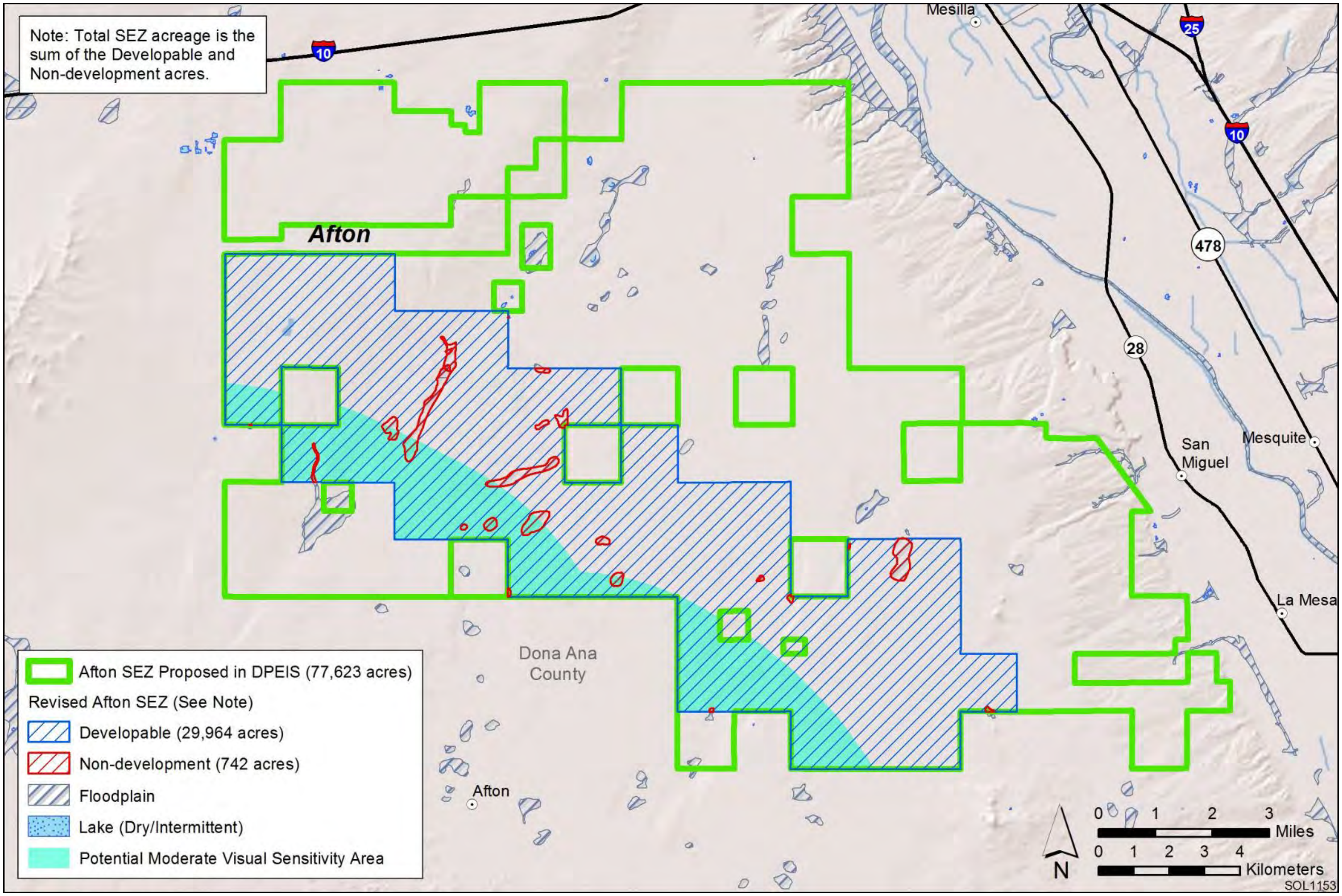

FIGURE 12.1.1.1-2 Developable and Non-development Areas for the Proposed Afton SEZ as Revised

The lands eliminated from the proposed Afton SEZ will be retained as solar ROW variance lands, because the BLM expects that in the future individual projects could be sited in these areas to avoid and/or minimize impacts. Any solar development within this area in the future would require appropriate environmental analysis.

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 Afton SEZ as described in the Draft Solar PEIS.

12.1.1.2 Development Assumptions for the Impact Analysis

Maximum solar development of the Afton SEZ was assumed to be 80% of the developable SEZ area over a period of 20 years, a maximum of 23,971 acres (121 km^2) (Table 12.1.1.2-1). Full development of the Afton SEZ would allow development of facilities with an estimated total of between 2,663 MW (power tower, dish engine, or photovoltaic [PV]), 9 acres/MW [0.04 km^2/MW]) and 4,794 MW (solar trough technologies, assuming 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 Afton SEZ, the nearest existing transmission line as identified in the Draft Solar PEIS is a 345-kV line that runs through the SEZ. It is possible

TABLE 12.1.1.2-1 Assumed Development Acreages, Solar MW Output, and Nearest Major Access Road and Transmission Line for the Proposed Afton 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	Area of Assumed Road ROW	Distance to Nearest Designated Corridor[e]
29,964 acres[a] and 23,971 acres	2,663 MW[b] 4,794 MW[c]	I-10 3 mi[d]	0 mi and 345 kV	22 acres	Adjacent

[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.

that this existing line could be used to provide access from the SEZ to the transmission grid, but the capacity of the existing line would not be adequate for 2,663 to 4,794 MW of new capacity. Therefore, at full build-out capacity, new transmission and possibly also upgrades of existing transmission lines may be required to bring electricity from the proposed Afton SEZ to load centers. An assessment of the load centers' destinations for power generated in the SEZ and a general assessment of the impacts of constructing and operating new transmission facilities to those load centers are provided in Section 12.1.23. In addition, the generic impacts of transmission lines 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.

About 5,216 acres (21 km^2) of the southern portion of the Afton SEZ overlaps a designated Section 368 energy corridor. For this impact assessment, it is assumed that up to 80% of the proposed SEZ could be developed. This does not take into account the potential limitations to solar development that may result from siting constraints associated with the corridor. The development of solar facilities and the existing corridor will be dealt with by the BLM on a case-by-case basis; see Section 12.1.2.2 on impacts on lands and realty for further discussion.

For the proposed Afton SEZ, an additional 22 acres (0.9 km^2) would be needed for new road access to support solar energy development, as summarized in Table 12.1.1.2-1. This estimate was based on the assumption that a new 3-mi (5-km) access road to the nearest major road, I-10, would support construction and operation of solar facilities.

12.1.1.3 Programmatic and SEZ-Specific Design Features

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

The discussions below addressing potential impacts of solar energy development on specific resource areas (Sections 12.1.2 through 12.1.22) 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 Afton SEZ may be required in addition to the programmatic design features. The proposed SEZ-specific design features for the Afton 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 12.1.2 through 12.1.22.

12.1.2 Lands and Realty

12.1.2.1 Affected Environment

The boundary of the proposed Afton SEZ has been revised, thus reducing the total acreage of the area from 77,623 acres (314 km^2) to 30,706 acres (124 km^2). The reduction in area has resulted in the proposed SEZ being located mainly along the Section 368 corridor located along the southwestern border of the area. Most of the areas removed were closer to I-10 in the north and to Las Cruces and the Rio Grande River Valley to the northeast and east. Most of the existing ROWs located within the original boundaries of the SEZ are still within the revised boundary. Because the revised boundaries are farther from the interstate corridor, the SEZ is now separated from commercial/industrial development in the corridor, and the current SEZ is more isolated, rural, and undeveloped in nature. The Section 368 corridor that crosses the revised SEZ contains several pipelines, a fiber optic line, and a county road. A 345-kV transmission line parallels the Section 368 corridor to the northeast. As of October 28, 2011, there was one pending ROW application for a solar project within the SEZ. The description of the area in the Draft Solar PEIS still accurately describes many of the existing facilities within the revised SEZ boundary.

12.1.2.2 Impacts

Full development of the proposed Afton SEZ could disturb up to about 23,971 acres (121 km^2) and would establish a very large industrial area that would exclude many existing and potential uses of the land. The overall appearance of the SEZ is rural and undeveloped, and utility-scale solar energy development would be a new and discordant land use in the area. It is possible that if the public lands are developed for solar energy production, the 18,128 acres (73 km^2) of state land in and near the SEZ could be developed in a similar manner if the state chooses to consider such development.

About 5,216 acres (21 km^2) of the southern portion of the Afton SEZ overlaps a designated Section 368 energy corridor. This existing corridor will be used primarily for the siting of transmission lines and other infrastructure such as pipelines. The existing corridor will be the preferred location for any transmission development that is required to support solar development and future transmission grid improvements related to the build-out of the Afton SEZ. Any use of the corridor lands within the Afton SEZ for solar energy facilities, such as solar panels or heliostats, must be compatible with the future use of the existing corridor. The BLM will assess solar projects in the vicinity of existing corridor on a case-by-case basis. The BLM will review and approve individual project plans of development to ensure compatible development that maintains the use of the corridor.

12.1.2.3 SEZ-Specific Design Features and Design Feature Effectiveness

Required programmatic design features that would reduce impacts on lands and realty are described in Section A.2.2 of Appendix A of this Final Solar PEIS. Implementing the programmatic design features will provide some mitigation for the identified impacts but will not 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.

No SEZ-specific design features for lands and realty have been identified through this Final Solar PEIS. Some SEZ-specific design features may be established for parcels within the proposed Afton SEZ through the process of preparing parcels for competitive offer and subsequent project-specific analysis.

12.1.3 Specially Designated Areas and Lands with Wilderness Characteristics

12.1.3.1 Affected Environment

The description of the specially designated areas within 25 mi (40 km) of the originally proposed Afton SEZ is still relevant to the revised SEZ. Nineteen specially designated areas near the proposed Afton SEZ that could be affected by solar energy development were discussed in the Draft Solar PEIS. These include seven Wilderness Study Areas (WSAs), three Areas of Critical Environmental Concern (ACECs), four Special Recreation Management Areas (SRMAs), one National Monument, one National Natural Landmark, one National Historic Landmark, and two National Historic Trails.

12.1.3.2 Impacts

Potential impacts on specially designated areas would be similar to those described in the Draft Solar PEIS, and the description of the nature of the potential impacts is still accurate. The Aden Lava Flow WSA is still the special area closest to the proposed SEZ and would be the area most likely to be affected. Most of the remaining areas, although farther away from the SEZ, are also higher in elevation and thus would have a clear view of solar development in the area. Although the overall size of the SEZ is smaller, at full development it would provide a dramatic contrast even at slightly longer distances; thus the impacts identified in the Draft Solar PEIS are expected to still be accurate. An exception to this could be impacts on Mesilla Plaza, the El Camino Real de Tierra Adentro, and to Las Cruces and the communities in the Rio Grande Valley. Because the eastern boundary of the proposed SEZ has been moved to the southwest relative to these areas, the topographic screening provided by the river valley will make solar facilities less likely to be visible, thereby reducing their potential impact.

12.1.3.3 SEZ-Specific Design Features and Design Feature Effectiveness

Required programmatic design features that would reduce impacts on specially designated areas are described in Section A.2.2 of Appendix A of this Final Solar PEIS (design features for both specially designated areas and visual resources would address impacts). Implementing the programmatic design features will provide some mitigation for the identified impacts but will not mitigate all adverse impacts on wilderness characteristics.

On the basis of impact analyses conducted for the Draft Solar PEIS, updates to those analyses due to changes to the SEZ boundaries, and consideration of comments received as applicable, the following SEZ-specific design feature for specially designated areas and lands with wilderness characteristics has been identified:

- The SEZ-specific design features for visual resources specified in Section 12.1.14.3 should be adopted, as they would provide some protection for visual-related impacts on the Aden Lava Flow WSA.

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.

12.1.4 Rangeland Resources

12.1.4.1 Livestock Grazing

12.1.4.1.1 Affected Environment

Because of the changes in the proposed Afton SEZ boundaries, the Corralitos Ranch allotment listed in the Draft Solar PEIS no longer overlaps with the SEZ. In addition, the West La Mesa and Little Black Mountain allotments now have fewer than 20 acres (0.08 km^2) within the SEZ and are not considered further because it is anticipated there would be no impact caused by the loss of these small portions of each allotment. Table 12.1.4.1-1 gives a summary of key information for the remaining allotments that still have acreage in the proposed SEZ.

12.1.4.1.2 Impacts

The general discussion in the Draft Solar PEIS regarding determination of the impact on grazing operations is still valid; however, the allotments that would be affected and the extent of those impacts has changed with the revision in the boundaries of the SEZ. Grazing would be excluded from the areas developed for solar energy production as provided for in the BLM grazing regulations (Title 43, Part 4100, of the *Code of Federal Regulations* [43 CFR Part 4100]). This would include reimbursement of the permittee for the portion of the value for any range improvements in the area removed from the grazing allotment. The

TABLE 12.1.4.1-1 Grazing Allotments within the Proposed Afton SEZ as Revised

Allotment	Total Acres[a,b]	Percentage of Acres in SEZ[c]	Active BLM AUMs[d]	Potential AUM loss	No. of Permittees
Aden Hills	20,534	19	1,310	249	1
Black Mesa	25,070	59	1,579	932	1
Home Ranch	35,931	28	2,149	602	1
La Mesa	34,720	6	1,782	107	1

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

[b] Includes public, state, and private land included in the allotment based on the Allotment Master Reports included in the BLM's Rangeland Administration System (BLM 2008), dated March16, 2010.

[c] This is the calculated percentage of public lands located in the SEZ of the total allotment acreage.

[d] AUM = animal unit month. This is the permitted use for the whole allotment, including public, state, and private lands.

impact of this change in the grazing permits would depend on several factors, including (1) how much of an allotment the permittee might lose to development, (2) how important the specific land lost is to the permittee's overall operation (i.e., considering such things as water developments and fencing), and (3) the amount of actual forage production that would be lost by the permittee. Quantification of the impact on the four grazing allotments would require an allotment-specific analysis involving, at a minimum, the three factors identified here; however, for purposes of this Final Solar PEIS, a simplistic assumption is made that the percentage reduction in authorized animal unit months (AUMs) would be the same as the percentage reduction in land area of the allotment.

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, the impacts of reducing the scale of an operation, or the impact on the value of the ranches, including private land values. The economic impacts of the loss or reduction in grazing permits have not been calculated. However, the impacts would include the complete loss or reduction in value of the value of the grazing permit along with the loss or diminution of the value of any private lands associated with the ranch operation.

The Black Mesa allotment is largely contained within the area of the SEZ, and public lands in the SEZ make up 59% of this allotment. The SEZ also splits the remaining portions of the allotment not within the SEZ, thus making it unlikely they would be useable for future grazing as part of one allotment. If full solar development occurs, the federal grazing permit for this allotment likely would be cancelled and the permittee would be displaced. For the purposes of analysis, it is assumed that all of the 1,579 AUMs associated with this allotment would be lost. It is possible that the isolated portions of the allotment could be retired from grazing or could be attached to remaining, adjoining allotments, thereby allowing grazing to continue in these areas and reducing the loss of livestock forage.

In the case of the Home Ranch allotment, about 28% of this allotment is within the SEZ and would be closed to grazing should full solar development occur. The remaining portion of the allotment not within the SEZ is split by the SEZ, potentially making it more difficult to continue operating as one unit. It may be possible that the permittee could continue operating on the remaining portion of the allotment since there is a County road that would connect the two separated pieces and would make it possible to move cattle between the units or retain direct access between the units for management purposes. The availability of livestock water in the two remaining pieces will affect whether the allotment remains viable. Because the future of this allotment would be uncertain if full solar development occurs, for the purposes of this analysis it was assumed that the whole federal grazing permit would be cancelled and the permittee would be displaced. In this case, 2,149 AUMs would be lost. If the permittee can continue to operate the allotment, it is estimated that 602 AUMs of forage would be lost. Alternatively, as described for the Black Mesa allotment, the separated portions of the allotment could be retired or could be attached to remaining, adjoining allotments, thereby allowing grazing to continue in these areas and reducing the loss of livestock forage.

The potential impact on the Aden Hills allotment would be a loss of about 20% of the land area of the allotment and would result in an assumed loss of 249 AUMs. This may understate the impact on this allotment since the Aden Hills off-highway vehicle (OHV) Area also occupies a portion of the allotment, and OHV use likely makes this area less useful for livestock grazing.

The La Mesa allotment would lose about 6% of the allotment should full solar development occur. It is estimated that this would result in a loss of 107 AUMs of forage.

On the basis of the assumptions above, it is anticipated there could be a reduction of up to 4,084 AUMs among the four allotments with full-build out of the proposed Afton SEZ.

12.1.4.1.3 SEZ-Specific Design Features and Design Feature Effectiveness

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

12.1.4.2 Wild Horses and Burros

12.1.4.2.1 Affected Environment

As presented in the Draft Solar PEIS, no wild horse or burro herd management areas (HMAs) occur within the proposed Afton SEZ or in close proximity to it. The revised developable area of the SEZ does not alter this finding.

12.1.4.2.2 Impacts

Solar energy development within the revised area of the proposed Afton SEZ would not affect wild horses and burros.

12.1.4.2.3 SEZ-Specific Design Features and Design Feature Effectiveness

Because solar energy development within the proposed Afton 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.

12.1.5 Recreation

12.1.5.1 Affected Environment

Although the proposed Afton SEZ has been reduced in size by 60%, the description of recreational opportunities in the revised SEZ in the Draft Solar PEIS still reflects the nature of recreational use within the revised SEZ boundary. Easy public access to lands so close to Las Cruces is an important amenity for recreational users provided by the public lands within the proposed SEZ.

12.1.5.2 Impacts

The analysis in the Draft Solar PEIS is still valid. Areas developed for solar energy production would no longer be available for recreational use. Some roads and trails that are currently open to travel within the proposed SEZ may be closed or rerouted. Recreational resources and use in six WSAs, the Organ–Franklin SRMA/ACEC, Robledo Mountains ACEC, and the Prehistoric Trackways National Monument likely would be adversely affected, and these impacts could not be completely mitigated.

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.

12.1.5.3 SEZ-Specific Design Features and Design Feature Effectiveness

Required programmatic design features that would reduce impacts on recreational use 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 loss of recreational use of areas developed for solar energy production.

No SEZ-specific design features to protect recreation 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.

12.1.6 Military and Civilian Aviation

12.1.6.1 Affected Environment

The revision of the boundaries of the proposed Afton SEZ has resulted in increasing the distance between the SEZ and the Las Cruces International Airport from 3 mi (5 km) to more than 5 mi (8 km). No military training routes or military airspace are located above the proposed SEZ.

12.1.6.2 Impacts

No anticipated impacts on either civilian or military aviation activities are anticipated. Federal Aviation Administration (FAA) requirements for airspace safety near the Las Cruces airport will apply.

12.1.6.3 SEZ-Specific Design Features and Design Feature Effectiveness

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

No SEZ-specific design features to protect either 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.

12.1.7 Geologic Setting and Soil Resources

12.1.7.1 Affected Environment

12.1.7.1.1 Geologic Setting

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

- The terrain of the proposed Afton SEZ is fairly flat, with a gentle slope to the southeast, toward the Rio Grande (Figure 12.1.7.1-1). The boundaries of the proposed SEZ have been changed to eliminate 46,917 acres (190 km^2), to focus potential solar development along the existing Section 368 corridor. Within this revised area, another 742 acres (3 km^2) of floodplain and intermittent and dry lakes were identified as non-development areas. On the basis of these changes, elevations on the SEZ range from about 4,371 ft (1,332 m) at its northwest corner to about 4,152 ft (1,266 m) at the dry lake (non-development area) near the SEZ’s southeast corner, about 1 mi (2 km) south of Little Black Mountain (in section 25 of T25S, R1E). The steeply graded region to the east, cut by gullies draining to the river, is no longer within the site’s boundaries.

12.1.7.1.2 Soil Resources

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

- Soils within the proposed Afton SEZ as revised are predominantly the Wink–Pintura complex, and the Onite–Pajarito, Wink–Harrisburg, and Simona–Harrisburg associations, which now make up about 91% of the soil coverage at the site (Table 12.1.7.1-1).

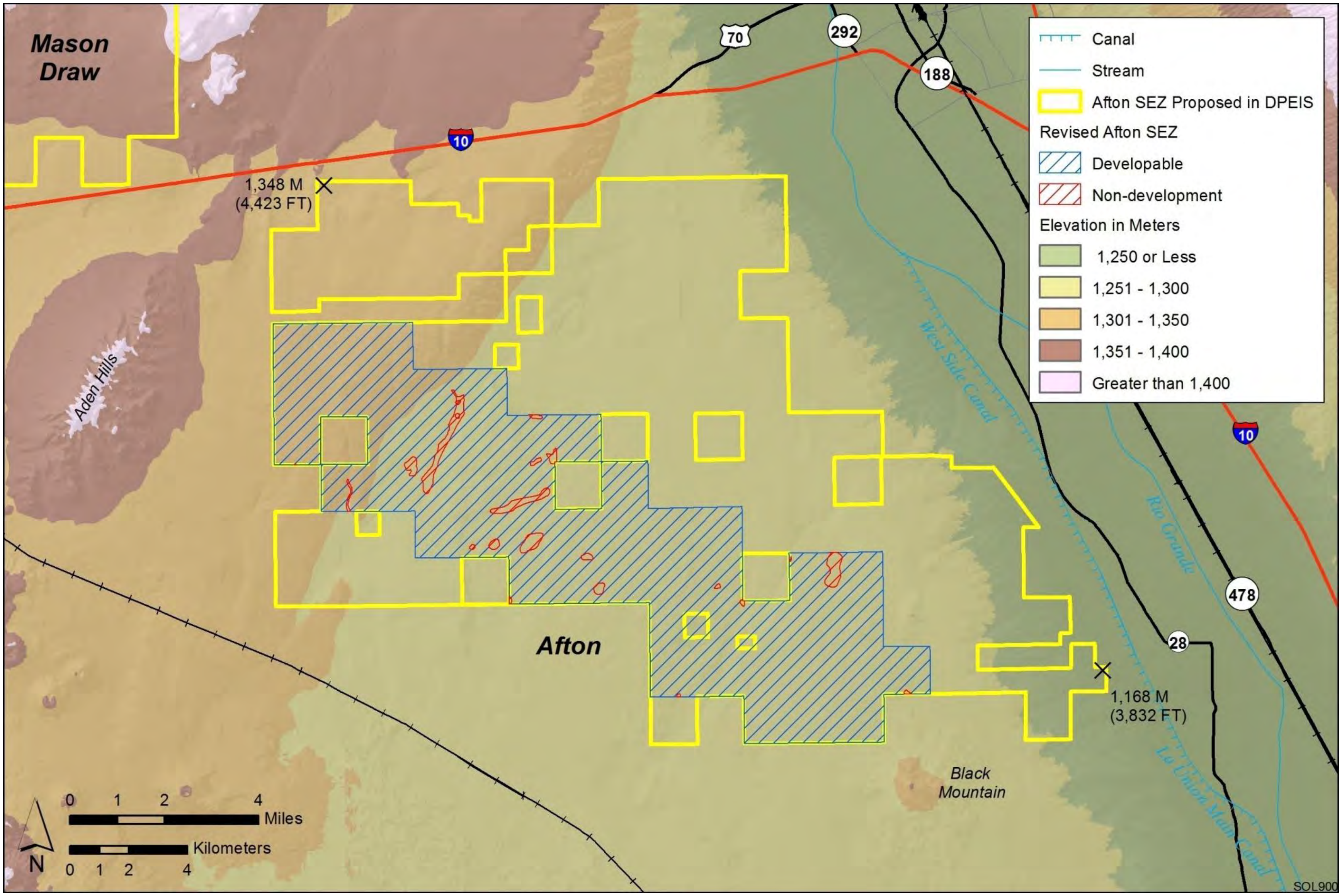

FIGURE 12.1.7.1-1 General Terrain of the Proposed Afton SEZ as Revised

TABLE 12.1.7.1-1 Summary of Soil Map Units within the Proposed Afton SEZ as Revised

Map Unit Symbol	Map Unit Name	Erosion Potential: Water[a]	Erosion Potential: Wind[b]	Description	Acres[c] (Percentage of SEZ)
WP	Wink–Pintura complex (1 to 5% slope)	Moderate (0.20)	High (WEG 2)[d]	Consists of about 45% Wink loamy fine sand and 35% Pintura fine sand. Gently undulating to undulating soils between and on dunes on fan piedmonts. Parent material includes eolian deposits and alluvium modified by wind. Deep and well drained, with moderate surface runoff potential and moderately rapid to rapid permeability. Shrink-swell potential is low. Available water capacity is low. Used mainly as rangeland, forestland, or wildlife habitat.	9,437 (31.1)[e]
WH	Wink–Harrisburg association (1 to 5% slope)	Moderate (0.28)	Moderate (WEG 3)	Consists of about 35% Wink fine sandy loam, 25% Harrisburg loamy fine sand, and 20% Simona sandy loam. Gently undulating to undulating soils between and on dunes and on upland ridges and swales on fan piedmonts. Parent material includes eolian deposits and residuum of sandstone, volcanic ash, and shale. Deep and well drained, with moderate surface runoff potential and moderately rapid permeability. Shrink-swell potential is low. Available water capacity is low. Used mainly as rangeland, forestland, or wildlife habitat.	7,921 (26.4)[f]
OP	Onite–Pajarito association (0 to 5% slope)	Slight (0.17)	High (WEG 2)	Consists of about 40% Onite loamy sand, 30% Pajarito fine sandy loam, and 15% Pintura fine sand. Level to nearly level soils between and on dunes on fan piedmonts. Parent material includes eolian deposits on dunes and mixed alluvium between dunes. Deep and well to excessively well drained, with moderate surface runoff potential and moderately rapid to rapid permeability. Shrink-swell potential is low. Available water capacity is very low to high. Used mainly as rangeland, forestland, or wildlife habitat.	6,356 (21.8)[g]

TABLE 12.1.7.1-1 (Cont.)

Map Unit Symbol	Map Unit Name	Erosion Potential		Description	Acres[c] (Percentage of SEZ)
		Water[a]	Wind[b]		
SH	Simona–Harrisburg association (1 to 5% slope)	Moderate (0.24)	Moderate (WEG 3)	Consists of about 50% Simona sandy loam and 25% Simona sandy loam. Gently undulating to moderately rolling soils on broad fans, fan piedmonts, and desert mesas. Parent material includes eolian deposits from sandstone, volcanic ash, and shale. Shallow to moderately deep and well drained, with high surface runoff potential (slow infiltration rate) and moderately rapid permeability (above caliche hardpan). Shrink-swell potential is low. Available water capacity is very low. Used mainly as rangeland, forestland, or wildlife habitat.	3,520 (11.8)[h]
CA	Cacique–Cruces association (0 to 5% slope)	Moderate (0.32)	High (WEG 2)	Consists of about 35% Cacique loamy sand, 25% Cruces loamy sand, and 20% Simona loamy sand. Gently undulating to moderately rolling soils on basin floors, alluvial plains, mesa tops, and low ridges. Parent material consists of alluvium (basin floors) and sandy sediment (plains and low ridges). Shallow to moderately deep and well drained, with high surface runoff potential (low infiltration) and moderately rapid permeability. Shrink-swell potential is low to moderate. Available water capacity is low to very low. Used mainly as rangeland, forestland, or wildlife habitat.	1,377 (4.5)
BO	Bluepoint loamy sand (1 to 15% slope)	Low (0.15)	High (WEG 2)	Nearly level to gently sloping soils on dunes, fans, terraces, and ridges along the upper margins of the Rio Grande Valley. Parent material consists of sandy alluvium modified by wind. Deep and somewhat excessively drained, with a low surface runoff potential (high infiltration rate) and rapid permeability. Shrink-swell potential is low to very low. Available water capacity is low. Used mainly as rangeland, pastureland, forestland, or wildlife habitat.	809 (2.6)[i]

TABLE 12.1.7.1-1 (Cont.)

Map Unit Symbol	Map Unit Name	Erosion Potential: Water[a]	Erosion Potential: Wind[b]	Description	Acres[c] (Percentage of SEZ)
TE	Tencee–Upton association (3 to 15% slope)	Low (0.10)	Moderate (WEG 4L)	Consists of about 35% Tencee very gravelly sandy loam and 20% Upton gravelly sandy loam. Undulating to moderately rolling soils on low ridge tops and side slopes. Parent material consists of gravelly alluvium. Shallow and well drained, with high surface runoff potential (low infiltration rate) and moderate permeability. Shrink-swell potential is low. Available water capacity is very low. Used mainly as rangeland, forestland, or wildlife habitat.	377 (1.2)
BJ	Berino–Bucklebar association	Moderate (0.24)	Moderate (WEG 3)	Consists of about 35% Berino loamy fine sand and 25% Bucklebar sandy loam. Gently sloping soils on alluvial fans, valley floors, and swales. Parent material consists of mixed fine-loamy alluvium, frequently reworked by wind. Very deep and well drained, with a moderate surface runoff potential and moderate permeability. Available water capacity is moderate to high. Used mainly as rangeland, pastureland, forestland, or wildlife habitat.	144 (<1)

[a] Water erosion potential is a qualitative interpretation based on soil properties or combination of properties that contribute to runoff and have low resistance to water erosion processes. The ratings are on a 1.0 scale and take into account soil features such as surface layer particle size, saturated hydraulic conductivity, and high runoff landscapes. A rating of “very high” (>0.9 to ≤1.0) indicates that the soil has the greatest relative vulnerability to water erosion; a rating of “very low” (<0.10) indicates that the soil has little or no relative water erosion vulnerability. A rating of “moderate” (>0.35 and ≤0.65) indicates the soil has medium relative water erosion vulnerability.

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

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

Footnotes continued on next page.

TABLE 12.1.7.1-1 (Cont.)

[d] WEGs are based on soil texture, content of organic matter, effervescence of carbonates, content of rock fragments, and mineralogy, and take into account soil moisture, surface cover, soil surface roughness, wind velocity and direction, and the length of unsheltered distance (USDA 2004). Groups range in value from 1 (most susceptible to wind erosion) to 8 (least susceptible to wind erosion). The NRCS provides a wind erodibility index, expressed as an erosion rate in tons per acre per year, for each of the wind erodibility groups: WEG 1, 220 tons (200 metric tons) per acre (4,000 m^2) per year (average); WEG 2, 134 tons (122 metric tons) per acre (4,000 m^2) per year; WEGs 3 and 4 (and 4L), 86 tons (78 metric tons) per acre (4,000 m^2) per year; WEG 5, 56 tons (51 metric tons) per acre (4,000 m^2) per year; WEG 6, 48 tons (44 metric tons) per acre (4,000 m^2) per year; WEG 7, 38 tons (34 metric tons) per acre (4,000 m^2) per year; and WEG 8, 0 tons (0 metric tons) per acre (4,000 m^2) per year.

[e] A total of 115 acres (0.47 km^2) within the Wink–Pintura complex (WP) is currently categorized as a non-development area (denoted by red areas in Figure 12.1.7.1-2).

[f] A total of 187 acres (0.76 km^2) within the Wink–Harrisburg (WH) association is currently categorized as a non-development areas(denoted by red areas in Figure 12.1.7.1-2).

[g] A total of 340 acres (1.4 km^2) within the Onite–Pajarito association (OP) is currently categorized as a non-development area (denoted by red areas in Figure 12.1.7.1-2).

[h] A total of 85 acres (0.34 km^2) within the Simona–Harrisburg association (SH) is currently categorized as a non-development area (denoted by red areas in Figure 12.1.7.1-2).

[i] A total of 1 acre (0.0040 km^2) within the Bluepoint loam sand (BO) is currently categorized as a non-development area (denoted by red areas in Figure 12.1.7.1-2).

Sources: NRCS (2010); Bolluch and Neher (1980).

Soil unit coverage at the proposed Afton SEZ as revised is shown in Figure 12.1.7.1-2. Taken together, the new SEZ boundaries and non-development areas eliminate 16,813 acres (68 km^2) of the Wink–Pintura complex, 11,442 acres (46 km^2) of the Onite–Pajarito association, 4,609 acres (19 km^2) of the Wink–Harrisburg association, 3,289 acres (13 km^2) of the Simona–Harrisburg association, 4,171 acres (17 km^2) (all) of the Bluepoint–Caliza–Yturbide complex, 2,252 acres (9 km^2) of the Cacique–Cruces association, 3,362 acres (14 km^2) (all) of the Bluepoint loamy sand (1 to 15% slopes), 1,780 acres (7.2 km^2) (all) of the Onite–Pintura complex, 695 acres (3 km^2) of the Tencee–Upton Association, 150 acres (0.61 km^2) (all) of the Akela–Rock outcrop complex, and 5 acres (0.020 km^2) of the Berino–Bucklebar association.

12.1.7.2 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. The assessment provided in the Draft Solar PEIS remains valid, with the following updates:

- Impacts related to wind erodibility are reduced because the new SEZ boundaries and non-development areas eliminate 40,294 acres (163 km^2) of highly erodible soils and 8,598 acres (35 km^2) of moderately erodible soils from development.

- Impacts related to water erodibility are reduced because the new SEZ boundaries and non-development areas eliminate 31,133 acres (126 km^2) of moderately erodible soils.

12.1.7.3 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, updates to those analyses due to changes in the SEZ boundaries, and consideration of comments received as applicable, no SEZ-specific design features were identified for soil resources at the proposed Afton SEZ. Some SEZ-specific design features may be identified through the process of preparing parcels for competitive offer and subsequent project-specific analysis.

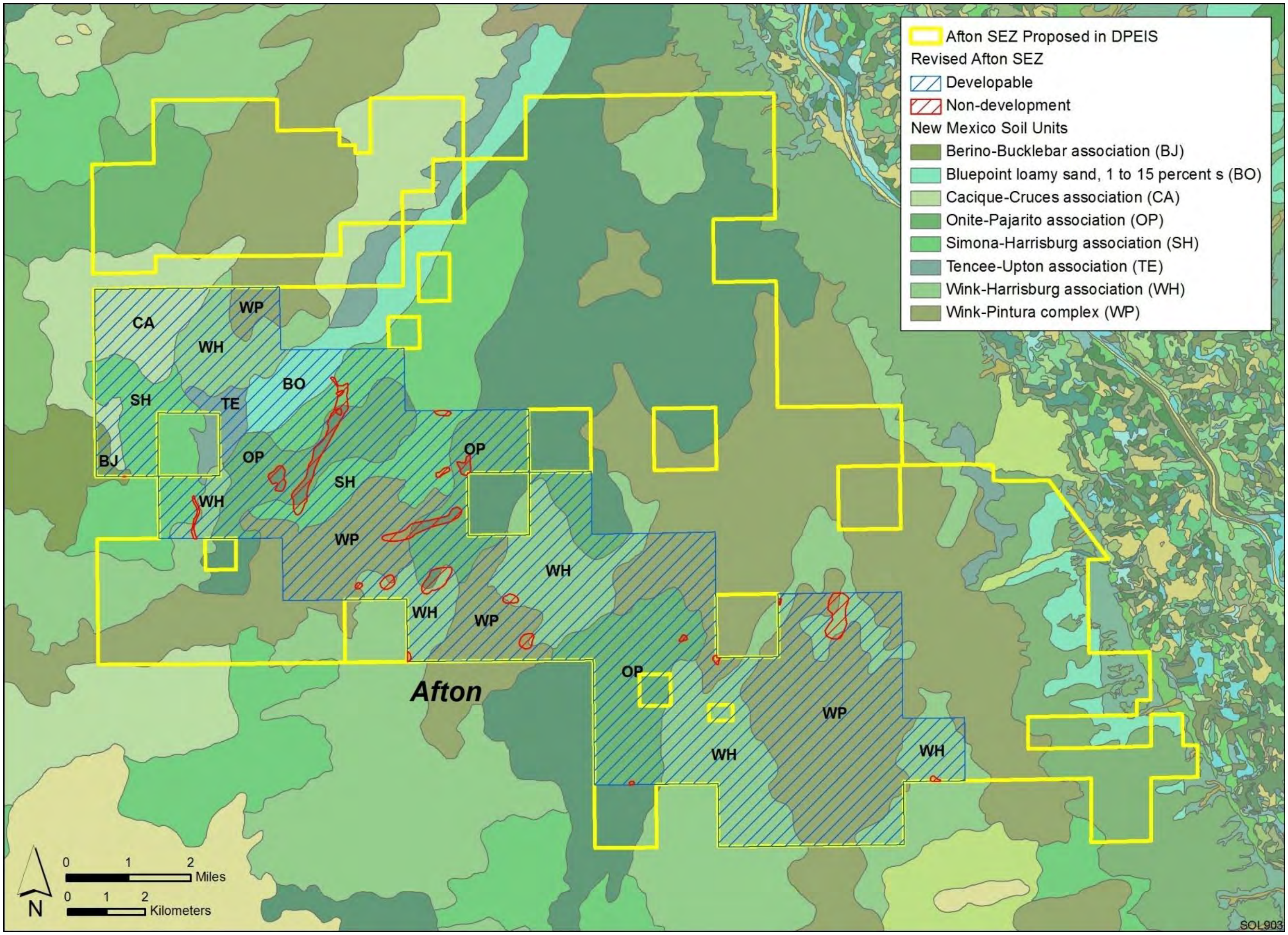

FIGURE 12.1.7.1-2 Soil Map for the Proposed Afton SEZ as Revised (Source: NRCS 2008)

12.1.8 Minerals (Fluids, Solids, and Geothermal Resources)

A mineral potential assessment for the proposed Afton 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 2.2.2.4 of this Final Solar PEIS). The potential impacts of this withdrawal are discussed in Section 12.1.24.

12.1.8.1 Affected Environment

As of February 8, 2012, there were no locatable mining claims within the proposed Afton SEZ. The revision of the SEZ resulted in removing an area that had a recent sale of scoria as well as the removal of the Little Black Mountain scoria site from the proposed SEZ. The remaining description in the Draft Solar PEIS is still valid.

12.1.8.2 Impacts

The analysis of impacts in the Draft Solar Energy PEIS remains valid. No adverse impacts on mineral resources are anticipated. If the area is designated as a SEZ, it would continue to be closed to all incompatible forms of mineral development.

12.1.8.3 SEZ-Specific Design Features and Design Feature Effectiveness

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

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

12.1.9 Water Resources

12.1.9.1 Affected Environment

The overall size of the proposed Afton SEZ has been reduced by 60% from the area described in the Draft Solar PEIS, resulting in a total area of 30,706 acres (124 km^2). The description of the affected environment given in the Draft Solar PEIS relevant to water resources at the Afton SEZ remains valid and is summarized in the following paragraphs.

The Afton SEZ is within the Rio Grande–Mimbres Subregion of the Rio Grande hydrologic region. The SEZ is located on sloping land, surrounded by the West Potrillo Mountains on the west, Malpais Lava Field to the southwest, Robledo Mountains to the north, and Mesilla Valley of the Rio Grande to the east. Precipitation and snowfall in the valley is between 6.8 to 9.4 in./yr (17 to 24 cm/yr) and 3 to 4 in./yr (8 to 10 cm/yr), respectively. Pan evaporation rates are estimated to be on the order of 102 in./yr (259 cm/yr). Surface water features within the SEZ include several small intermittent ponds and a few unnamed intermittent/ephemeral streams. The reduction in area of the Afton SEZ removed regions within the 100-year floodplain of the Rio Grande; the remaining SEZ regions are all outside of the 500-year floodplain. Groundwater in the Afton SEZ is in the northwestern part of the Mesilla Basin, an area referred to as the West Mesa. Groundwater is primarily found in basin-fill deposits that are a part of the Santa Fe Group consisting of poorly consolidated sedimentary and volcanic sediments that are approximately 1,000 to 1,500 ft (305 to 457 m) near the SEZ. Groundwater recharge to the Mesilla Basin is on the order of 10,000 ac-ft/yr (12.3 million m^3/yr). The groundwater table is typically 300 to 400 ft (91 to 122 m) below land surface, and the general flow pattern is to the southeast and parallel to the Rio Grande. Groundwater below the SEZ is fresh to moderately saline and concentrations of total dissolved solids (TDS), fluoride, manganese, and iron have all been measured at greater than the primary or secondary maximum contaminant level (MCL).

All waters in New Mexico are considered public and subject to appropriation according to the Water Resources Allocation Program (WRAP) under the Office of the State Engineer. The Afton SEZ is located in the Lower Rio Grande Basin, which is an Active Water Resource Management (AWRM) priority basin, where both groundwater and surface waters are fully appropriated and subject to restrictive water management programs. In AWRM priority basins, junior water rights can be temporarily curtailed in favor of more senior water rights in times of shortage. The Lower Rio Grande Basin includes the City of Las Cruces where projected water use demands exceed the total amount of water right allocations. Solar developers would have to secure water rights through existing rights transfers, which are reviewed by the WRAP 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 Afton SEZ and surrounding basin. Additional data regarding climate, surface water, and groundwater conditions are presented in Tables 12.1.9.1-1 through 12.1.9.1-7 and in Figures 12.1.9.1-1 and 12.1.9.1-2. Fieldwork and hydrologic analyses to determine jurisdictional water bodies would need to be coordinated with appropriate federal, state, and local agencies. Areas within the Afton SEZ that are determined to be jurisdictional will be subject to the permitting process described in the Clean Water Act (CWA).

TABLE 12.1.9.1-1 Watershed and Water Management Basin Information Relevant to the Proposed Afton SEZ as Revised

Basin	Name	Area (acres)[b]
Subregion (HUC4)[a]	Rio Grande–Mimbres (1303)	9,567,974
Cataloging unit (HUC8)	El Paso–Las Cruces (13030102)	3,451,527
Groundwater basin	Mesilla Valley	704,000
SEZ	Afton	30,706

[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 12.1.9.1-2 Climate Station Information Relevant to the Proposed Afton 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.)
Afton 6 Northeast, New Mexico (290125)	4,189	3	1942–1999	8.84	2.90
Las Cruces, New Mexico (294799)	3,862	13	1897–1958	6.82	3.90
State University, New Mexico (298535)	3,881	13	1959–2011	9.31	3.40

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

[b] Surface elevations for the proposed Afton SEZ range from 3,870 to 4,420 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).

12.1.9.2 Impacts

12.1.9.2.1 Land Disturbance Impacts on Water Resources

The discussion of land disturbance effects on water resources in the Draft Solar PEIS remains valid. As stated in the Draft Solar PEIS, land disturbance impacts in the vicinity of the proposed Afton SEZ could potentially affect drainage patterns, along with groundwater recharge and discharge properties. The alteration of natural drainage pathways during construction can

TABLE 12.1.9.1-3 Total Lengths of Selected Streams at the Subregion, Cataloging Unit, and SEZ Scale Relevant to the Proposed Afton SEZ as Revised

Water Feature	Subregion, HUC4 (ft)[a]	Cataloging Unit, HUC8 (ft)	SEZ (ft)
Unclassified streams	0	0	0
Perennial streams	1,139,430	30,073	0
Intermittent/ephemeral streams	127,041,366	23,729,181	18,548
Canals	3,838,965	3,319,740	0

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

Source: USGS (2012a).

TABLE 12.1.9.1-4 Stream Discharge Information Relevant to the Proposed Afton SEZ as Revised

	Station (USGS ID)	
Parameter	Rio Grande below Caballo Dam, New Mexico (08362500)	Rio Grande Tributary near Radium Springs, New Mexico (08363100)
Period of record	2008–2011	1958–1959
No. of observations	25	2
Discharge, median (ft^3/s)[a]	1,380	296
Discharge, range (ft^3/s)	0.29–2,440	260–332
Discharge, most recent observation (ft^3/s)	1,000	332
Distance to SEZ (mi)[b]	56	25

[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).

lead to impacts related to flooding, loss of water delivery to downstream regions, and alterations to riparian vegetation and habitats. The alteration of the SEZ boundaries to eliminate a significant portion of the SEZ, including the exclusion of wetland areas as non-development areas, reduces the potential for adverse impacts associated with land disturbance activities.

Land clearing, 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

TABLE 12.1.9.1-5 Surface Water Quality Data Relevant to the Proposed Afton SEZ as Revised

	Station (USGS ID)[a]	
Parameter	08362500	321745106492510
Period of record	1966–2010	1988–2009
No. of records	34	18
Temperature (°C)[b]	13.9 (6–26.1)	7.75 (4.5–13)
Total dissolved solids (mg/L)	534 (336–1,010)	841 (496–1,110)
Dissolved oxygen (mg/L)	9 (7.1–15.8)	10.45 (9.2–12.1)
pH	7.8 (7.2–8.5)	8.3 (7.8–8.6)
Total nitrogen (mg/L)	<0.32 (<0.25–0.57)	NA[c]
Phosphorus (mg/L as P)	<0.01 (<0.01–0.03)	0.02 (<0.01–0.09)
Organic carbon (mg/L)	6.9 (6.7–7.1)	NA
Calcium (mg/L)	72 (38–90)	110 (59–140)
Magnesium (mg/L)	13.5 (9.2–26)	21 (14–26.5)
Sodium (mg/L)	84 (52–239)	140 (89–220)
Chloride (mg/L)	66 (33–159)	140 (74–226)
Sulfate (mg/L)	161.5 (99–230)	300 (150–400)
Arsenic (µg/L)	2 (2–3)	2 (<1–3)

[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).

recharge, flood conveyance, sediment transport, geomorphology, and ecological habitats. Only a summary of the results from these surface water analyses is presented in this section; more information on methods and results is presented in Appendix O.

The study region considered for the intermittent/ephemeral stream evaluation relevant to the Afton SEZ is a subset of the Mesilla Basin watershed (HUC8), for which information regarding stream channels is presented in Tables 12.1.9.1-3 and 12.1.9.1-4 of this Final Solar PEIS. The results of the intermittent/ephemeral stream evaluation are shown in Figure 12.1.9.2-1, 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. The analysis indicated that 6% of the total length of the intermittent/ephemeral stream channel reaches in the evaluation had low sensitivity, 94% had moderate sensitivity, and less than 1% had high sensitivity to land disturbance. Two intermittent/ephemeral channels within the Afton SEZ were classified with moderate sensitivity to land disturbance (Figure 12.1.9.2-1).

TABLE 12.1.9.1-6 Water Quality Data from Groundwater Samples Relevant to the Proposed Afton SEZ as Revised

	Station (USGS ID)[a]				
Parameter	322310106305101	323601107010001	323930107041401	324122107120802	325123107175701
Period of record	1960–2007	1994–2008	1994–2008	2005–2008	1994–2008
No. of records	24	5	5	5	5
Temperature (°C)[b]	20.9 (19.8–22.7)	18.7 (17.4–20.6)	19.8 (18.4–20.7)	19.1 (18.8–19.4)	19.3 (18.2–19.9)
Total dissolved solids (mg/L)	443 (421–602)	849 (678–955)	866 (801–1,060)	1,220 (860–1,580)	846 (779–1,320)
Dissolved oxygen (mg/L)	1.3 (0.1–6.9)	0.3 (<0.1–0.5)	0.2 (<0.1–0.3)	0.3	0.3 (0.1–0.8)
pH	7 (6.7–7.2)	7.6 (7.4–7.7)	7.1 (7.1–7.3)	7.3	7.3 (7.3–7.4)
Nitrate + nitrite (mg/L as N)	NA[c]	1.04 (0.31–9.07)	1.42 (<0.04–5.6)	0.04 (0.02–<0.06)	0.08 (<0.04–0.17)
Phosphate (mg/L)	NA	0.172 (0.153–0.208)	0.061 (0.031–0.072)	0.0575 (0.04–0.075)	0.031 (0.015–0.064)
Organic carbon (mg/L)	NA	2.5 (2.4–2.6)	2.55 (2.4–2.7)	2.6	2 (1.6–2.4)
Calcium (mg/L)	80.45 (72.6–94)	115 (80.1–133)	140 (127–173)	181.5 (119–244)	121 (113–200)
Magnesium (mg/L)	14 (13–16.4)	25 (17.8–27.5)	23 (19.2–25.7)	32.5 (21.7–43.3)	20.5 (18.5–30)
Sodium (mg/L)	49.6 (47.5–53.8)	131 (110–153)	131 (100–152)	178.5 (136–221)	149 (123–200)
Chloride (mg/L)	26.75 (23.5–30)	122 (92.6–144)	107 (57.3–130)	167 (113–221)	121 (112–130)
Sulfate (mg/L)	130.5 (108–220)	293 (194–310)	308 (270–340)	468.5 (284–653)	250 (236–470)
Arsenic (mcg/L)	0.07	3.5 (3–3.5)	1.2 (1–1.6)	1.05 (1–1.1)	1.1 (0.8–1.3)
Fluoride (mg/L)	4.33 (3.78–7.69)	0.64 (0.5–0.8)	1.12 (1–1.28)	0.69 (0.65–0.73)	0.81 (0.6–0.81)
Iron (µg/L)	10 (5–3,040)	6 (3–10)	10 (5–22)	691 (497–885)	553 (81–1,200)
Manganese (µg/L)	8.5	274 (73.9–950)	518 (456–743)	1,113 (606–1,620)	1,040 (484–1,650)

[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 12.1.9.1-7 Groundwater Surface Elevations Relevant to the Proposed Afton SEZ as Revised

	Station (USGS ID)			
Parameter	321248106560001	320927106531201	320526106470101	320924106531201
Period of record	1968–2008	1983–2011	1986–2007	1986–2011
No. of observations	18	28	22	25
Surface elevation (ft)[a]	4,230	4,210	4,171	4,209
Well depth (ft)	NA	400	NA	680
Depth to water, median (ft)	354.05	368.46	354.78	366.52
Depth to water, range (ft)	320–358.6	366.42–369.32	354.34–356.73	364.34–371.2
Depth to water, most recent observation (ft)	354.87	369.18	355.98	367.4
Distance to SEZ (mi)[b]	4	1	8	1

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

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

Source: USGS (2012b).

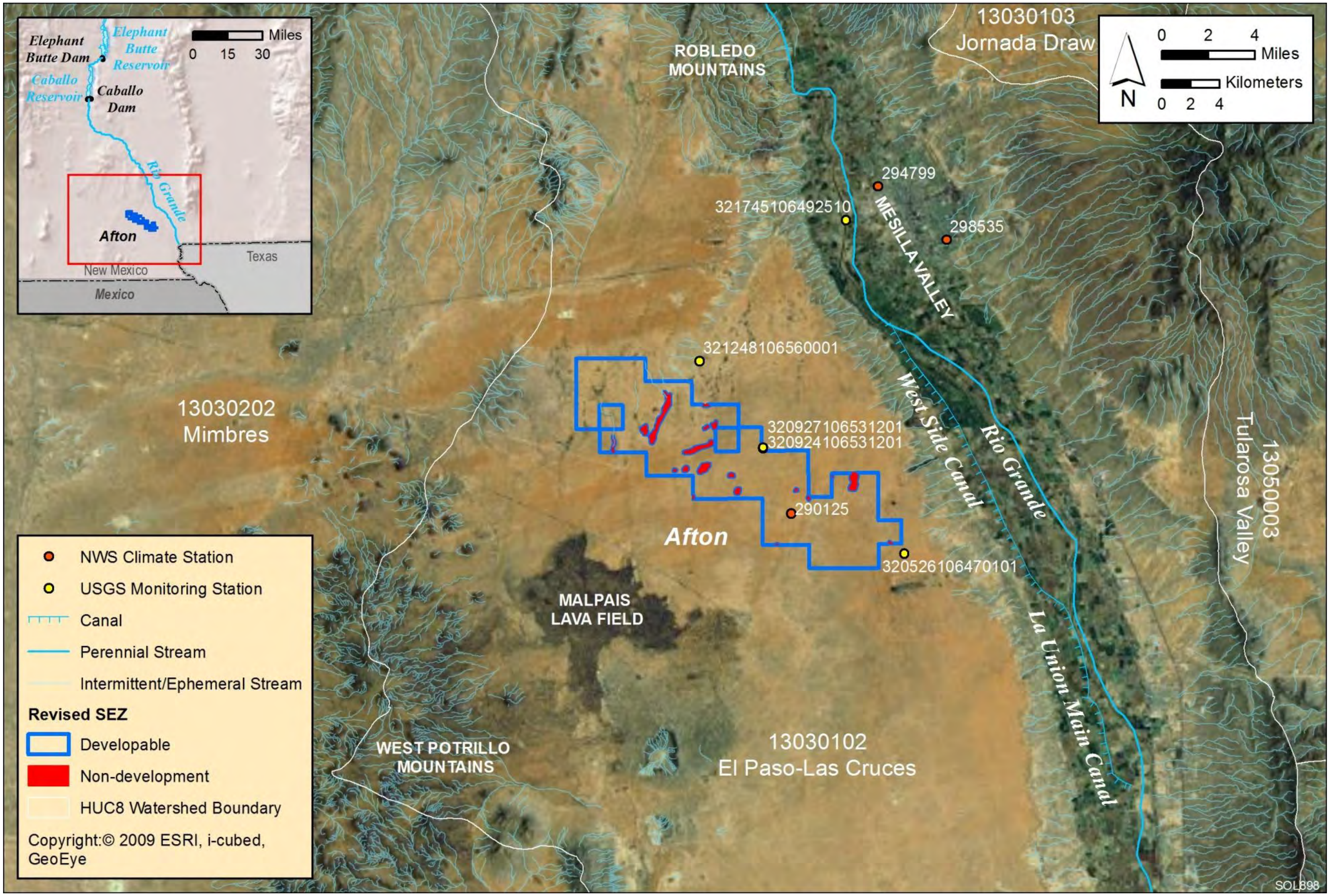

FIGURE 12.1.9.1-1 Water Features near the Proposed Afton SEZ as Revised

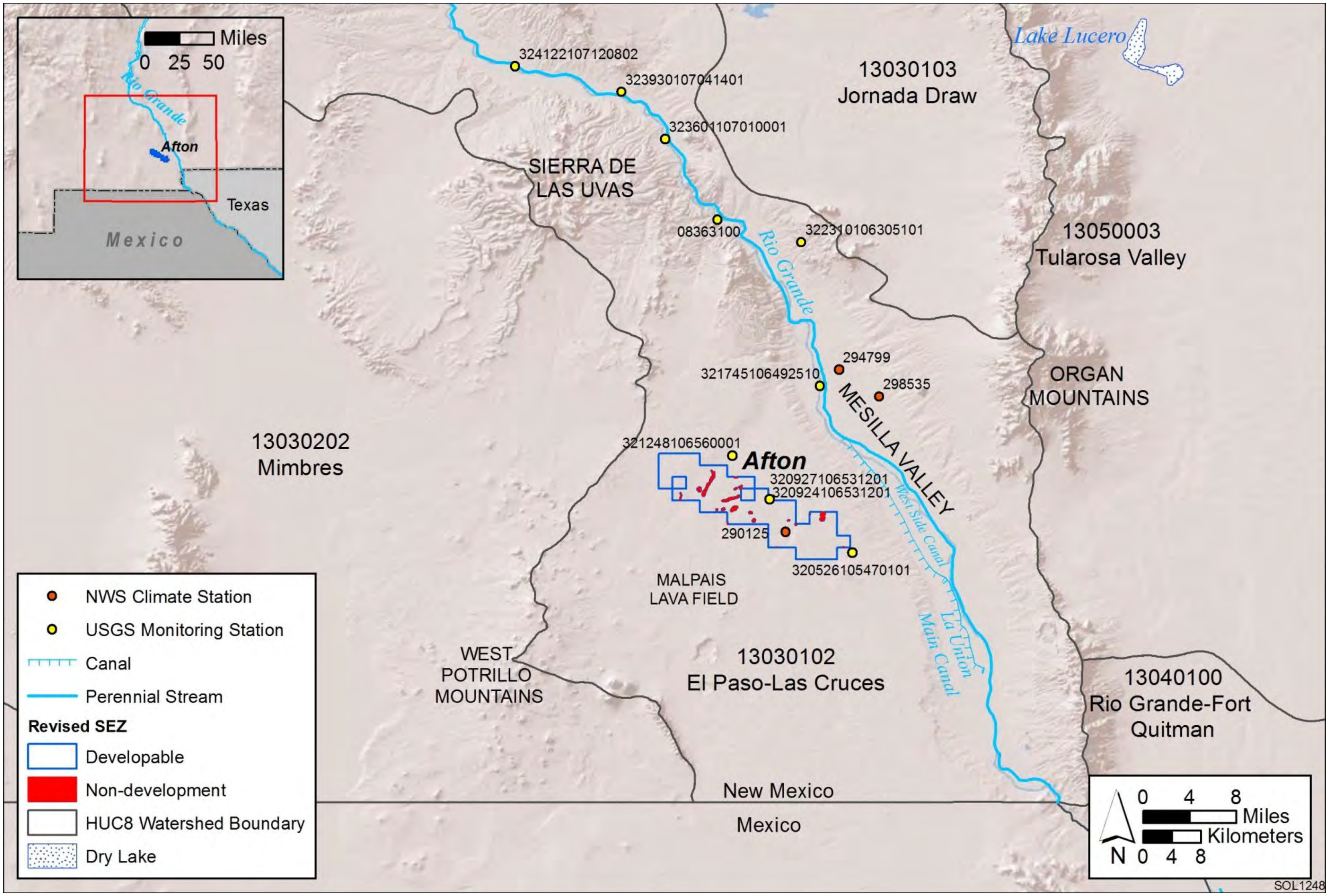

FIGURE 12.1.9.1-2 Water Features within the El Paso–Las Cruces Watershed, Which Includes the Proposed Afton SEZ as Revised

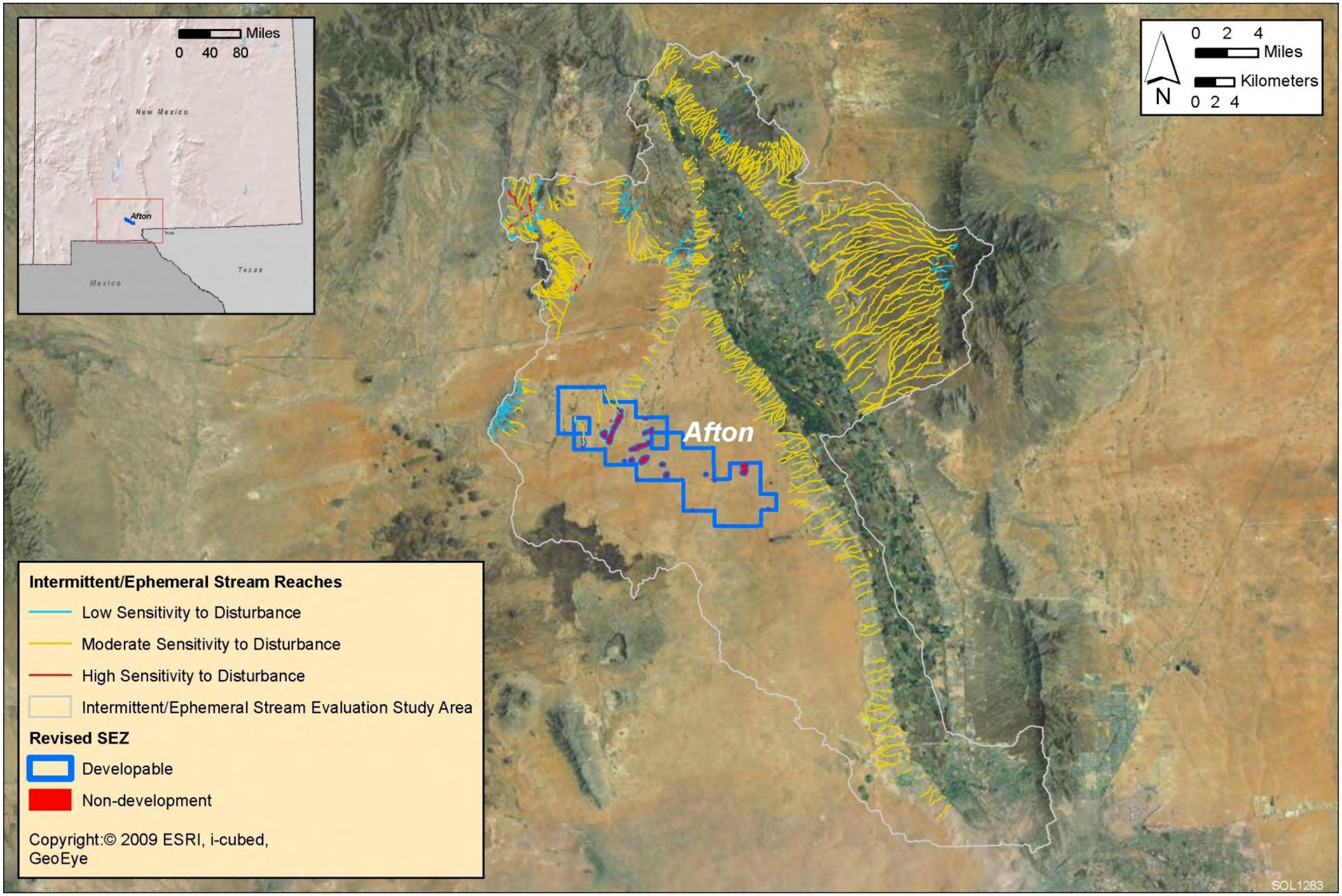

FIGURE 12.1.9.2-1 Intermittent/Ephemeral Stream Channel Sensitivity to Surface Disturbances in the Vicinity of the Proposed Afton SEZ as Revised

12.1.9.2.2 Water Use Requirements for Solar Energy Technologies

Changes in the Afton SEZ boundaries resulted in significant reductions to the estimated water use requirements and a reduction in the land affected by surface disturbances. This section presents changes in water use estimates for the reduced SEZ area and additional analyses pertaining to groundwater. The additional analyses of groundwater include 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.

Table 12.1.9.2-1 presents the revised estimates of water requirements for both construction and operation of solar facilities at the Afton SEZ, assuming full build-out of the SEZ and accounting for its reduced size. A basin-scale groundwater budget was assembled using available data on groundwater inputs, outputs, and storage, with results presented in Table 12.1.9.2-2. As can be seen in Table 12.1.9.2-2, a majority of the inputs to the basin are from reaches of the Rio Grande that leak to groundwater and associated irrigation-canal systems. Thus, when flow decreases in the Rio Grande, less water is input into the groundwater basin from these sources. Flows in the river are variable and controlled by upstream releases from the Elephant Butte and Caballo Dams, and the Upper Rio Grande Basin upstream of the dams has experienced an extended period of drought since 1996 (BOR 2009). In addition, a recent agreement between the states of New Mexico and Texas has reduced the amount of water available for agricultural users in the Mesilla Valley (EBID 2012). Since 2008, water delivery to farms has been reduced by about a third from historical levels, and groundwater pumping for irrigation has increased (Barroll 2011). The values for net irrigation return flow and seepage from the Rio Grande presented in Table 12.1.9.2-2 are from the 1970s; thus it is likely that these significant inputs to the Mesilla Basin are significantly less under current drought and management conditions. For this analysis, it was assumed that the water availability in the vicinity of the SEZ is primarily dependent upon the mountain front, slope front, and intermittent/ephemeral channel seepage recharge inputs to the basin, which are estimated to be between 10,000 and 11,000 ac-ft/yr (12.3 million and 13.6 million m^3/yr).

The estimated total water use requirements during the peak construction year are as high as 3,581 ac-ft/yr (4.4 million m^3/yr), which is over a third of the average annual recharge to the basin but constitutes a minor portion of current groundwater withdrawals and estimated groundwater storage in the Mesilla 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. 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).

TABLE 12.1.9.2-1 Estimated Water Requirements for the Proposed Afton SEZ as Revised[a]

Activity	Parabolic Trough	Power Tower	Dish Engine	PV
Construction—Peak Year				
Water use requirements				
Fugitive dust control (ac-ft)[b]	2,328	3,491	3,491	3,491
Potable supply for workforce (ac-ft)	148	90	37	19
Total water use requirements (ac-ft)	2,476	3,581	3,528	3,510
Wastewater generated				
Sanitary wastewater (ac-ft)	148	90	37	19
Operations				
Water use requirements				
Mirror/panel washing (ac-ft/yr)	2,397	1,332	1,332	133
Potable supply for workforce (ac-ft/yr)	67	30	30	3
Dry cooling (ac-ft/yr)	959–4,794	533–2,663	NA	NA
Wet cooling (ac-ft/yr)	21,574–69,516	11,986–38,620	NA	NA
Total water use requirements				
Non-cooled technologies (ac-ft/yr)	NA[c]	NA	1,362	136
Dry-cooled technologies (ac-ft/yr)	3,423–7,258	1,895–4,025	NA	NA
Wet-cooled technologies (ac-ft/yr)	24,038–71,980	13,348–39,982	NA	NA
Wastewater generated				
Blowdown (ac-ft/yr)	1,362	757	NA	NA
Sanitary wastewater (ac-ft/yr)	67	30	30	3

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

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

[c] NA = not applicable.

The low, medium, and high pumping scenarios result in groundwater withdrawals that range from 136 to 24,038 ac-ft/yr (168,000 to 30 million m^3/yr), or 2,720 to 480,760 ac-ft (3.4 million to 593 million m^3) over the 20-year operational period. From a groundwater budgeting perspective, the high pumping scenario would represent 9% of the estimated total annual groundwater inputs to the basin and 1% of the estimated groundwater storage over the 20-year operational period. However, the water required for the high pumping scenario would exceed the annual recharge to the basin by a factor of 2.4. The low and medium pumping scenarios have annual withdrawals that represent less than 1% and 1%, respectively, of the estimate of total groundwater inputs to the basin (Table 12.1.9.2-2). However, the low and medium pumping scenarios would represent 1% and 34% of the estimated annual recharge to the basin of 10,000 ac-ft/yr (12.3 million m^3/yr). Even though total groundwater withdrawals over the 20-year period are small compared to the total groundwater storage in the basin, the high

TABLE 12.1.9.2-2 Groundwater Budget for the Mesilla Groundwater Basin, Which Includes the Proposed Afton SEZ as Revised

Process	Amount
Inputs	
Groundwater recharge (ac-ft/yr)[a,b]	10,000[c]–11,000[d]
Underflow from Jornada (ac-ft/yr)	<850[c,d]
Net irrigation return flow (ac-ft/yr)[e]	187,000[d]
Seepage from Rio Grande (ac-ft/yr)	55,000[d]
Outputs	
Seepage to agricultural drains (ac-ft/yr)	130,000[d]
Non-irrigation withdrawals (ac-ft/yr)	41,300[d]
Underflow through El Paso Narrows (ac-ft/yr)	<700[d]
Evapotranspiration (non-agricultural) (ac-ft/yr)	81,000[d]
Storage	
Aquifer storage (ac-ft)	14,000,000[d,f]–50,000,000[c]

[a] Groundwater recharge includes mountain front, intermittent/ephemeral channel seepage, and direct infiltration recharge processes.

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

[c] Source: Hawley and Kennedy (2004).

[d] Source: Frenzel and Kaehler (1992).

[e] Net irrigation return flow equals total irrigation return flow to groundwater, plus leakage from canals to groundwater, minus evaporation from irrigated lands and irrigation withdrawals.

[f] Aquifer storage values are for the upper 100 ft (30 m) of the saturated zone.

pumping scenario would far exceed the estimate of groundwater recharge to the basin, and the medium pumping scenario would use over a third of the average annual recharge.

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 considering pumping from the lower confined aquifer. This analysis examines the impacts of groundwater pumping in a worst-case scenario, assuming that the pumping for full build-out would be from only two wells within the SEZ, even though it is unlikely that the two wells in combination would have the capacity to produce groundwater at the level of the high pumping scenario. A detailed discussion of the groundwater modeling analysis is presented in Appendix O. Note, however, that the aquifer parameters used for the one-dimensional groundwater model (Table 12.1.9.2-3) 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 300 and 400 ft (91 and 122 m) in the vicinity of the SEZ. The modeling results suggest that groundwater withdrawals for solar energy development would result in groundwater drawdown near the boundaries of the SEZ (approximately a 2- to 5-mi [3- to 8-km] radius) that ranges from approximately 107 to 128 ft (33 to 39 m) for the high pumping scenario, 15 to 18 ft (4.6 to 5.5 m) for the medium pumping scenario, and less than 1 ft (0.3 m) for the low pumping scenario (Figure 12.1.9.2-2). The modeled groundwater drawdown for the high pumping scenario suggests a potential for 99 ft (30 m) of drawdown at a distance of 7 mi (11 km) from the center of the SEZ, near the Rio Grande. A drawdown of 99 ft (30 m) could draw water from the shallow aquifer in the Mesilla Valley area, potentially leading to alterations of the flow of the Rio Grande, water delivery to agricultural and other users, and riparian vegetation along the Rio Grande and the intermittent/ephemeral streams in the vicinity of the SEZ. The medium pumping scenario could result in more than 14 ft (4.3 m) of drawdown at a distance of 7 mi (11 km) from the SEZ, which could also have impacts on the shallow aquifer and in turn affect other users and ecological habitats.

12.1.9.2.3 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

TABLE 12.1.9.2-3 Aquifer Characteristics and Assumptions Used in the One-Dimensional Groundwater Model for the Proposed Afton SEZ as Revised

Parameter	Value[a]
Lower, confined aquifer	
Aquifer type/conditions	Confined/basin fill
Aquifer thickness (ft)	1,000
Hydraulic conductivity (ft/day)	10
Transmissivity (ft^2/day)	10,000
Storage coefficient	0.00002
Analysis period (yr)	20
High pumping scenario (ac-ft/yr)	24,083
Medium pumping scenario (ac-ft/yr)	3,423
Low pumping scenario (ac-ft/yr)	136

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

Source: Hawley and Kennedy (2004).

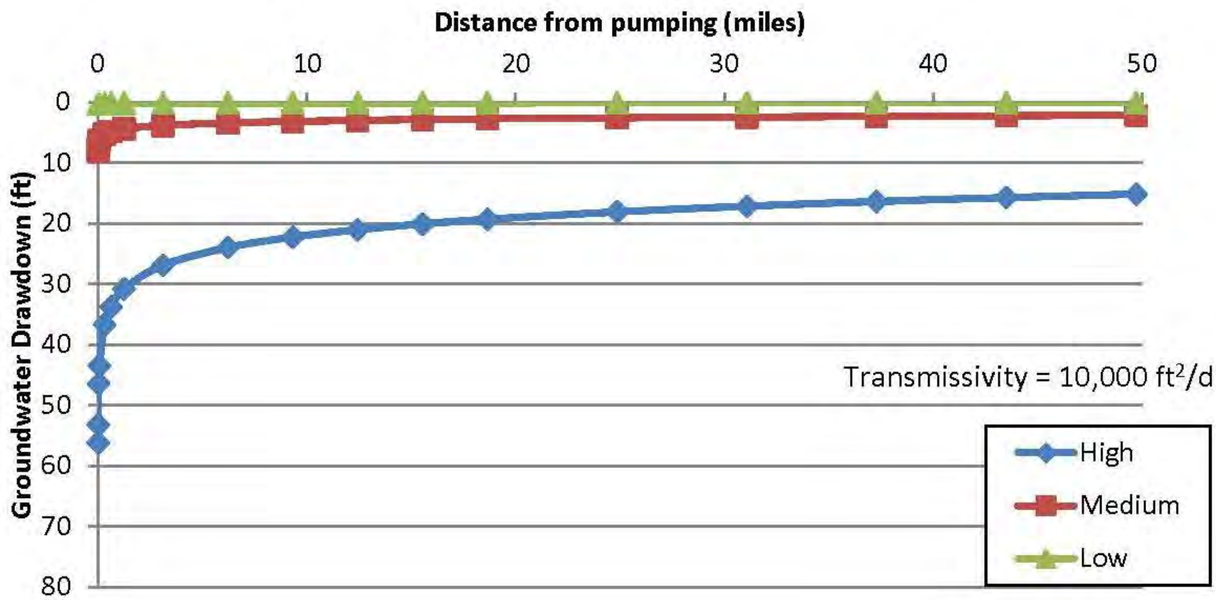

FIGURE 12.1.9.2-2 Estimated One-Dimensional Groundwater Drawdown Resulting from High, Medium, and Low Groundwater Pumping Scenarios over the 20-Year Operational Period at the Proposed Afton SEZ as Revised

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.

12.1.9.2.4 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. The primary potential for impacts resulting from solar energy development comes from surface disturbances and groundwater use.

The change in boundaries of the Afton SEZ resulted in a decrease in total operational water demand by approximately 60% for all technologies (Table 12.1.9.2-1). The change in SEZ boundaries excluded several intermittent/ephemeral streams along the Rio Grande floodplain area with moderate sensitivity to land disturbances and identified non-development areas that included land surface depressions within the SEZ within the 500-year floodplain. These changes in the SEZ boundaries have reduced potential impacts associated with groundwater withdrawals and surface disturbance on surface water features.

Disturbance to intermittent/ephemeral stream channels within the Afton SEZ should not pose a significant impact on the critical functions of groundwater recharge, sediment transport, flood conveyance, and ecological habitat. The land surface depressions will be non-development areas, and there are only two intermittent/ephemeral channels within the SEZ, the total length of which is very small compared to the total length of the intermittent/ephemeral channels within the study area. The intermittent/ephemeral channels and streams within the Afton SEZ are estimated to have a moderate sensitivity to disturbance.

The proposed water use for full-build out scenarios at the Afton SEZ indicates that the low pumping scenario is preferable, given that the medium and high pumping scenarios have potential to greatly affect the annual groundwater budget and also the groundwater-surface water connectivity in the Mesilla Valley shallow aquifer, which is connected to the Rio Grande system. In addition, the high pumping scenario greatly exceeds the annual groundwater recharge, and the medium pumping scenario has potential to affect the annual groundwater budget.

Predicting impacts associated with groundwater withdrawals 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 a combination of monitoring and modeling to fully identify the temporal and spatial extent of potential impacts. The BLM is currently working on the development of a more detailed numerical groundwater model for the Afton SEZ that would more accurately predict potential impacts on surface water features and groundwater drawdown. When the detailed model is completed, it will be made available through the project Web site (http://solareis.anl.gov) for use by applicants, the BLM, and other stakeholders.

12.1.9.3 SEZ-Specific Design Features and Design Feature Effectiveness

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

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

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

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.

12.1.10 Vegetation

12.1.10.1 Affected Environment

Revisions to the boundaries of the Afton SEZ have eliminated several wetlands mapped by the National Wetlands Inventory (NWI) and playas that had occurred in the SEZ. In addition, 742 acres (3 km^2) of floodplain and intermittent and dry lake within the SEZ were identified as exclusion areas where development would not be allowed.

As presented in Section 12.1.10.1 of the Draft Solar PEIS, 17 cover types were identified within the area of the proposed Afton SEZ, while 25 cover types were identified in the area of indirect impacts. Sensitive habitats on the SEZ include wetlands, riparian areas, sand dunes, cliffs, desert dry washes, and playas. Because of the change in SEZ boundaries, the Chihuahuan Succulent Desert Scrub, Apacherian-Chihuahuan Piedmont Semi-Desert Grassland and Steppe, North American Warm Desert Volcanic Rockland, Open Water, North American Warm Desert Playa, Agriculture, Chihuahuan Gypsophilous Grassland and Steppe, and North American Warm Desert Wash cover types no longer occur within the SEZ. Of these, the North American Warm Desert Playa and North American Warm Desert Wash cover types occur within the road corridor. The Apacherian-Chihuahuan Piedmont Semi-Desert Grassland and Steppe, Madrean Pinyon-Juniper Woodland, and North American Warm Desert Pavement cover types no longer occur within the indirect impact area (access road corridor and within 5 mi [8 km] of the SEZ boundary). Figure 12.1.10.1-1 shows the cover types within the affected area of the Afton SEZ as revised.

12.1.10.2 Impacts

As presented in the Draft Solar PEIS, the construction of solar energy facilities within the proposed Afton 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 change in SEZ boundaries, the amount of land cleared would be reduced to approximately 23,971 acres (121 km^2).

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.

12.1.10.2.1 Impacts on Native Species

The analysis presented in the Draft Solar PEIS based on the original Afton SEZ developable area indicated that development would result in a moderate impact on four land cover types and a small impact on all other land cover types occurring within the SEZ

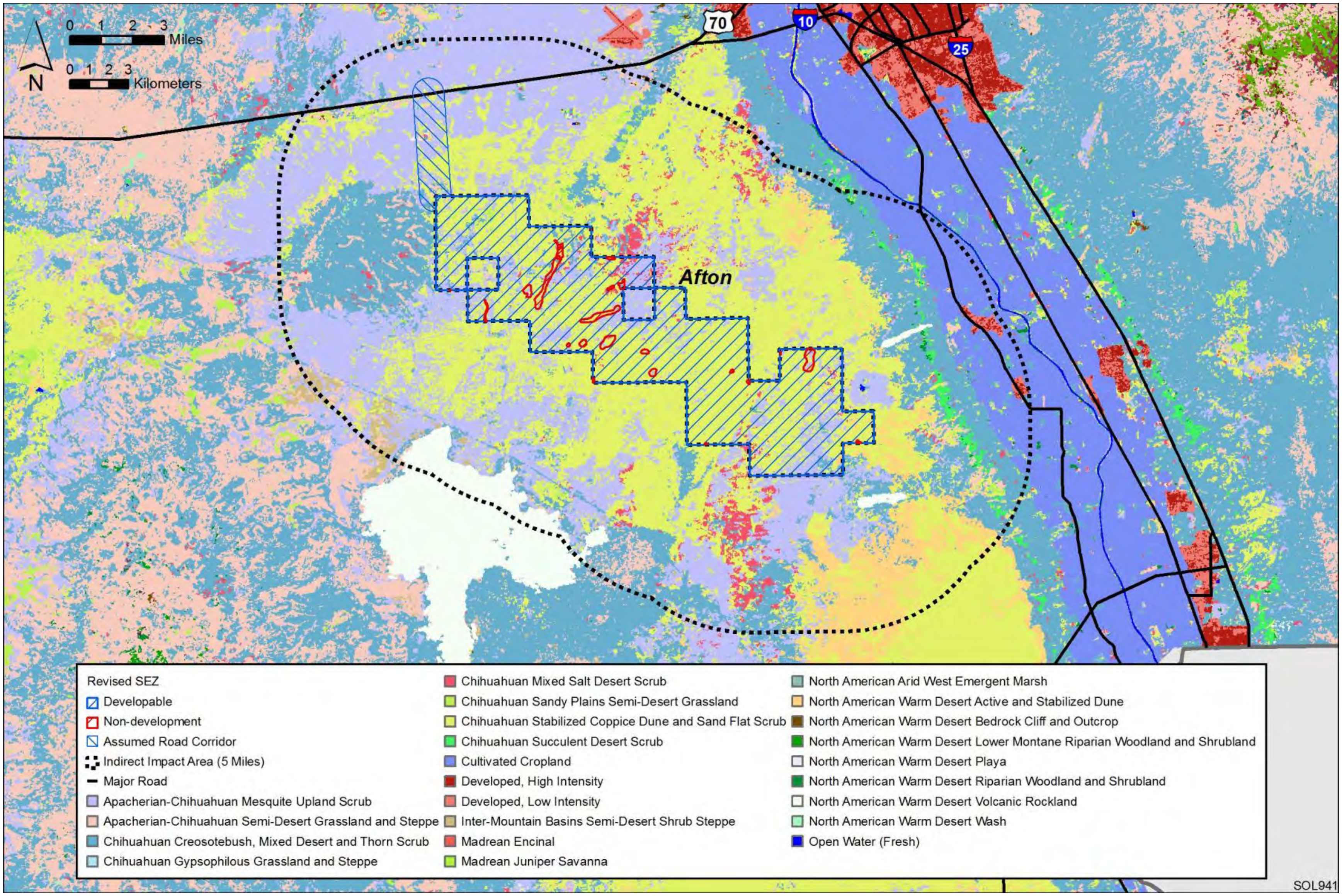

FIGURE 12.1.10.1-1 Land Cover Types within the Proposed Afton SEZ as Revised

(Table 12.1.10.1-1 in the Draft Solar PEIS). Development within the revised Afton SEZ could still directly affect most of the cover types evaluated in the Draft Solar PEIS, with the exception of Chihuahuan Succulent Desert Scrub (previously moderate impact), Apacherian-Chihuahuan Piedmont Semi-Desert Grassland and Steppe, North American Warm Desert Volcanic Rockland, Open Water, Agriculture, and Chihuahuan Gypsophilous Grassland and Steppe; the reduction in the developable area would result in reduced impact levels on all cover types in the affected area. The impact magnitude on Chihuahuan Mixed Salt Desert Scrub (previously moderate impact) would be reduced to a small impact, but the impact magnitudes on all the cover types would remain unchanged compared to original estimates in the Draft Solar PEIS. Because of the change in the indirect impact area, the Apacherian-Chihuahuan Piedmont Semi-Desert Grassland and Steppe, Madrean Pinyon-Juniper Woodland, and North American Warm Desert Pavement cover types would not be indirectly affected.

Direct impacts could still occur on unmapped wetlands within the remaining developable areas of the SEZ. In addition, indirect impacts on wetlands within or near the SEZ, as described in the Draft Solar PEIS, could occur. Indirect impacts from groundwater use on communities in the region that depend on groundwater, such as wetlands and riparian habitats along the Rio Grande floodplain, could also occur.

12.1.10.2.2 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 Afton SEZ could potentially result in the establishment or expansion of noxious weeds and invasive species populations, potentially including those species listed in Section 12.1.10.1 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.

12.1.10.3 SEZ-Specific Design Features and Design Feature Effectiveness

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

- All wetland, dry wash, playa, riparian, succulent, and dune communities and large blocks of unfragmented grassland within the SEZ shall be avoided to the extent practicable, and any impacts minimized and mitigated in consultation with appropriate agencies. Any yucca, agave, ocotillo, cacti (including *Opuntia* spp., *Cylindropuntia* spp., and *Echinocactus* spp.) and other succulent plant species that cannot be avoided shall be salvaged. A buffer area shall be maintained around wetland, dry wash, playa, and riparian habitats to reduce the potential for impacts.

- Appropriate engineering controls shall be used to minimize impacts on wetland, dry wash, playa, and riparian habitats, including downstream occurrences, resulting from surface water runoff, erosion, sedimentation, altered hydrology, accidental spills, or fugitive dust deposition to these habitats. Appropriate buffers and engineering controls will be determined through agency consultation.

- Groundwater withdrawals shall be limited to reduce the potential for indirect impacts on groundwater-dependent communities, such as wetland or riparian communities associated with the Rio Grande floodplain.

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

On the basis of impact analyses conducted for the Draft Solar PEIS, updates to those analyses due to changes to the SEZ boundaries, 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.

12.1.11 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.

12.1.11.1 Amphibians and Reptiles

12.1.11.1.1 Affected Environment

As presented in Section 12.1.11.1 of the Draft Solar PEIS, representative amphibian and reptile species expected to occur within the Afton SEZ include the Couch's spadefoot (*Scaphiopus couchii*), Great Plains toad (*Bufo cognatus*), plains spadefoot (*Spea bombifrons*), red-spotted toad (*Bufo punctatus*), collared lizard (*Crotaphytus collaris*), eastern fence lizard (*Sceloporus undulatus*), Great Plains skink (*Eumeces obsoletus*), long-nosed leopard lizard (*Gambelia wislizenii*), round-tailed horned lizard (*Phrynosoma modestum*), side-blotched lizard (*Uta stansburiana*), western whiptail (*Cnemidophorus tigris*), coachwhip (*Masticophis flagellum*), common kingsnake (*Lampropeltis getula*), glossy snake (*Arizona elegans*), gophersnake (*Pituophis catenifer*), groundsnake (*Sonora semiannulata*), long-nosed snake (*Rhinocheilus lecontei*), and nightsnake (*Hypsiglena torquata*). The most common poisonous snakes that could occur on the SEZ are the western diamond-backed rattlesnake (*Crotalus atrox*) and western rattlesnake (*Crotalus viridis*). The reduction in the boundary and developable area within the Afton SEZ does not alter the potential for these species to occur in the affected area.

12.1.11.1.2 Impacts

As presented in the Draft Solar PEIS, solar energy development within the Afton SEZ could affect potentially suitable habitats for the representative amphibian and reptile species. The analysis presented in the Draft Solar PEIS for the original Afton SEZ boundary and developable area indicated that development would result in small or moderate overall impact on the representative amphibian and reptile species (Table 12.1.11.1-1 in the Draft Solar PEIS). The reduction in the boundary and developable area of the Afton 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 be small.

12.1.11.1.3 SEZ-Specific Design Features and Design Feature Effectiveness

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

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

- Impacts on wash, riparian, playa, rock outcrop, and wetland habitats, which may provide more unique habitats for some amphibian and reptile species, should be avoided, minimized, or mitigated.

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.

12.1.11.2 Birds

12.1.11.2.1 Affected Environment

As presented the Draft Solar PEIS, a large number of bird species could occur or have potentially suitable habitat within the affected area of the proposed Afton SEZ. Representative bird species identified in the Draft Solar PEIS included (1) shorebirds: killdeer (*Charadrius vociferus*) and least sandpiper (*Calidris minutilla*); (2) passerines: ash-throated flycatcher (*Myiarchus cinerascens*), black-tailed gnatcatcher (*Polioptila melanura*), black-throated sparrow (*Amphispiza bilineata*), Brewer's blackbird (*Euphagus cyanocephalus*), cactus wren (*Campylorhynchus brunneicapillus*), common poorwill (*Phalaenoptilus nuttallii*), common raven (*Corvus corax*), Costa's hummingbird (*Calypte costae*), Crissal thrasher (*Toxostoma crissale*), Gila woodpecker (*Melanerpes uropygialis*), greater roadrunner (*Geococcyx californianus*), horned lark (*Eremophila alpestris*), ladder-backed woodpecker (*Picoides scalaris*), lesser nighthawk (*Chordeiles acutipennis*), loggerhead shrike (*Lanius ludovicianus*), Lucy's warbler (*Vermivora luciae*), phainopepla (*Phainopepla nitens*), sage sparrow (*Amphispiza belli*), Say's phoebe (*Sayornis saya*), Scott's oriole (*Icterus parisorum*), verdin (*Auriparus flaviceps*), western meadowlark (*Sturnella neglecta*), and white-throated swift (*Aeronautes saxatalis*); (3) raptors: American kestrel (*Falco sparverius*), golden eagle (*Aquila chrysaetos*), great horned owl (*Bubo virginianus*), long-eared owl (*Asio otus*), prairie falcon (*Falco mexicanus*), red-tailed hawk (*Buteo jamaicensis*), and turkey vulture (*Cathartes aura*); and (4) upland gamebirds: Gambel's quail (*Callipepla gambelii*), mourning dove (*Zenaida macroura*), scaled quail (*Callipepla squamata*), white-winged dove (*Zenaida asiatica*), and wild turkey (*Meleagris gallopavo*). The reduction in the boundary and developable area of the Afton SEZ does not alter the potential for these species or other bird species to occur in the affected area.

12.1.11.2.2 Impacts

As presented in the Draft Solar PEIS, solar energy development within the Afton SEZ could affect potentially suitable bird habitats. The analysis presented in the Draft Solar PEIS, based on the original Afton SEZ boundary and developable area, indicated that development would result in small or moderate impacts on the representative bird species (Table 12.1.11.2-1 in the Draft Solar PEIS). The reduction in the boundary and developable area of the Afton SEZ would result in reduced habitat impacts for all representative bird species; the resultant impact levels for all of the representative bird species would be small.

12.1.11.2.3 SEZ-Specific Design Features and Design Feature Effectiveness

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

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

- Impacts on wash, riparian, playa, rock outcrops, and wetland areas, which may provide unique habitats for some bird species, should be avoided, minimized, or mitigated.

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.

12.1.11.3 Mammals

12.1.11.3.1 Affected Environment

As presented in Section 12.1.11.3.1 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 Afton SEZ. Representative mammal species identified in the Draft Solar PEIS included (1) big game: cougar (*Puma concolor*), elk (*Cervis canadensis*), mule deer (*Odocoileus hemionus*), and pronghorn (*Antilocapra americana*); (2) furbearers and small game: the American badger (*Taxidea taxus*), black-tailed jackrabbit (*Lepus californicus*), bobcat (*Lynx rufus*), coyote (*Canis latrans*), desert cottontail (*Sylvilagus audubonii*), gray fox (*Urocyon cinereoargenteus*), javelina or collared peccary (*Pecari tajacu*), kit fox (*Vulpes macrotis*), ringtail (*Bassariscus astutus*), and striped skunk (*Mephitis mephitis*); and (3) small nongame: Botta's pocket gopher (*Thomomys bottae*), cactus mouse (*Peromyscus eremicus*), canyon mouse (*Peromyscus crinitus*), deer mouse (*P. maniculatus*), desert pocket mouse (*Chaetodipus penicillatus*), desert shrew (*Notiosorex crawfordi*), Merriam's kangaroo rat (*Dipodomys merriami*), northern grasshopper mouse (*Onychomys leucogaster*), Ord's kangaroo rat (*Dipodomys ordii*), round-tailed ground squirrel (*Spermophilus tereticaudus*), southern plains woodrat (*Neotoma micropus*), spotted ground squirrel (*Spermophilus spilosoma*), western harvest mouse (*Reithrodontomys megalotis*), and white-tailed antelope squirrel (*Ammospermophilus leucurus*). Bat species that may occur within the area of the SEZ include the big brown bat (*Eptesicus fuscus*), Brazilian free-tailed bat (*Tadarida brasiliensis*), California myotis (*Myotis californicus*), silver-haired bat (*Lasionycteris noctivagans*), spotted bat (*Euderma maculatum*), 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. The reduction in the size of the Afton SEZ does not alter the potential for these species or any additional mammal species to occur in the affected area.

12.1.11.3.2 Impacts

As presented in the Draft Solar PEIS, solar energy development within the Afton SEZ could affect potentially suitable habitats of mammal species. The analysis presented in the Draft Solar PEIS, based on the original Afton SEZ boundary and developable area, indicated that development would result in small or moderate impacts on the representative mammal species (Table 12.1.11.3-1 in the Draft Solar PEIS). The reduction in the boundary and developable area of the Afton SEZ would result in reduced habitat impacts for all representative mammal species; the resultant impact levels for all of the representative mammal species would be small. On the basis of mapped ranges, direct potential loss of mule deer habitat where deer are considered rare or absent would be reduced from 62,100 to 23,970 acres (251.3 km^2 to 97.0 km^2), and represents a change in potential habitat impact loss from moderate to small.

12.1.11.3.3 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, impacts on mammal species would be small.

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

- Impacts on playa, wash, wetland, and rock outcrop habitats should be avoided, minimized, or mitigated.

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.

12.1.11.4 Aquatic Biota

12.1.11.4.1 Affected Environment

No springs, intermittent or perennial streams, or water bodies are present on the proposed Afton SEZ. The boundaries of the Afton SEZ have been reduced compared to the boundaries given in the Draft Solar PEIS. On the basis of these changes, updates to the Draft Solar PEIS include the following:

- There are 10 mi (16 km) of the West Side Canal located within the area of indirect effects within 5 mi (8 km) of the SEZ associated with the SEZ.

- Many wetlands are no longer within the boundaries of the SEZ, and those identified wetlands that remain in the SEZ have been designated as non-development areas.

- Outside of the indirect effects area but within 50 mi (80 km) of the proposed Afton South SEZ are approximately 100 mi (161 km) of perennial streams (primarily the Rio Grande), 67 mi (108 km) of intermittent streams, and 23 mi (37 km) of canals. Also present within 50 mi (80 km) of the SEZ are 3,927 acres (16 km^2) of intermittent lake habitat (Lake Lucero).

- Perennial streams and canals are the only surface water features in the area of direct and indirect effects (within 5 mi [8 km] of the SEZ), and their area represents approximately 6% of the total amount of perennial stream present in the 50-mi (80-km) SEZ region.

- The analysis now assumes a 3-mi (5-km) road corridor to I-10 from the SEZ. However, the road corridor does not cross any aquatic habitat.

No information is available on aquatic biota in the surface water features in the SEZ. As stated in Appendix C of the Supplement to the Draft Solar PEIS, site surveys can be conducted at the project-specific level to characterize aquatic biota, if present, within the wetlands and washes in the Afton SEZ.

12.1.11.4.2 Impacts

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

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

- Wetlands located in the SEZ have been identified as non-development areas; therefore, construction activities would not directly affect wetlands. However, as described in the Draft Solar PEIS, the wetlands could be affected indirectly by solar development activities within the SEZ.

12.1.11.4.3 SEZ-Specific Design Features and Design Feature Effectiveness

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

- Undisturbed buffer areas and sediment and erosion controls shall be maintained around wetlands on the SEZ.

- Development shall avoid, to the extent practicable, any additional wetlands identified during future site-specific fieldwork.

- The use of heavy machinery and pesticides shall be avoided within the immediate catchment basins for wetlands on the SEZ.

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

On the basis of impact analyses conducted for the Draft Solar PEIS, updates to those analyses due to changes to the SEZ boundaries, and consideration of comments received as applicable, no SEZ-specific design features for 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.

12.1.12 Special Status Species

12.1.12.1 Affected Environment

As presented in the Draft Solar PEIS, 35 special status species were identified that could occur or have potentially suitable habitat within the affected area of the proposed Afton SEZ. The reduction in the size of the Afton SEZ and the addition of an assumed access road corridor, do not alter the potential for special status species to occur in the affected area, but they may reduce the impact magnitude for some species with moderate or large impacts as determined in the Draft Solar PEIS. A total of 11 special status species were determined to have moderate or large impacts in the Draft Solar PEIS: plants—sand prickly-pear cactus, Sandberg pincushion cactus, and sandhill goosefoot; reptiles—Texas horned lizard; birds—American peregrine falcon, Bell’s vireo, eastern bluebird, gray vireo, and western burrowing owl; and mammals—western small-footed myotis and yellow-faced pocket gopher. These 11 species are re-evaluated below; none of these species are federally listed as threatened or endangered under the Endangered Species Act of 1973 (ESA) or are proposed or candidates for listing under the ESA.

On the basis of comments received on the Draft Solar PEIS, it was determined that populations of the northern aplomado falcon that may occur in southern New Mexico and potentially within the affected area of the Afton SEZ were incorrectly listed as endangered under the ESA in the Draft Solar PEIS. Populations of this species throughout southern New Mexico, and potentially within the affected area of the Afton SEZ, are considered to be nonessential experimental populations (ESA-XN) under Section 10(j) of the ESA (71 FR 42298). Figure 12.1.12.1-1 shows the known or potential occurrences of species in the affected area of the revised Afton SEZ that are listed, proposed, or candidates for listing under the ESA. Included in this figure are known locations of ESA-XN of the northern aplomado falcon.

Sand Prickly-Pear Cactus. The sand prickly-pear cactus occurs from southern New Mexico and western Texas. This species is listed as endangered in the State of New Mexico. It occurs in semi-stabilized sand dunes in the Chihuahua Desert region in areas of sparse grass cover. This species is known to occur in the revised area of the Afton SEZ in the southwestern portion of the SEZ, as well as in other locations throughout the area of indirect effects. According to the SWReGAP land cover model, potentially suitable desert dune habitat

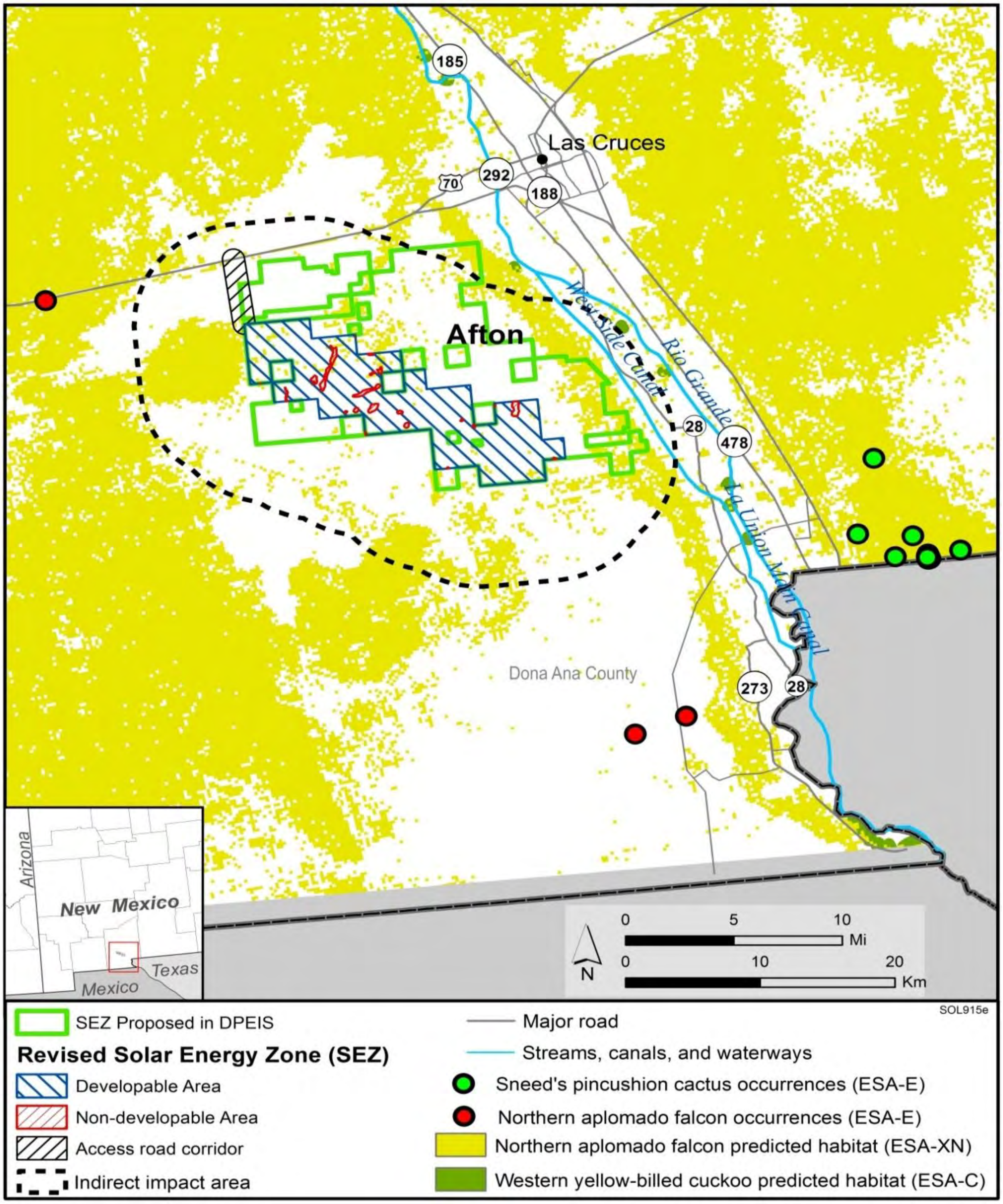

FIGURE 12.1.12.1-1 Proposed Afton SEZ as Revised and Distribution of Potentially Suitable Habitat for Species Listed under the Endangered Species Act

occurs on the SEZ, the assumed access road corridor, and other portions of the affected area (Table 12.1.12.1-1).

Sandberg Pincushion Cactus. The Sandberg pincushion cactus is considered to be a rare species in New Mexico. It is listed as a Species of Concern by the USFWS and State of New Mexico. It occurs on rocky limestone soils in Chihuahuan desertscrub communities and open oak and pinyon-juniper woodlands. This species is known to occur in Doña Ana County, and potentially suitable habitat may occur in the revised area of the Afton SEZ, the assumed access road corridor, and throughout the area of indirect effects (Table 12.1.12.1-1).

Sandhill Goosefoot. The sandhill goosefoot is an annual herb that ranges from Nebraska south to New Mexico and Texas. It occurs in open sandy habitats, frequently along desert sand dunes. This species is known to occur in Doña Ana County, New Mexico. According to the SWReGAP land cover model, potentially suitable sand dune habitat may occur on the revised area of the Afton SEZ, the assumed access road corridor, and other portions of the affected area (Table 12.1.12.1-1).

Texas Horned Lizard. The Texas horned lizard is widespread in the south-central United States and northern Mexico. This lizard inhabits open arid and semiarid regions on sandy substrates and sparse vegetation. Vegetation in suitable habitats includes grasses, cacti, or scattered brush or scrubby trees. The nearest quad-level occurrences of this species intersect the affected area about 5 mi (8 km) north of the revised SEZ. According to the SWReGAP habitat suitability model, potentially suitable habitat for this species occurs on the revised area of the SEZ, the assumed access road corridor, and throughout portions of the affected area (Table 12.1.12.1-1).

American Peregrine Falcon. The American peregrine falcon occurs throughout the western United States from areas with high vertical cliffs and bluffs that overlook large open areas such as deserts, shrublands, and woodlands. Nests are usually constructed on rock outcrops and cliff faces. Foraging habitat varies from shrublands and wetlands to farmland and urban areas. This species is known to occur in Doña Ana County, New Mexico. According to the SWReGAP habitat suitability model, potentially suitable year-round foraging and nesting habitat for the American peregrine falcon may occur within the affected area of the revised area of the Afton SEZ. On the basis of an evaluation of SWReGAP land cover types, potentially suitable nesting habitat (cliffs or outcrops) may occur on the SEZ (2 acres [<0.1 km^2]) and other portions of the affected area (37 acres [0.1 km^2]).

Bell's Vireo. The Bell's vireo is a small neotropical migrant songbird that is widespread in the central and southwestern United States and northern Mexico. This species is listed as threatened in New Mexico. According to the SWReGAP habitat suitability model, this species may occur throughout the SEZ region as a summer breeding resident. Breeding and foraging

TABLE 12.1.12.1-1 Habitats, Potential Impacts, and Potential Mitigation for Special Status Species That Could Be Affected by Solar Energy Development on the Proposed Afton 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]	Access Road Corridor (Direct Effects)[f]	Indirect Effects (Outside SEZ)[g]	Overall Impact Magnitude[h] and Species-Specific Mitigation[i]
Plants							
Sand prickly-pear cactus	*Opuntia arenaria*	NM-E; FWS-SC; NM-S2	Sandy areas, particularly semi-stabilized sand dunes among open Chihuahuan desertscrub, often associated with sparse cover of grasses at elevations between 3,800 and 4,300 ft.[j] Known to occur on the SEZ and in other portions of the affected area. About 913,000 acres[k] of potentially suitable habitat occurs in the SEZ region.	17,400 acres of potentially suitable habitat lost (1.9% of available potentially suitable habitat)	8 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	66,500 acres of potentially suitable habitat (7.3% of available potentially suitable habitat)	Moderate overall impact. Avoiding or minimizing disturbance to sand dunes and sand transport systems on the SEZ could reduce impacts. In addition, pre-disturbance surveys and avoidance or minimization of disturbance to occupied habitats in the area of direct effect, translocation of individuals from the area of direct effect, or compensatory mitigation of direct effects on occupied habitats could reduce impacts.
Sandberg pincushion cactus	*Escobaria sandbergii*	FWS-SC; NM-SC; NM-S2	San Andres and Fra Cristobal Mountains in Doña Ana and Sierra Counties, New Mexico, on rocky limestone soils in Chihuahuan desertscrub and open oak and pinyon-juniper woodlands at elevations between 4,200 and 7,400 ft. Known to occur in Doña Ana County, New Mexico. About 2,676,500 acres of potentially suitable habitat occurs in the SEZ region.	23,700 acres of potentially suitable habitat lost (0.8% of available potentially suitable habitat)	22 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	150,200 acres of potentially suitable habitat (5.6% of available potentially suitable habitat)	Small overall impact. Pre-disturbance surveys and avoidance or minimization of disturbance to occupied habitats in the area of direct effect, translocation of individuals from the area of direct effect, or compensatory mitigation of direct effects on occupied habitats could reduce impacts.

TABLE 12.1.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status[b]	Habitat[c]	Maximum Area of Potential Habitat Affected[d]: Within SEZ (Direct Effects)[e]	Access Road Corridor (Direct Effects)[f]	Indirect Effects (Outside SEZ)[g]	Overall Impact Magnitude[h] and Species-Specific Mitigation[i]
Plants (Cont.)							
Sandhill goosefoot	*Chenopodium cycloides*	BLM-S; NM-S2	Open sandy areas, frequently along the edges of sand dunes. Known to occur in Doña Ana County, New Mexico. About 1,009,000 acres of potentially suitable habitat occurs in the SEZ region.	17,400 acres of potentially suitable habitat lost (1.7% of available potentially suitable habitat)	8 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	74,500 acres of potentially suitable habitat (7.4% of available potentially suitable habitat)	Moderate overall impact. Avoiding or minimizing disturbance to sand dunes on the SEZ could reduce impacts. See sand prickly-pear cactus for a list of other applicable mitigations.
Reptiles							
Texas horned lizard	*Phrynosoma cornutum*	BLM-S	Flat, open, generally dry habitats with little plant cover, except for bunchgrass, cactus, and desertscrub in areas of sandy or gravelly soil. Nearest quad-level occurrence intersects the affected area within 5 mi[l] north of the SEZ. About 3,844,800 acres of potentially suitable habitat occurs in the SEZ region.	29,900 acres of potentially suitable habitat lost (0.8% of available potentially suitable habitat)	24 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	168,150 acres of potentially suitable habitat (4.4% of available potentially suitable habitat)	Small overall impact. Pre-disturbance surveys and avoidance or minimization of disturbance to occupied habitats in the area of direct effect, translocation of individuals from areas of direct effect, or compensatory mitigation of direct effects on occupied habitats could reduce impacts.

TABLE 12.1.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status[b]	Habitat[c]	Maximum Area of Potential Habitat Affected[d]: Within SEZ (Direct Effects)[e]	Access Road Corridor (Direct Effects)[f]	Indirect Effects (Outside SEZ)[g]	Overall Impact Magnitude[h] and Species-Specific Mitigation[i]
Birds							
American peregrine falcon	*Falco peregrinus anatum*	BLM-S; NM-T	Year-round resident in the SEZ region. Open habitats, including deserts, shrublands, and woodlands that are associated with high, near-vertical cliffs and bluffs above 200 ft. When not breeding, activity is concentrated in areas with ample prey, such as farmlands, marshes, lakes, rivers, and urban areas. Known to occur in Doña Ana County, New Mexico. About 1,997,000 acres of potentially suitable habitat occurs in the SEZ region.	7,800 acres of potentially suitable habitat lost (0.4% of available potentially suitable habitat)	14 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	92,000 acres of potentially suitable habitat (4.6% of available potentially suitable habitat)	Small overall impact on foraging and nesting habitat. Pre-disturbance surveys and avoidance or minimization of disturbance to occupied nests in the area of direct effect, or compensatory mitigation of direct effects on occupied habitats could reduce impacts.
Bell's vireo	*Vireo bellii*	NM-T; FWS-SC; NM-S2	Summer breeding resident in the SEZ region. Dense shrublands or woodlands along lower elevation riparian areas among willows, scrub oak, and mesquite. May potentially nest in any successional stage with dense understory vegetation. Known to occur in Doña Ana County, New Mexico. About 386,000 acres of potentially suitable habitat occurs in the SEZ region.	5,500 acres of potentially suitable habitat lost (1.4% of available potentially suitable habitat)	0 acres	23,000 acres of potentially suitable habitat (6.0% of available potentially suitable habitat)	Moderate overall impact. Pre-disturbance surveys and avoiding or minimizing disturbance to occupied nests in the area of direct effect or compensatory mitigation of direct effects on occupied habitats could reduce impacts.

TABLE 12.1.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status[b]	Habitat[c]	Maximum Area of Potential Habitat Affected[d]: Within SEZ (Direct Effects)[e]	Access Road Corridor (Direct Effects)[f]	Indirect Effects (Outside SEZ)[g]	Overall Impact Magnitude[h] and Species-Specific Mitigation[i]
Birds (Cont.)							
Eastern bluebird	*Sialia sialis*	NM-S1	Year-round resident in the SEZ region. Forest edges, open woodlands, and partly open situations with scattered trees, in coniferous or deciduous forest and riparian woodland. Nests in natural cavities, old woodpecker holes, and bird boxes. Nearest quad-level occurrence intersects the affected area within 5 mi east of the SEZ. About 850,000 acres of potentially suitable habitat occurs in the SEZ region.	7,000 acres of potentially suitable habitat lost (0.8% of available potentially suitable habitat)	0 acres	50,000 acres of potentially suitable habitat (5.9% of available potentially suitable habitat)	Moderate overall impact. Pre-disturbance surveys and avoidance or minimization of disturbance to occupied nests in the area of direct effects, or compensatory mitigation of direct effects on occupied habitat could reduce impacts.
Gray vireo	*Vireo vicinior*	NM-T; NM-S2	Summer breeding resident in the SEZ region. Semiarid, shrubby habitats, especially mesquite and brushy pinyon-juniper woodlands; also chaparral, desertscrub, thorn scrub, oak-juniper woodland, pinyon-juniper, mesquite, and dry chaparral. Nests in shrubs or trees. Known to occur in Doña Ana County, New Mexico. About 549,500 acres of potentially suitable habitat occurs in the SEZ region.	7,000 acres of potentially suitable habitat lost (1.3% of available potentially suitable habitat)	12 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	50,000 acres of potentially suitable habitat (9.0% of available potentially suitable habitat)	Moderate overall impact on foraging and nesting habitat. Pre-disturbance surveys and avoidance or minimization of disturbance to occupied nests in the area of direct effect or compensatory mitigation of direct effects on occupied habitats could reduce impacts.

TABLE 12.1.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status[b]	Habitat[c]	Maximum Area of Potential Habitat Affected[d]: Within SEZ (Direct Effects)[e]	Access Road Corridor (Direct Effects)[f]	Indirect Effects (Outside SEZ)[g]	Overall Impact Magnitude[h] and Species-Specific Mitigation[i]
Birds (Cont.)							
Western burrowing owl	*Athene cunicularia*	BLM-S; FWS-SC; NM-SC	Year-round resident in the SEZ region. Open grasslands and prairies, as well as disturbed sites such as golf courses, cemeteries, and airports throughout the SEZ region. Nests in burrows constructed by mammals (prairie dog, badger, etc.). Known to occur in Doña Ana County, New Mexico. About 3,800,000 acres of potentially suitable habitat occurs in the SEZ region.	29,900 acres of potentially suitable habitat lost (0.8% of available potentially suitable habitat)	23 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	170,000 acres of potentially suitable habitat (4.5% of available potentially suitable habitat)	Small overall impact. Pre-disturbance surveys and avoidance or minimization of disturbance to occupied burrows in the area of direct effect, or compensatory mitigation of direct effects on occupied habitats could reduce impacts.
Mammals							
Western small-footed myotis	*Myotis ciliolabrum*	BLM-S	Year-round resident in the SEZ region. Variety of woodlands and riparian habitats at elevations below 9,000 ft. Roosts in caves, buildings, mines, and crevices of cliff faces. Known to occur in Doña Ana County, New Mexico. About 3,805,400 acres of potentially suitable habitat occurs in the SEZ region.	29,900 acres of potentially suitable habitat lost (0.8% of available potentially suitable habitat)	23 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	163,500 acres of potentially suitable habitat (4.3% of available potentially suitable habitat)	Small overall impact habitat. Pre-disturbance surveys and avoidance or minimization of disturbance to occupied roosts in the area of direct effect, or compensatory mitigation of direct effects on occupied habitats could reduce impacts.

TABLE 12.1.12.1-1 (Cont.)

Common Name	Scientific Name	Listing Status[b]	Habitat[c]	Maximum Area of Potential Habitat Affected[d]: Within SEZ (Direct Effects)[e]	Access Road Corridor (Direct Effects)[f]	Indirect Effects (Outside SEZ)[g]	Overall Impact Magnitude[h] and Species-Specific Mitigation[i]
Mammals (Cont.)							
Yellow-faced pocket gopher	*Cratogeomys castanops*	NM-S2	Deep sandy or silty soils that are relatively free of rocks. Prefers deep firm soils, rich soils of river valleys and streams, agricultural land (orchards, gardens, potato fields and other croplands), and meadows. Also in mesquite-creosote habitat. Constructs shallow foraging burrows and deeper ones between nest and food cache. Known to occur in Doña Ana County, New Mexico. About 1,625,000 acres of potentially suitable habitat occurs in the SEZ region.	8,300 acres of potentially suitable habitat lost (0.5% of available potentially suitable habitat)	14 acres of potentially suitable habitat lost (<0.1% of available potentially suitable habitat)	52,500 acres of potentially suitable habitat (3.2% of available potentially suitable habitat)	Moderate overall impact. Pre-disturbance surveys and avoidance or minimization of disturbance to occupied habitats on the SEZ, or compensatory mitigation of direct effects on occupied habitats could reduce impacts.

[a] The species presented in this table represent new species identified following publication of the Draft Solar PEIS or a re-evaluation of those species that were determined to have moderate or large impacts in the Draft Solar PEIS. The other special status species for this SEZ are identified in Table 12.1.12.1-1 of the Draft Solar PEIS.

[b] BLM-S = listed as sensitive by the BLM.

[c] Potentially suitable habitat was determined using SWReGAP habitat suitability models (USGS 2004, 2007. Area of potentially suitable habitat for each species is presented for the SEZ region, which is defined as the area within 50 mi (80 km) of the SEZ center.

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

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

Footnotes continued on next page.

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TABLE 12.1.12.1-1 (Cont.)

[f] For access road development, direct effects were estimated within a 60-ft (18-m) wide, 3-mi (5-km) long access road from the SEZ to the nearest state highway or interstate. Direct impacts within this area were determined from the proportion of potentially suitable habitat within the 1-mi (1.6-km) wide road corridor.

[g] Area of indirect effects was assumed to be the area adjacent to the SEZ within 5 mi (8 km) of the SEZ boundary 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 acres to km^2, multiply by 0.004047.

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

habitat for this species consists of dense shrub-scrub vegetation such as riparian woodlands where there is an abundance of willows, scrub-oak communities, and mesquite woodlands. This species is known to occur in Doña Ana County, New Mexico, and potentially suitable foraging or nesting habitat may occur in the revised area of the SEZ or in other portions of the affected area (Table 12.1.12.1-1).

Eastern Bluebird. The eastern bluebird is considered to be a rare species in New Mexico (state rank S1). It is known to be a year-round resident in the Afton SEZ region. It inhabits forest edges and open woodlands. It nests in natural cavities, woodpecker holes, and bird boxes. Quad-level occurrences of this species intersect the affected area of the revised Afton SEZ, approximately 5 mi (8 km) north of the SEZ. According to the SWReGAP habitat suitability model for this species, potentially suitable habitat may occur in the revised area of the SEZ and throughout the area of indirect effects (Table 12.1.12.1-1).

Gray Vireo. The gray vireo is a small neotropical migrant songbird that occurs in the southwestern United States and northern Mexico. This species is listed as threatened in the State of New Mexico. According to the SWReGAP habitat suitability model, this species may occur throughout the SEZ region as a summer breeding resident. Breeding and foraging habitat for this species consists of semiarid shrublands, pinyon-juniper woodlands, oak-scrub woodlands, and chaparral habitats. This species is known to occur in Doña Ana County, New Mexico, and potentially suitable foraging or nesting habitat may occur in the revised area of the SEZ, the assumed access road corridor, or in other portions of the affected area (Table 12.1.12.1-1).

Western Burrowing Owl. The western burrowing owl forages in grasslands, shrublands, and open disturbed areas, and nests in burrows usually constructed by mammals. According to the SWReGAP habitat suitability model for the western burrowing owl, potentially suitable year-round foraging and nesting habitat may occur in the affected area of the revised Afton SEZ. This species is known to occur in Doña Ana County, New Mexico. Potentially suitable foraging and breeding habitat is expected to occur in the revised area of the SEZ, the assumed access road corridor, and in other portions of the affected area (Table 12.1.12.1-1). The availability of nest sites (burrows) within the affected area has not been determined, but shrubland habitat that may be suitable for either foraging or nesting occurs throughout the affected area.

Western Small-Footed Myotis. The western small-footed myotis is a year-round resident in the Afton SEZ region, where it occupies a wide variety of desert and nondesert habitats, including cliffs and rock outcrops, grasslands, shrubland, and mixed woodlands. The species roosts in caves, mines, and tunnels, beneath boulders or loose bark, buildings, and in other man-made structures. This species is known to occur in Doña Ana County, New Mexico. According to the SWReGAP habitat suitability model, potentially suitable year-round foraging or roosting habitat for this species may occur in the revised area of the SEZ, the assumed access road corridor, and other portions of the affected area (Table 12.1.12.1-1). On the basis of an evaluation of SWReGAP land cover types, potentially suitable roosting habitat (cliffs or outcrops) may occur on the revised SEZ (2 acres [<0.1 km^2]) and other portions of the affected area (37 acres [0.1 km^2]).

Yellow-Faced Pocket Gopher. The yellow-faced pocket gopher is considered to be a rare species in New Mexico (state rank S2). It is known to be a year-round resident in the Afton SEZ region. It inhabits areas with deep sandy or silty soils that are relatively free of rocks. It prefers soils of river valleys, riparian areas, agricultural lands, and meadows. This species is known to occur in Doña Ana County, New Mexico. According to the SWReGAP habitat suitability model for this species, potentially suitable habitat may occur in the revised SEZ, the assumed access road corridor, and throughout the area of indirect effects (Table 12.1.12.1-1).

12.1.12.2 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 Afton SEZ could affect potentially suitable habitats of special status species. The analysis presented in the Draft Solar PEIS for the original Afton SEZ boundaries indicated that development would result in no impact or a small overall impact on most special status species (Table 12.1.12.1-1 in the Draft Solar PEIS). However, development was determined to result in moderate or large impacts on some special status species. Development within the revised Afton SEZ could still affect the same 35 species evaluated in the Draft Solar PEIS. However, the reduction in the SEZ boundary and the developable area of the Afton SEZ would result in reduced impact levels compared to original estimates in the Draft Solar PEIS. Those 11 species that were determined to have moderate or large impacts in the Draft Solar PEIS are discussed below. Impacts on species that were determined to have small overall impacts in the Draft Solar PEIS are not discussed because impacts on these species using revised SEZ footprints are expected to remain small.

Sand Prickly-Pear Cactus. The sand prickly-pear cactus is known to occur on the Afton SEZ and in portions of the area of indirect effects within 5 mi (8 km) outside of the SEZ. According to the SWReGAP land cover model, approximately 17,400 acres (70 km^2) and 8 acres (<0.1 km^2) of potentially suitable sand dune habitat on the revised SEZ and assumed access road corridor, respectively, could be directly affected by construction and operations (Table 12.1.12.1-1). This direct impact area represents 1.9% of potentially suitable habitat in the SEZ region. Approximately 66,500 acres (269 km^2) of potentially suitable sand dune habitat occurs in the area of potential indirect effects; this area represents about 7.3% of the available suitable habitat in the SEZ region (Table 12.1.12.1-1).

The overall impact on the sand prickly-pear cactus from construction, operation, and decommissioning of utility-scale solar energy facilities within the revised Afton SEZ is considered moderate because greater than 1% but less than 10% of potentially suitable habitat for this species occurs in the area of direct effects. The implementation of design features is expected to be sufficient to reduce indirect impacts to negligible levels.

Avoiding or minimizing disturbance of sand dunes, other sandy areas, and sand transport systems on the revised SEZ could reduce direct impacts on this species. In addition, impacts could be reduced by conducting pre-disturbance surveys and avoiding or minimizing disturbance to occupied habitats in the area of direct effects. If avoidance or minimization is not a feasible option, plants could be translocated from the area of direct effects to protected areas that would not be affected directly or indirectly by future development. Alternatively, or in combination with translocation, a compensatory mitigation plan could be developed and implemented to offset 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 more of these options could be designed to completely offset the impacts of development.

Sandberg Pincushion Cactus. The Sandberg pincushion cactus is not known to occur in the affected area of the Afton SEZ. However, the species is known to occur in Doña Ana County, New Mexico. According to the SWReGAP land cover model, approximately 23,700 acres (96 km^2) and 22 acres (0.1 km^2) of potentially suitable desert shrub habitat on the revised SEZ and assumed access road corridor, respectively, could be directly affected by construction and operations (Table 12.1.12.1-1). This direct effects area represents 0.8% of available suitable habitat in the region. Approximately 150,200 acres (608 km^2) of potentially suitable habitat occurs in the area of indirect effects within 5 mi (8 km) outside of the SEZ; this area represents 5.6% of the available suitable habitat in the SEZ region (Table 12.1.12.1-1).

The overall impact on the Sandberg pincushion cactus from construction, operation, and decommissioning of utility-scale solar energy facilities within the revised Afton SEZ is considered small, because less than 1% of potentially suitable habitat for this species occurs in the area of direct effects. The implementation of design features may be sufficient to reduce indirect impacts to negligible levels.

Avoidance of all potentially suitable habitats to mitigate impacts on the Sandberg pincushion cactus is not feasible because potentially suitable desertscrub habitat is widespread throughout the area of direct effect. However, direct impacts could be reduced by conducting pre-disturbance surveys and avoiding or minimizing disturbance to occupied habitats in the area of direct effects. If avoidance or minimization is not a feasible option, individuals could be translocated from the area of direct effects to protected areas that would not be affected directly or indirectly by future development. Alternatively, or in combination with translocation, a compensatory mitigation plan could be developed and implemented to offset 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 more of these options could be designed to completely offset the impacts of development.

Sandhill Goosefoot. The sandhill goosefoot is not known to occur in the affected area of the Afton SEZ. However, the species is known to occur in Doña Ana County, New Mexico. According to the SWReGAP land cover model, approximately 17,400 acres (70 km^2) and 8 acres (<0.1 km^2) of potentially suitable sand dune habitat on the revised SEZ and assumed access road corridor, respectively, could be directly affected by construction and operations (Table 12.1.12.1-1). This direct effects area represents 1.7% of available suitable habitat in the region. Approximately 74,500 acres (301 km^2) of potentially suitable habitat occurs in the area of indirect effects within 5 mi (8 km) outside of the SEZ; this area represents 7.4% of the available suitable habitat in the SEZ region (Table 12.1.12.1-1).

The overall impact on the sandhill goosefoot from construction, operation, and decommissioning of utility-scale solar energy facilities within the revised Afton SEZ is considered moderate because greater than 1%, but less than 10%, of potentially suitable habitat for this species occurs in the area of direct effects. The implementation of design features is expected to be sufficient to reduce indirect impacts to negligible levels.

Avoidance or minimization of disturbance to sand dunes and sand transport systems on the SEZ and the implementation of mitigation measures described previously for the sand prickly-pear cactus could reduce direct impacts on this species. The need for mitigation, other than design features, should be determined by conducting pre-disturbance surveys for the species and its habitat in the area of direct effects.

Texas Horned Lizard. The Texas horned lizard is known to occur in the affected area of the Afton SEZ. According to the SWReGAP habitat suitability model, approximately 29,900 acres (121 km^2) and 24 acres (0.1 km^2) of potentially suitable habitat on the revised SEZ and assumed access road corridor, respectively, could be directly affected by construction and operations (Table 12.1.12.1-1). This direct impact area represents about 0.8% of potentially suitable habitat in the SEZ region. About 168,150 acres (680 km^2) of potentially suitable habitat occurs in the area of indirect effects; this area represents about 4.4% of the potentially suitable habitat in the SEZ region (Table 12.1.12.1-1).

The overall impact on the Texas horned lizard from construction, operation, and decommissioning of utility-scale solar energy facilities within the revised Afton 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 is expected to be sufficient to reduce indirect impacts on this species to negligible levels.

Avoidance of all potentially suitable habitats to mitigate impacts on the Texas horned lizard is not feasible because potentially suitable desertscrub habitat is widespread throughout the area of direct effect. However, direct impacts could be reduced by conducting pre-disturbance surveys and avoiding or minimizing disturbance to occupied habitats in the area of direct effects. If avoidance or minimization is not a feasible option, individuals could be translocated from the area of direct effects to protected areas that would not be affected directly or indirectly by future development. Alternatively, or in combination with translocation, a compensatory mitigation plan could be developed and implemented to offset 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 more of these options could be designed to completely offset the impacts of development.

American Peregrine Falcon. The American peregrine falcon is a year-round resident in the Afton SEZ region, and potentially suitable foraging and nesting habitat is expected to occur in the affected area. According to the SWReGAP habitat suitability model, approximately 7,800 acres (32 km^2) and 14 acres (<0.1 km^2) of potentially suitable habitat on the revised SEZ and assumed access road corridor, respectively, could be directly affected by construction and operations (Table 12.1.12.1-1). This direct impact area represents about 0.4% of potentially suitable habitat in the SEZ region. About 92,000 acres (372 km^2) of potentially suitable habitat occurs in the area of indirect effects; this area represents about 4.6% of the potentially suitable habitat in the SEZ region (Table 12.1.12.1-1). Most of this area could serve as foraging habitat (open shrublands). The availability of nest sites (e.g., rock outcrops) within the affected area has not been determined, but rocky cliffs and outcrops that may be suitable nesting sites occur within the affected area. On the basis of SWReGAP land cover data, approximately 2 acres (<0.1 km^2) of rocky cliffs and outcrops on the SEZ may be potentially suitable nesting habitat for this species.

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

Impacts on the American peregrine falcon could be reduced by conducting pre-disturbance surveys and avoiding or minimizing disturbance to potential nesting habitat in the area of direct effects. If avoidance or minimization is not a feasible option, a compensatory mitigation plan could be developed and implemented to offset direct effects on suitable nesting habitats. Compensation could involve the protection and enhancement of existing 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. The need for mitigation, other than design features, should be determined by conducting pre-disturbance surveys for the species and its habitat in the area of direct effects.

Bell's Vireo. The Bell's vireo is widespread in the central and southwestern United States and is a summer breeding resident in the Afton SEZ region. According to the

SWReGAP habitat suitability model, approximately 5,500 acres (22 km^2) of potentially suitable habitat on the revised SEZ could be directly affected by construction and operations (Table 12.1.12.1-1). This direct impact area represents about 1.4% of potentially suitable habitat in the SEZ region. About 23,000 acres (93 km^2) of potentially suitable habitat occurs in the area of indirect effects; this area represents about 6.0% of the potentially suitable habitat in the SEZ region (Table 12.1.12.1-1). Most of the potentially suitable habitat on the revised SEZ and throughout the area of indirect effects could serve as foraging or nesting habitat where suitable dense shrub-scrub vegetation occurs.

The overall impact on the Bell's vireo from construction, operation, and decommissioning of utility-scale solar energy facilities within the revised Afton SEZ is considered moderate because greater than 1% but less than 10% of potentially suitable habitat for this species occurs in the area of direct effects. The implementation of design features is expected to be sufficient to reduce indirect impacts to negligible levels.

Avoidance of all potentially suitable habitats is not a feasible way to mitigate impacts on the Bell's vireo because potentially suitable shrub-scrub habitat is widespread throughout the area of direct effect and readily available in other portions of the SEZ region. Impacts on the Bell's vireo could be reduced by conducting pre-disturbance surveys and avoiding or minimizing disturbance to occupied habitats, especially nesting habitat in the area of direct effects. If avoidance or minimization is not a feasible option, a compensatory mitigation plan could be developed and implemented to offset 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. The need for mitigation, other than design features, should be determined by conducting pre-disturbance surveys for the species and its habitat in the area of direct effects.

Eastern Bluebird. The eastern bluebird is known to be a year-round resident in the Afton SEZ region. According to the SWReGAP habitat suitability model, approximately 7,000 acres (28 km^2) of potentially suitable habitat on the revised SEZ could be directly affected by construction and operations (Table 12.1.12.1-1). This direct impact area represents about 0.8% of potentially suitable habitat in the SEZ region. About 50,000 acres (202 km^2) of potentially suitable habitat occurs in the area of indirect effects; this area represents about 5.9% of the potentially suitable habitat in the SEZ region (Table 12.1.12.1-1). Most of the potentially suitable habitat on the revised SEZ and throughout the area of indirect effects could serve as foraging or nesting habitat where suitable dense shrub-scrub vegetation occurs.

The overall impact on the eastern bluebird from construction, operation, and decommissioning of utility-scale solar energy facilities within the revised Afton SEZ is considered small, because less than 1% of potentially suitable habitat for this species occurs in the area of direct effects. The implementation of design features is expected to be sufficient to reduce indirect impacts to negligible levels.

Avoidance of all potentially suitable habitats is not a feasible way to mitigate impacts on the eastern bluebird because potentially suitable shrub-scrub habitat is widespread throughout the area of direct effects and readily available in other portions of the SEZ region. Impacts on the eastern bluebird could be reduced by conducting pre-disturbance surveys and avoiding or minimizing disturbance to occupied habitats, especially nesting habitat in the area of direct effects. If avoidance or minimization is not a feasible option, a compensatory mitigation plan could be developed and implemented to offset 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. The need for mitigation, other than design features, should be determined by conducting pre-disturbance surveys for the species and its habitat in the area of direct effects.

Gray Vireo. The gray vireo is known to occur in the southwestern United States and to occur as a summer breeding resident in the Afton SEZ region. According to the SWReGAP habitat suitability model, approximately 7,000 acres (28 km^2) and 12 acres (<0.1 km^2) of potentially suitable habitat on the revised SEZ and assumed access road corridor, respectively, could be directly affected by construction and operations (Table 12.1.12.1-1). This direct impact area represents about 1.3% of potentially suitable habitat in the SEZ region. About 50,000 acres (202 km^2) of potentially suitable habitat occurs in the area of indirect effects; this area represents about 9.0% of the potentially suitable habitat in the SEZ region (Table 12.1.12.1-1). Most of the potentially suitable habitat on the SEZ and throughout the area of indirect effects could serve as foraging or nesting habitat where suitable shrubs and trees occur.

The overall impact on the gray vireo from construction, operation, and decommissioning of utility-scale solar energy facilities within the revised Afton SEZ is considered moderate, because greater than 1% but less than 10% of potentially suitable habitat for this species occurs in the area of direct effects. The implementation of design features is expected to be sufficient to reduce indirect impacts to negligible levels.

Avoidance of all potentially suitable habitats is not a feasible way to mitigate impacts on the gray vireo, because potentially suitable shrubland habitat is widespread throughout the area of direct effects and readily available in other portions of the SEZ region. However, implementation of mitigation measures described previously for the Bell's vireo could reduce direct impacts on this species to negligible levels. The need for mitigation, other than design features, should be determined by conducting pre-disturbance surveys for the species and its habitat on the SEZ.

Western Burrowing Owl. The western burrowing owl is a year-round resident in the Afton SEZ region, and potentially suitable foraging and nesting habitat is expected to occur in the affected area. According to the SWReGAP habitat suitability model, approximately 29,900 acres (121 km^2) and 23 acres (0.1 km^2) of potentially suitable habitat on the revised SEZ and assumed access road corridor, respectively, could be directly affected by construction and operations (Table 12.1.12.1-1). This direct impact area represents about 0.8% of potentially suitable habitat in the SEZ region. About 170,000 acres (688 km^2) of potentially suitable habitat occurs in the area of indirect effects; this area represents about 4.5% of the potentially suitable habitat in the SEZ region (Table 12.1.12.1-1). Most of this area could serve as foraging and nesting habitat (shrublands). The abundance of burrows suitable for nesting in the affected area has not been determined.

The overall impact on the western burrowing owl from construction, operation, and decommissioning of utility-scale solar energy facilities within the revised Afton 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.

Avoidance of all potentially suitable habitats is not a feasible way to mitigate impacts on the western burrowing owl because potentially suitable desert shrub habitats are widespread throughout the area of direct effect and readily available in other portions of the SEZ region. Impacts on the western burrowing owl could be reduced by conducting pre-disturbance surveys and avoiding or minimizing disturbance to occupied burrows in the area of direct effects. If avoidance or minimization is not a feasible option, a compensatory mitigation plan could be developed and implemented to offset 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. The need for mitigation, other than design features, should be determined by conducting pre-disturbance surveys for the species and its habitat in the area of direct effects.

Western Small-Footed Myotis. The western small-footed myotis is a year-round resident within the Afton SEZ region. According to the SWReGAP habitat suitability model, approximately 29,900 acres (121 km^2) and 23 acres (0.1 km^2) of potentially suitable habitat on the revised SEZ and assumed access road corridor, respectively, could be directly affected by construction and operations (Table 12.1.12.1-1). This direct impact area represents about 0.8% of potentially suitable habitat in the SEZ region. About 163,500 acres (662 km^2) of potentially suitable habitat occurs in the area of indirect effects; this area represents about 4.3% of the potentially suitable habitat in the SEZ region (Table 12.1.12.1-1). Most of the potentially suitable habitat in the affected area is foraging habitat represented by desert shrubland. On the basis of an evaluation of SWReGAP land cover types, potentially suitable roosting habitat (cliffs or rock outcrops) may occur on the SEZ (2 acres [<0.1 km^2]) and in the area of indirect effects (37 acres [0.1 km^2]). However, the availability of roost sites within the affected area has not been determined.

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

Avoidance of all potentially suitable foraging habitat is not a feasible way to mitigate impacts on the western small-footed myotis, because potentially suitable habitats are widespread throughout the area of direct effect and readily available in other portions of the SEZ region. Impacts on the western small-footed myotis could be reduced by conducting pre-disturbance surveys and avoiding or minimizing disturbance to occupied roosts in the area of direct effects. If avoidance or minimization is not a feasible option, a compensatory mitigation plan could be developed and implemented to offset 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. The need for mitigation, other than design features, should be determined by conducting pre-disturbance surveys for the species and its habitat in the area of direct effects.

Yellow-Faced Pocket Gopher. The yellow-faced pocket gopher is known to be a year-round resident in the Afton SEZ region. According to the SWReGAP habitat suitability model, approximately 8,300 acres (34 km^2) and 14 acres (<0.1 km^2) of potentially suitable habitat on the revised SEZ and assumed access road corridor, respectively, could be directly affected by construction and operations (Table 12.1.12.1-1). This direct impact area represents about 0.5% of potentially suitable habitat in the SEZ region. About 52,500 acres (212 km^2) of potentially suitable habitat occurs in the area of indirect effects; this area represents about 3.2% of the potentially suitable habitat in the SEZ region (Table 12.1.12.1-1).

The overall impact on the yellow-faced pocket gopher from construction, operation, and decommissioning of utility-scale solar energy facilities within the revised Afton 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.

Avoidance of all potentially suitable habitats is not a feasible way to mitigate impacts on the yellow-faced pocket gopher because potentially suitable habitat may be widespread throughout the area of direct effects and readily available in other portions of the SEZ region. Impacts on the yellow-faced pocket gopher could be reduced by conducting pre-disturbance surveys and avoiding or minimizing disturbance to occupied burrows in the area of direct effects. If avoidance or minimization is not a feasible option, a compensatory mitigation plan could be developed and implemented to offset 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. The need for mitigation, other than design features, should be determined by conducting pre-disturbance surveys for the species and its habitat in the area of direct effects.

12.1.12.3 SEZ-Specific Design Features and Design Feature Effectiveness

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

- Pre-disturbance surveys shall be conducted within the SEZ to determine the presence and abundance of special status species, including those identified in Table 12.1.12.1-1; 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 effect, 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 development shall be developed in coordination with the appropriate federal and state agencies.

- Consultation with the USFWS and New Mexico Department of Game and Fish (NMDGF) shall be conducted to address the potential for impacts on the following species currently listed as threatened or endangered under the ESA: Sneed's pincushion cactus and northern aplomado falcon. Consultation will identify an appropriate survey protocol, avoidance and minimization 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 NMDGF shall be conducted to address the potential for impacts on the western yellow-billed cuckoo, a candidate species for listing under the ESA. Coordination will identify an appropriate survey protocol and mitigation, which may include avoidance, minimization, translocation, or compensation.

- Avoiding or minimizing disturbance to rocky slopes, cliffs, and outcrops on the SEZ shall be employed to reduce or eliminate impacts on the following 10 special status species: Alamo beardtongue, Marble Canyon rockcress, mosquito plant, New Mexico rock daisy, Sneed's pincushion cactus, American peregrine falcon, fringed myotis, long-legged myotis, Townsend's big-eared bat, and western small-footed myotis.

- Avoiding or minimizing disturbance to desert grassland habitat on the SEZ shall be employed to reduce or eliminate impacts on the following four special status species: desert night-blooming cereus, grama grass cactus, Villard pincushion cactus, and northern aplomado falcon.

- Avoiding or minimizing disturbance to sand dune habitat and sand transport systems on the SEZ shall be employed to reduce or eliminate impacts on the following three special status species: sand prickly-pear cactus, sandhill goosefoot, and Samalayuca Dune grasshopper.

- Avoiding or minimizing disturbance to playa habitat on the SEZ shall be employed to reduce or eliminate impacts on the Shotwell's range grasshopper.

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

On the basis of impact analyses conducted for the Draft Solar PEIS, updates to those analyses due to changes to the SEZ boundaries, and consideration of comments received as applicable, no SEZ-specific design features for 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.

12.1.13 Air Quality and Climate

12.1.13.1 Affected Environment

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

12.1.13.1.1 Existing Air Emissions

The Draft Solar PEIS presented Doña Ana county emissions data for 2002. More recent data for 2008 (EPA 2011a) were reviewed. The two emissions inventories are from different sources and have differing assumptions; for example, the 2008 data did not include biogenic volatile organic compound (VOC) emissions. In the more recent data, emissions of sulfur dioxide (SO_2), nitrous oxide (NO_x), carbon monoxide (CO), and VOCs were lower, while emissions of particulate matter with a diameter of 10 μm or less and a diameter of 2.5 μm or less (PM_{10} and $PM_{2.5}$) were much higher. These changes would not affect modeled air quality impacts presented in this update.

12.1.13.1.2 Air Quality

The calendar quarterly average National Ambient Air Quality Standard (NAAQS) of 1.5 μg/m^3 for lead (Pb) presented in Table 12.1.13.1-2 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 have been revoked as well (EPA 2011b). These changes will not affect the modeled air quality impacts presented in this update. New Mexico State Ambient Air Quality Standards (SAAQS) have not been changed.

The size of the proposed Afton SEZ was reduced from 77,623 acres (314.1 km^2) to 29,964 acres (121.3 km^2). On the basis of this reduction, the distances to the nearest Class I areas are about 2 to 5 mi (3 to 8 km) larger than those presented in the Draft Solar PEIS. As in the Draft Solar PEIS, Class I areas are farther than 62 mi (100 km) of the proposed Afton SEZ.

12.1.13.2 Impacts

12.1.13.2.1 Construction

Methods and Assumptions

Except for the following, the methods and assumptions remain the same as those presented in the Draft Solar PEIS. In the Draft Solar PEIS, three 3,000-acre (12.1-km^2) project areas with a total area of 9,000 acres (36.4 km^2) were modeled in the northeastern portion of the SEZ. In this update, two 3,000-acre (12.1-km^2) project areas with a total area of 6,000 acres (24.3 km^2) were modeled in the southeastern portion of the SEZ close to nearby residences and communities.

Results

Since the annual PM_{10} standard has been rescinded, the discussion of annual PM_{10} impacts in the Draft Solar PEIS is no longer applicable. Table 12.1.13.2-1 has been updated for this Final Solar PEIS. The concentration values in the table are based on updated air quality modeling reflecting the updated boundaries of the proposed Afton SEZ.

Given the reduced area of the proposed SEZ, the concentrations predicted for this Final Solar PEIS are less than or equal to those predicted in the Draft Solar PEIS, but the conclusions presented in the Draft Solar PEIS remain valid.[2] Predicted 24-hour PM_{10} and 24-hour $PM_{2.5}$ concentration levels could exceed NAAQS levels used for comparison at the SEZ boundaries and in the immediately surrounding area during the construction phase of a solar development. These high particulate levels would be limited to the immediate area surrounding the SEZ

[2] At this programmatic level, detailed information on construction activities, such as facility size, type of solar technology, heavy equipment fleet, activity level, work schedule, and so on, is not known; thus air quality modeling cannot be conducted. It has been assumed that 80% of the developable area of 2,882 acres (9.3 km^2) would be disturbed continuously; thus, the modeling results and discussion here should be interpreted in that context. During the site-specific project phase, more detailed information would be available and more realistic air quality modeling analysis could be conducted. It is likely that impacts on ambient air quality predicted for specific projects would be much lower than those presented in this Final Solar PEIS.

TABLE 12.1.13.2-1 Maximum Air Quality Impacts from Emissions Associated with Construction Activities for the Proposed Afton 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 hours	H6H	553	175	728	150	369	485
$PM_{2.5}$	24 hours	H8H	36.8	15	51.8	35	105	148
	Annual	–[d]	10.1	6.6	16.7	15	67	111

[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 12.1.13.1-2 of the Draft Solar PEIS.

[d] A dash indicates not applicable.

boundaries and would decrease quickly with distance. Predicted total concentrations for annual $PM_{2.5}$ would be below the standard level used for comparison.

Because of the increase in distances, the updated results at the nearest residences and towns decrease considerably compared with those presented in the Draft Solar PEIS. The increments for 24-hour PM_{10} are less than the NAAQS at all modeled locations, but they add to a background level that already exceeds the standard. Consistent with the discussion in the Draft Solar PEIS, total maximum 24-hour and annual $PM_{2.5}$ concentrations at site boundaries would exceed the NAAQS levels, while those at nearby residences or communities would be well below the standard level.

Predicted 24-hour and annual PM_{10} concentration increments at the surrogate receptors[3] for the nearest Class I Area—Gila WA—would be about 144 and 8% of the Prevention of Significant Deterioration (PSD) increments for the Class I area, respectively. These surrogate receptors are more than 51 mi (82 km) from the Gila WA, and thus predicted concentrations in the Gila WA would be much lower than these values (about 69% of the PSD increments for 24-hour PM_{10}). Thus, the conclusions in the Draft Solar PEIS remain valid.

[3] Because the nearest Class I area is more than 31 mi (50 km) from the SEZ (which exceeds the maximum modeling distance), several regularly spaced receptors in the direction of the nearest Class I area were selected as surrogates for the PSD analysis.

In conclusion, predicted 24-hour PM_{10} and 24-hour 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 communities would be much lower. Modeling indicates that emissions from construction activities are not anticipated to exceed Class I PSD PM_{10} increments at the nearest federal Class I area (Gila WA). Construction activities are not subject to the PSD program, and the comparison provides only a screen for gauging the magnitude of the impact.

Considering the reduced size of the proposed Afton SEZ, emissions from construction equipment and vehicles would be less that those presented in the Draft Solar PEIS. Any potential impacts on air quality–related values (AQRVs) at nearby federal Class I areas would be less than those presented in the Draft Solar PEIS, and the conclusions in the Draft remain valid. Emissions from construction-related equipment and vehicles are temporary and would cause some unavoidable but short-term impacts.

12.1.13.2.2 Operations

The reduction in the size of the proposed Afton SEZ by about 61% from 77,623 acres (314.1 km^2) to 29,964 acres (121.3 km^2) reduces the generating capacity and annual power generation, and thus reduces the potentially avoided emissions presented in the Draft Solar PEIS. Total revised power generation capacity ranging from 2,663 to 4,794 MW is estimated for the Afton 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 12.1.13.2-2 in the Draft Solar PEIS provided estimates for emissions potentially avoided by a solar facility. There estimates were updated by reducing the tabulated estimates by about 61% as shown in the revised Table 12.1.13.2-2. For example, for the technologies estimated to require 9 acres/MW (power tower, dish engine, and PV), up to 10,419 tons of NO_x per year (= 38.60% × the low-end value of 26,992 tons per year tabulated in the Draft Solar PEIS) could be avoided by full solar development of the proposed Afton SEZ as revised for this Final Solar PEIS. Although the total emissions avoided by full solar development of the proposed Afton SEZ are reduced from those presented in the Draft Solar PEIS, the conclusions of the Draft remain valid. Solar facilities built in the proposed Afton SEZ could avoid relatively more fossil fuel emissions than those built in other states with less reliance on fossil fuel–generated power.

12.1.13.2.3 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.

TABLE 12.1.13.2-2 Annual Emissions from Combustion-Related Power Generation Avoided by Full Solar Development of the Proposed Afton 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
29,964	2,663-4,794	4,666-8,400	4,188–7,538	10,419–18,755	0.15–0.28	4,644–8,359
Percentage of total emissions from electric power systems in the state of New Mexico[d]			14–25%	14–25%	14–25%	14–25%
Percentage of total emissions from all source categories in the state of New Mexico[e]			8.2–15%	3.1–5.6%	–[f]	7.1–13%
Percentage of total emissions from electric power systems in the six-state study area[d]			1.7–3.0%	2.8–5.1%	5.2–9.4%	1.8–3.2%
Percentage of total emissions from all source categories in the six-state study area[e]			0.89–1.6%	0.39–0.69%	–	0.56–1.0%

[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 1.79, 4.47, 6.6×10^{-5}, and 1,990 lb/MWh, respectively, were used for the state of New Mexico.

[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 (2009); WRAP (2009).

12.1.13.3 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 BLM's 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, updates to those analyses due to changes to the SEZ boundaries, and consideration of comments received as applicable, no SEZ-specific design features for air quality have been identified. Some SEZ-specific design features may be identified through the process of preparing parcels for competitive offer and subsequent project-specific analysis.

12.1.14 Visual Resources

12.1.14.1 Affected Environment

The SEZ boundaries have been revised to eliminate 46,917 acres (190 km^2) in the north, northeast, southeast, and southwest portions of the SEZ. In addition, 742 acres (3 km^2) of floodplain and intermittent and dry lake were identified as non-development areas within the SEZ. Areas that were labeled in the Draft Solar PEIS to meet Visual Resource Management (VRM) Class II-consistent mitigation measures were eliminated from the SEZ. The remaining developable area consists of 29,964 acres (121.2 km^2). Because of the reduction in size of the SEZ, the total acreage of the lands visible within the 25-mi (40-km) viewshed of the SEZ has decreased substantially.

Figure 12.1.14.1-1 is an updated Visual Resources Inventory (VRI) map for the SEZ and surrounding lands; it provides information from the BLM's 2010 VRI, which was finalized in October 2011 (BLM 2011a). As shown, most of the SEZ is VRI Class IV (indicating low relative visual values), while the far northwestern portion of the SEZ is VRI Class III (indicating moderate relative visual values).

Lands in the Las Cruces Field Office within the 25-mi (40-km), 650-ft (198-m) viewshed of the revised SEZ include no VRI Class I areas; 65,620 acres (265.6 km^2) of VRI Class II areas; 214,252 acres (867.0 km^2) of Class III areas; and 321,698 acres (1,301.9 km^2) of VRI Class IV areas.

12.1.14.2 Impacts

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

The reduction in size of the SEZ eliminated more than 60% of the original SEZ. The resulting visual contrast reduction for any given point with a view of the SEZ would vary greatly depending on the viewpoint's distance and direction from the SEZ. Contrast reduction generally would be greatest for viewpoints closest to the portions of the SEZ that were eliminated and especially for those that had broad, wide-angle views of these areas. In general, contrast reductions also would be larger for elevated viewpoints relative to non-elevated viewpoints, because the reduction in area of the solar facilities would be more apparent when looking down at the SEZ than when looking across it.

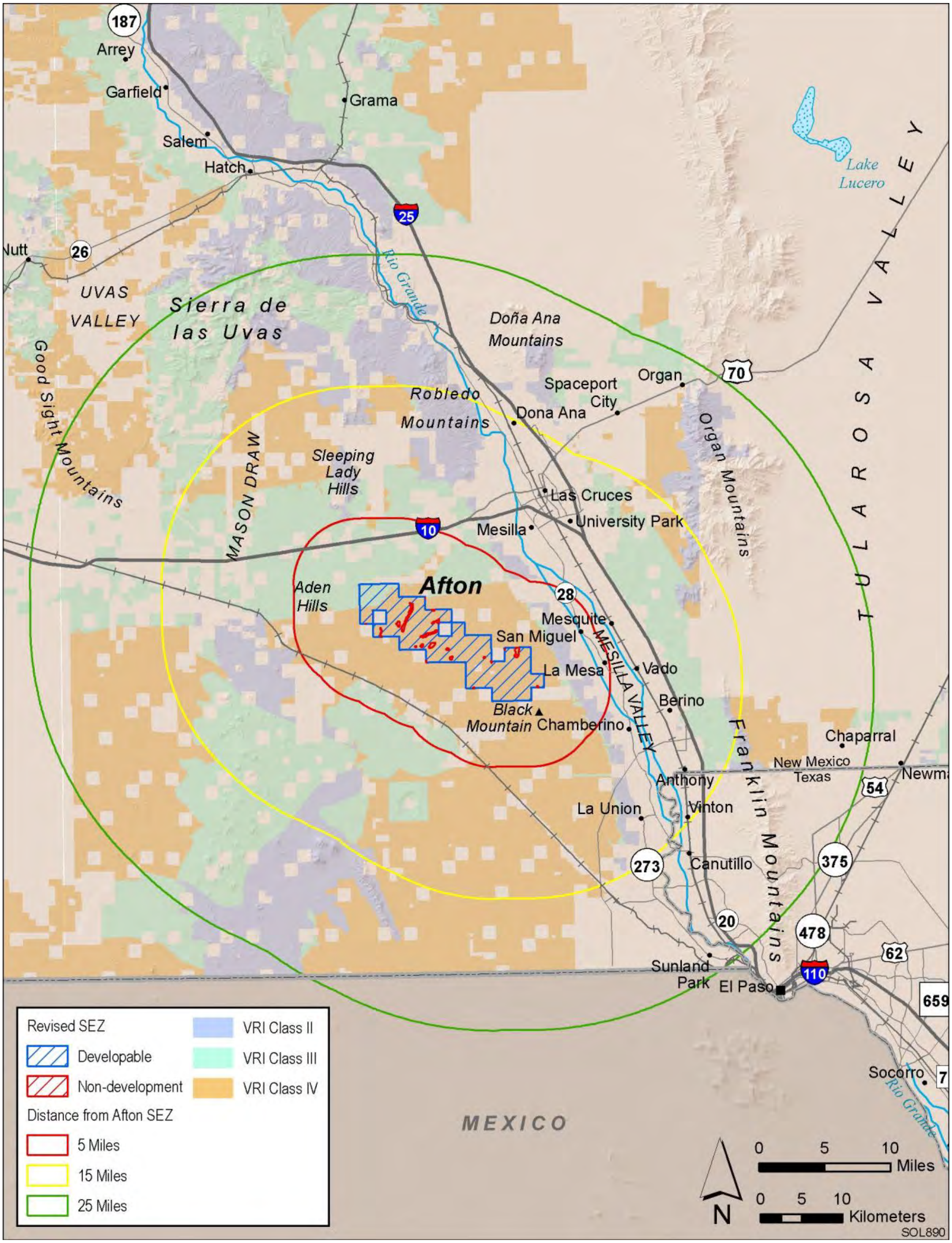

FIGURE 12.1.14.1-1 Visual Resource Inventory Values for the Proposed Afton SEZ as Revised

12.1.14.2.1 Impacts on the Proposed Afton SEZ

Although the reduction in size of the SEZ discussed in Section 12.1.14.2 would substantially reduce visual contrasts associated with solar development, solar development still would involve major modification of the existing character of the landscape; it likely would dominate the views from most locations within the Afton SEZ. Additional impacts would occur as a result of the construction, operation, and decommissioning of related facilities, such as access roads and electric transmission lines. In general, strong visual contrasts from solar development still would be expected to be observed from viewing locations within the SEZ.

12.1.14.2.2 Impacts on Lands Surrounding the Proposed Afton SEZ

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

These same viewsheds were recalculated in order to account for the boundary changes described in the Supplement to the Draft Solar PEIS. Figure 12.1.14.2-1 shows the combined results of the viewshed analyses for all four solar technologies. The colored segments indicate areas with clear lines of sight to one or more areas within the SEZ and from which solar facilities within these areas of the SEZ would be expected to be visible, assuming the absence of screening vegetation or structures and adequate lighting and other atmospheric conditions. The light brown areas are locations from which PV and parabolic trough arrays located in the SEZ could be visible. Solar dishes and power blocks for CSP technologies would be visible from the areas shaded in light brown and the additional areas shaded in light purple. Transmission towers and short solar power towers would be visible from the areas shaded light brown and light purple, and the additional areas shaded in dark purple. Power tower facilities located in the SEZ could be visible from areas shaded light brown, light purple, dark purple, and at least the upper portions of power tower receivers would be visible from the additional areas shaded in medium brown.

12.1.14.2.3 Impacts on Selected Federal-, State-, and BLM-Designated Sensitive Visual Resource Areas and Other Lands and Resources

Figure 12.1.14.2-2 shows the results of a geographical information system (GIS) analysis that overlays selected federal, state, and BLM-designated sensitive visual resource areas onto the combined tall solar power tower (650 ft [198.1 m]) and PV and parabolic trough array (24.6 ft [7.5 m]) viewsheds to illustrate which of these sensitive visual resource areas would have views of solar facilities within the SEZ, and therefore potentially would be subject to visual impacts from those facilities. Distance zones that correspond with BLM's VRM system-specified

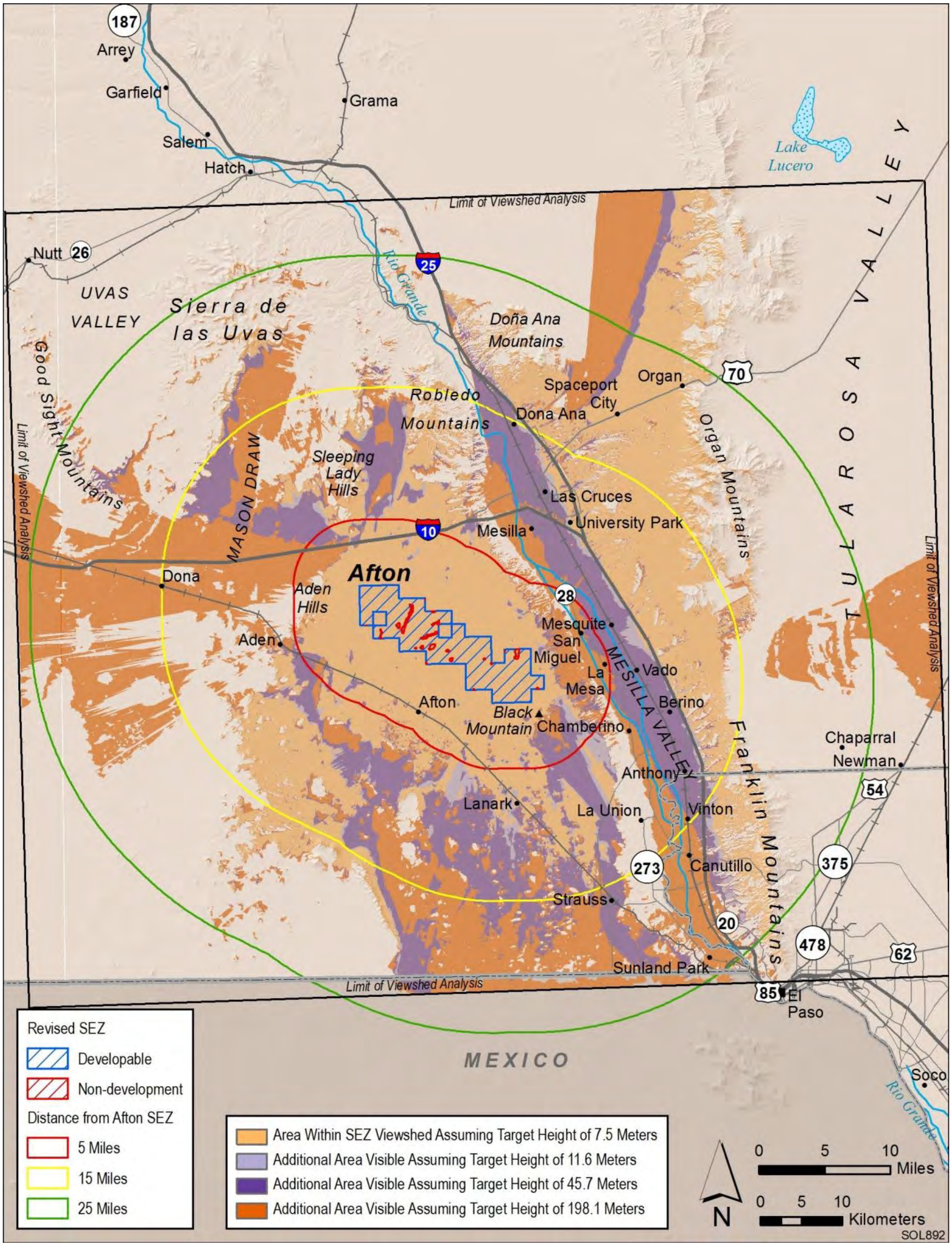

FIGURE 12.1.14.2-1 Viewshed Analyses for the Proposed Afton SEZ as Revised and Surrounding Lands, Assuming Viewshed Heights of 24.6 ft (7.5 m), 38 ft (11.6 m), 150 ft (45.7 m), and 650 ft (198.1 m) (shaded areas indicate lands from which solar development and/or associated structures within the SEZ could be visible)

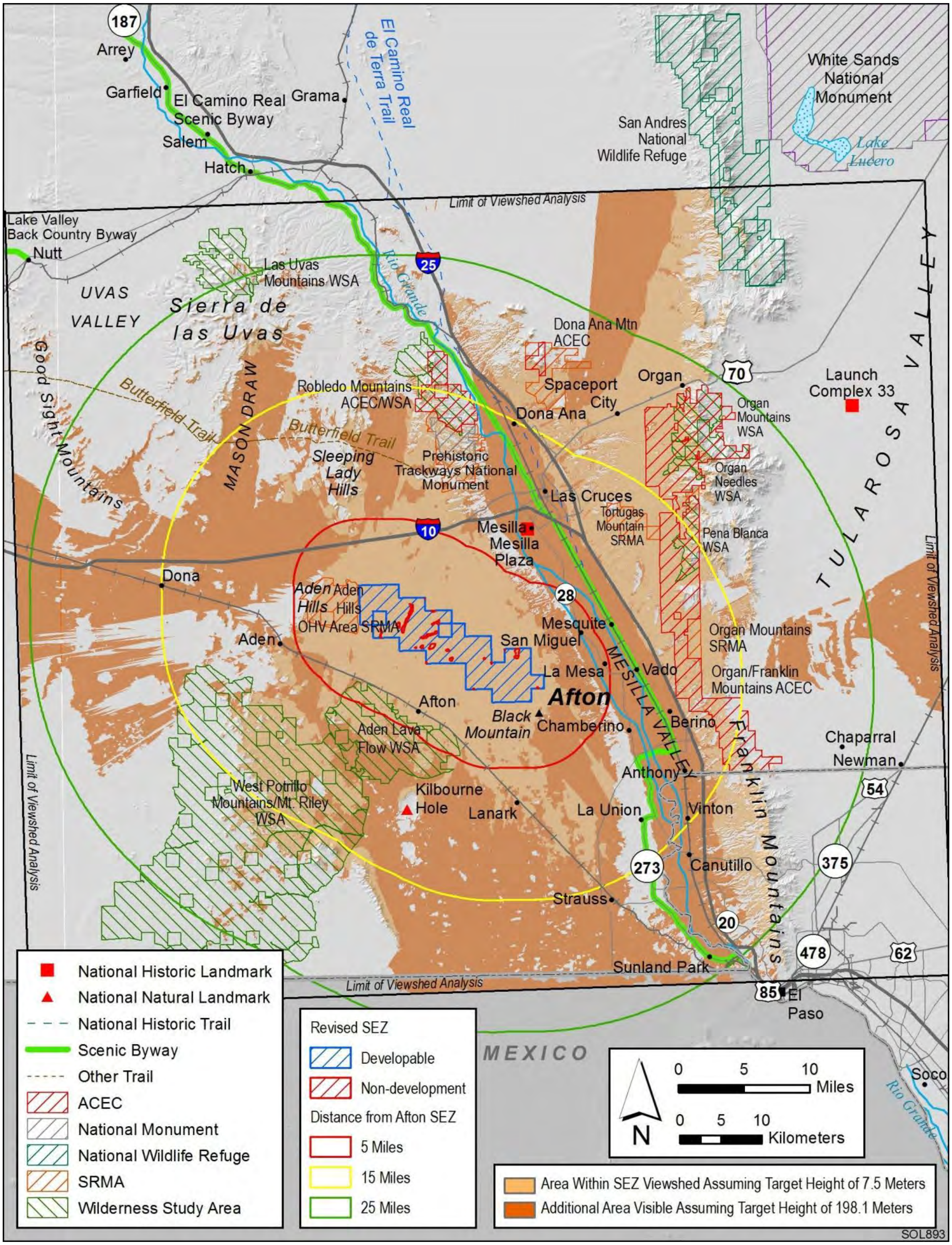

FIGURE 12.1.14.2-2 Overlay of Selected Sensitive Visual Resource Areas onto Combined 650-ft (198.1-m) and 24.6-ft (7.5-m) Viewsheds for the Proposed Afton SEZ as Revised

foreground-middle ground distance (5 mi [8 km]), background distance (15 mi [24 km]), and a 25-mi (40-km) distance zone are shown as well, in order to indicate the effect of distance from the SEZ on impact levels, which are highly dependent on distance. A similar analysis was conducted for the Draft Solar PEIS.

The scenic resources included in the viewshed analyses were as follows:

- National Parks, National Monuments, National Recreation Areas, National Preserves, National Wildlife Refuges, National Reserves, National Conservation Areas, National Historic Sites;

- Congressionally authorized Wilderness Areas;

- Wilderness Study Areas;

- National Wild and Scenic Rivers;

- Congressionally authorized Wild and Scenic Study Rivers;

- National Scenic Trails and National Historic Trails;

- National Historic Landmarks and National Natural Landmarks;

- All-American Roads, National Scenic Byways, State Scenic Highways, and BLM- and USFS-designated scenic highways/byways; BLM-designated Special Recreation Management Areas; and

- ACECs designated because of outstanding scenic qualities.

The results of the GIS analyses are summarized in Table 12.1.14.2-1. The change in size of the SEZ alters the viewshed, such that the visibility of the SEZ and solar facilities within the SEZ from the surrounding lands would be reduced.

Even with the reduction in size of the SEZ, solar energy development within the SEZ still would be expected to create moderate or strong visual contrasts for viewers within many of the surrounding scenic resource areas and other resources listed in Table 12.1.14.2-1. These areas include the Prehistoric Trackways National Monument, the Aden Lava Flow WSA, the Organ Mountains WSA, the Organ Needles WSA, the Peña Blanca WSA, the Robledo Mountains WSA and ACEC, the West Potrillo Mountains/Mt. Riley WSA, the Aden Hills SRMA, the Organ/Franklin Mountains SRMA and ACEC, and the Kilbourne Hole National Natural Landmark.

Solar development on lands in the SEZ visible from and in close proximity to the Aden Lava Flow WSA has a higher potential to cause visual impacts on the WSA. The BLM has identified areas in the SEZ visible from and within 5 mi (8 km) of the Aden Lava Flow WSA as potential moderate visual sensitivity areas, where solar development would be subject to specific

TABLE 12.1.14.2-1 Selected Potentially Affected Sensitive Visual Resources within a 25-mi (40-km) Viewshed of the Proposed Afton SEZ as Revised, Assuming a Target Height of 650 ft (198.1 m)

		Feature Area or Linear Distance[c]		
			Visible Between	
Feature Type	Feature Name (Total Acreage/ Linear Distance)[a,b]	Visible within 5 mi	5 and 15 mi	15 and 25 mi
National Monument	Prehistoric Trackways (5,255 acres)	0 acres (0%)	2,526 acres (48%)	0 acres (0%)
WSAs	Aden Lava Flow (25,978 acres)	6,367 acres (25%)	18,981 acres (73%)	0 acres (0%)
	Las Uvas Mountains (11,084 acres)	0 acres (0%)	0 acres	253 acres (2%)
	Organ Mountains (7,186 acres)	0 acres (0%)	0 acres	3,693 acres (51%)
	Organ Needles (5,936 acres)	0 acres (0%)	0 acres	2,258 acres (38%)
	Peña Blanca (4,648 acres)	0 acres (0%)	2,170 acres (47%)	1,290 acres (28%)
	Robledo Mountains (13,049 acres)	0 acres (0%)	1,193 acres (9%)	728 acres (6%)
	West Potrillo Mountains/Mt. Riley (159,323 acres)	0 acres (0%)	35,532 acres (22%)	13,941 acres (9%)
SRMAs	Aden Hills OHV Area (8,053 acres)	7,157 acres (89%)	0 acres	0 acres (0%)
	Doña Ana Mountain (8,345 acres)	0 acres (0%)	0 acres	4,868 acres (58%)
	Organ/Franklin Mountains RMZ (60,823 acres)	0 acres (0%)	22,876 acres (38%)	18,722 acres (31%)
ACECs	Doña Ana Mountains (1,427 acres)	0 acres (0%)	0 acres	678 acres (47%)

TABLE 12.1.14.2-1 (Cont.)

Feature Type	Feature Name (Total Acreage/ Linear Distance)[a,b]	Feature Area or Linear Distance[c]		
			Visible Between	
		Visible within 5 mi	5 and 15 mi	15 and 25 mi
ACECs (cont.)	Organ /Franklin Mountains (58,512 acres)	0 acres (0%)	20,914 acres (36%)	18,467 acres (32%)
	Robledo Mountains (8,659 acres)	0 acres (0%)	1,098 acres (13%)	352 acres (4%)
National Historic Trail	El Camino Real de Tierra Adentro (404 mi)[d]	0 acres (0%)	30.1 mi (7%)	6.3 mi (2%)
National Historic Landmark	Mesilla Plaza (acreage not available)	0 acres (0%)	Not available	0 acres (0%)
Scenic Byway	El Camino Real[e] (299 mi)	0 mi (0%)	38.1 mi (13%)	9.6 mi (3%)
National Natural Landmark	Kilbourne Hole (Acreage Not Available)	0 acres (0%)	Not available	0 acres (0%)

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

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

[c] Percentage of total feature acreage or road length viewable.

[d] Source: America's Byways (2012).

[e] Source: NPS (2010).

additional design features that will be identified when project-specific environmental analyses are conducted.

In addition to these areas, impacts on other lands and resource areas were evaluated. These areas include the Butterfield Trail; I-25; I-10; U.S. 70; and the communities of Las Cruces, University Park, Mesilla, Doña Ana, Radium Springs, Organ, Spaceport City, San Miguel, La Mesa, La Union, Mesquite, Vado, Chamberino, Berino, Anthony, and El Paso (Texas).

12.1.14.2.4 Summary of Visual Resource Impacts for the Proposed Afton SEZ

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

In some locations, the reduction in size of the SEZ would reduce the visual contrast associated with solar facilities as seen both within the SEZ and from surrounding lands in both daytime- and nighttime views. The reductions in visual contrast resulting from the boundary changes can be summarized as follows:

- Within the Afton SEZ: Contrasts experienced by viewers in the north, northeast, southeast, and southwest portions of the SEZ would be reduced because of the elimination of 46,917 acres (190 km^2) of land within the SEZ; however, strong contrasts still would result in the remaining developable area. There also would be a small reduction in contrasts in the areas of the SEZ designated as non-development lands because of the presence of floodplains and intermittent and dry lakes.

- Prehistoric Trackways National Monument: A reduction in contrasts would be anticipated because of the elimination of acreage in the northern portion of the SEZ. The monument was approximately 6.4 mi (10.3 km) from the SEZ, as it was originally proposed in the Draft Solar PEIS; it is now approximately 10.5 mi (16.9 km) from the SEZ at the point of closest approach. Expected contrast levels would be lowered from “moderate to strong” to “moderate.”

- Aden Lava Flow WSA: A reduction in contrasts would be anticipated because of the elimination of acreage in the southwestern portion of the SEZ. The WSA was approximately 1.4 mi (2.3 km) from the SEZ, as it was originally proposed in the Draft Solar PEIS. It is now approximately 3.3 mi (5.3 km) from the SEZ. Expected contrast levels would be lower, but strong contrasts would still be expected for much of the WSA.

- Las Uvas Mountains WSA: A reduction in contrasts would be anticipated because of the elimination of acreage in the northwestern portion of the SEZ; expected contrast levels would be lowered from “weak” to “minimal.”

- Organ Mountains WSA: A reduction in contrasts would be anticipated because of the elimination of acreage in the northeastern portion of the SEZ; expected contrast levels would be lowered from “moderate to strong” to “moderate.”

- Organ Needles WSA: A reduction in contrasts would be anticipated because of the elimination of acreage in the northeastern portion of the SEZ; expected contrast levels would be lowered from “moderate to strong” to “moderate.”

- Peña Blanca WSA: A reduction in contrasts would be anticipated because of the elimination of acreage in the northeastern portion of the SEZ; expected contrast levels would be lowered from “moderate to strong” to “weak to moderate,” depending on viewer location within the WSA.

- Robledo Mountains WSA: A reduction in contrasts would be anticipated because of the elimination of acreage in the northern portion of the SEZ; expected contrast levels would be lowered from “strong” to “moderate.”

- West Potrillo Mountains/Mt. Riley WSA: A reduction in contrasts would be anticipated because of the elimination of acreage in the southwestern portion of the SEZ; however, solar development within the SEZ still would cause moderate to strong contrasts.

- Aden Hills SRMA: A reduction in contrasts would be anticipated because of the elimination of acreage in the southwestern and northwestern portions of the SEZ; however, solar development within the SEZ still would cause strong contrasts because of the proximity of the SRMA to the SEZ. The SRMA is less than 0.25 mi (0.4 km) from the western edge of the SEZ.

- Doña Ana Mountains SRMA: A reduction in contrasts would be anticipated because of the elimination of acreage in the northern portion of the SEZ; expected contrast levels would be lowered from “weak to moderate” to “weak.”

- Organ/Franklin Mountains SRMA: A reduction in contrasts would be anticipated because of the elimination of acreage in the northeastern portion of the SEZ; expected contrast levels would be lowered from “moderate to strong” to “moderate.”

- Doña Ana Mountains ACEC: A reduction in contrasts would be anticipated because of the elimination of acreage in the northern portion of the SEZ; expected contrast levels lowered from “weak to moderate” to “weak.”

- Organ/Franklin Mountains ACEC: A reduction in contrasts would be anticipated because of the elimination of acreage in the northeastern portion of the SEZ; expected contrast levels would be lowered from “moderate to strong” to “moderate.”

- Robledo Mountains ACEC: A reduction in contrasts would be anticipated because of the elimination of acreage in the northern portion of the SEZ; expected contrast levels would be lowered from “strong” to “moderate.”

- Mesilla Plaza National Historic Landmark: A reduction in contrasts would be anticipated because of the elimination of acreage in the eastern portion of the SEZ; expected contrast levels would be lowered from “moderate to strong” to “minimal.”

- Kilbourne Hole National Natural Landmark: A reduction in contrasts would be anticipated because of the elimination of acreage in the southwest portions of the SEZ. Views from the top of the ridge on the north side surrounding the crater would be expected to have contrast levels lowered from “moderate to strong” to “moderate.”

- El Camino Real de Tierra Adentro National Historic Trail: A reduction in contrasts would be anticipated because of the elimination of acreage within the eastern portions of the SEZ; expected contrast levels would be lowered from “weak to strong” to “minimal to weak,” depending on viewer location on the trail.

- El Camino Real Scenic Byway: A reduction in contrasts would be anticipated because of the elimination of acreage within eastern portions of the SEZ; expected contrast levels would be lowered from “minimal to strong” to “minimal to weak,” depending on viewer location on the byway.

- Butterfield Trail: A reduction in contrasts would be anticipated because of the elimination of acreage in the northern portions of the SEZ; expected contrast levels would be lowered from “minimal to moderate” to “minimal to weak,” depending on viewer location on the trail.

- I-25: A reduction in contrasts would be anticipated because of the elimination of acreage in eastern portions of the SEZ; expected contrast levels would be lowered from “weak to strong” to “weak to moderate,” depending on viewer location on I-25.

- I-10: A reduction in contrasts would be anticipated because of the elimination of acreage in the northern portions of the SEZ. As the SEZ was originally proposed in the Draft Solar PEIS, I-10 was located within less than 0.5 mi (0.8 km) of the SEZ. It is now located approximately 3 mi (5 km) from the SEZ at the point of closest approach. Expected contrast levels, however, would still be strong for the portions of I-10 north of the SEZ on West Mesa, with minimal to weak contrasts for portions of I-10 in the Mesilla Valley.

- U.S. 70: A reduction in contrasts would be anticipated because of the elimination of acreage in the northern and northeastern portions of the SEZ; however, expected contrast levels would still be strong for the portions of U.S. 70 north of the SEZ on West Mesa, with minimal to weak contrasts for portions of U.S. 70 in the Mesilla Valley.

- Las Cruces: A reduction in contrasts would be anticipated because of the elimination of acreage in the northern and northeastern portions of the SEZ; expected contrast levels would be lowered from "moderate to strong" to "minimal to weak," depending on viewer location within Las Cruces.

- University Park: A reduction in contrasts would be anticipated because of the elimination of acreage in the eastern and northeastern portions of the SEZ; expected contrast levels would be lowered from "moderate to strong" to "minimal."

- Mesilla: A reduction in contrasts would be anticipated because of the elimination of acreage in the eastern and northeastern portions of the SEZ; expected contrast levels would be lowered from "strong" to "minimal."

- Doña Ana: A reduction in contrasts would be anticipated because of the elimination of acreage in the eastern and northeastern portions of the SEZ; expected contrast levels would be lowered from "weak to moderate" to "minimal."

- Radium Springs: Radium Springs is no longer located within the 25-mi (40-km) viewshed; expected contrast levels would be lowered from "minimal" to "none."

- Organ: A reduction in contrasts would be anticipated because of the elimination of acreage in the eastern and northeastern portions of the SEZ; expected contrast levels would be lowered from "weak" to "minimal."

- Spaceport City: A reduction in contrasts would be anticipated because of the elimination of acreage in the eastern and northeastern portions of the SEZ; expected contrast levels would be lowered from "weak" to "minimal."

- San Miguel: A reduction in contrasts would be anticipated because of the elimination of acreage in the eastern portions of the SEZ; expected contrast levels would be lowered from "strong" to "minimal to weak," depending on viewer location within San Miguel.

- La Mesa: A reduction in contrasts would be anticipated because of the elimination of acreage in the eastern portions of the SEZ; expected contrast levels would be lowered from "strong" to "minimal to weak," depending on viewer location within La Mesa.

- La Union: La Union is no longer located within the 25-mi (40-km) viewshed; expected contrast levels would be lowered from "minimal" to "none."

- Mesquite: A reduction in contrasts would be anticipated because of the elimination of acreage in the eastern portions of the SEZ; expected contrast levels would be lowered from "strong" to "minimal."

- Vado: A reduction in contrasts would be anticipated because of the elimination of acreage within the eastern part of the SEZ; expected contrast levels would be lowered from "strong" to "minimal to weak," depending on viewer location within Vado.

- Chamberino: Chamberino is no longer located within the 25-mi (40-km) viewshed; expected contrast levels would be lowered from "minimal" to "none."

- Berino: A reduction in contrasts would be anticipated because of the elimination of acreage within the eastern part of the SEZ; expected contrast levels would be lowered from "moderate to strong" to "minimal."

- Anthony: A reduction in contrasts would be anticipated because of the elimination of acreage within the eastern part of the SEZ; expected contrast levels would be lowered from "weak to moderate" to "minimal."

- El Paso, Texas: El Paso, Texas, is no longer located within the 25-mi (40-km) viewshed; expected contrast levels would be lowered from "minimal to very weak" to "none."

In addition to those areas evaluated within the Draft Solar PEIS, the following areas may potentially be affected by solar development within the SEZ:

- Picacho SRMA: Expected contrast levels would be "moderate." This area is located approximately 8.9 mi (14.3 km) north of the SEZ. Views to the south from higher elevation viewpoints points, such as Picacho Mountain, would include a view of solar development in some portions of the SEZ. Views from the more northern parts of the SRMA may be partially screened by topography.

- Talavera SRMA: Expected contrast levels would be "weak to moderate" depending on viewer location within the SRMA. The SRMA is approximately 12.1 mi (19.5 km) northeast of the SEZ. Views from this SRMA may be partially screened by topography and vegetation.

- Tortugas Mountain SRMA: Expected contrast levels would be "weak to moderate" depending on viewer location within the SRMA. The SRMA is approximately 10.9 mi (17.5 km) northeast of the SEZ. Views from this SRMA may be partially screened by topography and vegetation.

Table 12.1.14.2-2 provides the acreage of these areas that would be visible within the 650-ft (198.1-m) viewshed.

12.1.14.3 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. Given the large scale, reflective surfaces, and strong regular geometry of utility-scale solar energy facilities and the lack of screening vegetation and landforms within the SEZ viewshed, siting the facilities away from sensitive visual resource areas and other sensitive viewing areas would be the primary means of mitigating visual impacts. The effectiveness of other visual impact mitigation measures generally would be limited.

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

TABLE 12.1.14.2-2 Additional Selected Potentially Affected Sensitive Visual Resources within a 25-mi (40-km) Viewshed of the Proposed Afton SEZ as Revised, Assuming a Target Height of 650 ft (198.1 m)

		Feature Area or Linear Distance within 650-ft (198.1-m) Viewshed[c]		
			Visible Between	
Feature Type	Feature Name (Total Acreage)[a]	Visible within 5 mi[b]	5 and 15 mi	15 and 25 mi
SRMA	Picacho (9,110 acres)	0 acres (0%)	4,308 acres (47%)	0 acres (0%)
	Talavera (645 acres)	0 acres (0%)	645 acres (100%)	0 acres (0%)
	Tortugas Mountain (3,422 acres)	0 acres (0%)	3,031 acres (89%)	0 acres (0%)

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

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

[c] Percentage of total feature acreage or road length viewable.

- Special visual impact mitigation should be considered for solar development on lands in the SEZ visible from and within 5 mi (8 km) of the Aden Lava Flow WSA. These areas are visible from and in close proximity to the Aden Lava Flow WSA, and thus have a higher potential to cause visual impacts on the WSA. The BLM has identified these lands as potential moderate visual sensitivity areas, where solar development is subject to additional SEZ-specific mitigation that will be identified when project-specific environmental analyses are conducted. These lands are shown in Figure 12.1.1.1-2.

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.

12.1.15 Acoustic Environment

12.1.15.1 Affected Environment

The area of the proposed Afton SEZ was reduced from 77,623 acres (314.1 km^2) to 29,964 acres (121.3 km^2). With the change in the proposed boundaries, distances to some of the sensitive receptors are greater than those presented in the Draft Solar PEIS. The distance to the Aden Lava Flow WSA increased from 1.3 mi (2.1 km) to about 3.2 mi (5.1 km) south of the proposed SEZ. As presented in the Draft Solar PEIS, several residences exist adjacent to the northeastern SEZ boundary and as close as 200 ft (61 m) from the southeastern SEZ boundary. However, because of the removal of considerable portions of the eastern SEZ, the nearest residences are located as close as about 3 mi (5 km) of the SEZ's southeastern boundary in this Final Solar PEIS.

12.1.15.2 Impacts

12.1.15.2.1 Construction

With the reduction in size of the Afton SEZ, the updated noise predictions in this Final Solar PEIS will be less than those in the Draft Solar PEIS. Some of the conclusions presented in the Draft Solar PEIS have been updated to reflect reduced estimates of noise levels at nearby residences and new information on noise impacts on wildlife.

With the updated SEZ boundaries, estimated noise levels at the closest residences adjacent to the southeastern SEZ boundary are about 30 to 33 dBA, which is well below the typical daytime mean rural background level of 40 dBA, and much less than the 74 to 77 dBA presented in the Draft Solar PEIS. In addition, an estimated 40-dBA L_{dn}[4] at these residences is

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

well below the U.S. Environmental Protection Agency (EPA) guidance of 55 dBA L_{dn} for residential areas. The conclusion in the Draft Solar PEIS that construction within the proposed Afton SEZ would cause some unavoidable but localized short-term noise impacts on neighboring communities is updated for this Final Solar PEIS, to conclude that construction would cause negligible noise impacts at nearby residences and communities.

On the basis of comments received and recent references, as applicable, this Final Solar PEIS used an updated approximate significance threshold of 55 dBA, corresponding to the onset of adverse physiological impacts (Barber et al. 2010) to update the analysis of potential noise impacts on terrestrial wildlife in areas of special concern. As a result of this updated significance threshold, the assessment of impacts in the Aden Lava Flow WSA has been updated. Construction activities at the SEZ would produce an estimated noise level at the boundary of the Aden Lava Flow WSA of about 29 dBA. This estimated level is well below the significance threshold, and thus noise from construction in the proposed Afton SEZ is not anticipated to considerably affect wildlife in the nearby specially designated areas. However, as discussed in Section 5.10.2 of this Final Solar PEIS, there is the potential for other effects to occur at lower noise levels (Barber et al. 2011). Even considering potential impacts at these lower noise levels, construction noise at the SEZ is sufficiently low that it would not be anticipated to affect wildlife there, and the conclusion in the Draft Solar PEIS remains valid.

Given the increased distances to the nearest residences with the updated boundaries of the proposed Afton SEZ, the conclusion in the Draft Solar PEIS that potential vibration impacts on the nearest residences would be negligible, except when pile driving for dish engine construction was occurring near the residences, is updated for this Final Solar PEIS to conclude that construction would cause no vibration impacts at nearby residences.

Overall, the updated analysis for this Final Solar PEIS concludes that construction noise and vibration would cause negligible or no noise and vibration impacts at nearby residences and the Aden Lava Flow WSA.

12.1.15.2.2 Operations

With the decrease in size of the proposed SEZ, the updated noise estimates in this Final Solar PEIS are less than those presented in the Draft Solar PEIS, and, except as noted below for wildlife impacts in specially designated areas, the conclusions presented in the Draft Solar PEIS remain valid.

Parabolic Trough and Power Tower

For parabolic trough and power tower facilities using thermal energy storage (TES), predicted noise levels at the nearest residence are lower by about 20 dBA than those in the Draft Solar PEIS. If TES is used, the nighttime noise level is reduced from 61 dBA in the Draft Solar PEIS to 42 dBA in the Final Solar PEIS, which is still higher than the typical nighttime mean rural background level of 30 dBA. However, the L_{dn} estimate is updated from 63 dBA L_{dn} in the

Draft Solar PEIS to 45 dBA L_{dn} for this Final Solar PEIS, that is, from above to below the EPA guideline of 55 dBA L_{dn} for residential areas. The conclusion of the Draft Solar PEIS has been updated; operating parabolic trough or power tower facilities using TES could result in minor noise impacts on the nearby residences during nighttime hours if a facility is located near the southeastern SEZ boundary.

As stated above under construction impacts, an updated approximate significance threshold of 55 dBA was used to evaluate potential noise impacts on terrestrial wildlife in areas of special concern. Operations of a parabolic trough or power tower facility equipped with TES would result in estimated daytime and nighttime noise levels at the boundary of the Aden Lava Flow WSA of about 32 and 42 dBA, respectively. These estimated levels are below the significance threshold, and thus noise from operations in the proposed Afton SEZ is not anticipated to adversely affect wildlife in the nearby specially designated areas. However, as discussed in Section 5.10.2 of this Final Solar PEIS, there is the potential for other effects to occur at lower noise levels (Barber et al. 2011). Considering these impacts and the potential for impacts at lower noise levels, noise impacts on terrestrial wildlife from a parabolic trough or power tower facility equipped with TES would have to be considered on a project-specific basis, including consideration of site-specific background levels and hearing sensitivity for site-specific terrestrial wildlife of concern.

Dish Engines

The reduction in size of the proposed Afton SEZ by about 61% would reduce the number of dish engines by a similar percentage. At the nearest residences, estimated noise levels updated for this Final Solar PEIS (42 dBA) would be just above the typical daytime mean rural background level of 40 dBA; those estimated in the Draft Solar PEIS (58 dBA) were well above that background level. L_{dn} estimates went from a value of 55 dBA L_{dn} in the Draft Solar PEIS, just equal to the EPA guideline for residential areas, to 43 dBA, well below the guideline level, for this Final Solar PEIS. The conclusion of the Draft Solar PEIS that noise from dish engines could cause adverse impacts on the nearest residences, depending on background noise levels and meteorological conditions, is updated for this Final Solar PEIS to have negligible impacts.

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

Changes in the proposed Afton SEZ boundaries would not alter the discussions of vibration, transformer and switchyard noise, and corona discharge presented in the Draft Solar PEIS. Noise impacts from vibration and transformer and switchyard noise would be minimal, and those from corona discharge would be negligible.

12.1.15.2.3 Decommissioning and Reclamation

With the updated SEZ boundaries, decommissioning and reclamation activities in the SEZ would cause estimated noise levels at the closest residences lower than those considered in the Draft Solar PEIS. The conclusion in the Draft Solar PEIS that decommissioning and reclamation activities within the proposed Afton SEZ would cause some moderate but temporary short-term noise impacts on surrounding communities is updated for this Final Solar PEIS to conclude that decommissioning and reclamation activities would cause negligible noise impacts at nearby residences and communities.

12.1.15.3 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, updates to those analyses due to changes to the SEZ boundaries, and consideration of comments received as applicable, no SEZ-specific design features for noise were identified. Some SEZ-specific design features may be identified through the process of preparing parcels for competitive offer and subsequent project-specific analysis.

12.1.16 Paleontological Resources

12.1.16.1 Affected Environment

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

- The potential fossil yield classification (PFYC) Class I areas of the SEZ constitute less than 1% of the total acreage of the SEZ (199 acres [0.8 km^2]). The remaining 29,765 acres (120.5 km^2) are classified as PFYC Class 4/5.

- The distance to the Prehistoric Trackways National Monument has been increased from 6 to 10 mi (10 to 16 km), to 10 to 14 mi (16 to 22 km).

- The BLM Regional Paleontologist may have additional information regarding the paleontological potential of the SEZ and be able to verify the PFYC of the SEZ as Class 4/5 as used in the Draft Solar PEIS.

12.1.16.2 Impacts

The assessment provided in the Draft Solar PEIS remains valid. Impacts on significant paleontological resources could occur, especially in the PFYC Class 4/5 areas of the SEZ. However, a more detailed look at the geological deposits of the SEZ is needed to determine whether a paleontological survey is warranted.

12.1.16.3 SEZ-Specific Design Feature 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 will 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, updates to those analyses based on changes to the SEZ boundaries, and consideration of public comments received as applicable, the following SEZ-specific design feature for paleontological resources has been identified:

- Avoidance of the eastern edge of the SEZ may be warranted if a paleontological survey results in findings similar to those known south of the SEZ.

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

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

12.1.17 Cultural Resources

12.1.17.1 Affected Environment

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

- The distance from the SEZ boundary to trails and various other cultural resources that are located to the north and east of the SEZ has increased by 4 to 6 mi (6 to 9 km) due to the reduced size of the proposed Afton SEZ (i.e., El Camino Real de Tierra Adentro; Fort Fillmore; Butterfield Overland Mail Stage; the Atchison, Topeka and Santa Fe Railroad; Mesilla Plaza; and other cultural resources located in the towns of Mesilla and Las Cruces; and the West Canal of the Elephant Butte Irrigation District).

- The amount of land that has been surveyed for cultural resources has decreased from 6,096 acres (25 km^2), 8% of the original SEZ, to about 1,840 acres (7.4 km^2), about 6% of the revised SEZ footprint.

- The number of cultural resource sites that are located in the proposed Afton SEZ has decreased from 113 sites to 58, of which at least two are eligible for listing in the *National Register of Historic Places* (NRHP); however, many of these sites have not been evaluated.

- The distance from the SEZ boundary to several ACECs in the vicinity of the proposed Afton SEZ has increased by 4 to 6 mi (6 to 9 km) due to the reduced size of the proposed Afton SEZ (Los Tules ACEC, Organ/Franklin Mountain ACEC, Robledo Mountain ACEC, Doña Ana Mountains ACEC, and San Diego Mountain ACEC).

- The distance from the proposed Afton SEZ boundary to the Butterfield Trail has increased to 8 mi (13 km).

- The distance from the proposed Afton SEZ boundary to the White Sands National Monument has increased to 43 mi (69 km).

- The distance to the NRHP-listed sites in Table 12.1.17.1-1 of the Draft Solar PEIS has increased by 4 to 6 mi (6 to 9 km).

- 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 stratified random sample survey of the SEZ with a goal of achieving a 10% sample (roughly 2,996 acres [12.1 km^2]), as funding to support additional Class II sample inventories in the SEZ areas becomes available. If the approximately 1,840 acres (7.4 km^2) previously surveyed meets current survey standards, then approximately 1,156 acres (4.67 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, some 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 zones as an aid in planning future solar development.

  – The identification of any high-potential segments of the El Camino Real de Tierra Adentro National Historic Trail and the results of viewshed analyses from key points along those portions of the trail.
  – Results of a viewshed analysis from Mesilla Plaza, a National Historic Landmark.
  – The identification of key observation points within nearby ACECs (Los Tules, Organ/Franklin Mountains, Robledo Mountain, Doña Ana Mountain, and San Diego Mountain) and Special Management Areas (Butterfield Trail), and the results of a viewshed analyses to determine visual impacts on these resource areas designated for cultural values.
  – Continuation of government-to-government consultation as described in Section 2.4.3 of the Supplement to the Draft Solar PEIS and IM 2012-032 (BLM 2011b), including follow-up to recent ethnographic studies covering some SEZs in Nevada and Utah with tribes not included in the original studies to determine whether those tribes have similar concerns.

12.1.17.2 Impacts

As stated in the Draft Solar PEIS, direct impacts on significant cultural resources could occur in the proposed Afton SEZ; however, further investigation is needed. The following updates are based on the revised boundaries of the SEZ:

- The distance to important trail systems, as well as several NRHP-listed properties has increased to more than 5 mi (8 km); however, visual impacts are possible, and additional analysis on the visual effects of solar development on these properties would be needed prior to any development.

- Impacts on significant resources located in the dune areas in the northern and eastern portions of the SEZ are less likely because much of the dune area has been removed from the SEZ.

12.1.17.3 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. If any of the unevaluated sites in the SEZ are found to meet the eligibility criteria for listing in the NRHP, they will be subject to the programmatic design features regarding eligible sites as described in

Section A.2.2 of Appendix A. Programmatic design features will be applied to address SEZ-specific resources and conditions, for example:

- For projects in the Afton SEZ that are located within the viewshed of El Camino Real de Tierra Adentro National Historic Trail and/or the Butterfield Trail, a National Trail inventory will be required to determine the area of possible adverse impact on resources, qualities, values, and associated settings of the trail, to prevent substantial interference, and to determine any areas unsuitable for development. Residual impacts will be avoided, minimized, and/or mitigated to the extent practicable according to program policy standards. Programmatic design features have been included in BLM's Solar Energy Program to address impacts on National Historic Trails (see Section A.2.2.23 of Appendix A).

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

- Design features for reducing visual impacts (presented in Section 12.1.14.3) on the El Camino Real National Historic Trail, the Butterfield Trail, and Mesilla Plaza National Historic Landmark would also reduce impacts on these cultural resources. Coordination with trails associations and historical societies regarding impacts on El Camino Real de Tierra Adentro, the Butterfield Trail, and Mesilla Plaza, as well as other NRHP-listed properties should be conducted.

The need for and nature of additional SEZ-specific design features would be determined in consultation with the New Mexico SHPO and affected tribes and would depend on the results of future investigations. Some SEZ-specific design features may be established through the process of preparing parcels for competitive offer and subsequent project-specific analysis.

12.1.18 Native American Concerns

12.1.18.1 Affected Environment

Data provided in the Draft Solar PEIS remain valid.

12.1.18.2 Impacts

The description of potential concerns provided in the Draft Solar PEIS remains valid. The impacts expected on resources important to Native Americans from solar energy development within the Afton SEZ fall into two major categories: impacts on the landscape and impacts on discrete localized resources. As consultation with the tribes continues and project-specific analyses are undertaken, it is possible that Native Americans will express concerns over potential visual and other effects of solar energy development within the SEZ on a culturally important landscape, including features such as the Potrillo and Florida Mountains, and Salinas Peak (see also Section 12.1.17 of the Draft Solar PEIS). Regarding localized effects, since solar energy facilities cover large tracts of ground, even taking into account the implementation of design features, it is unlikely that avoidance of all resources would be possible. However, as discussed in Sections 12.1.10 and 12.1.11 of this Final Solar PEIS, impacts on plant and animal resources are expected to be small since there is an abundance of similar plant and animal habitat in the area. As discussed in Section 12.1.17.2, potential impacts are possible on cultural resources if those present (or identified in the future) are determined eligible for listing in the NRHP.

12.1.18.3 SEZ-Specific Design Features and Design Feature Effectiveness

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

On the basis of impact analyses conducted for the Draft Solar PEIS, updates to those analyses due to changes to the SEZ boundaries, and consideration of comments received as applicable, no SEZ-specific design features 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 the Potrillo Mountains, Florida Mountains, and Salinas Peak and nearby ACECs (Los Tules, Organ/Franklin Mountains, Robledo Mountain, Doña Ana Mountain, and San Diego Mountain), as well as trail systems, mountain springs, habitation sites as places of cultural importance, burial sites, rock art, ceremonial areas, water resources, and plant and animal resources, should be considered and discussed during consultation.

12.1.19 Socioeconomics

12.1.19.1 Affected Environment

Although the boundaries of the Afton SEZ have been reduced compared to the boundaries given in the Draft Solar PEIS, 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 affected environment information given in the Draft Solar PEIS are required.

12.1.19.2 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, impacts on local housing markets, and on local community service employment. The impact assessment provided in the Draft Solar PEIS remains valid, with the following updates.

12.1.19.2.1 Solar Trough

Construction

Total construction employment impacts in the ROI (including direct and indirect impacts) from the use of solar trough technology would be up to 10,681 jobs (Table 12.1.19.2-1). Construction activities would constitute 2.3% of total ROI employment. A solar development would also produce $589.0 million in income. Direct sales taxes would be $27.5 million; direct income taxes, $12.6 million.

Given the scale of construction activities and the low likelihood that the entire construction workforce in the required occupational categories would be available in the ROI, construction of a solar facility would mean that some in-migration of workers and their families from outside the ROI would be required, with up to 1,486 persons in-migrating into the ROI. Although in-migration may potentially affect local housing markets, the relatively small number of in-migrants and the availability of temporary accommodations (hotels, motels, and mobile home parks) mean that the impact of solar facility construction on the number of vacant rental housing units would not be expected to be large, with up to 513 rental units expected to be occupied in the ROI. This occupancy rate would represent 3.6% of the vacant rental units expected to be available in the ROI.

In addition to the potential impact on housing markets, in-migration also would affect community services (education, health, and public safety) employment. An increase in such employment would be required to meet existing levels of service in the ROI. Accordingly, up to 22 new teachers, 3 physicians, and 2 public safety employees (career firefighters and uniformed police officers) would be required in the ROI. These increases would represent 0.1% of total ROI employment expected in these occupations.

TABLE 12.1.19.2-1 ROI Socioeconomic Impacts Assuming Full Build-out of the Proposed Afton SEZ as Revised with Trough Facilities

Parameter	Maximum Annual Construction Impacts[a]	Annual Operations Impacts[b]
Employment (no.)		
Direct	3,488	1,044
Total	10.681	1,744
Income[c]	589.0	60.0
Total		
Direct state taxes[c]		
Sales	27.5	0.4
Income	12.6	1.6
BLM payments[c]		
Acreage-related fee	NA[d]	2.8
Capacity fee[e]	NA	31.5
In-migrants (no.)	1,486	133
Vacant housing[f] (no.)	513	83
Local community service employment		
Teachers (no.)	22	2
Physicians (no.)	3	0
Public safety (no.)	2	0

[a] Construction impacts were based on the development at the site in a single year; it was assumed that several facilities with a combined capacity of up to 1,200 MW (corresponding to 6,000 acres [24 km^2] of land disturbance) could be built.

[b] Operations impacts were based on full build-out of the site, producing a total output of 4,794 MW.

[c] Values are reported in $ million 2008.

[d] NA = not applicable.

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

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

Operations

Total operations employment impacts in the ROI (including direct and indirect impacts) from a full build-out of the SEZ using solar trough technologies would be 1,744 jobs (Table 12.1.19.2-1). Such a solar development would also produce $60.0 million in income. Direct sales taxes would be $0.4 million; direct income taxes, $1.6 million. On the basis of fees established by the BLM (BLM 2010), acreage–related fees would be $2.8 million, and solar generating capacity fees would total at least $31.5 million.

As for the construction workforce, operation of a solar facility likely would require some in-migration of workers and their families from outside the ROI, with up to 133 persons in-migrating into the ROI. Although in-migration may potentially affect local housing markets, the relatively small number of in-migrants and the availability of temporary accommodations (hotels, motels, and mobile home parks) mean that the impact of solar facility operation on the number of vacant owner-occupied housing units would not be expected to be large, with up to 83 owner-occupied units expected to be occupied in the ROI.

In addition to the potential impact on housing markets, in-migration would affect community services (health, education, and public safety) employment. An increase in such employment would be required to meet existing levels of service in the provision of these services in the ROI. Accordingly, up to two new teachers would be required in the ROI.

12.1.19.2.2 Power Tower

Construction

Total construction employment impacts in the ROI (including direct and indirect impacts) from the use of power tower technology would be up to 4,255 jobs (Table 12.1.19.2-2). Construction activities would constitute 0.9% of total ROI employment. Such a solar development would also produce $234.6 million in income. Direct sales taxes would be $10.9 million; direct income taxes, $5.0 million.

Given the scale of construction activities and the low likelihood that the entire construction workforce in the required occupational categories would be available in the ROI, construction of a solar facility would mean that some in-migration of workers and their families from outside the ROI would be required, with up to 592 persons in-migrating into the ROI. Although in-migration may potentially affect local housing markets, the relatively small number of in-migrants and the availability of temporary accommodations (hotels, motels, and mobile home parks) mean that the impact of solar facility construction on the number of vacant rental housing units would not be expected to be large, with up to 204 rental units expected to be occupied in the ROI. This occupancy rate would represent 1.4% of the vacant rental units expected to be available in the ROI.

TABLE 12.1.19.2-2 ROI Socioeconomic Impacts Assuming Full Build-out of the Proposed Afton SEZ as Revised with Power Tower Facilities

Parameter	Maximum Annual Construction Impacts[a]	Annual Operations Impacts[b]
Employment (no.)	1,389	539
Direct	4,255	765
Total		
Income[c]	234.6	24.6
Total		
Direct state taxes[c]		
Sales	10.9	0.1
Income	5.0	0.9
BLM payments[c]		
Acreage-related fee	NA[d]	2.8
Capacity fee[e]	NA	17.5
In-migrants (no.)	592	69
Vacant housing[f] (no.)	204	43
Local community service employment		
Teachers (no.)	9	1
Physicians (no.)	1	0
Public safety (no.)	1	0

[a] Construction impacts were based on the development at the site in a single year; it was assumed that several facilities with a combined capacity of up to 667 MW (corresponding to 6,000 acres [24 km^2] of land disturbance) could be built.

[b] Operations impacts were based on full build-out of the site, producing a total output of 2,663 MW.

[c] Values are reported in $ million 2008.

[d] NA = not applicable.

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

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

In addition to the potential impact on housing markets, in-migration would affect community services (education, health, and public safety) employment. An increase in such employment would be required to maintain existing levels of service in the ROI. Accordingly, up to nine new teachers, one physician, and one public safety employee would be required in the ROI. These increases would represent 0.1% of total ROI employment expected in these occupations.

Operations

Total operations employment impacts in the ROI (including direct and indirect impacts) from a full build-out of the SEZ using power tower technologies would be 765 jobs (Table 12.1.19.2-2). Such a solar development would also produce $24.6 million in income. Direct sales taxes would be $0.1 million; direct income taxes, $0.9 million. On the basis of fees established by the BLM (BLM 2010), acreage-related fees would be $2.8 million, and solar generating capacity fees would total at least $17.5 million.

As for the construction workforce, operation of a solar facility likely would require some in-migration of workers and their families from outside the ROI, with up to 69 persons in-migrating into the ROI. Although in-migration may potentially affect local housing markets, the relatively small number of in-migrants and the availability of temporary accommodations (hotels, motels, and mobile home parks) mean that the impact of solar facility operation on the number of vacant owner-occupied housing units would not be expected to be large, with up to 43 owner-occupied units expected to be required in the ROI.

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

12.1.19.2.3 Dish Engine

Construction

Total construction employment impacts in the ROI (including direct and indirect impacts) from the use of dish engine technology would be up to 1,730 jobs (Table 12.1.19.2-3). Construction activities would constitute 0.4 % of total ROI employment. Such a solar development would also produce $95.4 million in income. Direct sales taxes would be $4.5 million; direct income taxes, $2.0 million.

Given the scale of construction activities and the low likelihood that the entire construction workforce in the required occupational categories would be available in the ROI, construction of a dish engine facility would mean that some in-migration of workers and their families from outside the ROI would be required, with up to 241 persons in-migrating into the

TABLE 12.1.19.2-3 ROI Socioeconomic Impacts Assuming Full Build-out of the Proposed Afton SEZ as Revised with Dish Engine Facilities

Parameter	Maximum Annual Construction Impacts[a]	Annual Operations Impacts[b]
Employment (no.)		
Direct	565	524
Total	1,730	743
Income[c]		
Total	95.4	23.9
Direct state taxes[c]		
Sales	4.5	<0.1
Income	2.0	0.8
BLM payments[c]		
Acreage-related fee	NA[d]	2.8
Capacity fee[e]	NA	17.5
In-migrants (no.)	241	67
Vacant housing[f] (no.)	83	42
Local community service employment		
Teachers (no.)	4	1
Physicians (no.)	1	0
Public safety (no.)	0	0

[a] Construction impacts were based on the development at the site in a single year; it was assumed that several facilities with a combined capacity of up to 667 MW (corresponding to 6,000 acres [24 km^2] of land disturbance) could be built.

[b] Operations impacts were based on full build-out of the site, producing a total output of 2,663 MW.

[c] Values are reported in $ million 2008.

[d] NA = not applicable.

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

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

ROI. Although in-migration may potentially affect local housing markets, the relatively small number of in-migrants and the availability of temporary accommodations (hotels, motels, and mobile home parks) mean that the impact of solar facility construction on the number of vacant rental housing units would not be expected to be large, with up to 83 rental units expected to be occupied in the ROI. This occupancy rate would represent 0.6% of the vacant rental units expected to be available in the ROI.

In addition to the potential impact on housing markets, in-migration would affect community services (education, health, and public safety) employment. An increase in such employment would be required to meet existing levels of service in the ROI. Accordingly, up to four new teachers and one physician would be required in the ROI. This increase would represent less than 0.1% of total ROI employment expected in these occupations.

Operations

Total operations employment impacts in the ROI (including direct and indirect impacts) from a full build-out using dish engine technology would be 743 jobs (Table 12.1.19.2-3). Such a solar development would also produce $23.9 million in income. Direct sales taxes would be less than $0.1 million; direct income taxes, $0.8 million. On the basis of fees established by the BLM (BLM 2010), acreage-related fees would be $2.8 million, and solar generating capacity fees would total at least $17.5 million.

As for the construction workforce, operation of a solar facility likely would require some in-migration of workers and their families from outside the ROI, with up to 67 persons in-migrating into the ROI. Although in-migration may potentially affect local housing markets, the relatively small number of in-migrants and the availability of temporary accommodations (hotels, motels, and mobile home parks) mean that the impact of solar facility operation on the number of vacant owner-occupied housing units would not be expected to be large, with up to 42 owner-occupied units expected to be required in the ROI.

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

12.1.19.2.4 Photovoltaic

Construction

Total construction employment impacts in the ROI (including direct and indirect impacts) from the use of PV technology would be up to 807 jobs (Table 12.1.19.2-4). Construction activities would constitute 0.2% of total ROI employment. Such a solar development would also

TABLE 12.1.19.2-4 ROI Socioeconomic Impacts Assuming Full Build-out of the Proposed Afton SEZ as Revised with PV Facilities

Parameter	Maximum Annual Construction Impacts[a]	Annual Operations Impacts[b]
Employment (no.)		
Direct	263	52
Total	807	74
Income[c]		
Total	44.5	2.4
Direct state taxes[c]		
Sales	2.1	<0.1
Income	1.0	0.1
BLM payments[c]		
Acreage-related fee	NA[d]	2.8
Capacity fee[e]	NA	14.0
In-migrants (no.)	112	7
Vacant housing[f] (no.)	39	4
Local community service employment		
Teachers (no.)	2	0
Physicians (no.)	0	0
Public safety (no.)	0	0

[a] Construction impacts were based on the development at the site in a single year; it was assumed that several facilities with a combined capacity of up to 667 MW (corresponding to 6,000 acres [24 km^2] of land disturbance) could be built.

[b] Operations impacts were based on full build-out of the site, producing a total output of 2,663 MW.

[c] Values are reported in $ million 2008.

[d] NA – not applicable.

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

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

produce $44.5 million in income. Direct sales taxes would be $2.1 million; direct income taxes, $1.0 million.

Given the scale of construction activities and the low likelihood that the entire construction workforce in the required occupational categories would be available in the ROI, construction of a solar facility would mean that some in-migration of workers and their families from outside the ROI would be required, with up to 112 persons in-migrating into the ROI. Although in-migration may potentially affect local housing markets, the relatively small number of in-migrants and the availability of temporary accommodations (hotels, motels, and mobile home parks) mean that the impact of solar facility construction on the number of vacant rental housing units would not be expected to be large, with up to 39 rental units expected to be occupied in the ROI. This occupancy rate would represent 0.3% of the vacant rental units expected to be available in the ROI.

In addition to the potential impact on housing markets, in-migration would affect community services (education, health, and public safety) employment. An increase in such employment would be required to meet existing levels of service in the ROI. Accordingly, up to two new teachers would be required in the ROI. This increase would represent less than 0.1% of total ROI employment expected in this occupation.

Operations

Total operations employment impacts in the ROI (including direct and indirect impacts) from a full build-out of the SEZ using PV technologies would be 74 jobs (Table 12.1.19.2-4). Such a solar development would also produce $2.4 million in income. Direct sales taxes would be less than $0.1 million; direct income taxes $0.1 million. On the basis of fees established by the BLM (BLM 2010), acreage-related fees would be $2.8 million, and solar generating capacity fees would total at least $14.0 million.

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

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

12.1.19.3 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, updates to those analyses due to changes to the SEZ boundaries, 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.

12.1.20 Environmental Justice

12.1.20.1 Affected Environment

The data presented in the Draft Solar PEIS have not substantially changed due to the change in boundaries of the proposed Afton SEZ. There are minority, but no low-income populations in the New Mexico or Texas portions of the 50-mi (80-km) radius of the SEZ.

12.1.20.2 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 to moderate, and there are minority populations as defined by Council on Environmental Quality (CEQ) guidelines (CEQ 1997) (Section 12.1.20.1 of the Draft Solar PEIS) within the 50-mi (80-km) radius around the boundary of the SEZ. This means that any adverse impacts of solar projects could disproportionately affect minority populations. Because there are no low-income populations within the 50-mi (80-km) radius, according to CEQ guidelines, there would not be impacts on low-income populations.

12.1.20.3 SEZ-Specific Design Features and Design Feature Effectiveness

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

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

12.1.21 Transportation

12.1.21.1 Affected Environment

The changes in the SEZ boundaries do not change the majority of information on the affected environment provided in the Draft Solar PEIS. With the reduction in size of the SEZ, primarily in the northern region, from that presented in the Draft Solar PEIS, the proximity of the northern edge of the SEZ to I-10 is now within 3 to 4 mi (4.8 to 6.4 km) rather than approximately 0.5 mi (0.8 km).

12.1.21.2 Impacts

As stated in the Draft Solar PEIS, the primary transportation impacts are anticipated to be from commuting worker traffic. I-10 provides a regional traffic corridor that would experience small impacts for single projects that may have up to 1,000 daily workers, with an additional 2,000 vehicle trips per day (maximum). Such an increase is approximately 10% of the current traffic on I-10 as it passes the northern section of the SEZ. However, the exits on I-10 might experience moderate impacts with some congestion. Local road improvements would be necessary in any portion of the SEZ near I-10 that might be developed so as not to overwhelm the local roads near any site access point(s). Similarly, any access to portions of the SEZ using State Route 28 may require road improvements on State Route 28 or other local access roads.

Should up to two large projects with approximately 1,000 daily workers each be under development simultaneously, an additional 4,000 vehicle trips per day could be added to I-10 in the vicinity of the SEZ, assuming ride-sharing was not implemented and all access to the SEZ funneled through I-10 near the northern section of the SEZ (i.e., no workers commuted to work through local roads via State Routes 28 or 478 to the east). This would be about a 24% increase in the current average daily traffic level on most segments of I-10 near the northern portion of the SEZ and could have moderate impacts on traffic flow during peak commute times. The extent of the problem would depend on the relative locations of the projects within the SEZ, where the worker populations originate, and work schedules. The affected exits on I-10 would experience moderate impacts with some congestion. Local road improvements would be necessary in any portion of the SEZ near I-10 that might be developed so as not to overwhelm the local roads near any site access point(s). Similarly, any access to portions of the SEZ from the east using I-10 or State Routes 28 or 478 may also require road improvements on these roads and local access roads, dependent on the percentage of worker commuter traffic using those routes.

Solar development within the SEZ would affect public access along 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.

12.1.21.3 SEZ-Specific Design Features and Design Feature Effectiveness

Required programmatic design features that would reduce transportation impacts are described in Section A.2.2 of Appendix A of this Final Solar PEIS. The programmatic design features, including local road improvements, multiple site access locations, staggered work schedules, and ride-sharing, will 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, updates to those analyses due to changes to the SEZ boundaries, 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.

12.1.22 Cumulative Impacts

The analysis of potential impacts in the vicinity of the proposed Afton SEZ presented in the Draft Solar PEIS is still generally applicable for this Final Solar PEIS, although the impacts would decrease because the size of developable area of the proposed SEZ has been greatly reduced from 77,623 acres (314.1 km^2) to 29,964 acres (121.2 km^2). The following sections include an update to the information presented in the Draft Solar PEIS regarding cumulative effects for the proposed Afton SEZ.

12.1.22.1 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 the impact may occur (e.g., air quality impacts may have a greater geographic extent than impacts on visual resources). The BLM, the DoD, and the USDA administer most of the land around the Afton SEZ; the BLM administers approximately 32% of the lands within a 50-mi (80-km) radius of the SEZ.

12.1.22.2 Overview of Ongoing and Reasonably Foreseeable Future Actions

The proposed Afton SEZ decreased from 77,623 acres (314.1 km^2) to 30,706 acres (124.3 km^2), with an additional 742 acres (3.0 km^2) within the SEZ identified as non-developable. The Draft Solar PEIS included two other proposed SEZs in New Mexico, Mason Draw and Red Sands. These SEZs have been removed from further consideration.

There are approximately three pending ROW applications for solar facilities within 120 mi (190 km) of the Afton SEZ that could generate up to about 2,200 MW on public lands in New Mexico (see Table B-2 of Appendix B of this Final Solar PEIS). One of these applications (for a 600-MW parabolic trough facility on 3,000 acres [12 km^2]) is for lands within the proposed Afton SEZ. As of the end of October 2011, these three applications were not considered reasonably foreseeable future actions because they have no firm near-term plans or environmental documentation.

The list of reasonably foreseeable future actions related to energy production and distribution near the proposed Afton SEZ has been updated and presented in Table 12.1.22.2-1. The locations of projects listed in the table are shown in Figure 12.1.22.2-1. Projects not described in the Draft Solar PEIS are discussed below.

Roadrunner Solar Generating Facility. NRG Energy has constructed and is operating a 20-MW PV power plant on 210 acres (0.85 km^2) of industrial-zoned land, about 16 mi (26 km) south of the Afton SEZ. Construction of the facility required 200 workers at the peak of construction. Operation requires only one worker and some security guards (NRG Energy 2011).

Hatch Solar Energy Center. NextEra Energy Resources has constructed and is operating a 5-MW PV solar energy facility on a 39-acre (0.16-km^2) site in the Village of Hatch Industrial Park, 7 mi (11 km) west of the Village of Hatch, New Mexico, and about 35 mi (56 km) north of the proposed Afton SEZ (NextEra Energy 2011).

Sun Edison Solar Facility. SunEnergy is constructing a 12-MW PV solar generating station in the West Mesa Industrial Park, about 8 mi (13 km) west of Las Cruces, New Mexico, and about 5 mi (8 km) north of the SEZ. Construction of the facility required 230 workers at the peak of construction (MVEDA 2011).

12.1.22.2.1 Other Actions

No substantive changes have occurred to the projects listed in Table 12.1.22.2-3 of the Draft Solar PEIS.

12.1.22.3 General Trends

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

12.1.22.4 Cumulative Impacts on Resources

Total disturbance over 20 years in the proposed Afton SEZ is assumed to be about 23,971 acres (97.0 km^2) (80% of the developable area of the 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

TABLE 12.1.22.2-1 Ongoing and Reasonably Foreseeable Future Actions Related to Energy Development and Distribution near the Proposed Afton SEZ as Revised[a]

Description	Status	Resources Affected	Primary Impact Location
Renewable Energy Projects on BLM-administered lands			
None			
Other Solar Energy Projects			
Roadrunner Solar Generating Facility, 20-MW PV, 210 acres (industrial-zoned)	**Operating**	**Land use, terrestrial habitats, visual**	**About 16 mi[b] south of the proposed Afton SEZ**
Hatch Solar Energy Center, 5-MW PV, 39 acres (industrial park)	**Operating**	**Land use, terrestrial habitats, visual**	**About 35 mi north of the proposed Afton SEZ**
Sun Edison, 12-MW PV facility	**Under construction**	**Land use, terrestrial habitats, visual**	**About 5 mi north of the SEZ**
Transmission and Distribution Systems			
SunZia Southwest Transmission Project (two 500-kV lines)	DEIS May 2012[c]	Land use, terrestrial habitats, visual	Project Study Area includes the proposed Afton SEZ, most of central New Mexico, and a corridor through southwest New Mexico that connects to Arizona
High Plains Express Transmission Project (two 500-kV lines)	**Stage 1** Feasibility Study June 2008 **Stage 2 Feasibility Study 2010**	Land use, terrestrial habitats, visual	Conceptual route from northeast to southwest New Mexico via Luna, New Mexico, to Arizona

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

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

[c] See BLM (2012b) for details.

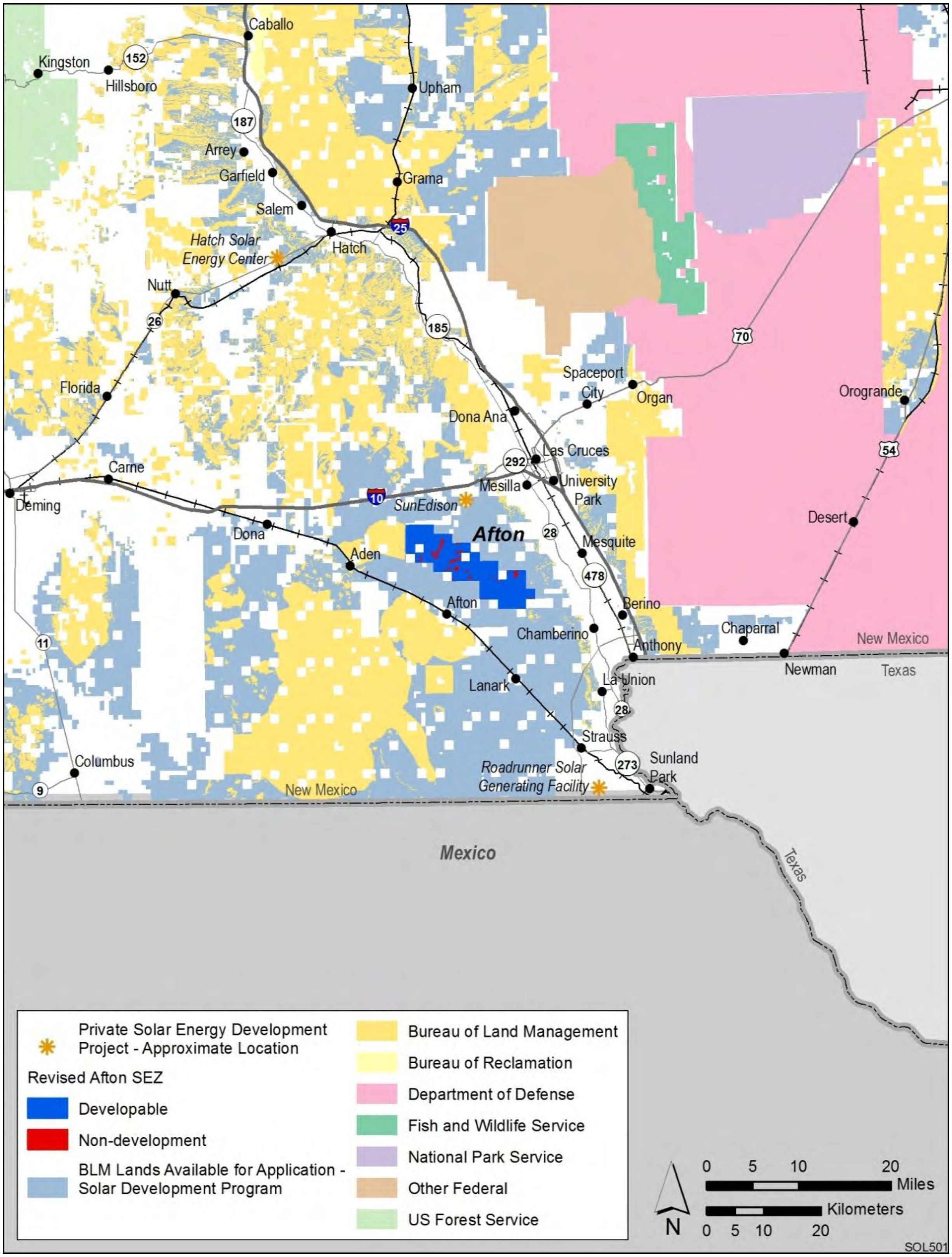

FIGURE 12.1.22.2-1 Locations of Existing and Reasonably Foreseeable Renewable Energy Projects on Public Land within a 50-mi (80-km) Radius of the Proposed Afton SEZ as Revised

from development in the Afton 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.

Three small solar projects have been added that were not addressed in the Draft Solar PEIS: Roadrunner Solar Generating Facility, a 20-MW PV facility on 120 acres (0.85 km^2); the Hatch Solar Energy Center, a 5-MW PV facility on 39 acres (0.85 km^2);, and the Sun Edison Solar Facility, a 12-MW PV facility. These projects encompass a few hundred acres of additional land committed to renewable energy development, compared to the removal of 59,826 acres (242.1 km^2) of potential developable area in both the Afton and Mason Draw SEZs. As a result, the incremental cumulative impacts associated with development in the proposed Afton SEZ during construction, operation, and decommissioning are expected to be the same or less than those projected in the Draft Solar PEIS.

12.1.23 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 proposed Afton 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 12.1.2 through 12.1.22, this Section is not an update of previous analysis for the Afton 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. Comments received on the material presented in the Supplement were used to improve the methodology used for the assessment presented in this Final Solar PEIS.

The Afton SEZ represents one of the more complex cases because of its potential to generate a large amount of solar power. On the basis of its size, the assumption of a minimum of 5 acres of land required per MW, and the assumption of a maximum of 80% of the land area developed, the Afton SEZ is estimated to have the potential to generate 4,794 MW of marketable solar power at full build-out.

12.1.23.1 Identification and Characterization of Load Areas

The primary candidates for Afton SEZ load areas are the major surrounding cities. Figure 12.1.23.1-1 shows the possible load areas for the Afton SEZ and the estimated portion of their market that could be served by solar generation. Possible load areas for the Afton SEZ include Albuquerque, Las Cruces, and Farmington, New Mexico; El Paso, Texas; Tucson, Yuma, and Phoenix, Arizona; Salt Lake City, Utah; Las Vegas, Nevada; and El Centro, San Diego, San Diego County, Los Angeles, and the major cities in San Bernardino and Riverside Counties, California.

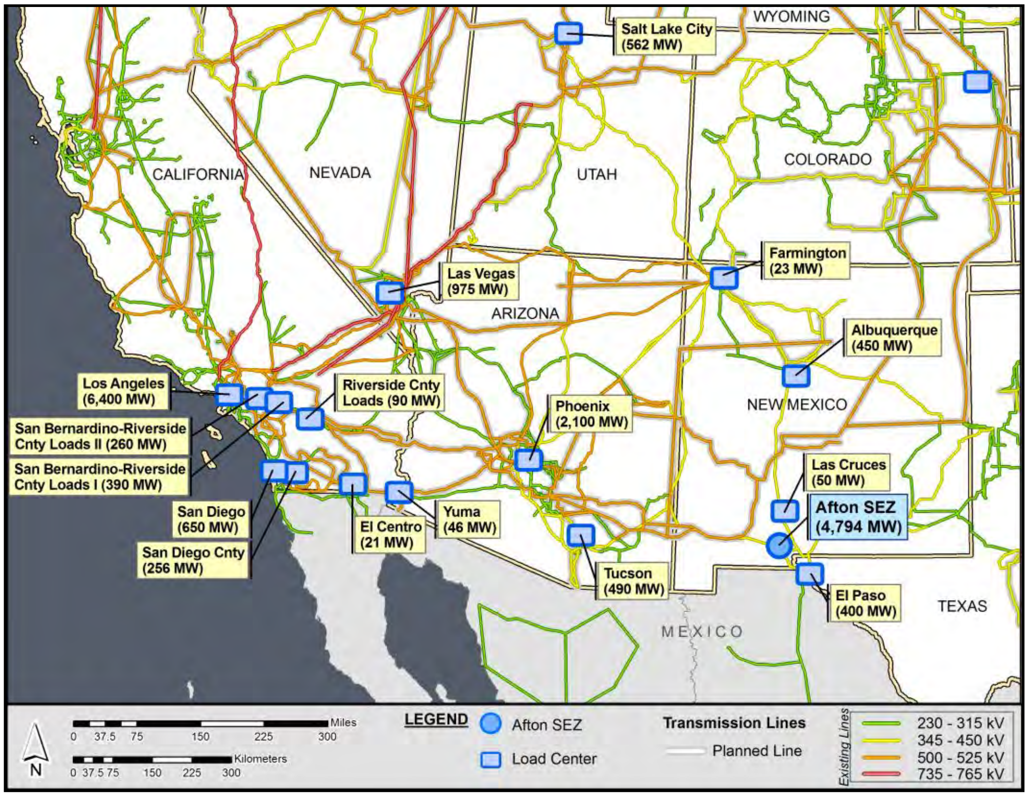

FIGURE 12.1.23.1-1 Location of the Proposed Afton SEZ and Possible Load Areas (Source for background map: Platts 2011)

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

1. Tucson and Phoenix, Arizona; Las Vegas, Nevada; Riverside County and San Bernardino–Riverside County load I, California; El Paso, Texas; Las Cruces, Albuquerque, and Farmington, New Mexico; and Salt Lake City, Utah; and

2. Tucson, Arizona; Riverside County, San Bernardino–Riverside County load I, San Bernardino–Riverside County load II, and Los Angeles, California; El Paso, Texas; Las Cruces, Albuquerque, and Farmington, New Mexico; and Salt Lake City, Utah.

Figure 12.1.23.1-2 shows the most economically viable transmission scheme for the Afton SEZ (transmission scheme 1), and Figure 12.1.23.1-3 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 4,794 MW could be fully allocated.

FIGURE 12.1.23.1-2 Transmission Scheme 1 for the Proposed Afton SEZ (Source for background map: Platts 2011)

Table 12.1.23.1-1 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.

12.1.23.2 Findings for the DLT Analysis

The DLT analysis approach assumes that the Afton SEZ will require all new construction for transmission lines (i.e., dedicated lines) and substations. The new transmission lines(s) would directly convey the 4,794-MW output of the Afton SEZ to the prospective load areas for each possible transmission scheme. The approach also assumes that all existing transmission lines in the WECC region are saturated and have little or no available capacity to accommodate the SEZ's output throughout the entire 10-year study horizon.

Figures 12.1.23.1-2 and 12.1.23.1-3 display the pathways that new dedicated lines might follow to distribute solar power generated at the Afton SEZ via the two identified transmission schemes described in Table 12.1.23.1-1. These pathways parallel existing 500-, 345-, 230-kV, and/or lower voltage lines. The intent of following existing lines is to avoid pathways that may be infeasible due to topographical limitations or other concerns.

FIGURE 12.1.23.1-3 Transmission Scheme 2 for the Proposed Afton SEZ (Source for background map: Platts 2011)

For transmission scheme 1, new lines would be constructed to connect with the Tucson (490 MW), Phoenix (2,100 MW), Las Vegas (975 MW), Riverside County (90 MW), San Bernardino–Riverside County load I (390 MW), El Paso (400 MW), Las Cruces (50 MW), Albuquerque (450 MW), Farmington (23 MW), and Salt Lake City (562 MW) areas, so that the 4,794-MW output of the Afton SEZ could be fully utilized by these 10 load centers (Figure 12.1.23.1-2). This particular scheme requires two primary paths consisting of 10 segments. The path to the west of the Afton SEZ begins with one segment that extends from the SEZ to the Tucson area (490 MW) over a distance of about 312 mi (502 km). On the basis of engineering and operational considerations, this segment would require a double-circuit, 765-kV (2–765 kV) bundle of four conductors (Bof4) transmission line design. The second segment extends to the northwest from Tucson (490 MW) to the Phoenix area (2,100 MW) over a distance of about 239 mi (385 km). This segment comprises three individual sub-segments: a double-circuit, 765-kV bundle of four conductors (184 mi [296 km]); a double-circuit, 500-kV bundle of three conductors (18 mi [29 km]); and a double-circuit, 345-kV bundle of two conductors (37 mi [60 km]) transmission line design. The third segment extends to the northwest from the Phoenix area (2,100 MW) to the Las Vegas area (975 MW) over a distance of about 252 mi (406 km). This segment would require a double-circuit, 345-kV bundle of two conductors (Bof2) transmission line design. The fourth segment extends to the west from the Phoenix area (2,100 MW) to Riverside County (90 MW) over a distance of about 240 mi (386 km). This segment would require a single-circuit, 345-kV bundle of two conductors transmission line

TABLE 12.1.23.1-1 Candidate Load Area Characteristics for the Proposed Afton SEZ

Transmission Scheme	City/Load Area Name	Position Relative to SEZ	2010 Population[f]	Estimated Total Peak Load (MW)	Estimated Peak Solar Market (MW)
1	Tucson, Arizona[a]	West	980,000	2,450	490
	Phoenix, Arizona[a]	Northwest	4,200,000	10,500	2,100
	Las Vegas, Nevada[a]	Northwest	1,950,000	4,875	975
	Riverside County, California[b]	West	180,000	450	90
	San Bernardino–Riverside County load I, California[c]	West	780,000	1,950	390
	El Paso, Texas[a]	East	800,000	2,000	400
	Las Cruces, New Mexico[d]	Northeast	100,000	250	50
	Albuquerque, New Mexico[a]	North	900,000	2,250	450
	Farmington, New Mexico[d]	North	46,000	115	23
	Salt Lake City, Utah[a]	North	1,124,000	2,810	562
2	Tucson, Arizona[a]	West	980,000	2,450	490
	Riverside County, California[b]	West	180,000	450	90
	San Bernardino–Riverside County load I, California[c]	West	780,000	1,950	390
	San Bernardino–Riverside County load II, California[e]	West	520,000	1,300	260
	Los Angeles, California[d]	West	12,800,000	32,000	6,400
	El Paso, Texas[a]	East	800,000	2,000	400
	Las Cruces, New Mexico[d]	Northeast	100,000	250	50
	Albuquerque, New Mexico[a]	North	900,000	2,250	450
	Farmington, New Mexico[d]	North	46,000	115	23
	Salt Lake City, Utah[a]	North	1,124,000	2,810	562

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

[b] The Riverside County load area includes the communities of Indio, Cathedral City, and Palm Springs.

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

[d] The load area represents the city named.

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

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

design. The fifth and final segment of the western transmission path extends to the west from the Riverside County area (90 MW) to San Bernardino–Riverside County load I (390 MW) over a distance of about 45 mi (72 km). This segment would require a single-circuit, 230-kV bundle of one conductor transmission line design.

The second primary transmission path transports energy to the east and north of the Afton SEZ and begins with one segment that extends from the SEZ to the El Paso area (400 MW) over a distance of about 56 mi (90 km). On the basis of engineering and operational considerations, this segment would require a double-circuit, 345-kV bundle of two conductors (Bof2) (23 mi [37 km]) sub-segment and a single-circuit, 345-kV bundle of two conductors (33 mi [53 km]) sub-segment transmission line design. The second segment extends to the north from the El Paso area (400 MW) to the Las Cruces area (50 MW) over a distance of about 18 mi (29 km). This segment would require a double-circuit, 345-kV bundle of two conductors transmission line design. The third segment extends to the north from the Las Cruces area (50 MW) to the Albuquerque area (450 MW) over a distance of about 205 mi (330 km). This segment would require a double-circuit, 345-kV bundle of two conductors transmission line design. The fourth segment extends to the north from the Albuquerque area (450 MW) to the Farmington area (23 MW) over a distance of about 173 mi (278 km). This segment would require a double-circuit, 138-kV bundle of one conductor transmission line design. The fifth and final segment extends to the north from the Farmington area (23 MW) to the Salt Lake City area (562 MW) over a distance of about 336 mi (541 km). This segment would require a double-circuit, 138-kV bundle of one conductor transmission line design. In general, the transmission configurations options were determined by using the line "loadability" curve provided in American Electric Power's *Transmission Facts* (AEP 2010), Appendix G documents the line options used for this analysis and describes how the load area groupings were determined.

For transmission scheme 2, Figure 12.1.23.1-3 shows that new lines would be constructed to connect with the Tucson (490 MW), Riverside County (90 MW), San Bernardino–Riverside County load I area (390 MW), San Bernardino–Riverside County load II area (260 MW), Los Angeles (6,400 MW), El Paso (400 MW), Las Cruces (50 MW), Albuquerque (450 MW), Farmington (23 MW), and Salt Lake City (562 MW) areas, so that the 4,794-MW output of the Afton SEZ could be fully utilized by these 10 load centers. This particular scheme requires two primary paths consisting of 10 segments. The path to the west of Afton SEZ begins with one segment that extends from the SEZ to the Tucson area (490 MW) over a distance of about 312 mi (502 km). On the basis of engineering and operational considerations, this segment would require a double-circuit, 765-kV (2–765 kV) bundle of four conductors (Bof4) transmission line design. The second segment extends to the west from Tucson (490 MW) to the Riverside County area (90 MW) over a distance of about 424 mi (682 km). This segment would require a double-circuit, 765-kV bundle of four conductors transmission line design. The third segment extends to the west from the Riverside County area (90 MW) to the San Bernardino–Riverside County load I (390 MW) area over a distance of about 45 mi (72 km). This segment would require a double-circuit, 500-kV bundle of three conductors transmission line design. The fourth segment extends to the west from the San Bernardino–Riverside County load I area (390 MW) to San Bernardino–Riverside County load II area (260 MW) over a distance of about 15 mi (24 km). This segment would require a double-circuit, 500-kV bundle of three conductors transmission line design. The fifth and final segment of the western transmission path extends to the west from the San Bernardino–Riverside County load II area (260 MW) to the Los Angeles area (6,400 MW) over a distance of about 42 mi (68 km). This segment would require a double-circuit, 500-kV bundle of three conductors transmission line design.

The second primary transmission path transports energy to the east and north of the Afton SEZ and begins with one segment that extends from the SEZ to the El Paso area (400 MW) over a distance of about 56 mi (90 km). On the basis of engineering and operational considerations, This segment would require a double-circuit, 345-kV bundle of two conductors (23 mi [37 km]) sub-segment and a single-circuit, 345-kV bundle of two conductors (33 mi [53 km]) sub-segment transmission line design, The second segment extends to the north from the El Paso area (400 MW) to the Las Cruces area (50 MW) over a distance of about 18 mi (29 km). This segment would require a double-circuit, 345-kV bundle of two conductors transmission line design. The third segment extends to the north from the Las Cruces area (50 MW) to the Albuquerque area (450 MW) over a distance of about 205 mi (330 km). This segment would require a double-circuit, 345-kV bundle of two conductors transmission line design. The fourth segment extends to the north from the Albuquerque area (450 MW) to the Farmington area (23 MW) over a distance of about 173 mi (278 km). This segment would require a double-circuit, 138-kV bundle of one conductor transmission line design. The fifth and final segment extends to the north from the Farmington area (23 MW) to the Salt Lake City area (562 MW) over a distance of about 336 mi (541 km). This segment would require a double-circuit, 138-kV bundle of one conductor transmission line design.

Table 12.1.23.2-1 summarizes the distances to the various load areas over which new transmission lines would need to be constructed, as well as the assumed number of substations that would be required. One substation is assumed to be installed at each load area and an additional one at the SEZ. Thus, in general, the total number of substations per scheme is simply equal to the number of load areas associated with the scheme plus one. Substations at the load areas will consist of one or more step-down transformers, while the originating substation at the SEZ would consist of several step-up transformers. The originating substation would have a rating of at least 4,794 MW (to match the plant's output), while the combined load substations would have a similar total rating of 4,794 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 12.1.23.2-2 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 the costs and area disturbed would be scheme 1, which would serve the Tucson, Phoenix, Las Vegas, Riverside County, San Bernardino–Riverside County load I, El Paso, Las Cruces, Albuquerque, Farmington, and Salt Lake City areas. This scheme is estimated to potentially disturb about 35,469 acres (143.5 km^2) of land. The less favorable transmission scheme with respect to minimizing the costs and area disturbed would be scheme 2, which serves the Tucson, Riverside County, San Bernardino–Riverside County load I, San Bernardino–Riverside County load II, Los Angeles, El Paso, Las Cruces, Albuquerque, Farmington, and Salt Lake City areas. For this scheme, the construction of new

TABLE 12.1.23.2-1 Potential Transmission Schemes, Estimated Solar Markets, and Distances to Load Areas for the Proposed Afton SEZ

Transmission Scheme	City/Load Area Name	Estimated Peak Solar Market (MW)[f]	Total Solar Market (MW)	Sequential Distance (mi)[g]	Total Distance (mi)[g]	Line Voltage (kV)	No. of Substations
1	Tucson, Arizona[a]	490	5,530	312	1,876	765	16
	Phoenix, Arizona[a]	2,100		239		765, 500, 345	
	Las Vegas, Nevada[a]	975		252		500, 345	
	Riverside County, California[b]	90		240		345	
	San Bernardino–Riverside County load I, California[c]	390		45		230	
	El Paso, Texas[a]	400		56		345	
	Las Cruces, New Mexico[d]	50		18		345	
	Albuquerque, New Mexico[a]	450		205		345	
	Farmington, New Mexico[d]	23		173		138	
	Salt Lake City, Utah[a]	562		336		138	
2	Tucson, Arizona[a]	490	9,115	312	1,626	765	15
	Riverside County, California[b]	90		424		765	
	San Bernardino–Riverside County load I, California[c]	390		45		500	
	San Bernardino–Riverside County load II, California[e]	260		15		500	
	Los Angeles, California[d]	6,400		42		500	
	El Paso, Texas[a]	400		56		345	
	Las Cruces, New Mexico[d]	50		18		345	
	Albuquerque, New Mexico[a]	450		205		345	
	Farmington, New Mexico[b]	23		173		138	
	Salt Lake City, Utah[a]	562		336		38	

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

[b] The Riverside County load area includes the communities of Indio, Cathedral City, and Palm Springs.

Footnotes continued on next page.

TABLE 12.1.23.2-1 (Cont.)

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

[d] The load area represents the city named.

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

[f] From Table 12.1.23.1-1.

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

TABLE 12.1.23.2-2 Comparison of the Various Transmission Line Configurations with Respect to Land Use Requirements for the Proposed Afton SEZ

				Land Use (acres)[g]		
Transmission Scheme	City/Load Area Name	Total Distance (mi)[f]	No. of Substations	Transmission Line	Substation	Total
1	Tucson, Arizona[a] Phoenix, Arizona[a] Las Vegas, Nevada[a] Riverside County, California[b] San Bernardino–Riverside County load I, California[c] El Paso, Texas[a] Las Cruces, New Mexico[d] Albuquerque, New Mexico[a] Farmington, New Mexico[d] Salt Lake City, Utah[a]	1,876	16	35,353.6	115.2	35,468.8
2	Tucson, Arizona[a] Riverside County, California[b] San Bernardino–Riverside County load I, California[c] San Bernardino–Riverside County load II, California[e] Los Angeles, California[d] El Paso, Texas[a] Las Cruces, New Mexico[d] Albuquerque, New Mexico[a] Farmington, New Mexico[d] Salt Lake City, Utah[a]	1,626	15	31,168.0	115.2	31,283.2

Footnotes on next page.

TABLE 12.1.23.2-2

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

[b] The Riverside County load area includes the communities of Indio, Cathedral City, and Palm Springs.

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

[d] The load area represents the city named.

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

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

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

transmission lines and substations is estimated to disturb a land area on the order of 31,283 acres (126.6 km^2).

Table 12.1.23.2-3 shows the estimated net present value (NPV) of both transmission schemes and takes into account the cost of constructing the lines and the substations and the projected revenue stream over the 10-year horizon. A positive NPV indicates that revenues more than offset investments. This calculation does not include the cost of producing electricity.

The most economically attractive configuration (transmission scheme 1) has the highest positive NPV and serves Tucson, Phoenix, Las Vegas, Riverside County, San Bernardino–Riverside County load I, El Paso, Las Cruces, Albuquerque, Farmington, and Salt Lake City. The secondary case (transmission scheme 2), which excludes one or more of the primary pathways used in scheme 1, is less economically attractive and serves the Tucson, Riverside County, San Bernardino–Riverside County load I, San Bernardino–Riverside County load II, Los Angeles, El Paso, Las Cruces, Albuquerque, Farmington, and Salt Lake City markets. For the assumed utilization factor of 20%, both options exhibit positive NPVs of similar magnitude, implying similar degrees of economic viability under the current assumptions.

Table 12.1.23.2-4 shows the effect of varying the value of the utilization factor on the NPV of the transmission schemes. It also shows that as the utilization factor is increased, the economic viability of the lines 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.

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

- Transmission scheme 1, which identifies Tucson, Phoenix, Las Vegas, Riverside County, San Bernardino–Riverside County load I, El Paso, Las Cruces, Albuquerque, Farmington, and Salt Lake City as the primary markets, represents the most favorable option based on NPV ($942 million based on a 20% utilization factor). However, in terms of and land use

TABLE 12.1.23.2-3 Comparison of Potential Transmission Lines with Respect to NPV (Base Case) for the Proposed Afton 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	Tucson, Arizona[a] Phoenix, Arizona[a] Las Vegas, Nevada[a] Riverside County, California[b] San Bernardino–Riverside County load I, California[c] El Paso, Texas[a] Las Cruces, New Mexico[d] Albuquerque, New Mexico[a] Farmington, New Mexico[d] Salt Lake City, Utah[a]	5,232.8	284.1	836.4	6,485.5	941.7
2	Tucson, Arizona[a] Riverside County, California[b] San Bernardino–Riverside County load I, California[c] San Bernardino–Riverside County load II, California[e] Los Angeles, California[d] El Paso, Texas[a] Las Cruces, New Mexico[d] Albuquerque, New Mexico[a] Farmington, New Mexico[d] Salt Lake City, Utah[a]	5,644.3	315.1	836.4	6,458.5	499.1

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

[b] The Riverside County load area includes the communities of Indio, Cathedral City, and Palm Springs.

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

[d] The load area represents the city named.

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

TABLE 12.1.23.2-4 Effects of Varying the Utilization Factor on the NPV of the Transmission Schemes for the Proposed Afton SEZ

Transmission Scheme	City/Load Area Name	NPV ($ million) at Different Utilization Factors					
		20%	30%	40%	50%	60%	70%
1	Tucson, Arizona[a] Phoenix, Arizona[a] Las Vegas, Nevada[a] Riverside County, California[b] San Bernardino–Riverside County load I, California[c] El Paso, Texas[a] Las Cruces, New Mexico[d] Albuquerque, New Mexico[a] Farmington, New Mexico[d] Salt Lake City, Utah[a]	942	4,171	7,400	10,629	13,859	17,088
2	Tucson, Arizona[a] Riverside County, California[b] San Bernardino–Riverside County load I, California[b] San Bernardino–Riverside County load II, California[e] Los Angeles, California[d] El Paso, Texas[a] Las Cruces, New Mexico[d] Albuquerque, New Mexico[a] Farmington, New Mexico[d] Salt Lake City, Utah[a]	499	3,728	6,958	10,187	13,416	16,645

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

[b] The Riverside County load area includes the communities of Indio, Cathedral City, and Palm Springs.

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

[d] The load area represents the city named.

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

requirements, estimated at 35,469 acres (143.5 km^2), scheme 1 is less favorable than scheme 2.

- Transmission scheme 2, which represents an alternative configuration if Phoenix is excluded, serves Tucson, Riverside County, San Bernardino–Riverside County load I, San Bernardino–Riverside County load II, Los Angeles, El Paso, Las Cruces, Albuquerque, Farmington, and Salt Lake City. In terms of new land disturbance, estimated at 31,283 acres (126.6 km^2), scheme 2 is more favorable than scheme 1. However, in terms of NPV ($499 million based on a 20% utilization factor), scheme 2 is less favorable than scheme 1.

- Other load area configurations are possible but would be less favorable than scheme 1 in terms of NPV. If new electricity generation at the proposed Afton SEZ is not sent to either of the two market sets identified above, the potential upper-bound impacts in terms of cost would be greater.

- The analysis of transmission requirements for the proposed Afton 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 Afton 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.

12.1.24 Impacts of the Withdrawal

The BLM is proposing to withdraw 29,964 acres (121 km^2) of public land comprising the proposed Afton 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 Afton 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 January 2012), there are no recorded mining claims within the land withdrawal area.

Although the mineral potential of the lands within the Afton 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 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).

12.1.25 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 their 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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12.1.26 Errata for the Proposed Afton 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 12.1.26-1 provides corrections to information presented in the Draft Solar PEIS and the Supplement to the Draft.

TABLE 12.1.26-1 Errata for the Proposed Afton SEZ (Section 12.1 of the Draft Solar PEIS and Section C.5.1 of the Supplement to the Draft Solar PEIS)

Section No.	Page No.	Line No.	Figure No.	Table No.	Correction
12.1.11.2					All uses of the term "neotropical migrants" in the text and tables of this section should be replaced with the term "passerines."
12.1.22.2.2	12.1-371	39–42			This text should read "***White Sands Missile Range (WSMR).*** The White Sands Missile Range, the Department of the Army's largest installation, covers approximately 2.2 million acres (8,900 km^2). The closest boundary is 23 mi (37 km) northeast of the SEZ. The facility began operating in 1945 and employs approximately 5,500 military personnel and contractors. The primary mission is to support missile development and test programs for the U.S. Army, Navy, Air Force, and NASA. WSMR supports approximately 3,200 to 4,300 test events annually (GlobalSecurity.org 2010d; WSMR 2009)."

12.2 MASON DRAW

As stated at the beginning of this chapter, the Mason Draw SEZ was dropped from further consideration through the Supplement to the Draft Solar PEIS. This section presents the information (with minor updates) provided in Appendix B of the Supplement to the Draft Solar PEIS on the rationale for dropping this SEZ.

12.2.1 Summary of Potential Impacts Identified in the Draft Solar PEIS

The proposed Mason Draw SEZ, as presented in the Draft Solar PEIS, had a total area of 12,909 acres (52 km^2). It is located in Doña Ana County in southern New Mexico (Figure 12.2.1-1). The nearest towns of Doña Ana, Las Cruces, Mesilla, Picacho, and University Park are at least 12 mi (19 km) from the SEZ. The nearest residences to the SEZ are about 3 mi (5 km) to the east.

Potential environmental and other impacts identified in the Draft Solar PEIS included the following:

- The historic setting of the route of the Butterfield Trail would be adversely affected by construction of solar facilities in the SEZ; this impact would be difficult to mitigate. There would be minor adverse impacts on scenic and recreational resources in the Prehistoric Trackways National Monument and the Robledo Mountains WA and ACEC.

- The grazing permits for the Corralitos Ranch grazing allotment would be reduced, and a maximum of 970 AUMs would be lost.

- Areas developed for solar energy production would be closed to recreational use, resulting in lost opportunities for backcountry driving, hiking and walking, bird-watching, and hunting.

- The DoD indicated that solar technologies with structures higher than 100 ft (30 m) would adversely affect military airspace.

- Impacts on soil resources (e.g., soil compaction, soil horizon mixing, soil erosion by wind and runoff, sedimentation, and soil contamination) could occur.

- Groundwater use would deplete the aquifer to the extent that, at a minimum, wet-cooling options would not be feasible.

- Clearing of a large portion of the proposed SEZ could affect wetland, dry wash, woodland, playa, and riparian habitats, depending on the amount of habitat disturbed. The establishment of noxious weeds could result in habitat degradation.

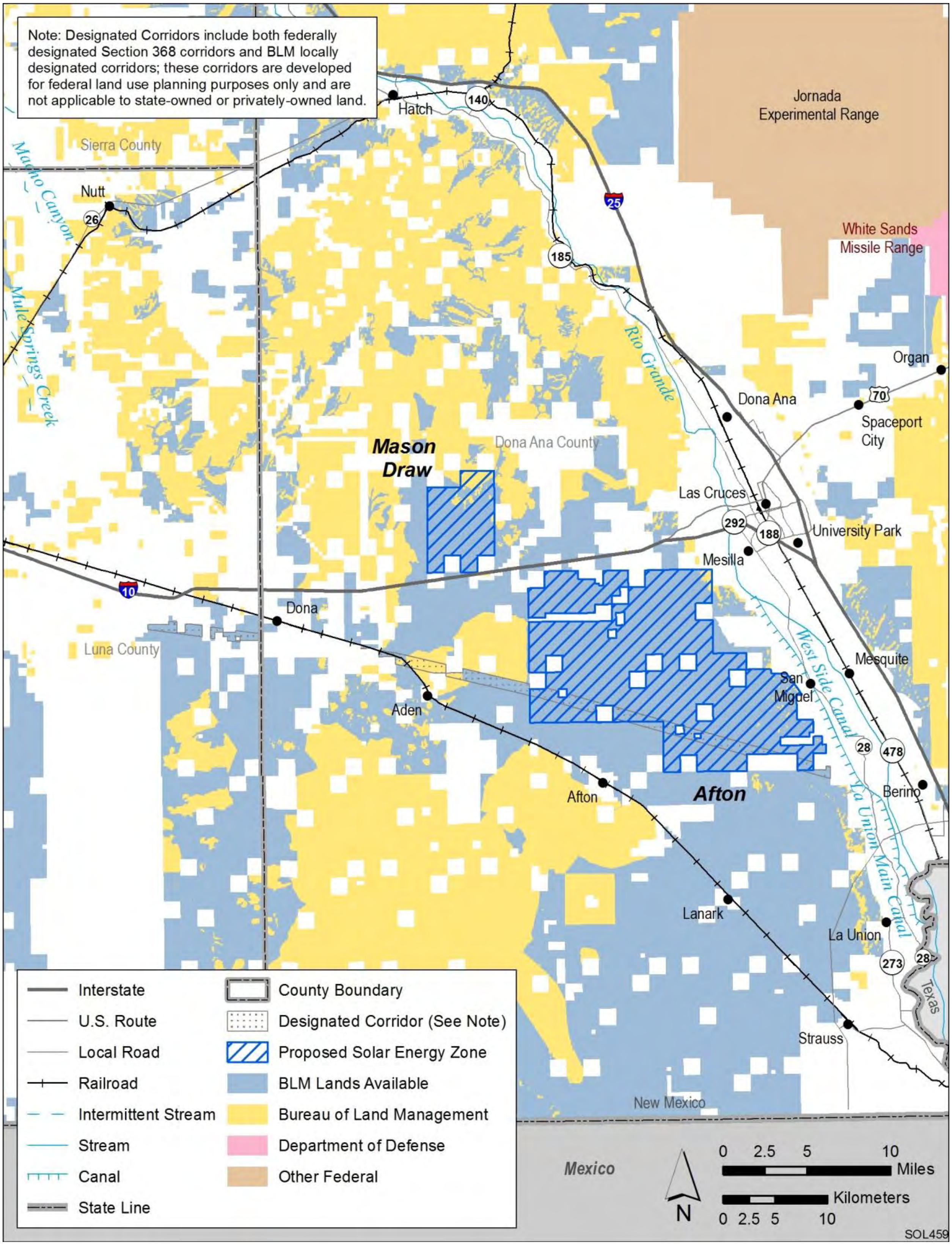

FIGURE 12.2.1-1 Proposed Mason Draw SEZ as Presented in the Draft Solar PEIS

- Potentially suitable habitat for 29 special status species occurs in the affected area of the proposed SEZ; less than 1.0% of the potentially suitable habitat for any of these species and any wildlife species occurs in the region that would be directly affected by development.

- If aquatic biota are present, they could be affected by the direct removal of surface water features within the construction footprint, a decline in habitat quantity and quality due to water withdrawals and changes in drainage patterns, as well as increased sediment and contaminant inputs associated with ground disturbance and construction activities.

- Temporary exceedances of ambient air quality standards for particulate matter at the SEZ boundaries are possible during construction. These high concentrations, however, would be limited to the immediate area surrounding the SEZ boundary.

- Although the SEZ is in an area of low scenic quality, strong visual contrasts could be observed by visitors to the Butterfield Trail and for travelers on I-10, I-25, and I-70. Moderate to strong visual contrasts could be observed by visitors to the Aden Hills SRMA.

- The potential for impacts on significant paleontological resources in the proposed SEZ is unknown but could be high. Direct impacts on significant cultural resources could occur in the proposed SEZ, especially in dune areas. Visual impacts on two trail systems, including a National Historic Trail would occur. The nearby Potrillo Mountains provided home bases for some Chiricahua groups. Views from these mountains may be of cultural importance.

- Minority populations occur within a 50-mi (80-km) radius of the proposed SEZ boundary; thus adverse impacts of solar development could disproportionately affect minority populations.

12.2.2 Summary of Comments Received

Of the comments received on the proposed Mason Draw SEZ, most were in favor of eliminating the area as an SEZ (NMDGF). Others supported designating the area as an SEZ, provided boundary adjustments were made. The Mesilla Valley Audubon Society and The Wilderness Society et al.[1] supported designating the area as an SEZ if the boundary were

[1] The Wilderness Society, New Mexico Wilderness Alliance, Defenders of Wildlife, Audubon New Mexico, Gila Resources Information Project, Gila Conservation Coalition, Western Environmental Law Center, Southwest Environmental Law Center, Upper Gila Watershed Alliance, Sierra Club, Natural Resources Defense Council, Soda Mountain Wilderness Council, and Sierra Trek submitted joint comments on the proposed New Mexico SEZs. Those comments are attributed to The Wilderness Society et al.

adjusted to exclude the Sleeping Lady Hills unit of the New Mexico Wilderness Alliance's Citizens' Proposed Wilderness Inventory.

The New Mexico Department of Agriculture expressed concern for ranching operations in the area and the disproportionate burden that would be placed on ranchers if development occurred on the SEZ. The NMDFG supported elimination of the Mason Draw SEZ because of the presence of large areas of intact native grassland of the Chihuahuan Semi-Desert Grasslands type, and populations of antelope, quail, and doves that make the area a popular and high-quality hunting and wildlife-watching recreational resource. The Wilderness Society et al. also had concerns about impacts on wildlife and wildlife habitat, including pronghorn, mule deer, and Aplomado falcon, as well as overlap of the SEZ with a portion of the Goodsight Mountains' Citizens' Proposed Wilderness Area on the northern end of the unit. The Full Circle Heritage Services recommended a robust ESA and Section 106 consultation process.

12.2.3 Rationale for Eliminating the SEZ

On the basis of public comments received on the Draft Solar PEIS, review by the BLM and continued review of potential impacts identified in the Draft Solar PEIS, the Mason Draw SEZ was eliminated from further consideration and will not be identified as an SEZ in applicable land use plans. The potential impacts from solar development in the proposed Mason Draw SEZ were considered sufficient reason to eliminate the area from further consideration.

Although the area has been dropped from consideration as an SEZ, the lands that composed the proposed Mason Draw SEZ will be retained as solar ROW variance areas, because the BLM expects that individual projects could be sited in this area to avoid and/or minimize impacts. Any solar development within this area in the future would require appropriate environmental analysis.

12.3 RED SANDS

As stated at the beginning of this chapter, the Red Sands SEZ was dropped from further consideration through the Supplement to the Draft Solar PEIS. This section presents the information (with minor updates) provided in Appendix B of the Supplement to the Draft Solar PEIS on the rationale for dropping this SEZ.

12.3.1 Summary of Potential Impacts Identified in the Draft Solar PEIS

The proposed Red Sands SEZ, as presented in the Draft Solar PEIS, had a total area of 22,520 acres (91 m^2). It is located in Otero County in south–central New Mexico (Figure 12.3.1-1). The towns of Boles Acres and Alamogordo are located about 2 mi (3 km) east and 6 mi (10 km) northeast of the SEZ, respectively.

Potential environmental and other impacts identified in the Draft Solar PEIS included the following:

- Because of the fragmented nature of the SEZ, it is likely that public access routes to lands outside the SEZ would be blocked by solar development.

- Wilderness characteristics in the Culp Canyon WSA would be adversely affected. Scenic values and recreational use in the Sacramento Escarpment ACEC and the USFS Roadless Areas on the front of the Sacramento Mountains would be adversely affected. Visitors to the eastern and southeastern portions of the White Sands National Monument would have clear views of development in portions of the SEZ, and this would have an adverse effect on visitor experience in the monument.

- Grazing permits for the Bar H W Ranch, Diamond A Ranch, Escondido Well, Lone Butte, and White Sands Ranch grazing allotments would be reduced. A maximum of 2,495 AUMs would be lost.

- Recreational use in the Culp Canyon WSA, Sacramento Escarpment ACEC, White Sands National Monument, and the USFS Roadless Areas would be adversely affected and would not be completely mitigated.

- The DoD expressed concern over any facilities constructed in the SEZ that could affect its current operations, including the potential for flight restrictions above any solar facilities and the height of solar facilities that could interfere with approaches to and departures from Holloman Air Force Base or that would intrude into low-level airspace.

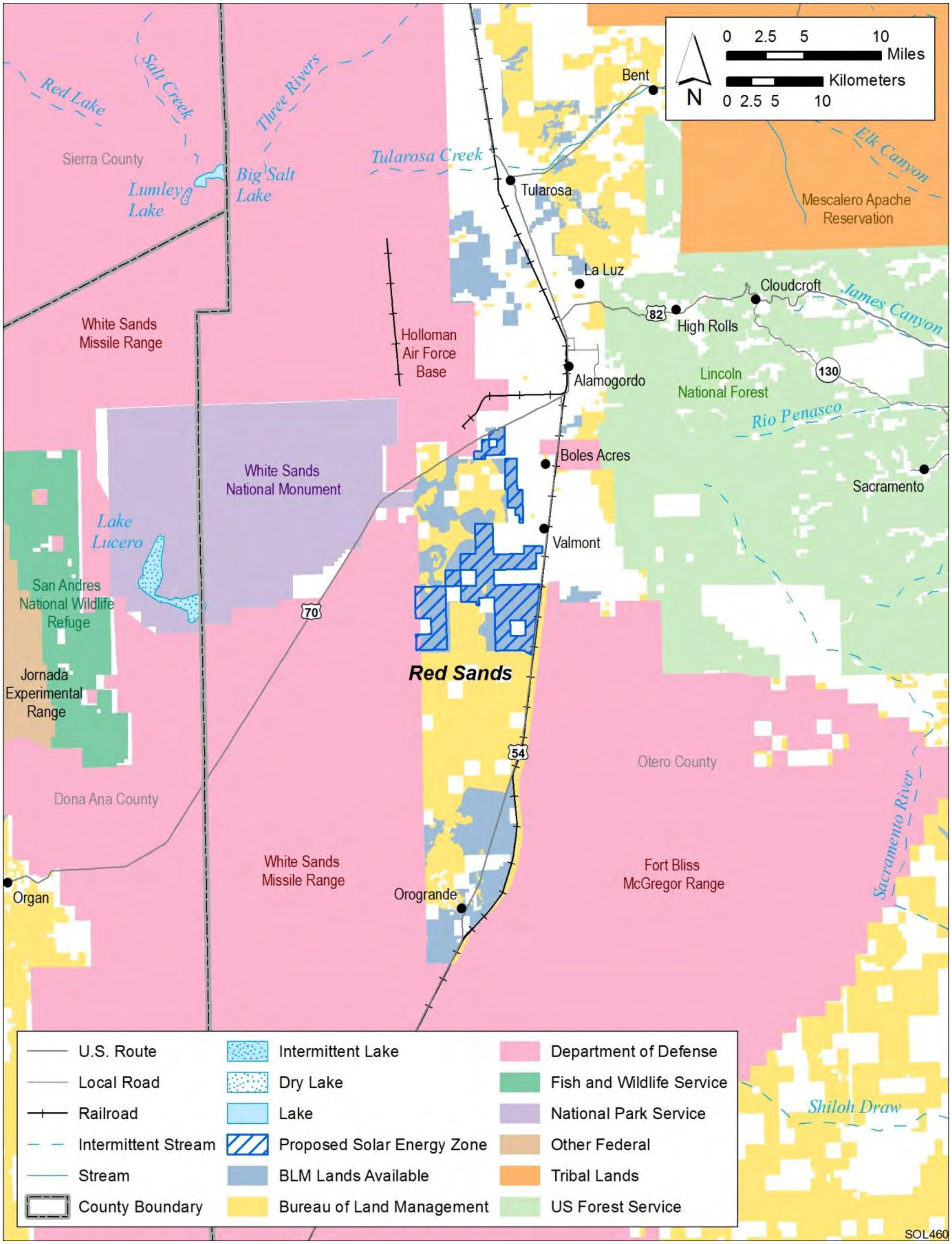

FIGURE 12.3.1-1 Proposed Red Sands SEZ as Presented in the Draft Solar PEIS

- Impacts on soil resources (e.g., soil compaction, soil horizon mixing, soil erosion by wind and runoff, sedimentation, and soil contamination) could occur.

- Groundwater use would deplete the aquifer to the extent that, at a minimum, wet-cooling options would not be feasible.

- Clearing of a large portion of the proposed SEZ could affect wetland, dry wash, playa, and dune habitats, depending on the amount of habitat disturbed. The establishment of noxious weeds could result in habitat degradation.

- Potentially suitable habitat for 43 special status species occurs in the affected area of the proposed SEZ. For most of these species and most wildlife species, less than 1.0% of the potentially suitable habitat occurs in the region that would be directly affected by development. For several special status species and two wildlife species, between 2 and 3% of the potentially suitable habitat in the region occurs in the area of direct effects.

- If aquatic biota are present in wetland, dry wash, riparian, or playa areas of the SEZ, they could be affected by the direct removal of surface water features within the construction footprint, a decline in habitat quantity and quality due to water withdrawals and changes in drainage patterns, as well as increased sediment and contaminant inputs associated with ground disturbance and construction activities.

- Temporary exceedances of ambient air quality standards for particulate matter at the SEZ boundaries are possible during construction. These high concentrations, however, would be limited to the immediate area surrounding the SEZ boundary.

- Although the SEZ is in an area of low scenic quality, strong visual contrasts could be observed by visitors to the White Sands National Monument, Culp Canyon WSA, Sacramento Escarpment ACEC, Lone Butte, and for travelers on I-70 and U.S. 54. Strong visual contrasts could be observed by residents of the communities of Alamogordo and Boles Acres.

- During construction, noise levels at the nearest residences could be higher than the EPA guidance levels. During operations, noise levels at the nearest residences could be above EPA guidance levels if CSP facilities with energy storage technologies (which could extend the daily operational time by 6 hours or more) were used at the SEZ, and equal to EPA guidance levels if dish engine technology were used at the SEZ.

- The potential for impacts on significant paleontological resources in the proposed SEZ is low. Direct impacts on significant cultural resources could occur in the proposed SEZ. The adjacent Sacramento and San Andres

Mountains provided home bases for some Mescalero groups. Views from these mountains may be of cultural importance.

- Minority populations occur within a 50-mi (80-km) radius of the proposed SEZ boundary; thus adverse impacts of solar development could disproportionately affect minority populations.

12.3.2 Summary of Comments Received

Many comments on the proposed Red Sands SEZ were received. Some commentors were in favor of eliminating the area as a SEZ (e.g., the National Parks Conservation Association, the Cultural Resources Preservation Council [CRPC]), while others (e.g., the NMDGF and The Wilderness Society et al.[1]) supported designating the area as an SEZ.

The Wilderness Society et al. was concerned that groundwater withdrawals might affect the White Sands pupfish. The CRPC recommended that the BLM modify the boundaries or drop the SEZ entirely. The CRPC also suggested that the BLM work closely with affected Tribes to determine whether development of the SEZ could cause adverse impacts on sacred viewsheds and whether those impacts could be adequately mitigated. The National Parks Conservation Association favored eliminating the Red Sands SEZ because development within the SEZ could jeopardize groundwater at White Sands National Monument, and because it would have adverse impacts on the development and stability of the gypsum sand dunes and on visual resources of the White Sands National Monument. The DoD recommended that no power tower facilities be allowed in the SEZ.

12.3.3 Rationale for Eliminating the SEZ

On the basis of public comments received on the Draft Solar PEIS, review by the BLM, and continued review of the potential impacts identified in the Draft Solar PEIS, the Red Sands SEZ was eliminated from further consideration and will not be identified as an SEZ in applicable land use plans. The potential impacts from solar development in the proposed Red Sands SEZ were considered sufficient reason to eliminate the area from further consideration as an SEZ.

Although the area has been dropped from consideration as an SEZ, the lands that composed the proposed Red Sands SEZ will be retained as solar ROW variance areas, because the BLM expects that individual projects could be sited in this area to avoid and/or minimize impacts. Any solar development within this area in the future would require appropriate environmental analysis.

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[1] The Wilderness Society, New Mexico Wilderness Alliance, Defenders of Wildlife, Audubon New Mexico, Gila Resources Information Project, Gila Conservation Coalition, Western Environmental Law Center, Southwest Environmental Law Center, Upper Gila Watershed Alliance, Sierra Club, Natural Resources Defense Council, Soda Mountain Wilderness Council, and Sierra Trek submitted joint comments on the proposed New Mexico SEZs. Those comments are attributed to The Wilderness Society et al.

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.

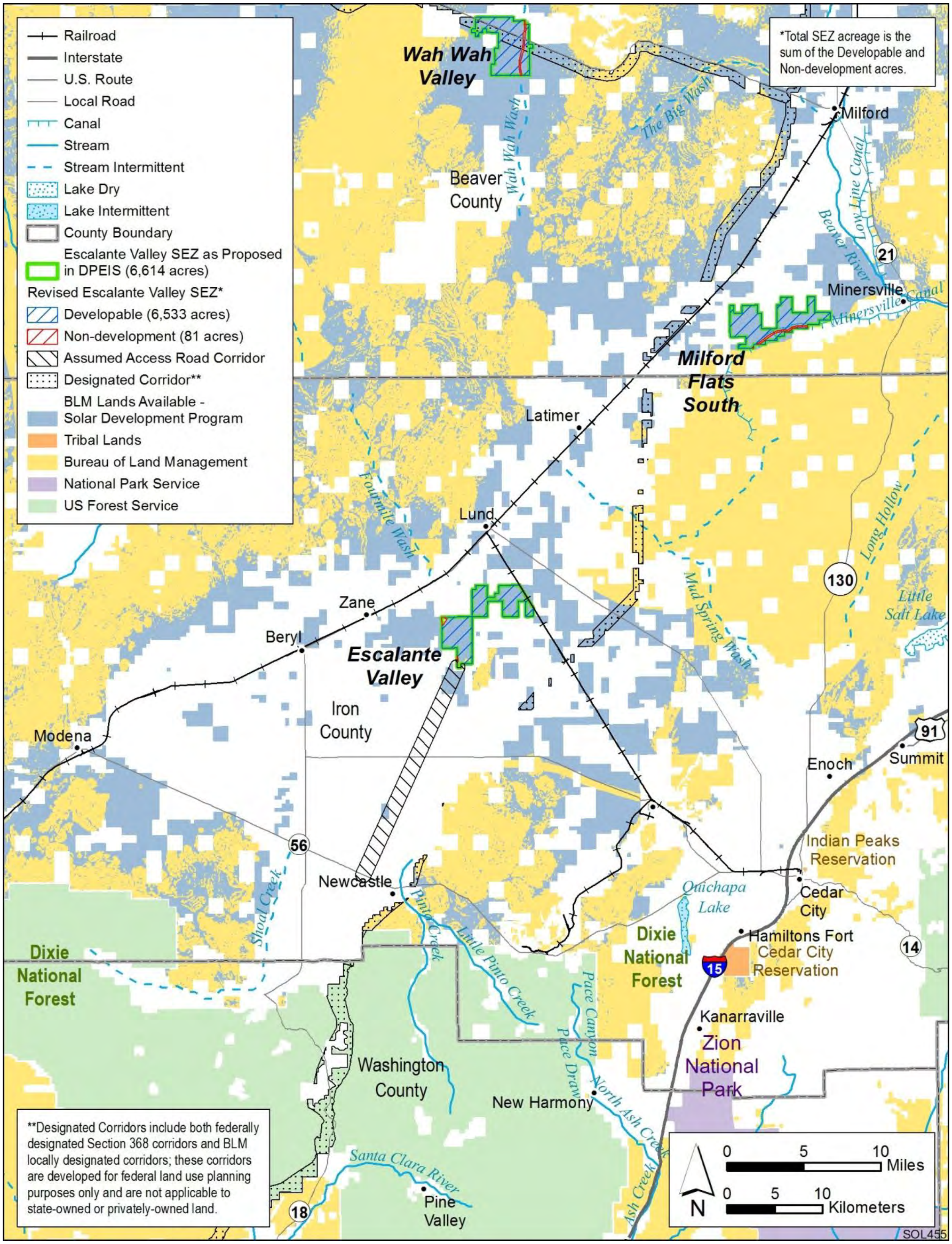
As published in the Draft Solar PEIS, the proposed Escalante Valley SEZ had a total area of 6,614 acres (27 km^2) (Figure 13.1.1.1-1). In the Supplement to the Draft Solar PEIS (BLM and DOE 2011), no boundary revisions were identified for the proposed SEZ. However, areas specified for non-development 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).

1



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

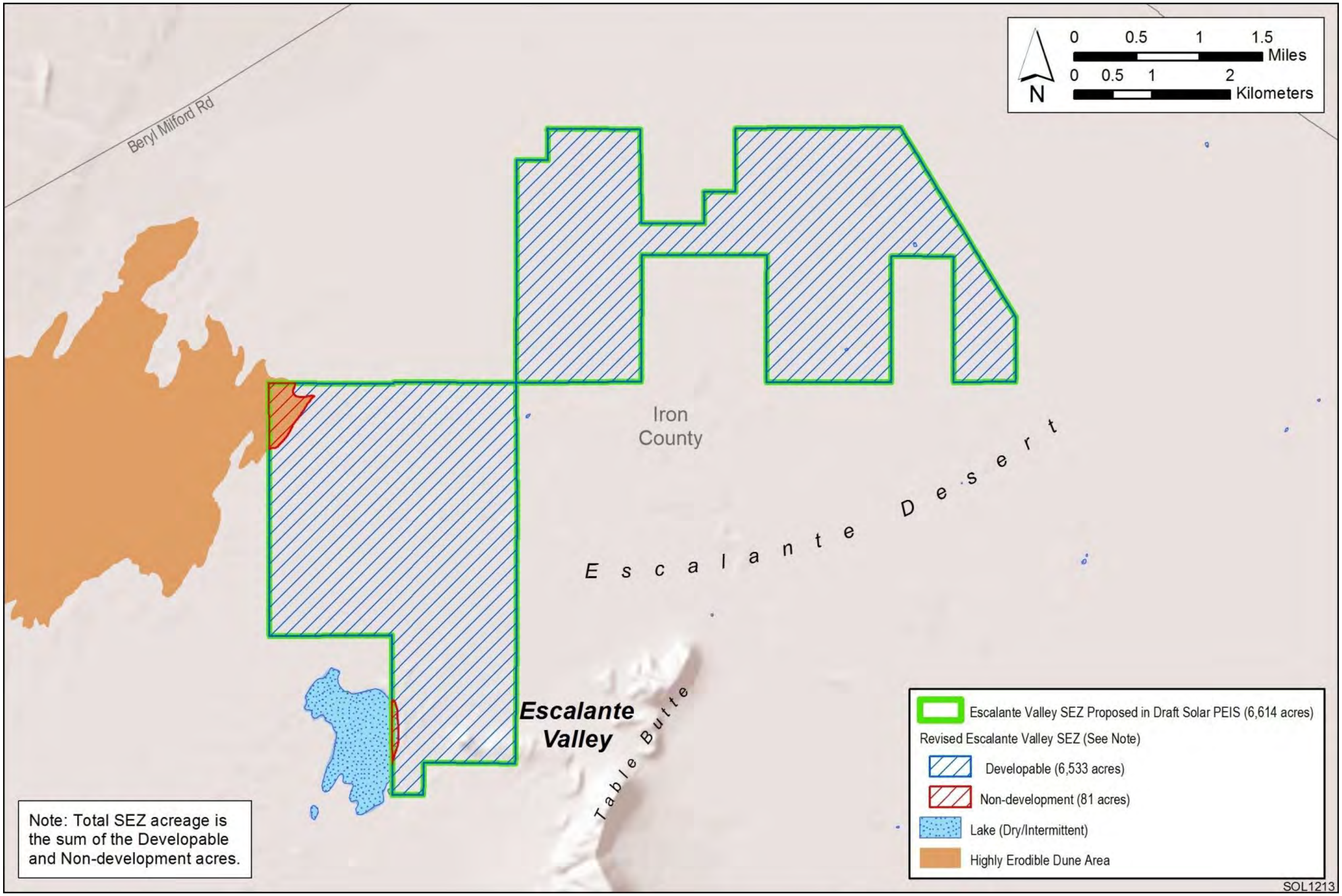


FIGURE 13.1.1.1-2 Developable and Non-development Areas for the Proposed Escalante Valley SEZ as Revised

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 Water[b]	Erosion Potential Wind[c]	Description	Area in Acres[d] (Percentage of SEZ)
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: Water[b]	Erosion Potential: Wind[c]	Description	Area in Acres[d] (Percentage of SEZ)
483903	Escalante sandy loam (1 to 5% slopes)	Moderate	Moderate (WEG 3)	Nearly level soils on alluvial flats and alluvial fan remnants. Parent material consists of alluvium from igneous and sedimentary rocks. Soils are very deep and well drained, with moderate surface runoff potential and high permeability. Available water capacity is moderate. Farmland of statewide importance.[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: Water[b]	Erosion Potential: Wind[c]	Description	Area in Acres[d] (Percentage of SEZ)
483825	Antelope Springs loam (0 to 2% slopes)	Moderate	Moderate (WEG 6)	Level to nearly level soils on alluvial flats and alluvial fan remnants. Parent material consists of alluvium from igneous and sedimentary rocks. Soils are very deep and well drained, with high surface runoff potential (slow infiltration rate) and high permeability. Available water capacity is moderate. Severe rutting hazard. Used mainly for rangeland.	16 (<1.0)
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

	Station (USGS ID)[a]			
Parameter	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

	Station (USGS ID)[a]	
Parameter	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).

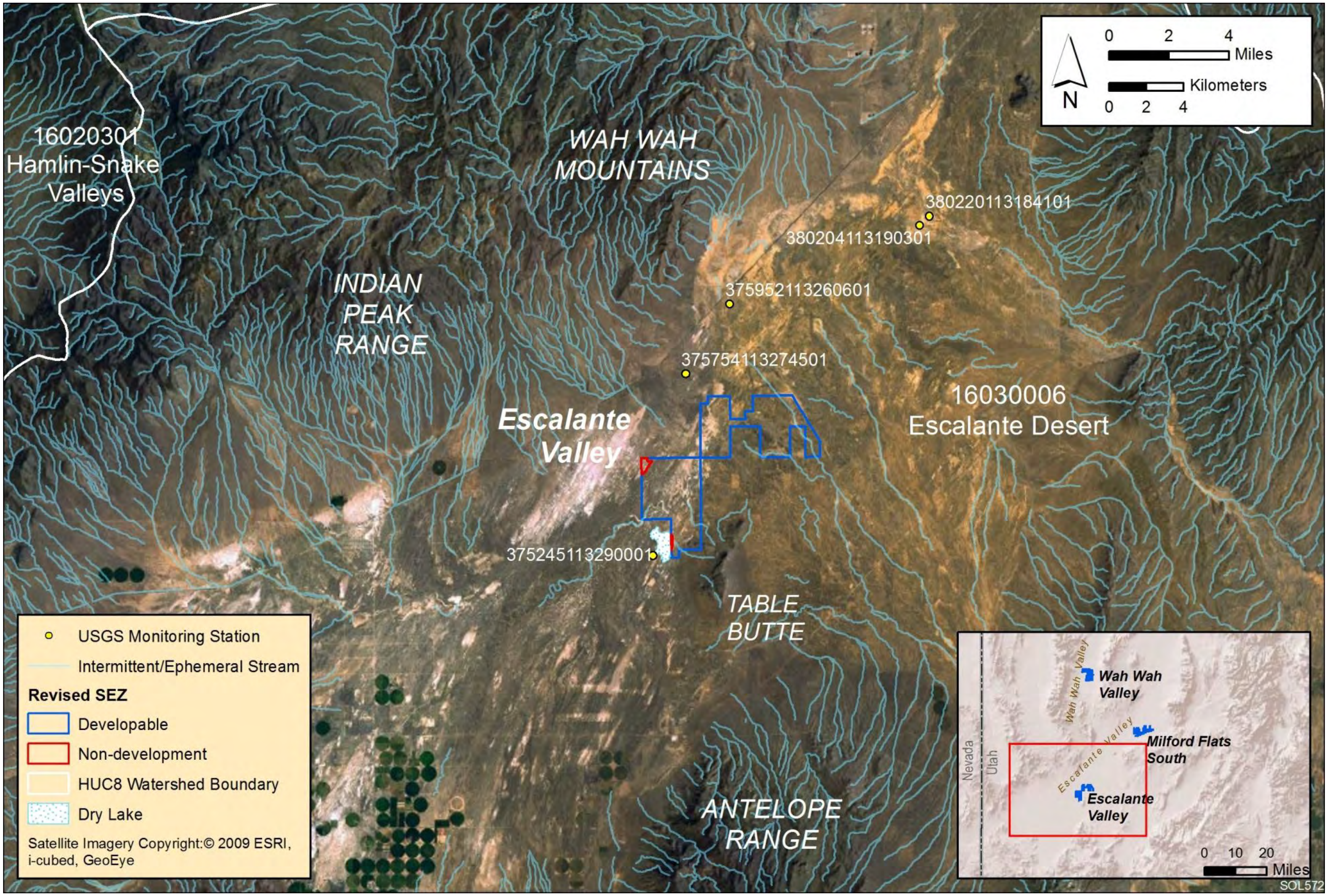


FIGURE 13.1.9.1-1 Water Features near the Proposed Escalante Valley SEZ as Revised

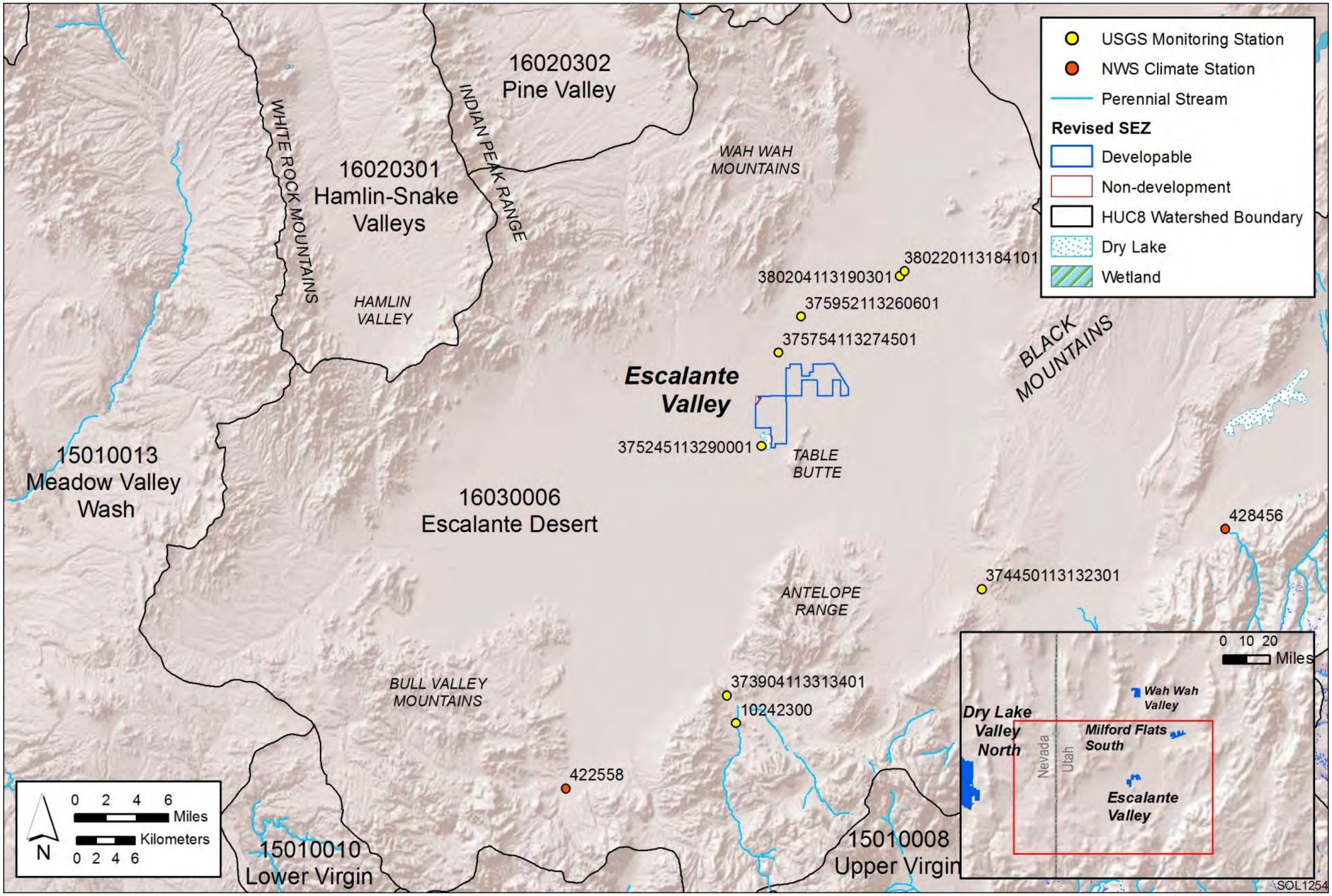


FIGURE 13.1.9.1-2 Water Features within the Escalante Desert Watershed, Which Includes the Proposed Escalante Valley SEZ as Revised

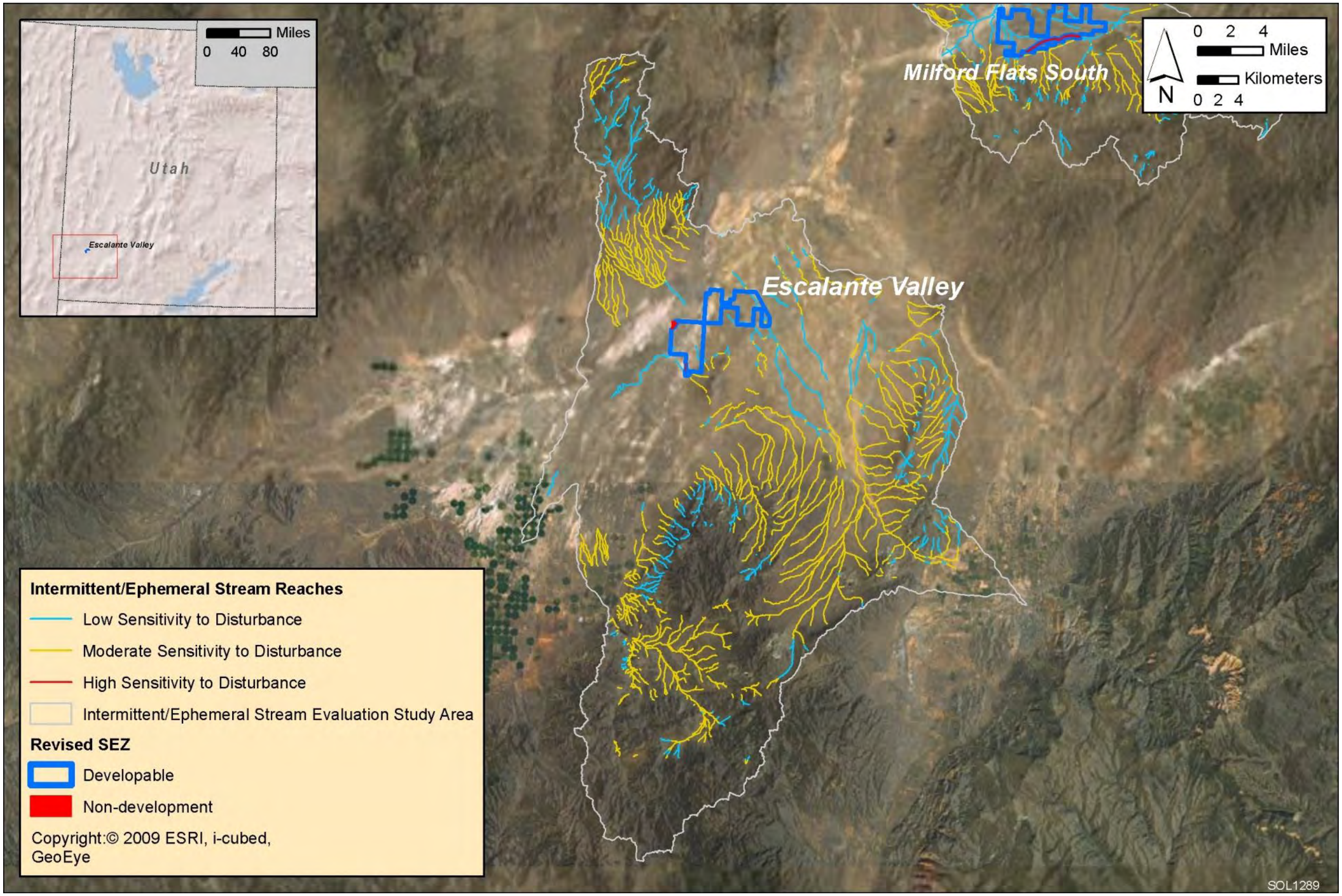


FIGURE 13.1.9.2-1 Intermittent/Ephemeral Stream Channel Sensitivity to Surface Disturbances in the Vicinity of the Proposed Escalante Valley SEZ as Revised

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.

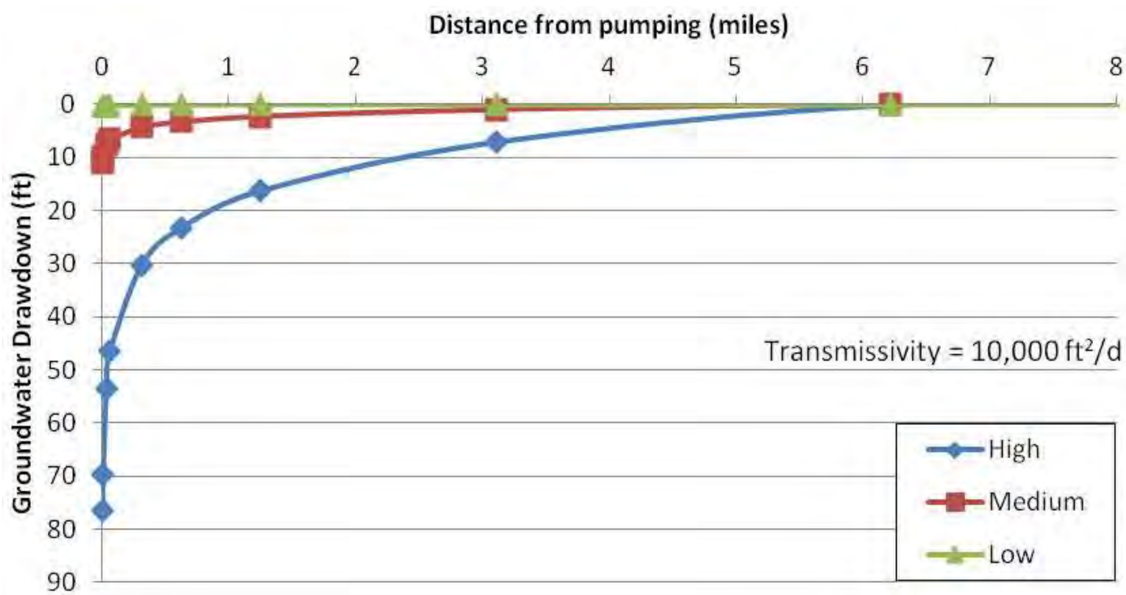


FIGURE 13.1.9.2-2 Estimated One-Dimensional Groundwater Drawdown Resulting from High, Medium, and Low Groundwater Pumping Scenarios over the 20-Year Operational Period at the Proposed Escalante Valley SEZ as Revised

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.

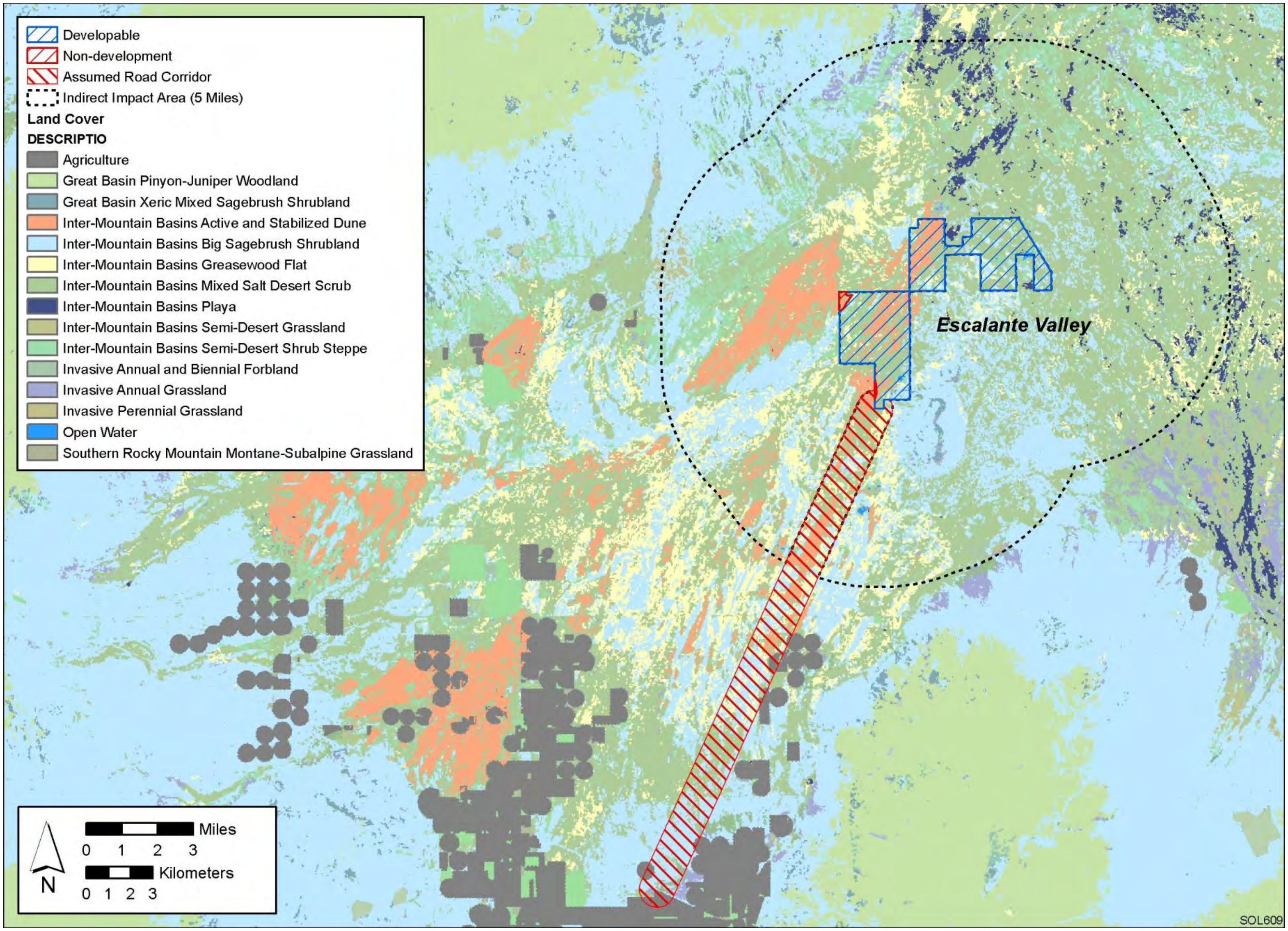


FIGURE 13.1.10.1-1 Land Cover Types within the Proposed Escalante Valley SEZ as Revised

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]	Access Road (Direct Effects)[f]	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.

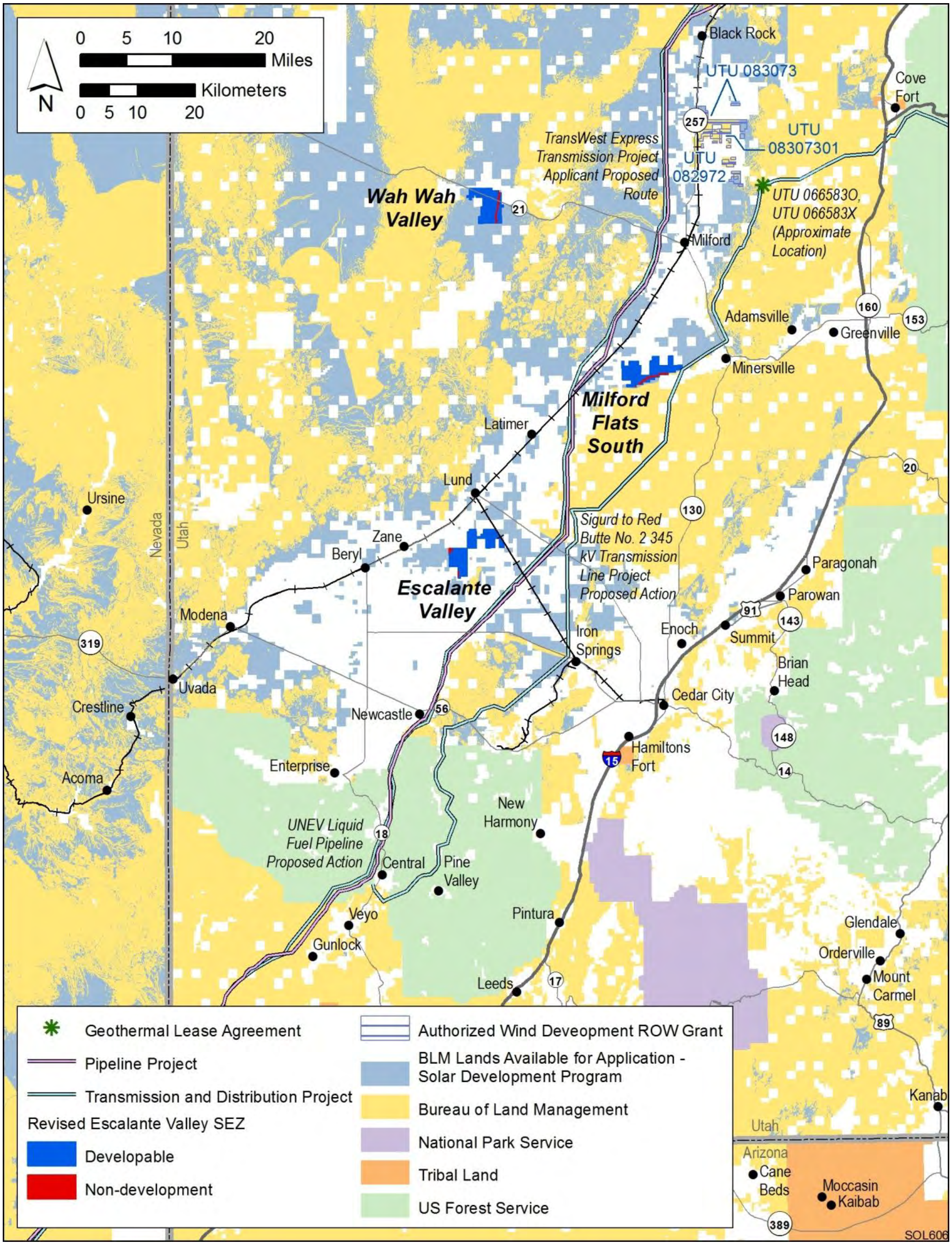


FIGURE 13.1.22.2-1 Locations of Existing and Reasonably Foreseeable Renewable Energy Projects on Public Land within a 50-mi (80-km) Radius of the Proposed Escalante Valley SEZ as Revised

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.

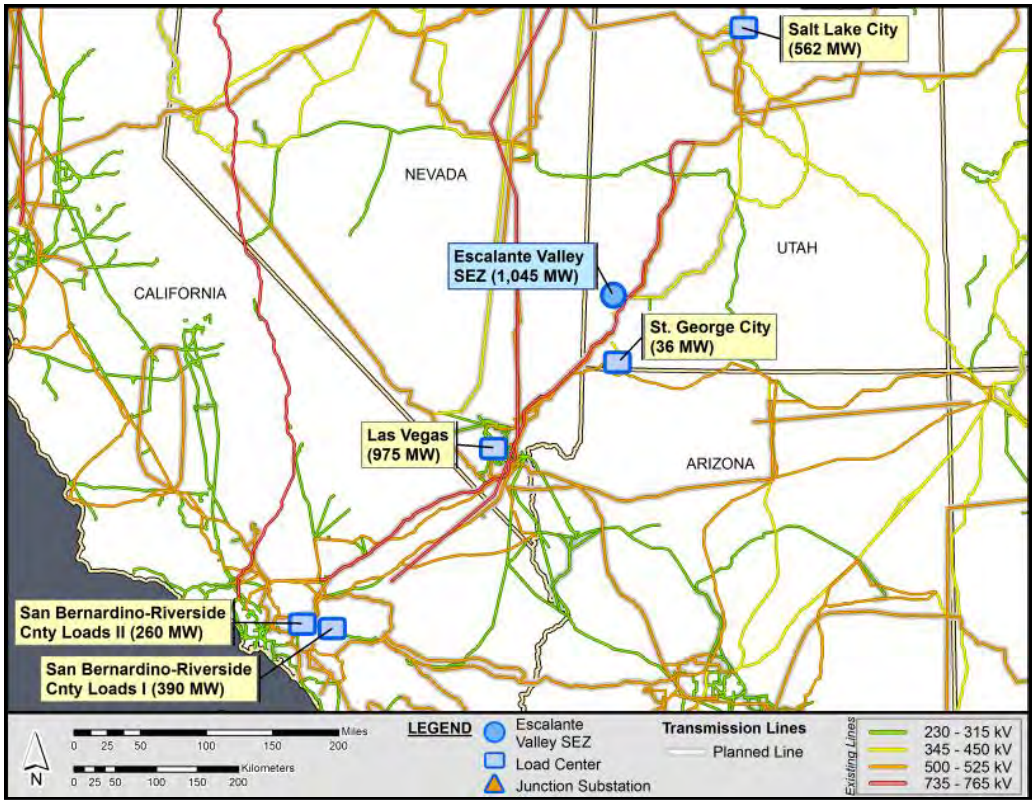


FIGURE 13.1.23.1-1 Location of the Proposed Escalante Valley SEZ and Possible Load Areas (Source for background map: Platts 2011)

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

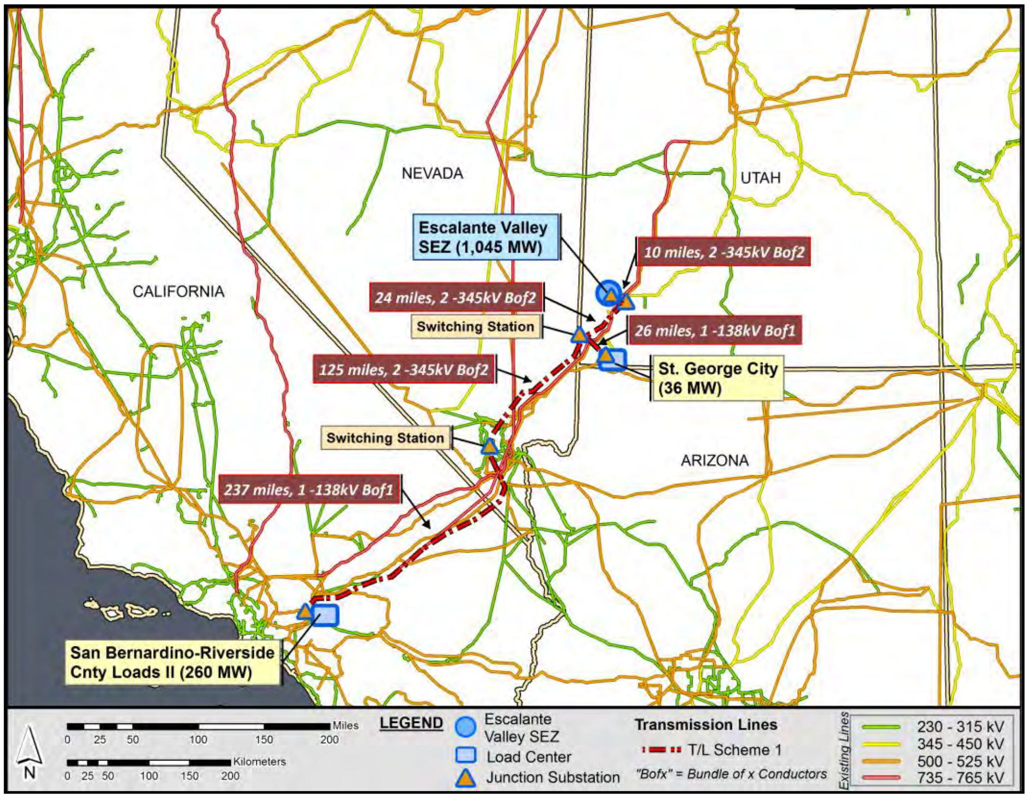


FIGURE 13.1.23.1-2 Transmission Scheme 1 for the Proposed Escalante Valley SEZ (Source for background map: Platts 2011)

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

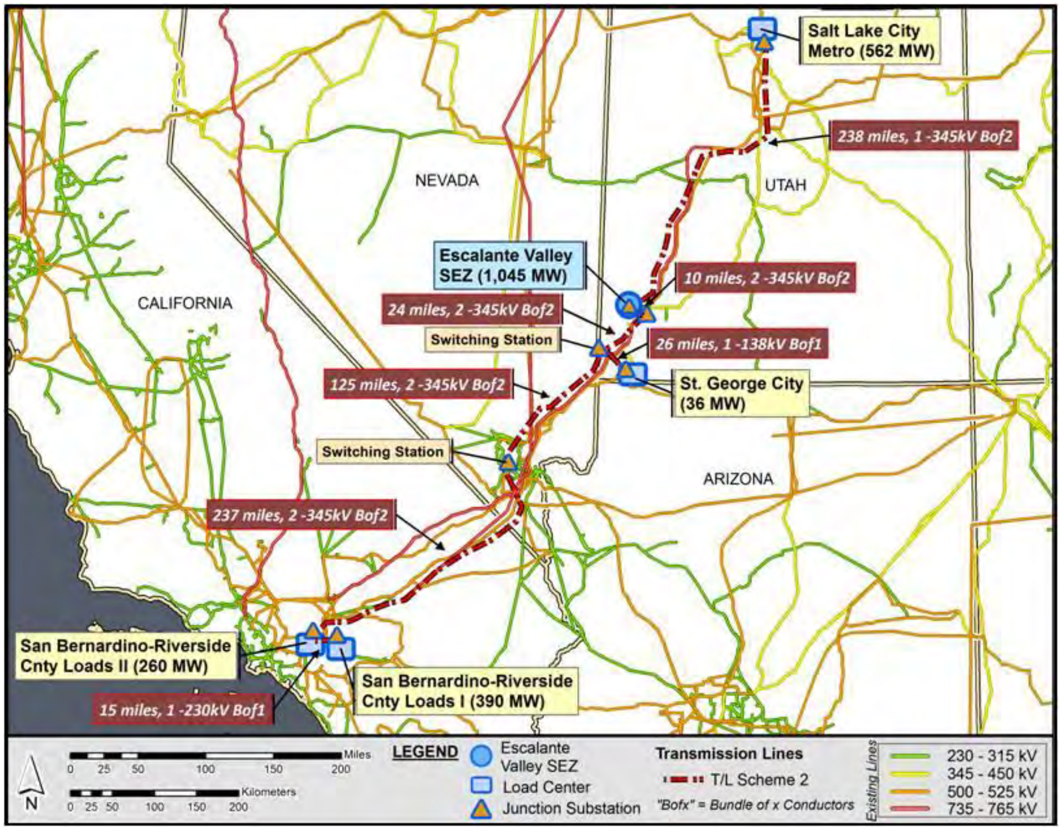


FIGURE 13.1.23.1-3 Transmission Scheme 2 for the Proposed Escalante Valley SEZ (Source for background map: Platts 2011)

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

				Land Use (acres)[f]		
Transmission Scheme	City/Load Area Name	Total Distance (mi)[e]	No. of Substations	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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13.2 MILFORD FLATS SOUTH

13.2.1 Background and Summary of Impacts

13.2.1.1 General Information

The proposed Milford Flats South SEZ is located in Beaver County in southwestern Utah about 21 mi (34 km) northeast of the proposed Escalante Valley SEZ. In 2008, the county population was 7,265, while adjacent Iron County to the south had a population of 45,833. The largest nearby city is Cedar City, about 30 mi (48 km) south–southeast in Iron County. Several small towns are located closer to the SEZ; Minersville is about 5 mi (8 km) east, and Milford is about 13 mi (21 km) north–northeast.

The nearest major road is State Route 21/130, about 5 mi (8 km) east in Minersville. A smaller spur of State Route 129 is about 3 mi (5 km) northwest of the SEZ. Access to the Milford Flats South SEZ is by county and local roads. Access to the interior of the SEZ is by dirt roads. The UP Railroad passes 2 mi (3 km) to the west of the SEZ and has a rail stop in Lund, 20 mi (32 km) southwest, and in Milford. As of October 28, 2011, there were no pending ROW applications for solar projects within the SEZ.

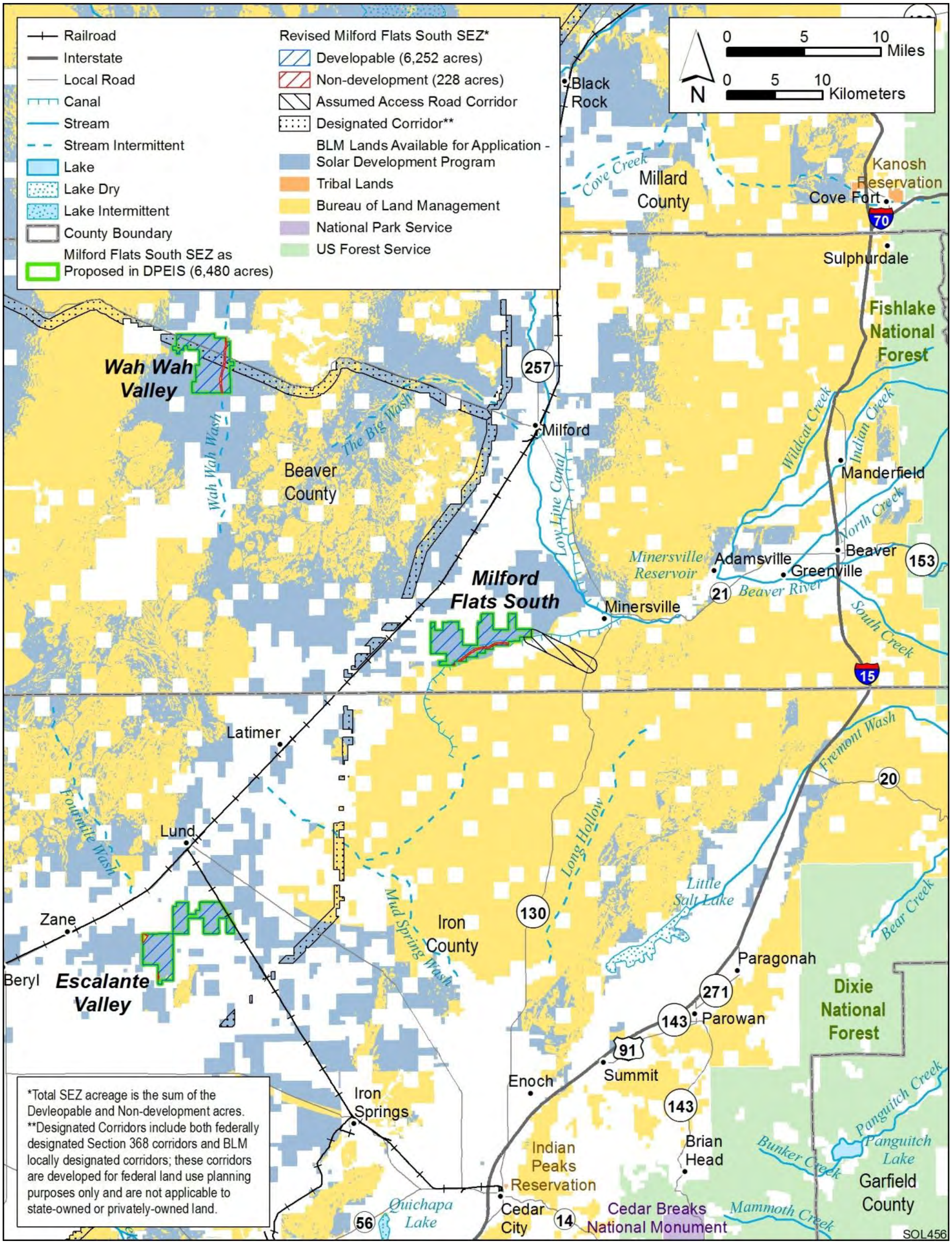
As published in the Draft Solar PEIS (BLM and DOE 2010, the proposed Milford Flats South SEZ had a total area of 6,480 acres (26 km^2) (see Figure 13.2.1.1-1). In the Supplement to the Draft Solar PEIS (BLM and DOE 2011), no boundary revisions were identified for the proposed SEZ. However, areas specified for non-development were mapped, where data were available (see Figure 13.2.1.1-2). For the proposed Milford Flats South SEZ, the 228 acres (0.9 km^2) composing the Minersville Canal was identified as a non-development area (see Figure C.6.2-2). The remaining developable area within the SEZ is 6,252 acres (25.3 km^2).

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

13.2.1.2 Development Assumptions for the Impact Analysis

Maximum solar development of the proposed Milford Flats South SEZ was assumed to be 80% of the SEZ area over a period of 20 years, a maximum of 5,002 acres (20 km^2). Full development of the proposed Milford Flats South SEZ would allow development of facilities with an estimated total of between 556 MW (power tower, dish engine, or PV technologies), 9 acres/MW [0.04 km^2/MW]) and 1,000 MW (solar trough technologies, 5 acres/MW [0.02 km^2/MW]) of electrical power capacity (Table 13.2.1.2-1).

1



2 **FIGURE 13.2.1.1-1 Proposed Milford Flats South SEZ as Revised**

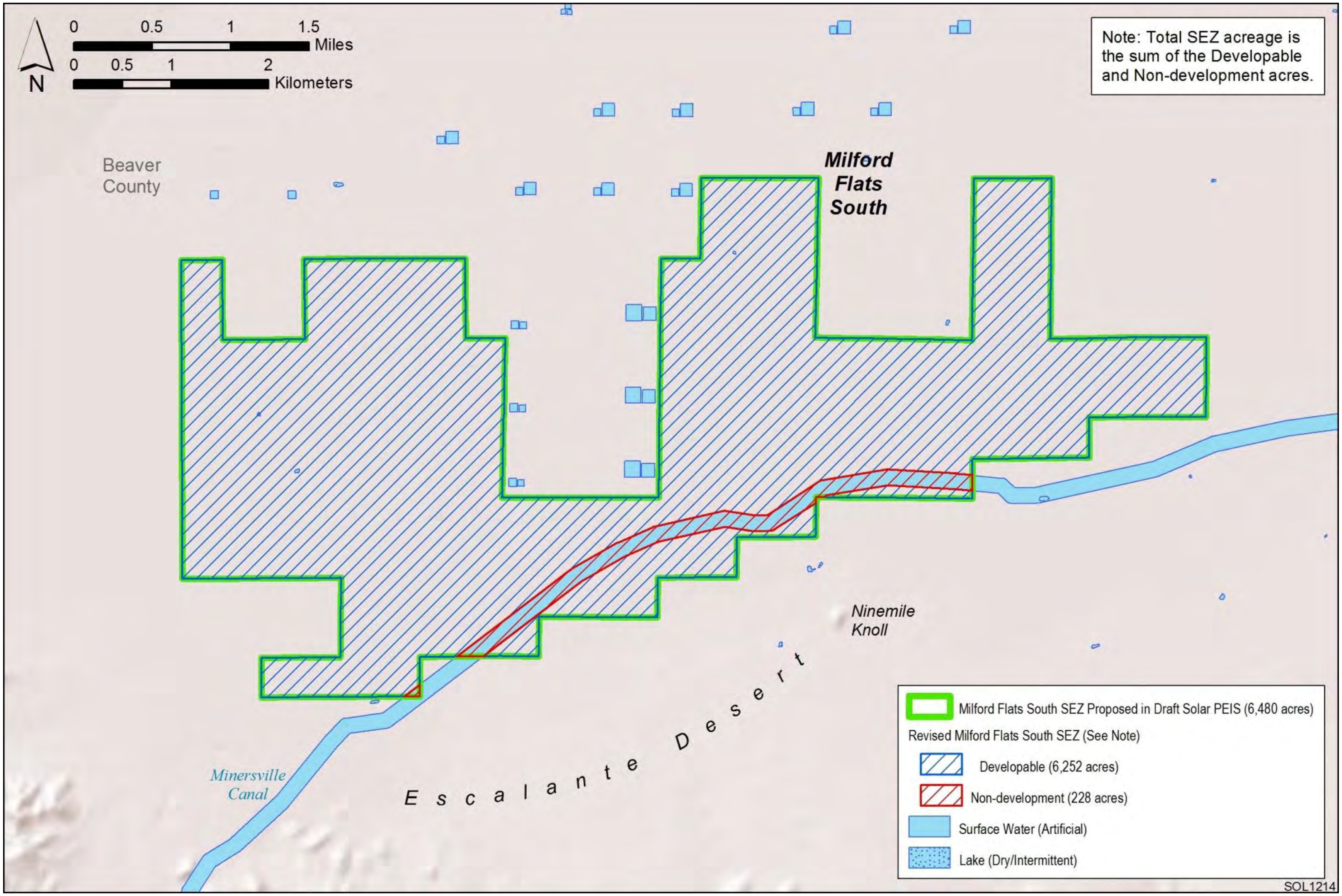


FIGURE 13.2.1.1-2 Developable and Non-development Areas for the Proposed Milford Flats South SEZ as Revised

TABLE 13.2.1.2-1 Assumed Development Acreages, Solar MW Output, and Nearest Major Access Road and Transmission Line for the Proposed Milford Flats South SEZ as Revised

Total Developable Acreage and Assumed Development Acreage (80% of Total)	Assumed Maximum SEZ Output for Various Solar Technologies	Distance to Nearest State, U.S., or Interstate Highway	Distance and Capacity of Nearest Existing Transmission Line	Assumed Area of Road ROW	Distance to Nearest Designated Corridor[e]
6,252 acres[a] and 5,002 acres	556 MW[b] 1,000 MW[c]	State Route 21/130: 5 mi[d]	19 mi and 345 kV	36 acres	2 mi (3 km)

[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.

Availability of transmission from SEZs to load centers will be an important consideration for future development in SEZs. For the proposed Milford Flats South SEZ, the nearest existing transmission line, as identified in the Draft Solar PEIS, is a 345-kV line 19 mi (31 km) southeast of the SEZ.[1] It is possible that a new transmission line could be constructed from the SEZ to this existing line, but the capacity of the line would be inadequate for the possible 556 to 1,000 MW of new capacity. Therefore, at full build-out capacity, new transmission lines and possibly also upgrades of existing transmission lines would be required to bring electricity from the proposed Milford Flats South SEZ to load centers. An assessment of the most likely load center destinations for power generated at the Milford Flats South SEZ and a general assessment of the impacts of constructing and operating new transmission facilities to those load centers is provided in Section 13.2.23. 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 Milford Flats South 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 576 acres (2.3 km^2) of land disturbance for a hypothetical transmission

[1] There is also a DC transmission line located 2 mi (3 km) to the northwest of the SEZ. Tie-in to the DC line from the SEZ is not considered likely.

corridor to the existing transmission line is no longer assumed (although the impacts of required new transmission overall are addressed in Section 13.2.23).

For the proposed Milford Flats South SEZ, State Route 21/130 lies about 5 mi (8 km) to the east of the SEZ. On the basis of the assumption that construction of a new access road to reach State Route 21/130 would be needed to support construction and operation of solar facilities, approximately 36 acres (0.15 km^2) of land disturbance would occur (a 60-ft [18-m] wide ROW is assumed).

13.2.1.3 Programmatic and SEZ-Specific Design Features

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

The discussions below addressing potential impacts of solar energy development on specific resource areas (Sections 13.2.2 through 13.2.22) 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 Milford Flats South SEZ may be required in addition to the programmatic design features. The proposed SEZ-specific design features for the Milford Flats South SEZ have been updated on the basis of revisions to the SEZ since the Draft Solar PEIS (such as boundary changes and the identification of non-development areas) and on the basis of comments received on the Draft and Supplement to the Draft Solar PEIS. All applicable SEZ-specific design features identified to date (including those from the Draft Solar PEIS that are still applicable) are presented in Sections 13.2.2 through 13.2.22.

13.2.2 Lands and Realty

13.2.2.1 Affected Environment

The boundaries of the Milford Flats South SEZ as proposed in the Draft Solar PEIS have not changed. A total of 228 acres (0.9 km^2) along the Minersville Canal along the southern boundary of the SEZ have been identified as a non-development area. The presence of the canal separates about 285 acres (1.2 km^2) from the rest of the SEZ that will likely not be developable because of the lack of access. The remaining description of the area in the Draft Solar PEIS remains valid.

13.2.2.2 Impacts

Full development of the proposed Milford Flats South SEZ would disturb up to 5,002 acres (20.2 km^2) and would exclude many existing and potential uses of the public land. Existing ROWs located within the SEZ are prior existing rights and would be protected. The remaining analysis of impacts presented in the Draft Solar PEIS remains valid.

13.2.2.3 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 shall be given to utilizing existing county 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.

13.2.3 Specially Designated Areas and Lands with Wilderness Characteristics

13.2.3.1 Affected Environment

The Granite Peak wilderness inventory unit and the route of the Old Spanish National Historic Trail are within 25 mi (40 km) of the proposed SEZ. The description of the area in the Draft Solar PEIS remains valid.

13.2.3.2 Impacts

There are no anticipated impacts on specially designated areas. The analysis in the Draft Solar PEIS remains valid.

13.2.3.3 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 some mitigation for the identified impacts.

No SEZ-specific design features for specially designated areas have been identified through 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.

13.2.4 Rangeland Resources

13.2.4.1 Livestock Grazing

13.2.4.1.1 Affected Environment

There are three perennial grazing allotments that overlie the proposed Milford Flats South SEZ. The description of the area in the Draft Solar PEIS remains valid.

13.2.4.1.2 Impacts

It is estimated that a total of 360 AUMs of livestock forage would be lost from the three allotments. The discussion of impacts on grazing in the Draft Solar PEIS indicated that the anticipated loss of AUMs would not be significant and this may not be correct. While it is not likely that the Minersville No. 5 allotment will incur a significant impact, the effect on Minersville No. 4 and No. 6, though small, may not be insignificant to these operations.

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 the Draft Solar PEIS is still valid.

13.2.4.1.3 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 will 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.

13.2.4.2 Wild Horses and Burros

13.2.4.2.1 Affected Environment

As presented in the Draft Solar PEIS, no wild horse or burro HMAs occur within the proposed Milford Flats South SEZ or in close proximity to it.

13.2.4.2.2 Impacts

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

13.2.4.2.3 SEZ-Specific Design Features and Design Feature Effectiveness

Because solar energy development within the proposed Milford Flats South 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.

13.2.5 Recreation

13.2.5.1 Affected Environment

The proposed Milford Flats South SEZ offers little potential for recreational use, largely because of the presence of confined hog-rearing operations on adjacent private lands. The area may be used occasionally by local residents for general recreational purposes. The description in the Draft Solar PEIS remains valid.

13.2.5.2 Impacts

Recreational users would be excluded from any portions of the SEZ developed for solar energy production, but impacts on recreational use are anticipated to be low.

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.

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

13.2.5.3 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.

13.2.6 Military and Civilian Aviation

13.2.6.1 Affected Environment

There are no identified military or civilian aviation uses in near proximity to the proposed Milford Flats South SEZ.

13.2.6.2 Impacts

There are no identified impacts on military or civilian aviation facilities associated with the proposed Milford Flats South SEZ.

13.2.6.3 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 these 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 and civilian aviation have been identified in this Final Solar PEIS. Some SEZ-specific design features may be identified through the process of preparing parcels for competitive offer and subsequent project-specific analysis.

13.2.7 Geologic Setting and Soil Resources

13.2.7.1 Affected Environment

13.2.7.1.1 Geologic Setting

Data provided in the Draft Solar PEIS remain valid. The boundaries of the proposed Milford Flats South SEZ remain the same, but 228 acres (0.92 km^2) along the Minersville Canal has been identified as a non-development area.

13.2.7.1.2 Soil Resources

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

- Table 13.2.7.1-1 provides revised areas for soil map units taking into account the non-development area within the proposed Milford Flats South SEZ as revised.

- Biological soil crusts are likely present within the proposed Milford Flats South SEZ as revised.

13.2.7.2 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

TABLE 13.2.7.1-1 Summary of Soil Map Units within the Proposed Milford Flats South SEZ as Revised

Map Unit Symbol[a]	Map Unit Name	Erosion Potential: Water[b]	Erosion Potential: Wind[c]	Description	Area, in Acres[d] (percentage of SEZ)
139	Thermosprings–Taylorsflat, moderately saline Kunzler complex (0 to 2% slopes)	Moderate	Moderate (WEG 4)[e]	Level to nearly level soils (silt loams) on lake plains. Parent material consists of alluvium from igneous and sedimentary rocks and/or lacustrine deposits. Soils are well drained, with slow infiltration (due to shallow impeding layer) and moderately high permeability. Slightly to strongly saline. Available water capacity is high. Severe rutting hazard. Used for rangeland, irrigated cropland, and wildlife habitat.	3,165 (48.8)[f]
138	Thermosprings–Sevy complex (0 to 3% slopes)	Moderate	Moderate (WEG 3)	Level to nearly level soils (silt loams) on lake plains. Parent material consists of alluvium from igneous and sedimentary rocks. Soils are well drained, with slow infiltration (due to shallow impeding layer) and moderately high permeability. Available water capacity is high. Moderate rutting hazard. Used as rangeland and irrigated cropland.	1,766 (27.3)
129	Bylo silty clay loam (0 to 3% slopes)	Moderate	Moderate (WEG 4)	Level to nearly level soils on alluvial flats. Parent material consists of alluvium from igneous and sedimentary rocks. Soils are very deep and well drained, with slow infiltration (due to shallow impeding layer) and moderately high permeability. Available water capacity is high. Severe rutting hazard. Used for livestock grazing and wildlife habitat.	548 (8.5)
112	Heist–Crestline strongly alkaline complex (0 to 3% slopes)	Slight	Moderate (WEG 3)	Level to nearly level soils (fine sandy loams) on alluvial fan skirts, beach plains, and stream terraces. Parent material consists of alluvium from igneous and sedimentary rocks. Soils are very deep and well drained, with low surface-runoff potential (high infiltration rate) and high permeability. Available water capacity is moderate. Moderate rutting hazard. Used for livestock grazing, irrigated cropland, and wildlife habitat.	317 (4.9)[g]

TABLE 13.2.7.1-1 (Cont.)

Map Unit Symbol[a]	Map Unit Name	Erosion Potential Water[b]	Erosion Potential Wind[c]	Description	Area, in Acres[d] (percentage of SEZ)
106	Dixie–Garbo complex (3 to 8% slopes)	Moderate	Low (WEG 7)	Nearly level to gently sloping soils (gravelly loams) on alluvial fan remnants. Parent material consists of alluvium from igneous and sedimentary rocks. Soils are very deep and well drained, with slow infiltration (due to shallow impeding layer) and moderately high permeability. Available water capacity is moderate. Severe rutting hazard. Used for rangeland, wildlife habitat, and recreation.	206 (3.2)
122	Decca–Drum complex (0 to 3% slopes)	Moderate	Low (WEG 7)	Level to nearly level soils (gravelly loams) on stream terraces. Parent material consists of alluvium from igneous rock. Soils are very deep and well drained, with slow infiltration (due to shallow impeding layer) and very high permeability. Available water capacity is low. Moderate rutting hazard. Used for rangeland and irrigated cropland.	169 (2.6)
128	Harding silt loam (0 to 2% slopes)	Severe	Moderate (WEG 4)	Level to nearly level soils on lake plains. Parent material consists of Lake Bonneville lacustrine deposits from igneous and sedimentary rocks. Soils are very deep and well drained, with slow infiltration (due to shallow impeding layer) and moderately low permeability. Available water capacity is moderate. Severe rutting hazard. Used mainly as winter rangeland.	154 (2.4)
123	Taylorsflat silt loam (0 to 2% slopes)	Moderate	Moderate (WEG 6)	Level to nearly level soils on alluvial flats. Parent material consists of alluvium from igneous and sedimentary rocks. Soils are very deep and well drained, with slow infiltration (due to shallow impeding layer) and moderately high permeability. Available water capacity is high. Severe rutting hazard. Used for rangeland, irrigated cropland, and wildlife habitat.	80 (1.2)

TABLE 13.2.7.1-1 (Cont.)

Map Unit Symbol[a]	Map Unit Name	Erosion Potential: Water[b]	Erosion Potential: Wind[c]	Description	Area, in Acres[d] (percentage of SEZ)
104	Uvada–Playas complex (0 to 2% slopes)	Moderate	Moderate (WEG 4)	Level to nearly level soils (silt loams) on lake plains. Parent material consists of Lake Bonneville lacustrine deposits from igneous and sedimentary rocks. Soils are very deep and well drained, with high surface runoff potential (very slow infiltration rate) and moderately high permeability. Available water capacity is moderate. Severe rutting hazard. Used for rangeland (Uvada).	71 (1.1)
102	Arents–Miscellaneous water, sewage complex (0 to 3% slopes)	Not rated	Not rated	Level to nearly level variable mixed (disturbed) soils. Soils are well drained, with low surface runoff potential (high infiltration rate) and high permeability. Slight rutting hazard. Used mainly as cropland, urban land, pasture, or wildlife habitat.	4 (<1.0)

a Map unit symbols are shown in Figure 13.2.7.1-5 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.

1

TABLE 13.2.7.1-1 (Cont.)

[e] WEGs are based on soil texture, content of organic matter, effervescence of carbonates, content of rock fragments, and mineralogy, and also take into account soil moisture, surface cover, soil surface roughness, wind velocity and direction, and the length of unsheltered distance (USDA 2004). Groups range in value from 1 (most susceptible to wind erosion) to 8 (least susceptible to wind erosion). The NRCS provides a wind erodibility index, expressed as an erosion rate in tons per acre (4,000 m^2) per year, for each of the wind erodibility groups: WEG 1, 220 tons (200 metric tons) per acre (4,000 m^2) per year (average); WEG 2, 134 tons (122 metric tons) per acre (4,000 m^2) per year; WEGs 3 and 4 (and 4L), 86 tons (78 metric tons) per acre (4,000 m^2) per year; WEG 5, 56 tons (51 metric tons) per acre (4,000 m^2) per year; WEG 6, 48 tons (44 metric tons) per acre (4,000 m^2) per year; WEG 7, 38 tons (34 metric tons) per acre (4,000 m^2) per year; and WEG 8, 0 tons (0 metric tons) per acre (4,000 m^2) per year.

[f] A total of 158 acres (0.64 km^2) of the Thermosprings–Taylorsflat complex along the southeast-facing border of the SEZ is currently categorized as a non-development area.

[g] A total of 70 acres (0.28 km^2) of the Heist–Crestline complex along the southeast-facing border of the SEZ is currently categorized as a non-development area.

Source: NRCS (2010).

project. Because the developable area of the SEZ has changed by less than 4%, 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 the non-development area eliminates 228 acres (0.92 km^2) of moderately erodible soils from development.

- Impacts related to water erodibility are somewhat reduced, because the identification of the non-development area eliminates 158 acres (0.64 km^2) of moderately erodible soils from development.

13.2.7.3 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. Some SEZ-specific design features may be identified through the process of preparing parcels for competitive offer and subsequent project-specific analysis.

13.2.8 Minerals (Fluids, Solids, and Geothermal Resources)

A mineral potential assessment for the proposed Milford Flats South 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 13.2.24.

13.2.8.1 Affected Environment

There are no known locatable minerals present within the proposed Milford Flats South SEZ. There are four existing oil and gas leases that cover the SEZ, but they are currently classified as nonproducing. While there are no geothermal leases within the SEZ, the area around it is considered to be potentially valuable for geothermal resources. A geothermal plant has been developed 3 mi (5 km) southwest of the SEZ.

13.2.8.2 Impacts

The description of impacts on the proposed Milford Flats South SEZ in the Draft Solar PEIS remains valid. If the area is identified as a SEZ, it would 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 existing leases or from offset drilling from outside the SEZ. The surface of the SEZ would be unavailable for geothermal development, but such resources, if present, might be accessible from outside of the SEZ. Production of common minerals could take place in areas not directly developed for solar energy production.

13.2.8.3 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.

13.2.9 Water Resources

13.2.9.1 Affected Environment

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

The Milford Flats South SEZ is located within the Escalante Desert–Sevier Lake subregion of the Great Basin hydrologic region. The SEZ is located in the Milford area of the Escalante Desert Valley with the Black Mountains to the north, the San Francisco Mountains to the west, and the Mineral Mountains to the east. Average precipitation is estimated to be 9 in./yr (20 cm/yr), and the average pan evaporation rate is estimated to be 70 in./yr (178 cm/yr). The Beaver River flows west out of the Minersville Reservoir (controlled by Rocky Ford Dam and then north along the center of the valley, but almost the entire river flow is diverted for agricultural irrigation. Minersville Canal flows through the southern portion of the SEZ, and several small, unnamed intermittent/ephemeral washes cross the SEZ area as well. The area around the Milford Flats South SEZ has not been examined for flood risk, but any flooding would be limited to local ponding and erosion.

The Milford Flats South SEZ is located within the Milford Area groundwater basin in the northern portion of the Escalante Valley. Groundwater is primarily found in the basin-fill aquifer, which consists of alternating layers of clay, sand, and gravel and ranges between 300 and 500 ft (91 and 152 m) in thickness. Groundwater recharge has been estimated to be 16,000 ac-ft/yr (20 million m^3/yr), primarily from mountain front recharge and irrigation return flows. Two wells within 1.0 mi (1.6 km) of the SEZ indicated depths to groundwater of 90 ft (27 m) and 135 ft (41 m). Groundwater levels dropped as much as 65 ft (20 m) between 1948 and 2009 and land subsidence and fracturing have been observed in areas of the highest groundwater withdrawal rates. Groundwater flows from the south to the north, and its quality is generally good.

In Utah, water resources are considered public, and water rights are allocated by the Utah DWR. The northern Escalante Desert Valley 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 Milford Flats South SEZ and surrounding basin. Additional data regarding climate, surface water, and groundwater conditions are presented in Tables 13.2.9.1-1 through 13.2.9.1-7 and in Figures 13.2.9.1-1 and 13.2.9.1-2. 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 Milford Flats South SEZ that are found to be within a 100-year floodplain will be identified as non-development areas. Any water features within the Milford Flats South SEZ determined to be jurisdictional will be subject to the permitting process described in the CWA.

TABLE 13.2.9.1-1 Watershed and Water Management Basin Information Relevant to the Proposed Milford Flats South SEZ as Revised

Basin	Name	Area (acres)[b]
Subregion (HUC4)[a]	Escalante Desert–Sevier Lake (1603)	10,544,005
Cataloging unit (HUC8)	Beaver Bottoms–Upper Beaver (16030007)	1,112,295
Groundwater basin	Milford area	742,000
SEZ	Milford Flats South	6,480

[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 13.2.9.1-2 Climate Station Information Relevant to the Proposed Milford Flats South 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.)
Beaver, Utah (420519)	5,940	25	1888–1990	11.35	34.00
Milford, Utah (425654)	5,010	16	1906–2011	9.10	34.10
Minersville, Utah (425723)	5,280	9	1897–2011	11.18	22.30
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 Milford Flats South SEZ range from 5,020 to 5,120 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 13.2.9.1-3 Total Lengths of Selected Streams at the Subregion, Cataloging Unit, and SEZ Scale Relevant to the Proposed Milford Flats South 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	1,457,973	0
Intermittent/ephemeral streams	160,714,376	16,361,544	60,773
Canals	10,978,835	864,909	20,797

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

Source: USGS (2012a).

13.2.9.2 Impacts

13.2.9.2.1 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 Milford Flats South SEZ could result in increased erosion and sedimentation along the Minersville Canal and several intermittent/

TABLE 13.2.9.1-4 Stream Discharge Information Relevant to the Proposed Milford Flats South SEZ as Revised

Station (USGS ID)	Period of Record	No. of Records
No peak flow/discharge information available for nearby surface water stations (all are springs).	NA[a]	NA

[a] NA = No data collected for this parameter.

Source: USGS (2012b).

TABLE 13.2.9.1-5 Surface Water Quality Data Relevant to the Proposed Milford Flats South SEZ as Revised[a]

	Station (USGS ID)
Parameter	381023113121301
Period of record	1939–1967
No. of records	6
Temperature (°C)[b]	78.3 (76.7–82.8)
Total dissolved solids (mg/L)	1485 (1,470–1,490)
Dissolved oxygen (mg/L)	NA[c]
pH	7.7 (7.1–8.6)
Nitrate (mg/L as N)	0.0795 (0.023–0.248)
Phosphate (mg/L)	0.85 (0.1–1.6)
Organic carbon (mg/L)	NA
Calcium (mg/L)	75 (71–82)
Magnesium (mg/L)	9.8 (9.2–12)
Sodium (mg/L)	360 (360–370)
Chloride (mg/L)	215 (210–220)
Sulfate (mg/L)	460 (460–470)
Arsenic (µg/L)	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 13.2.9.1-6 Water Quality Data from Groundwater Samples Relevant to the Proposed Milford Flats South SEZ as Revised

	Station (USGS ID)[a]		
Parameter	381119113005302	381257113114401	381543113035501
Period of record	1960–2004	1971–1971	1956–2008
No. of records	25	2	61
Temperature (°C)[b]	21.1 (21.1–21.1)	15 (15–15)	16 (13.5–23)
Total dissolved solids (mg/L)	300 (291–309)	NA	476.5 (432–521)
Dissolved oxygen (mg/L)	NA[c]	NA	NA
pH	7.6 (7.5–7.7)	7.5 (7.5–7.5)	7.5 (7.1–7.7)
Nitrate (mg/L as N)	1.125 (1.08–1.17)	0.226	NA
Phosphate (mg/L)	NA	0.15 (0.15–0.15)	0.104 (0.095–0.113)
Organic carbon (mg/L)	NA	NA	NA
Calcium (mg/L)	37 (34–40)	55 (55–55)	83 (73.5–100)
Magnesium (mg/L)	8.65 (8.5–8.8)	28 (28–28)	17 (15.2–21.1)
Sodium (mg/L)	38	170 (170–170)	46.5 (37.7–58)
Chloride (mg/L)	29.5 (25–34)	180 (180–180)	110 (94.9–138)
Sulfate (mg/L)	52 (50–54)	230 (230–230)	71.5 (67.7–87)
Arsenic (µg/L)	NA	NA	3.65 (3.6–3.7)

[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 13.2.9.1-7 Groundwater Surface Elevations Relevant to the Proposed Milford Flats South SEZ as Revised

	Station (USGS ID)	
Parameter	381318113024801	381319113003501
Period of record	1953–2011	1953–2007
No. of observations	133	127
Surface elevation (ft)[a]	5,081	5,128
Well depth (ft)	110	140
Depth to water, median (ft)	69.19	112.1
Depth to water, range (ft)	55.28–91.87	96.45–134.18
Depth to water, most recent observation (ft)	91.87	134.18
Distance to SEZ (mi)[b]	3	5

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

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

Source: USGS (2012b).

ephemeral streams that cross the SEZ. The identification of regions within the Escalante Valley SEZ near the Minersville Canal as non-development areas (Figure 13.2.1.1-2) 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 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 Milford Flats South SEZ is a subset of the Beaver Bottoms–Upper Beaver watershed (HUC8), for which information regarding stream channels is presented in Tables 13.2.9.1-3 and 13.2.9.1-4 of this Final Solar PEIS. The results of the intermittent/ephemeral stream evaluation are shown in Figure 13.2.9.2-1, which depicts a subset of flow lines from the National Hydrography Dataset (USGS 2012a) labeled as having a low, moderate, or high sensitivity to land disturbance (Figure 13.2.9.2-1). The analysis indicated that 34% of the total length of the intermittent/ephemeral stream channel reaches in the evaluation had low sensitivity, and 66%

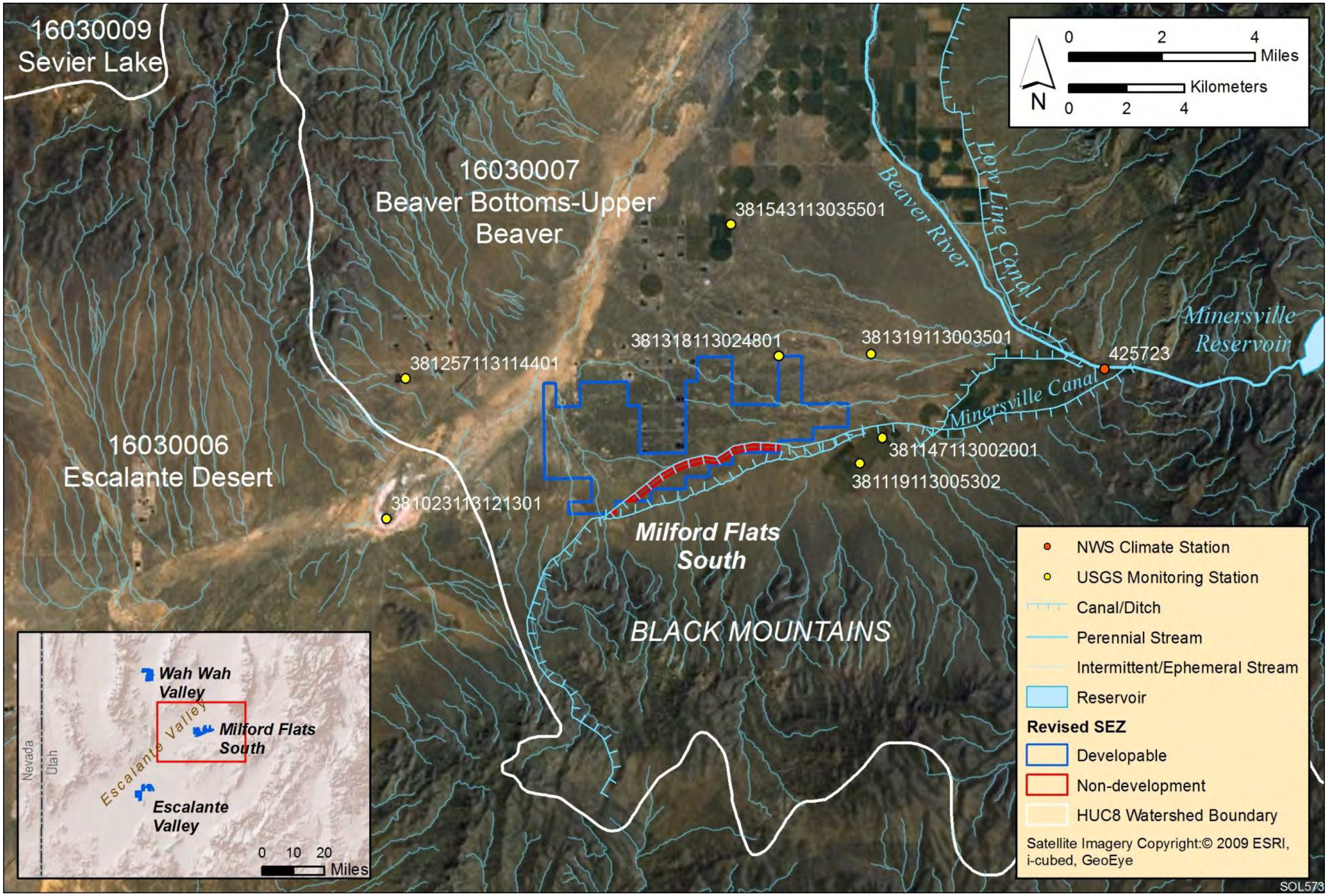


FIGURE 13.2.9.1-1 Surface Water Features near the Proposed Milford Flats South SEZ as Revised

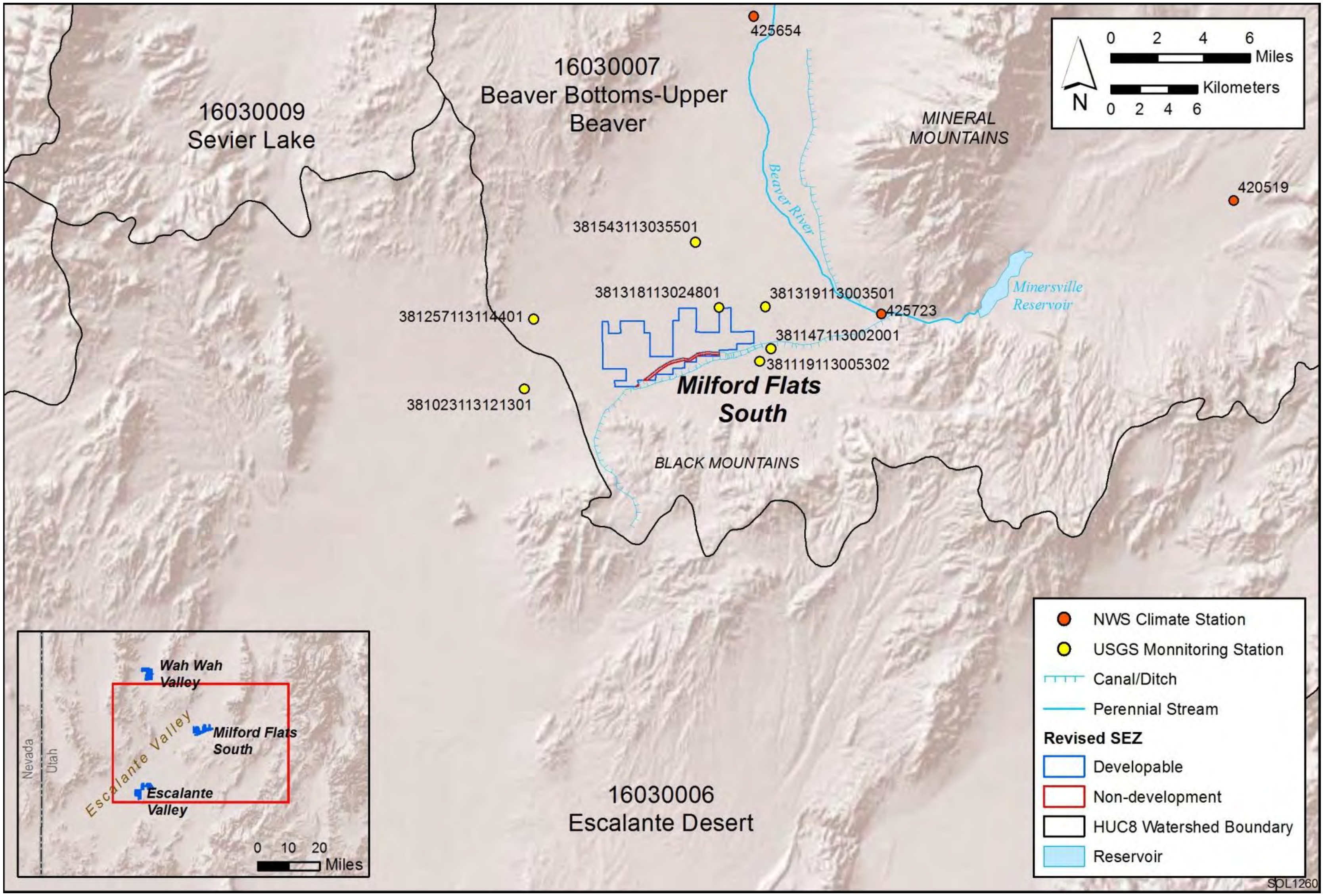


FIGURE 13.2.9.1-2 Surface Water and Groundwater Features within the Beaver Bottoms–Upper Beaver Watershed, Which Includes the Proposed Milford Flats South SEZ as Revised

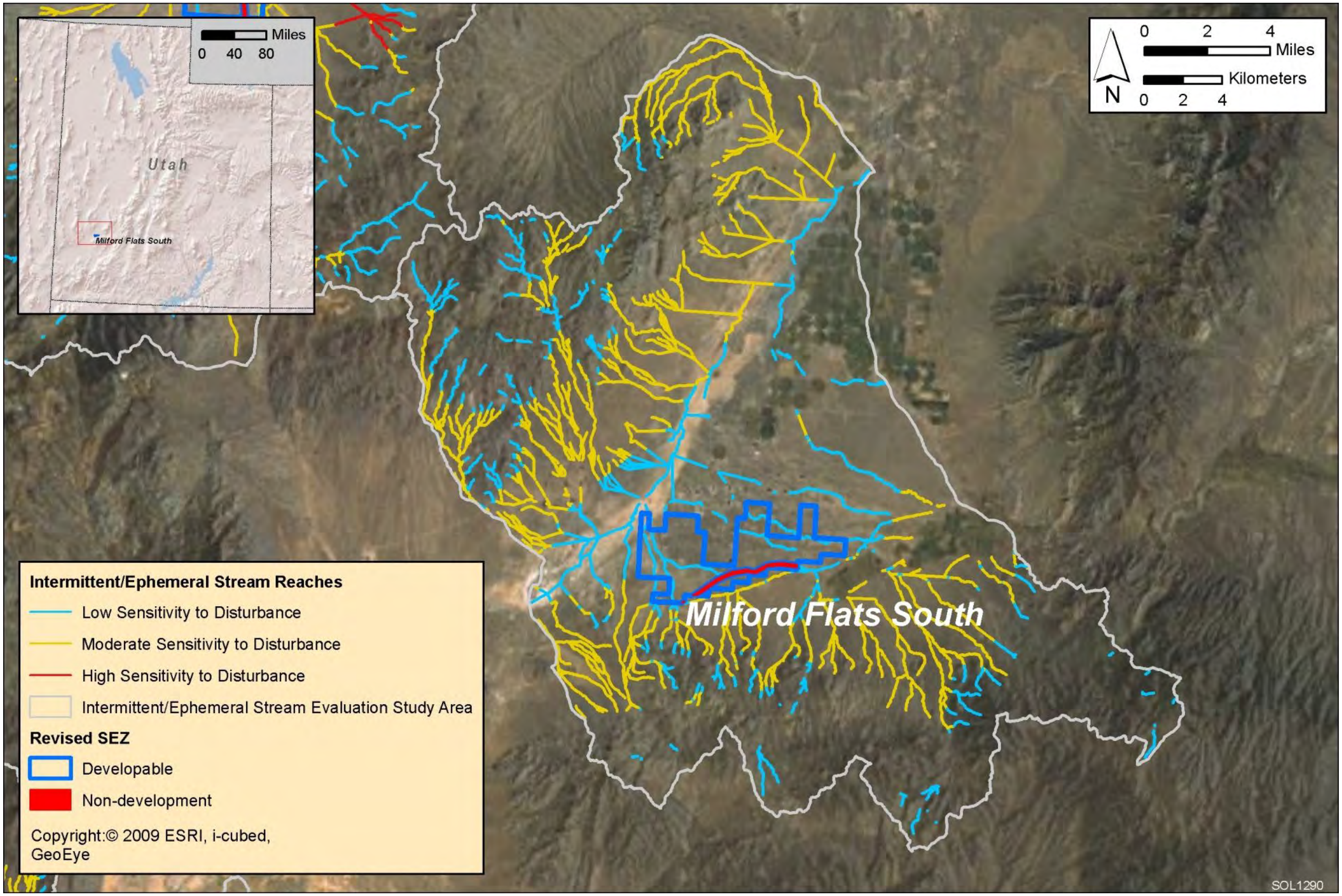


FIGURE 13.2.9.2-1 Intermittent/Ephemeral Stream Channel Sensitivity to Surface Disturbances in the Vicinity of the Proposed Milford Flats South SEZ as Revised

had moderate sensitivity to disturbance. Several intermittent/ephemeral channels within the Milford Flats South 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).

13.2.9.2.2 Water Use Requirements for Solar Energy Technologies

The water use requirements for full build-out scenarios at the Milford Flats South SEZ have not changed from the values presented in the Draft Solar PEIS (see Tables 13.2.9.2-1 and 13.2.9.2-2). 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.

TABLE 13.2.9.2-1 Groundwater Budget for the Milford Area Groundwater Basin, Which Includes the Proposed Milford Flats South SEZ as Revised

Process	Amount
Inputs	
Groundwater recharge (ac-ft/yr)[a,b]	9,200
Underflow from adjacent basins (ac-ft/yr)	1,700
Irrigation recharge (ac-ft/yr)	22,700
Losses from canals (ac-ft/yr)	8,500
Underflow from mountains (ac-ft/yr)	16,000
Outputs	
Total withdrawals (ac-ft/yr)[c]	62,000[c]
Evapotranspiration (ac-ft/yr)	24,000
Storage	
Aquifer storage (ac-ft)[d]	95,000,000

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

[b] Groundwater recharge includes mountain front, intermittent/ephemeral channel seepage, and direct infiltration recharge processes.

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

[d] Pre-development storage in the Milford area.

Source: Mower and Cordova (1974).

TABLE 13.2.9.2-2 Aquifer Characteristics and Assumptions Used in the One-Dimensional Groundwater Model for the Proposed Milford Flats South 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]	5,199
Medium pumping scenario (ac-ft/yr)	740
Low pumping scenario (ac-ft/yr)	29

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

b Source: Mower and Cordova (1974).

c Source: Durbin and Loy (2010).

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

The Milford Flats South SEZ is located in the Milford Area portion of the Escalante Desert groundwater basin; Durbin and Loy (2010) refer to this portion of the basin as the Beaver Bottoms basin. A basin-scale groundwater budget was assembled using available data on groundwater inputs, outputs, and storage (Table 13.2.9.2-1) for comparison with water use estimates related to solar energy development. The estimated total water use requirements during the peak construction year are as high as 1,244 ac-ft/yr (1.5 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 Milford area 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.

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 29 to 5,199 ac-ft/yr (0.036 to 6.4 million m^3/yr), or 580 to 103,980 ac-ft (0.72 to 128 million m^3) over the 20-year operational period. From a groundwater budgeting perspective, the high pumping scenario would represent 9% 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 13.2.9.2-1), 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 much less than 1% of the estimated groundwater inputs into the basin (Table 13.2.9.2-1).

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 13.2.9.2-2) represent available literature data, and that the model aggregates these values into a simplistic representation of the aquifer.

Currently, the depth to groundwater ranges between 90 and 130 ft (27 and 40 m) in the vicinity of the SEZ (Table 13.2.9.1-7). 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 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 13.2.9.2-2). If the pumping well were located at a distance of 0.5 mi (0.8 km) from the Minersville Canal on the SEZ, the modeled groundwater drawdown for the high pumping scenario suggests a potential for 25 ft (8 m) of

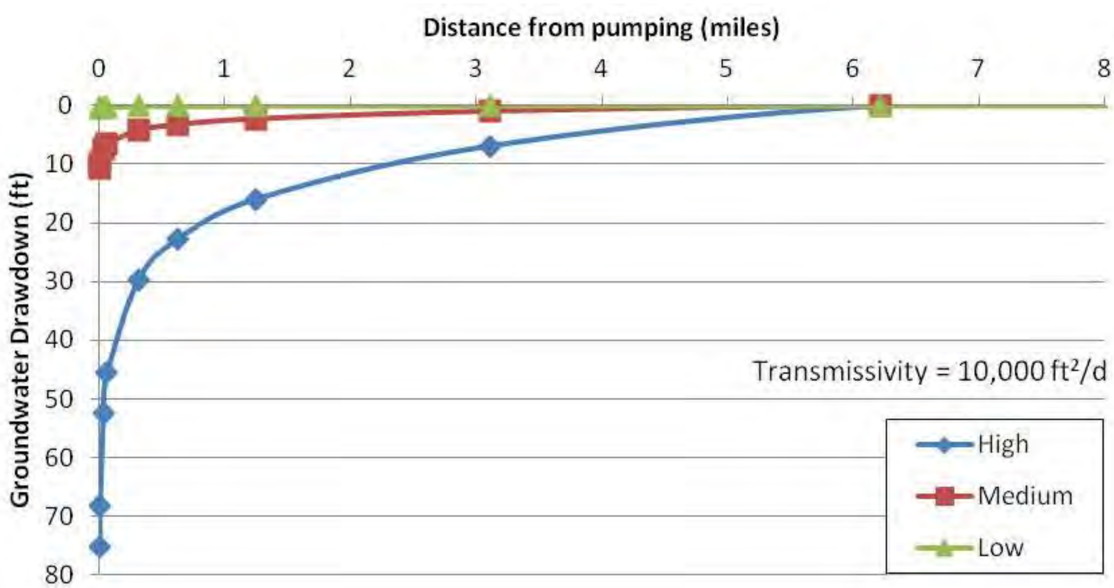


FIGURE 13.2.9.2-2 Estimated One-Dimensional Groundwater Drawdown Resulting from High, Medium, and Low Groundwater Pumping Scenarios over the 20-Year Operational Period at the Proposed Milford Flats South SEZ as Revised

drawdown, which could impair groundwater–surface water connectivity via infiltration processes along the canal. Intermittent/ephemeral channels directly to the south of the SEZ could also be affected by the drawdown, leading to a loss of groundwater-surface water connectivity via infiltration processes during channel inundation and alterations to the riparian vegetation (Figure 13.2.9.2-1).

13.2.9.2.3 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.

13.2.9.2.4 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 Milford Flats South SEZ is located in a 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 65 ft (20 m) from 1948 to 2009 (Burden 2011). These baseline conditions suggest that water resources are vulnerable in the vicinity of the Milford Flats South SEZ, and that the primary potential for impacts from solar energy development comes from surface disturbances and groundwater use.

The regions identified as non-development areas within the SEZ contain the Minersville Canal along the southern edge of the SEZ, which has reduced potential impacts associated with surface disturbance of surface water features. Disturbance to intermittent/ephemeral stream channels within the Milford Flats South SEZ should not have a significant impact on the critical functions of groundwater recharge, sediment transport, flood conveyance, and ecological habitat given the relatively small footprint of the Milford Flats South SEZ with respect to the study area, and the sensitivity of identified intermittent/ephemeral streams. The intermittent/ephemeral stream evaluation suggests that all intermittent/ephemeral streams crossing the SEZ have a low sensitivity to land disturbances. 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 Milford Flats South SEZ indicate 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, and that the high pumping scenario may impair potential groundwater-surface water connectivity in the Minersville Canal and the unnamed intermittent/ephemeral streams along the southern edge of the SEZ.

Predicting impacts associated with groundwater withdrawals 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 Milford Flats South SEZ.

13.2.9.3 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.

13.2.10 Vegetation

13.2.10.1 Affected Environment

In the Supplement to the Draft Solar PEIS, 228 acres (0.9 km^2) along the Minersville Canal was identified as a non-development area in the Milford Flats South SEZ.

As presented in the Draft Solar PEIS, 7 cover types were identified within the area of the proposed Milford Flats South SEZ, while 26 cover types were identified within the area of indirect effects, including the assumed access road and transmission line corridors and within 5 mi (8 km) of the SEZ boundary. For this Final Solar PEIS, a specifically located hypothetical transmission line is no longer being assumed (see Section 13.2.23 for an updated transmission assessment for this SEZ). Sensitive habitats on the SEZ include ephemeral dry washes. Figure 13.2.10.1-1 shows the cover types within the affected area of the Milford Flats South SEZ as revised.

13.2.10.2 Impacts

As presented the Draft Solar PEIS, the construction of solar energy facilities within the proposed Milford Flats South 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. On the basis of the newly identified non-development area, approximately 5,002 acres (20.2 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.

13.2.10.2.1 Impacts on Native Species

The analysis presented in the Draft Solar PEIS for the original Milford Flats South SEZ developable area indicated that development would result in a small impact on all land cover types occurring within the SEZ (Table 13.2.10.1-1 in the Draft Solar PEIS). Development within the revised Milford Flats South SEZ could still directly affect all the cover types evaluated in the Draft Solar PEIS; the reduction in the developable area would result in reduced impact levels on most land cover types in the affected area, but the impact magnitudes would remain unchanged compared to original estimates in the Draft Solar PEIS.

Direct impacts on habitats within the previously identified transmission corridor would not occur. As a result, direct impacts on the Rocky Mountain Cliff and Canyon and Massive Bedrock, Inter-Mountain Basins Mountain Mahogany Woodland and Shrubland, and Southern Rocky Mountain Montane-Subalpine Grassland cover types, which were only within the transmission corridor, would not occur. However, direct and indirect impacts on plant communities associated with playa habitats, greasewood flats, or other intermittently flooded areas, or dry washes, within or near the SEZ, as described in the Draft Solar PEIS, could still occur. Indirect impacts on riparian communities along Beaver River could still occur. The indirect impacts from groundwater use on plant communities in the region that depend on groundwater, such as riparian communities, could also occur. Direct or indirect impacts on

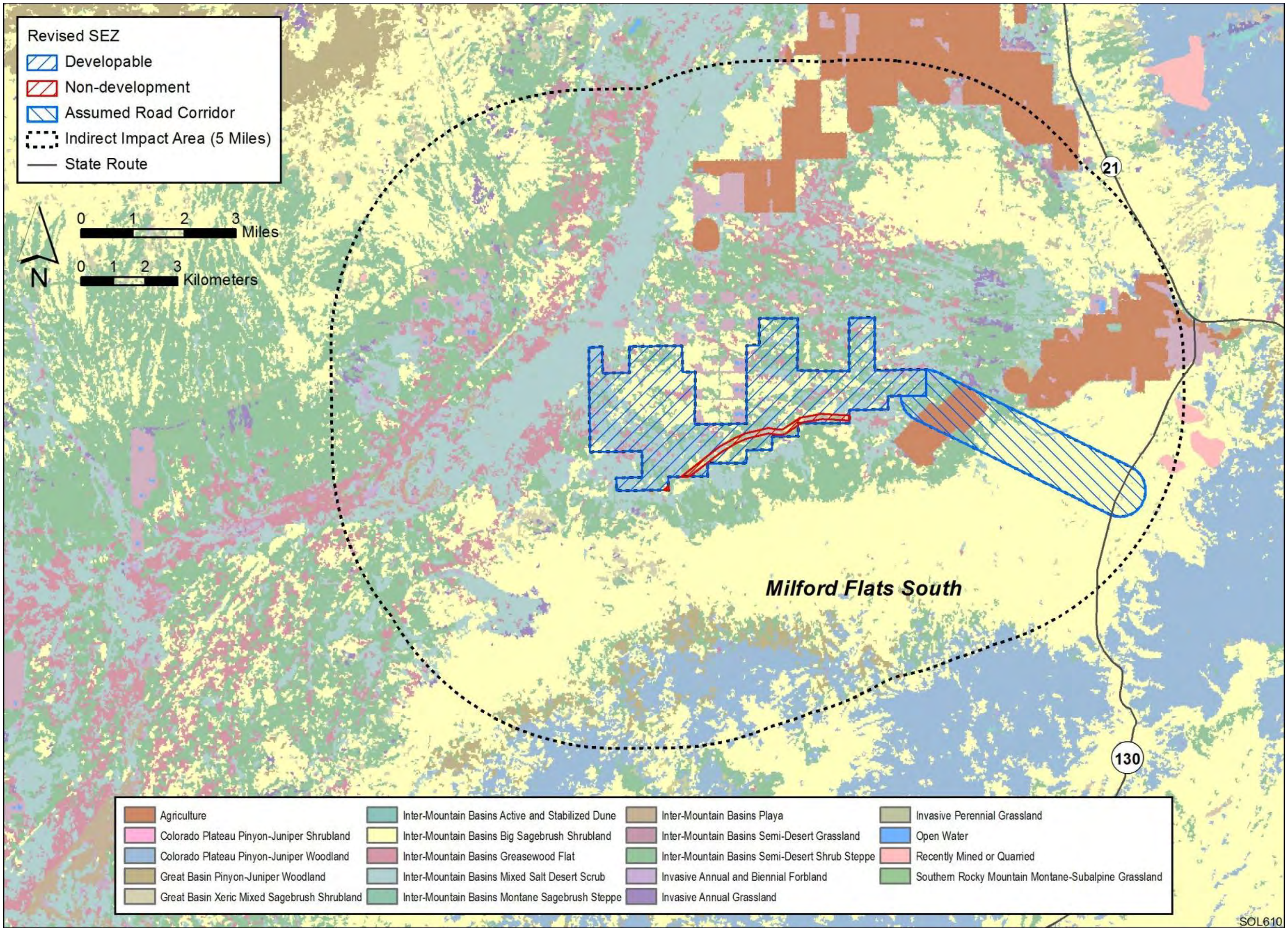


FIGURE 13.2.10.1-1 Land Cover Types within the Proposed Milford Flats South SEZ as Revised

wetlands, riparian habitat, or woodlands in or near the access road ROW, as described in the Draft Solar PEIS, could also occur.

13.2.10.2.2 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 Milford Flats South SEZ could potentially result in the establishment or expansion of noxious weeds and invasive species populations, potentially including those species listed in Section 13.2.10.1 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.

13.2.10.3 SEZ-Specific Design Features and Design Feature Effectiveness

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

- All dry wash habitats within the SEZ and all dry wash and riparian habitats within the assumed access road corridor 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 dry washes and riparian habitats to reduce the potential for impacts.

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

- Groundwater studies shall be conducted to evaluate the potential for indirect impacts on riparian habitats, such as those along Beaver River.

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, and riparian habitats 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.

13.2.11 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.

13.2.11.1 Amphibians and Reptiles

13.2.11.1.1 Affected Environment

As presented in the Draft Solar PEIS, representative amphibian and reptile species expected to occur within the Milford Flats South SEZ include the Great Basin spadefoot (*Spea intermontana*), Great Plains toad (*Bufo cognatus*), 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).

13.2.11.1.2 Impacts

As presented in the Draft Solar PEIS, solar energy development within the Milford Flats South 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 13.2.11.1-1 in the Draft Solar PEIS). The reduction in the developable area of the Milford Flats South SEZ would result in reduced habitat impacts for all representative amphibian and reptile species; the resultant impact levels for all the representative species would be small.

13.2.11.1.3 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 implementation of required programmatic design features, impacts on amphibian and reptile species will be reduced.

Because of the change in the developable area within the SEZ boundaries, the SEZ-specific design feature identified in Section 13.2.11.1.3 of the Draft Solar PEIS (i.e., the Minersville Canal should be avoided) is no longer applicable. On the basis of impact analyses conducted for the Draft Solar PEIS and consideration of comments received as applicable, no

SEZ-specific design features for amphibian and reptile 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.

13.2.11.2 Birds

13.2.11.2.1 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 Milford Flats South 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*).

13.2.11.2.2 Impacts

As presented in the Draft Solar PEIS, solar energy development within the Milford Flats South SEZ could affect potentially suitable bird habitats. The analysis presented in the Draft Solar PEIS based on the original Milford Flats South SEZ boundaries indicated that development would result in a small overall impact on the representative bird species (Table 13.2.11.2-1 in the Draft Solar PEIS). The reduction in the developable area of the Milford Flats South SEZ would result in reduced habitat impacts for all representative bird species; however, the resultant impact levels for all the representative bird species would be small.

13.2.11.2.3 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 area of the SEZ, one of the SEZ-specific design features identified in Section 13.2.11.2.3 of the Draft Solar PEIS (i.e., the Minersville Canal should be avoided) is no longer applicable.

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 bird species has been identified:

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

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.

13.2.11.3 Mammals

13.2.11.3.1 Affected Environment

As presented in Section 13.2.11.3.1 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 Milford Flats South 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.

13.2.11.3.2 Impacts

As presented in the Draft Solar PEIS, solar energy development within the Milford Flats South SEZ could affect potentially suitable habitats of mammal species. The analysis presented in the Draft Solar PEIS indicated that development would result in a small overall impact on the representative mammal species (Table 13.2.11.3-1 in the Draft Solar PEIS). The reduction in the developable area of the Milford Flats South 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. Based on mapped activity areas, direct potential loss of crucial pronghorn habitat would be reduced from 5,184 acres (21 km^2) to 5,002 acres (20.2 km^2). The direct impact level on crucial pronghorn habitat would be small. No mapped activity areas for the other big game species occur within the SEZ.

13.2.11.3.3 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, impacts on mammal species will be reduced.

Because of changes in the developable area of the SEZ, one of the SEZ-specific design features identified in Section 13.2.11.3.3 of the Draft Solar PEIS (i.e., the Minersville Canal should be avoided) is no longer applicable. On the basis of impact analyses conducted for the Draft Solar PEIS and consideration of comments received as applicable, no SEZ-specific design features for mammal species have been identified through 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. 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 consultation.

13.2.11.4 Aquatic Biota

13.2.11.4.1 Affected Environment

No permanent water bodies or perennial streams occur within the boundaries of the Milford Flats South SEZ. Because the boundaries of the Milford Flats South SEZ given in the Draft Solar PEIS have not changed, the amount of surface water features within the area of direct and indirect effects is still valid. Updates to the Draft Solar PEIS include the following:

- The segment of Minersville Canal located within the southern portion of the SEZ has been identified as a non-development area.

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

Aquatic biota present in the surface water features in the Milford Flats South 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.

13.2.11.4.2 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 Solar PEIS and this 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, with the following update:

- The portion of Minersville Canal within the SEZ has been identified as a non-development area; therefore, construction activities would not directly affect the canal. However, as described in the Draft Solar PEIS, Minersville Canal could be affected indirectly by solar development activities within the SEZ.

13.2.11.4.3 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 the programmatic design features will reduce impacts on aquatic biota, and if the utilization of water from groundwater or surface water sources is adequately controlled to maintain sufficient water levels in nearby aquatic habitats, the potential impacts on aquatic biota from solar energy development at the Milford Flats South 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.

13.2.12 Special Status Species

13.2.12.1 Affected Environment

Twenty 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 Milford Flats South SEZ. The reduction in the developable area of the Milford Flats South SEZ does not alter the potential for special status species to occur in the affected area.

13.2.12.2 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 Milford Flats South SEZ could affect potentially suitable habitats of special status species. The analysis presented in the Draft Solar PEIS for the original Milford Flats South SEZ developable area indicated that development would result in no impact or a small overall impact on all special status species (Table 13.2.12.1-1 in the Draft Solar PEIS). Development within the SEZ could still affect the same 20 special status 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.

13.2.12.3 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. Some additional SEZ-specific resources and conditions will guide how programmatic design features are applied, for example:

- Pre-disturbance surveys shall be conducted to determine the presence and abundance of special status species, including those identified in Table 13.2.12.1-1 of the Draft Solar PEIS; disturbance to occupied habitats for these species shall be avoided, or impacts on occupied habitats 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 or offset impacts. A comprehensive mitigation strategy for special status species that uses one or more of these options to offset the impacts of development shall be developed in coordination with the appropriate federal and state agencies.

- Avoiding or minimizing disturbance of woodland habitats (e.g., pinyon-juniper, mixed conifer, oak) in the area of direct effects may reduce impacts on the ferruginous hawk (nesting), Lewis's woodpecker, and northern goshawk (nesting).

- Consultations with the USFWS and the UDWR shall be conducted to address the potential for impacts on the Utah prairie dog, a species listed as threatened under the 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 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.

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

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

13.2.13 Air Quality and Climate

13.2.13.1 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 essentially unchanged.

13.2.13.1.1 Existing Air Emissions

The Draft Solar PEIS presented Beaver 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 SO_2, NO_x, CO, and VOCs were lower, while PM_{10} and $PM_{2.5}$ emissions were higher. These changes would not affect modeled air quality impacts presented in this Final Solar PEIS.

13.2.13.1.2 Air Quality

The calendar quarterly average NAAQS of 1.5 $\mu g/m^3$ for lead (Pb) presented in Table 13.2.13.1-2 of the Draft Solar PEIS has been replaced by the rolling 3-month standard (0.15 $\mu g/m^3$). The federal 24-hour and annual SO_2, 1-hour O_3, and annual PM_{10} standards have been revoked as well (EPA 2011). Utah adopts the NAAQS; thus, Utah SAAQS will reflect the same changes. These changes will not affect the modeled air quality impacts presented in this Final Solar PEIS.

Because the boundaries of the proposed Milford Flats South SEZ have not changed, the updated distances to the nearest Class I areas are the same as presented in the Draft Solar PEIS. Two Class I areas are situated within 62 mi (100 km) of the proposed SEZ. The nearest Class I area is Zion NP, about 47 mi (75 km) south of the SEZ; the other is Bryce Canyon NP, about 59 mi (95 km) southeast of the SEZ.

13.2.13.2 Impacts

13.2.13.2.1 Construction

Methods and Assumptions

The methods and modeling assumptions remain the same as presented in the Draft Solar PEIS. The area of the proposed Milford Flats South SEZ was reduced by less than 4% from 6,480 acres (26.2 km^2) to 6,252 acres (25.3 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 13.2.13.2-1 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 Solar PEIS remain valid.[2] Predicted 24-hour PM_{10} and 24-hour 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 towns would be lower. Modeling indicates that emissions from construction activities are not anticipated to exceed Class I 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 size is assumed to be disturbed both in the Draft Solar PEIS and in this Final Solar PEIS, 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 AQRVs (e.g., visibility and acid deposition) at the nearest federal Class I area, Zion NP, which is not located directly downwind

[2] At this programmatic level, detailed information on construction activities, such as facility size, type of solar technology, heavy equipment fleet, activity level, work schedule, and so on 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; thus the modeling results and discussion here should be interpreted in that context. During the site-specific project phase, more detailed information would be available and more realistic air quality modeling analysis could be conducted. It is likely that impacts on ambient air quality predicted for specific projects would be much lower than those presented in this Final Solar PEIS.

TABLE 13.2.13.2-1 Maximum Air Quality Impacts from Emissions Associated with Construction Activities for the Proposed Milford Flats South 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	515	83	598	150	343	398
$PM_{2.5}$	24 hour	H8H	37.1	18	55.1	35	106	157
	Annual	NA[d]	10.1	8	18.1	15.0	67	121

[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 13.2.13.1-2 of the Draft Solar PEIS (Prey 2009).

[d] NA = not applicable.

of prevailing winds. Construction-related emissions are temporary and thus would cause some unavoidable but short-term impacts.

13.2.13.2.2 Operations

The reduction in the developable area of the proposed Milford Flats South SEZ by less than 4%, from 6,480 acres (26.2 km^2) to 6,252 acres (25.3 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 556 to 1,000 MW is estimated for the Milford Flats South 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 13.2.13.2-2 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 3.53%, as shown in the revised Table 13.2.13.2-2. For example, for the technologies estimated to require 9 acres/MW (power tower, dish engine, and PV), up to 1,853 tons of NO_x per year (= 96.47% × the value of 1,921 tons per year tabulated in the Draft Solar PEIS) could be avoided by full solar development of the proposed Milford Flats South SEZ as revised. Because the total emissions potentially avoided by full solar development of the proposed Milford Flats South SEZ are about the same as those presented in the Draft Solar PEIS, the conclusions of the Draft

TABLE 13.2.13.2-2 Annual Emissions from Combustion-Related Power Generation Avoided by Full Solar Development of the Proposed Milford Flats South SEZ as Revised

Area Size (acres)[a]	Capacity (MW)[b]	Power Generation (GWh/yr)[c]	Emission Rates (tons/yr; 10^3 tons/yr for CO_2)[d]			
			SO_2	NO_x	Hg	CO_2
6,252	556–1,000	974–1,753	969–1,744	1,853–3,336	0.004-0.007	1,050–1,891
Percentage of total emissions from electric power systems in Utah[e]			2.6–4.7%	2.6–4.7%	2.6–4.7%	2.6–4.7%
Percentage of total emissions from all source categories in Utah[f]			1.8–3.2%	0.76–1.4%	NA[g]	1.4–2.6%
Percentage of total emissions from electric power systems in the six-state study area[e]			0.39–0.70%	0.50–0.90%	0.13–0.23%	0.40–0.72%
Percentage of total emissions from all source categories in the six-state study area[f]			0.21–0.37%	0.07-0.12%	NA	0.13–0.23%

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

[b] It is assumed that the SEZ would eventually have development on 80% of the lands and that a range of 5 acres (0.020 km^2) per MW (for parabolic trough technology) to 9 acres (0.04 km^2) per MW (power tower, dish engine, and PV technologies) of land would be required.

[c] A capacity factor of 20% is assumed.

[d] Composite combustion-related emission factors for SO_2, NO_x, Hg, and CO_2 of 1.99, 3.81, 7.8×10^{-6}, and 2,158 lb/MWh, respectively, were used for the state of Utah.

[e] Emission data for all air pollutants are for 2005.

[f] Emission data for SO_2 and NO_x are for 2002, while those for CO_2 are for 2005.

[g] NA = not estimated.

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

Solar PEIS remain valid. Full solar development of the proposed Milford Flats South SEZ could result in substantial avoided emissions. Solar facilities to be built in the Milford Flats South SEZ could avoid relatively more fossil fuel emissions than those built in other states that rely less on fossil fuel–generated power.

13.2.13.2.3 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.

13.2.13.3 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.

13.2.14 Visual Resources

13.2.14.1 Affected Environment

No boundary revisions were identified for the proposed Milford Flats South SEZ in the Supplement to the Draft Solar PEIS; however, 228 acres (0.9 km^2) of the Minersville Canal were identified as non-development areas. The remaining developable area within the SEZ is 6,252 acres (25.3 km^2).

13.2.14.2 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, with numerous cultural disturbances already present. Residents, workers, and visitors to the area may experience visual impacts from solar energy facilities located within the SEZ (as well as any associated access roads and transmission lines) as they travel area roads. The residents nearest to the SEZ could be subjected to large visual impacts from solar energy development within the SEZ.

Utility-scale solar energy development within the proposed Milford Flats South SEZ is unlikely to cause even moderate visual impacts on highly sensitive visual resource areas, the closest of which is more than 25 mi (40 km) from the SEZ. The closest community (Minersville) is approximately 5 mi (8 km) from the SEZ, and weak visual contrasts from solar development within the SEZ are expected where the SEZ is visible within the community.

13.2.14.3 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. Given the large scale, reflective surfaces, and strong regular geometry of utility-scale solar energy facilities and the lack of screening vegetation and landforms within the SEZ viewshed, siting the facilities away from sensitive visual resource areas and other sensitive viewing areas would be the primary means of mitigating visual impacts. The effectiveness of other visual impact mitigation measures generally would be limited.

On the basis of impact analyses conducted for the Draft Solar PEIS and considering comments received as applicable, no SEZ-specific design features to address impacts on 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.

13.2.15 Acoustic Environment

13.2.15.1 Affected Environment

The developable area of the proposed Milford Flats South SEZ was reduced by less than 4% from 6,480 acres (26.2 km^2) to 6,252 acres (25.3 km^2). The boundaries of the SEZ were not changed, and thus the information for acoustic environment remains the same as presented in the Draft Solar PEIS.

13.2.15.2 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.

13.2.15.2.1 Construction

The conclusions in the Draft Solar PEIS remain valid.

For construction activities occurring near the eastern SEZ boundary, estimated noise levels at the nearest residence (about 1.1 mi [1.8 km] from the eastern SEZ boundary) would be about 41 dBA, which is below the neighboring Iron County regulation level of 50 dBA and comparable to a typical daytime mean rural background level of 40 dBA. The estimated 42 dBA L_{dn} at this residence is well below the EPA guideline of 55 dBA L_{dn} for residential areas.

There are no specially designated areas within 5 mi (8 km) of the Milford Flats South 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 eastern SEZ boundary, close to the nearest residences.

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

13.2.15.2.2 Operations

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

Parabolic Trough and Power Tower

For operating parabolic trough and power tower technologies, both the neighboring Iron County level of 50 dBA and the EPA guideline of 55 dBA L_{dn} for residential areas would be met at the nearest residence (about 1.1 mi [1.8 km] from the eastern SEZ boundary) if TES were not used. However, use of TES at a solar facility located near the eastern SEZ boundary could produce nighttime noise levels of 50 dBA, higher than the typical nighttime mean rural background level of 30 dBA and equal to the neighboring Iron County regulatory level at the nearest residence. The predicted day-night average level of 52 dBA L_{dn} would be below the EPA guideline level of 55 dBA L_{dn} for residential areas. Operating parabolic trough or power tower facilities using TES and located near the eastern SEZ boundary could result in adverse noise impacts on the nearest residence, 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 residence (about 1.1 mi [1.8 km] from the eastern SEZ boundary) is about 44 dBA, below the neighboring Iron County regulation level of 50 dBA, but is higher than the typical daytime mean rural background level of 40 dBA. For a 12-hour daytime operation, predicted 44 dBA L_{dn} at this residence 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 minor 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 minimal to negligible.

13.2.15.2.3 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.

13.2.15.3 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.

13.2.16 Paleontological Resources

13.2.16.1 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 PFYC of the SEZ as Class 2 as used in the Draft Solar PEIS.

13.2.16.2 Impacts

Few, if any, impacts on significant paleontological resources are likely to occur in the proposed Milford Flats South 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.

13.2.16.3 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 above and remain classified as PFYC Class 2 or Class 1, SEZ-specific design features for mitigating impacts on paleontological resources within the proposed Milford Flats South 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.

13.2.17 Cultural Resources

13.2.17.1 Affected Environment

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

- The Dominguez–Escalante Trail may have gone through or passed very near to the SEZ.

- A tribally approved ethnographic study of the proposed Milford Flats South 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, important cultural landscapes, water sources, and traditional plants and animals were identified (see Section 13.2.18 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).

- The Confederated Tribes of the Goshute Reservation and the Paiute Indian Tribe of Utah identified the Thermo Hot Springs as the outstanding feature of the Milford Flats South SEZ area.

- 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 625 acres [2.5 km^2]) as funding to support additional Class II sample inventories in the SEZ areas becomes available. If the roughly 123 acres (0.5 km^2) previously surveyed meets current survey standards, then approximately 502 acres (2.03 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, some 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.
  – Continuation of government-to-government consultation as described in Section 2.4.3 of the Supplement to the Draft Solar PEIS and IM 2012-032 (BLM 2011c), including follow-up to recent ethnographic studies with tribes not included in the original studies to determine whether those tribes have similar concerns.

13.2.17.2 Impacts

Few, if any, adverse impacts on significant cultural resources are anticipated in the proposed Milford Flats South SEZ; however, further investigation is needed. The assessment provided in the Draft Solar PEIS remains valid, with the following update:

- The Dominguez–Escalante Trail may have gone through or passed very close to the Milford Flats South SEZ, but as stated for the Escalante Valley SEZ in the Draft PEIS, since there is relatively little potential for finding traces of the single pack trail itself, the potential for adverse effects on the trail is very low. The nearest well-documented site related to the Dominguez–Escalante Trail is the Thermo Hot Springs. Visual impacts on Thermo Hot Springs are possible (see also Section 13.2.18.2).

13.2.17.3 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, no SEZ-specific design features for cultural resources have been identified. SEZ-specific design features, if needed, would be determined during consultations with the Utah SHPO and affected tribes and would depend on the findings of future investigations. Some SEZ-specific design features may be identified through the process of preparing parcels for competitive offer and subsequent project-specific analysis.

13.2.18 Native American Concerns

13.2.18.1 Affected Environment

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

- A tribally approved ethnographic study of the proposed Milford Flats South 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. New important cultural landscapes, 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://solarpeis.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 Milford Flats South SEZ are important in helping both tribes to understand their past, present, and future.

- The tribal representatives of the Confederated Tribes of the Goshute Reservation and the Paiute Indian Tribe of Utah believe that culturally significant areas such as Thermo Hot Springs and Parowan Gap should be considered Sacred Sites and nominated as traditional cultural properties. Both tribes have noted increased vandalism to the Parowan Gap petroglyph complex and would like to have better protection measures instituted to protect the rock art.

- 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 a 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.

- Indian Graves Peak, located approximately 18 mi (28.9 km) northwest of the proposed SEZ, has been identified as a location of several Native American burials.

- 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.

- Beaver River was identified by ethnographers as an important source of water for the irrigated agriculture practiced by Native Americans in the area.

- Ethnographers identified the present town of Milford as an area where Paiute peoples may have lived prior to European contact.

- Historical events in and around the Escalante and Wah Wah Valleys have contributed to the history of the Confederated Tribes of the Goshute Reservation and the Paiute Indian Tribe of Utah. These events include the first recorded encounter between the 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 lifestyle; the establishment of mines and mining communities in which Native American were employed; 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 13.2.18.1-2 of the Draft Solar PEIS: alkaligrass (*Puccinellia* sp.), big sagebrush (*Artemisia tridentate*), bud sagebrush (*Picrothamnus dessertorum*), desert prince's plume (*Stanleya pinnata*), fourwing saltbrush (*Atriplex canescens*), Indian tea (*Ephedra viridis*), nettle (*Urtica* sp.), orange lichen (*Caloplaca trachyhylla*), rough cocklebur (*Xanthium strumarium*), shadscale (*Atriplex confertifolia*), singleleaf Pinyon (*Pinus monophylla*), spikerush (*Eleocharis* sp.), three-leaf sumac (*Rhus trilobata*), tulip pricklypear (*Opuntia phaecantha*), Utah juniper (*Juniperus osteoperma*), winterfat (*Krascheninnikovia lanata*), western tansymustard (*Descurainia pinnata*), and western wheatgrass (*Pascopyrum smithii*).

- The following traditional animals have been identified in addition to those listed in Table 13.2.18.1-3 of the Draft Solar PEIS: American black bear (*Ursus americanus*); American badger (*Taxidea taxus*); elk (*Cervis Canadensis*), white-tailed antelope squirrel (*Ammospermophilus leucurus*), American kestrel (*Falco sparverius*), loggerhead shrike (*Lanius ludovicianus*), roadrunner (*Geococcyx* sp.), rock wren (*Salpinctes obsoletus*), turkey vulture (*Cathartes aura*), and western kingbird (*Tyrannus verticalis*).

13.2.18.2 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, 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 Milford Flats South SEZ identified the following impacts:

- Tribal representatives believe that solar energy development within the proposed Milford Flats South SEZ will adversely affect rock art sites, water sources, culturally important geological features, and traditional plant, mineral, and animal resources (SWCA and University of Arizona 2011).

- Development within the proposed Milford Flats South SEZ could result in visual impacts on Thermo Hot Springs. Possible visual impacts could occur to Parowan Gap, the Dominquez–Escalante Trail, and the Old Spanish Trail as well.

- Development within the proposed Milford Flats South SEZ may affect the spiritual connection both tribes have to water and *Puha*, especially for developments near spiritual water sources such as Thermo Hot Springs and the Beaver River.

- Development within the proposed Milford Flats South SEZ will directly affect culturally important plant and animal resources because it will likely require the grading of the project area.

13.2.18.3 SEZ-Specific Design Features and Design Feature Effectiveness

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

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

13.2.19 Socioeconomics

13.2.19.1 Affected Environment

The boundaries of the Milford Flats South SEZ have not changed. The socioeconomic 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.

13.2.19.2 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, impacts on local housing markets, and on local community service employment. Since the boundaries of the proposed Milford Flats South SEZ remain unchanged and the reduction of the developable area was small (less than 4%), the impacts for full build-out of the SEZ estimated in the Draft Solar PEIS remain essentially unchanged. During construction, between 216 and 2,856 jobs and between $11.2 million and $148 million in income could be associated with solar development in the SEZ. During operations at full build-out, between 15 and 327 jobs and between $0.4 million and $9.9 million in income could be produced. In-migration of workers and their families would mean between 48 and 631 rental housing units would be needed during construction, and between 4 and 86 owner-occupied units during operations.

13.2.19.3 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.

13.2.20 Environmental Justice

13.2.20.1 Affected Environment

The data presented in the Draft Solar PEIS for the proposed Milford Flats South SEZ have not changed substantially. 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.

13.2.20.2 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 CEQ guidelines (CEQ 1997) (see Section 13.2.20.1 of the Draft Solar PEIS) within the 50-mi (80-km) radius around the boundary of the SEZ. Thus 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.

13.2.20.3 SEZ-Specific Design Features and Design Feature Effectiveness

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

13.2.21 Transportation

13.2.21.1 Affected Environment

The reduction in developable area of the proposed Milford Flats South SEZ of less than 4% does not change the information on affected environment for transportation provided in the Draft Solar PEIS.

13.2.21.2 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 volumes of traffic on regional corridors would be more than double the current values in most cases. Beryl Milford Road and State Routes 21, 129, and 130 provide regional traffic corridors near the proposed Milford Flats South SEZ. Local road improvements would be necessary on any portion of these roads that might be developed so as not to overwhelm the local access roads near any site access point(s). Thermal Road would also require upgrades. Potential existing site access roads would require improvements, including asphalt pavement.

Solar development within the SEZ would affect public access along OHV routes 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.

13.2.21.3 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 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.

13.2.22 Cumulative Impacts

The analysis of potential impacts in the vicinity of the proposed Milford Flats South 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 4%. The following sections include an update to the information presented in the Draft Solar PEIS regarding cumulative effects for the proposed Milford Flats South SEZ.

13.2.22.1 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 the impact may occur (e.g., air quality impacts may have a greater geographic extent than visual resources impacts). Most of the lands around the SEZ are state owned, administered by the USFS, or administered by the BLM. The BLM administers about 54% of the lands within a 50-mi (80-km) radius of the SEZ.

13.2.22.2 Overview of Ongoing and Reasonably Foreseeable Future Actions

The Draft Solar PEIS included two other proposed SEZs in southwestern Utah, Escalante Valley 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 Milford Flats South SEZ has been updated and is presented in Table 13.2.22.2-1. The locations of these projects are shown in Figure 13.2.22.2-1.

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 Milford Flats South SEZ that were listed in Table 13.2.22.2-3 of the Draft Solar PEIS have had a change in their status: Utah's Copper King Mining has filed for Chapter 11 and suspended operations at the Hidden Treasure Mine (Oberbeck 2010), and the Environmental Assessment on the Hamlin Valley Resource Protection and Habitat Improvement Project was issued on February 2, 2012 (BLM 2012b).

13.2.22.3 General Trends

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

13.2.22.4 Cumulative Impacts on Resources

Total disturbance in the proposed Milford Flats South SEZ over 20 years is assumed to be about 5,002 acres (20.2 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 Milford Flats South SEZ may include impacts on water quantity and quality,

TABLE 13.2.22.2-1 Ongoing and Reasonably Foreseeable Future Actions Related to Energy Development and Distribution near the Proposed Milford Flats South 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 November 2009[b]**	Land use, ecological resources, visual	About 25 mi[c] northeast of the Milford Flats South SEZ (Beaver and Millard Counties)
Milford Wind Phase II (UTU 83073), **68 turbines, 102 MW[b]**	**Operating since May 2011[b]**	Land use, ecological resources, visual	About 25 mi northeast of the Milford Flats South SEZ (Beaver and Millard Counties)
Milford Wind Phase III (UTU 8307301), **140 turbines, 16,068 acres[d] (private)**	**Draft Environmental Assessment Report October 2011[e]**	Land use, ecological resources, visual	About 25 mi northeast of the Milford Flats South SEZ (Beaver and Millard Counties)
Milford Wind Phases IV–V, (UTU 8307301)	Planned	Land use, ecological resources, visual	About 25 mi northeast of the Milford Flats South SEZ (Beaver and Millard Counties)
Geothermal Energy Project (UTU 66583O)	Authorized	Land use, groundwater, terrestrial habitats, visual	About 20 mi northeast of the Milford Flats South SEZ (Beaver County)
Geothermal Energy Project (UTU 66583X)	Authorized	Land use, groundwater terrestrial habitats, visual	About 20 mi northeast of the Milford Flats South SEZ (Beaver County)
Geothermal projects: Several geothermal projects in the vicinity of the SEZ on both BLM-administered lands and state lands are either in the planning stages or under construction	Planned and ongoing	Land use, water resources, ecological resources, socioeconomics, transportation	General vicinity of the SEZ and north of Milford
Blundell Geothermal Power Station, **Units 1 & 2, 26 & 12 MW, 2,000 acres[f]**	Ongoing	Land use, groundwater, terrestrial habitats, visual	About 40 mi north of the Milford Flats South SEZ (Beaver County)

TABLE 13.2.22.2-1 (Cont.)

Description	Status	Resources Affected	Primary Impact Location
Transmission and Distribution System			
Milford Wind Corridor Project	Ongoing	Land use, ecological resources, visual	Wah Wah Valley
Sigurd to Red Butte No. 2, 345-kV Transmission Line Project	**DEIS May 2011**[g]	Land use, ecological resources, visual	East of the Milford Flats South and Escalante Valley SEZs
Energy Gateway South, 500-kV AC Transmission Line Project	**ROW modified and no longer within 50 mi (80 km) of the SEZ**[h]		
TransWest Express, 600-kV DC Transmission Line Project	**Scoping Report July 2011**[i]	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)	**DEIS April 2010**[j]	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 First Wind (2011) for details.

c To convert mi to km, multiply by 1.6093.

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

e See CH2MHILL (2011) for details.

f See PacifiCorp (2011) for details.

g See BLM (2011a) for details.

h See BLM (2011b) for details.

i See BLM and Western (2011) for details.

j See BLM (2010) for details.

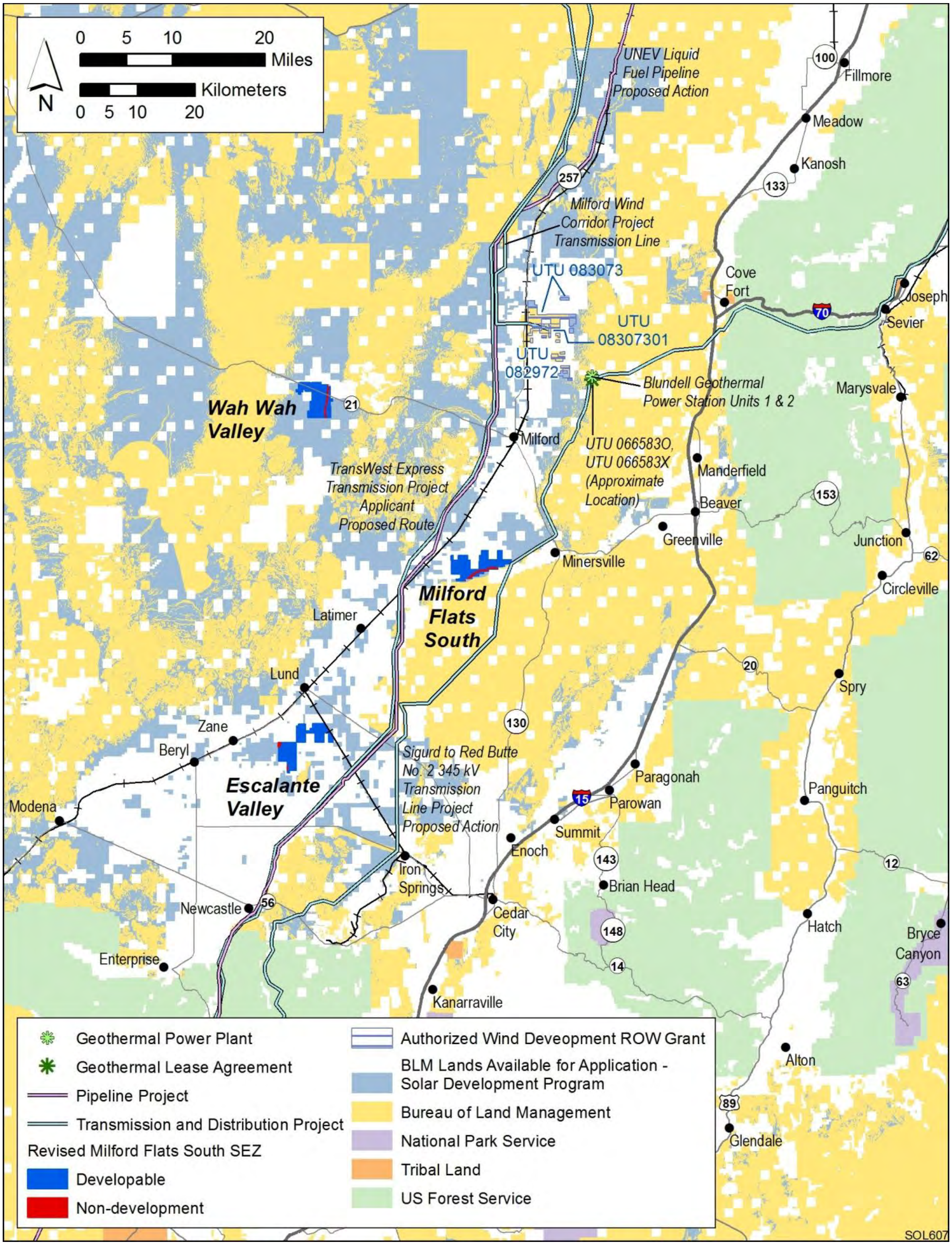


FIGURE 13.2.22.2-1 Locations of Existing and Reasonably Foreseeable Energy Projects on Public Land within a 50-mi (80-km) Radius of the Proposed Milford Flats South SEZ as Revised

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 Milford Flats South during construction, operation, and decommissioning are expected to be the same as those projected in the Draft Solar PEIS.

13.2.23 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 Milford Flats South SEZ, including the identification of potential load areas to be served by power generated at the SEZ and the results of the DLT analysis. Unlike Sections 13.2.2 through 13.2.22, this section is not an update of previous analysis for the Milford Flats 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 (0.0.2 km^2) of land required per MW, and the assumption of a maximum of 80% of the land area developed, the Milford Flats South SEZ is estimated to have the potential to generate 1,000 MW of marketable solar power at full build-out.

13.2.23.1 Identification and Characterization of Load Areas

The primary candidates for Milford Flats South SEZ load areas are the major surrounding cities. Figure 13.2.23.1-1 shows the possible load areas for the Milford Flats South SEZ and the estimated portion of their market that could be served by solar generation. Possible load areas for the Milford Flats South 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 groupings examined for the Milford Flats South SEZ are as follows:

1. St. George, Utah; and Las Vegas, Nevada; and

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

Figure 13.2.23.1-2 shows the most economically viable load groups and transmission scheme for the Milford Flats South SEZ (transmission scheme 1), and Figure 13.2.23.1-3 shows an alternative transmission scheme (transmission scheme 2) that represents a logical choice should transmission scheme 1 be infeasible. As described in Appendix G, the alternative shown

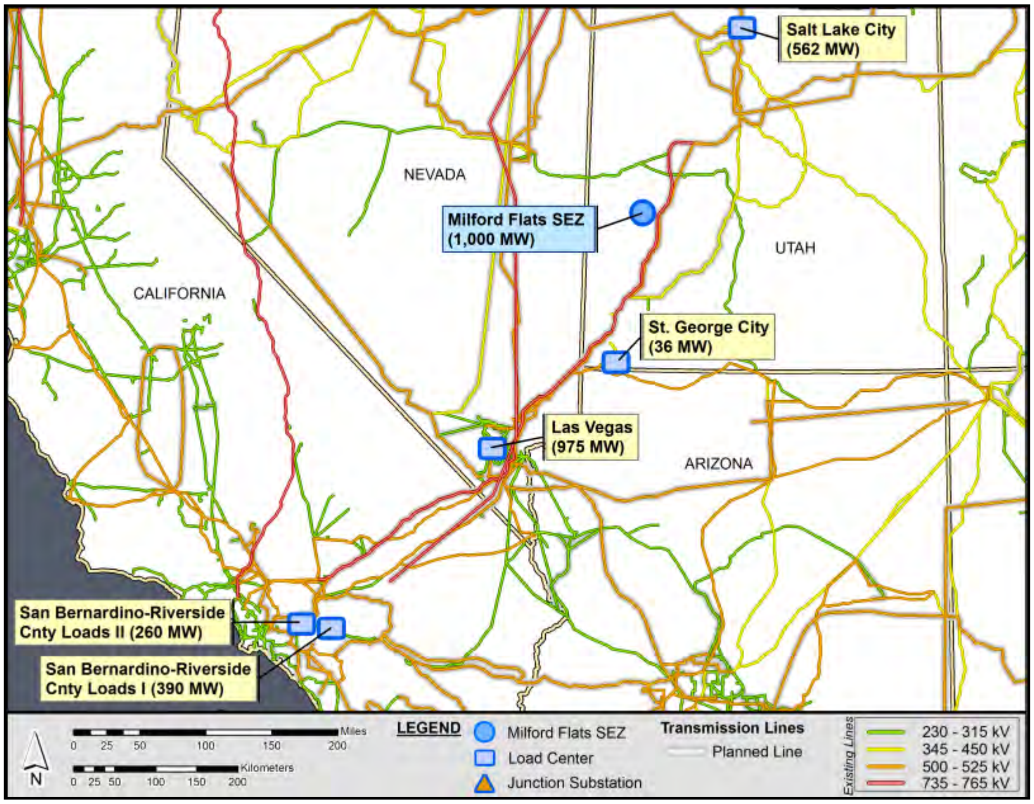


FIGURE 13.2.23.1-1 Location of the Proposed Milford Flats South SEZ and Possible Load Areas (Source for background map: Platts 2011)

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 1,000 MW could be fully allocated.

Table 13.2.23.1-1 summarizes and groups the load areas according to their associated transmission scheme and provides details on how the megawatt load for each area was estimated.

13.2.23.2 Findings for the DLT Analysis

The DLT analysis approach assumes that the Milford Flats South SEZ will require all new construction for transmission lines (i.e., dedicated lines) and substations. The new transmission lines(s) would directly convey the 1,000-MW output of the Milford Flats South SEZ to the prospective load areas for each possible transmission scheme. The approach also assumes that all existing transmission lines in the WECC region are saturated and have little or no available capacity to accommodate the SEZ's output throughout the entire 10-year study horizon.

Figures 13.2.23.1-2 and 13.2.23.1-3 display the pathways that new dedicated lines might follow to distribute solar power generated at the Milford Flats South SEZ via the two identified

FIGURE 13.2.23.1-2 Transmission Scheme 1 for the Proposed Milford Flats South SEZ (Source for background map: Platts 2011)

transmission schemes described in Table 13.2.23.1-1. 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 areas to the southwest, a new line would be constructed to connect with St. George and Las Vegas, so that the 1,000-MW output of the Milford Flats South SEZ could be fully utilized (Figure 13.2.23.1-2). This particular scheme has four segments. The first segment extends to the southwest from the SEZ to the first switching station over a distance of about 13 mi (21 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 would extend about 98 mi (158 km) from the first switching station to a second switching station and forms as a tap point for the line going to St. George. The third segment extends from the second switching station about 26 mi (42 km) to St. George (36 MW). The fourth and final leg would extend about 125 mi (201 km) from the second switching station near St. George to Las Vegas. 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.

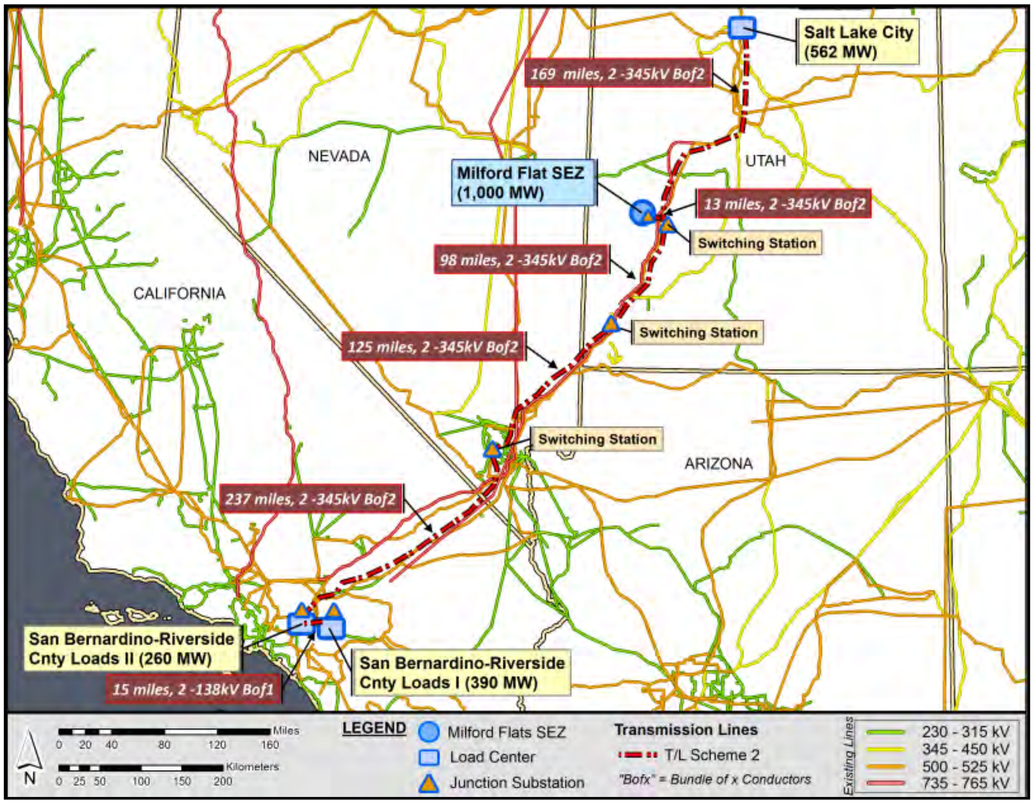


FIGURE 13.2.23.1-3 Transmission Scheme 2 for the Proposed Milford Flats South SEZ (Source for background map: Platts 2011)

Transmission scheme 2, which assumes the Las Vegas market is not available, serves load centers to the southwest and northwest. Figure 13.2.23.1-3 shows that new lines would be constructed to connect with San Bernardino–Riverside County load II (260 MW), San Bernardino–Riverside County load I (390 MW), and Salt Lake City (562 MW), so that the 1,000-MW output of the Milford Flats South SEZ could be fully utilized. This scheme has six segments, or legs. The first segment extends to the southwest from the SEZ to the first switching station over a distance of about 13 mi (21 km). This segment would require a double-circuit, 345-kV (2–345 kV) bundle of two (Bof2) conductors transmission line design. The second leg goes about 98 mi (158 km) from the first switching station to a second switching station, and the third leg extends about 125 mi (201 km) from the second switching station to the Las Vegas switching station. The fourth segment runs from the Las Vegas switching station to the San Bernardino–Riverside County load II (260 MW) via a 237-mi (381-km) line, while the fifth leg links San Bernardino–Riverside County load II with San Bernardino–Riverside County load I (390 MW) via a 15-mi (24-km) line. The seventh leg extends to the northeast from the first switching station near the SEZ to Salt Lake City (562 MW) over a distance of 169 mi (272 km).

Table 13.2.23.2-1 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

TABLE 13.2.23.1-1 Candidate Load Area Characteristics for the Proposed Milford Flats South 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
2	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).

to the number of load areas associated with the scheme plus one. Substations at the load areas would consist of one or more step-down transformers, while the originating substation at the SEZ would consist of several step-up transformers. The originating substation would have a rating of at least 1,000 MW (to match the plant's output), while the combined load substations would have a similar total rating of 1,000 MW. Switching stations are introduced at appropriate junctions where there is the need to branch out to simultaneously serve two or more load areas in different locations. 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 13.2.23.2-2 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 the costs and area disturbed would be scheme 1, which would serve St. George and Las Vegas. This scheme is estimated to potentially disturb about 5,282 acres (21.4 km^2) of land. The less favorable transmission scheme with respect to minimizing the costs and area disturbed would be scheme 2 (serving San Bernardino–Riverside County loads I and II and Salt Lake City, but excluding Las Vegas). For this scheme, the construction of new transmission lines and substations is estimated to disturb a land area on the order of 13,788 acres (55.8 km^2).

TABLE 13.2.23.2-1 Potential Transmission Schemes, Estimated Solar Markets, and Distances to Load Areas for the Proposed Milford Flats South 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	1,011	137	262	345,	5
	Las Vegas, Nevada[b]	975		125		138	
2	San Bernardino–Riverside County load II, California[c]	260	1,212	473	657	345, 138	7
	San Bernardino–Riverside County load I, California[d]	390		15			
	Salt Lake City, Utah[b]	562		169			

[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 13.2.23.1-1.

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

Table 13.2.23.2-3 shows the estimated NPV of both transmission schemes and takes into account the cost of constructing the lines, the substations, and the projected revenue stream over the 10-year horizon. A positive NPV indicates that revenues more than offset investments. This calculation does not include the cost of producing electricity.

The most economically attractive configuration (transmission scheme 1) has the highest positive NPV and serves Las Vegas. The secondary case (transmission scheme 2), which excludes the Las Vegas market, 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.

Table 13.2.23.2-4 shows the effect of varying the value of the utilization factor on the NPV of the transmission schemes. The table shows that just slightly above 20% utilization, the NPVs for both transmission schemes are positive. It also shows that as the utilization factor is increased, the economic viability of the lines 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.

The findings of the DLT analysis for the proposed Milford Flats South SEZ are as follows:

TABLE 13.2.23.2-2 Comparison of the Various Transmission Line Configurations with Respect to Land Use Requirements for the Proposed Milford Flats 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]	262	5	5,258.2	24.0	5,282.2
2	San Bernardino–Riverside County load II, California[c] San Bernardino–Riverside County load I, California[d] Salt Lake City, Utah[b]	657	7	13,763.6	24.0	13,787.6

[a] The load area represents the city named.

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

[c] 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.

- Transmission scheme 1, which identifies St. George and Las Vegas as the primary markets, represents the most favorable option based on NPV and land use requirements. This configuration would result in new land disturbance of about 5,282 acres (21.4 km^2).

- Transmission scheme 2, which represents an alternative configuration if Las Vegas is excluded, serves the major cities in San Bernardino and Riverside Counties and Salt Lake City. This configuration would result in new land disturbance of about 13,788 acres (55.8 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 Milford Flats South SEZ is not sent to either of the two markets identified above, the potential upper-bound impacts in terms of cost would be greater.

TABLE 13.2.23.2-3 Comparison of Potential Transmission Lines with Respect to NPV (Base Case) for the Proposed Milford Flats 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]	605.9	66.7	177.1	1,367.7	695.1
2	San Bernardino–Riverside County load II, California[c] San Bernardino–Riverside County load I, California[d] Salt Lake City, Utah[b]	1,563.5	80.0	212.3	1,367.7	–3.8

[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.

TABLE 13.2.23.2-4 Effect of Varying the Utilization Factor on the NPV of the Transmission Schemes for the Proposed Milford Flats South SEZ

Transmission Scheme	City/Load Area Name	NPV ($ million) at Different Utilization Factors					
		20%	30%	40%	50%	60%	70%
1	St. George, Utah[a] Las Vegas, Nevada[b]	695.9	1,379.0	2,062.8	2,746.7	3,430.6	4,114.4
2	San Bernardino–Riverside County load II, California[c] San Bernardino–Riverside County load I, California[d] Salt Lake City, Utah[b]	–3.8	816.0	1,635.8	2,455.6	3,275.5	4,095.3

[a] The load area represents the city named.

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

[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.

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

13.2.24 Impacts of the Withdrawal

The BLM is proposing to withdraw 6,480 acres (2 km^2) of public land comprising the proposed Milford Flats South 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 Milford Flats South 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 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 Milford Flats South 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).

13.2.25 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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13.2.26 Errata for the Proposed Milford Flats South 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 13.2.26-1 provides corrections to information presented in the Draft Solar PEIS and the Supplement to the Draft.

TABLE 13.2.26-1 Errata for the Proposed Milford Flats South SEZ (Section 13.2 of the Draft Solar PEIS and Section C.6.2 of the Supplement to the Draft Solar PEIS)

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

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13.3 WAH WAH VALLEY

13.3.1 Background and Summary of Impacts

13.3.1.1 General Information

The proposed Wah Wah Valley SEZ is located in Beaver County in southwestern Utah about 21 mi (34 km) northwest of the proposed Milford Flats South SEZ. In 2008, the county population was 7,265, while adjacent Iron County to the south had a population of 45,833. The largest nearby town is Cedar City, Utah, about 50 mi (80 km) southeast in Iron County. The town of Milford is located about 23 mi (37 km) east.

The SEZ can be accessed from State Route 21, which runs from west to east through the northern half of the SEZ. Access to the interior of the SEZ is by dirt roads. The nearest UP Railroad stop is 23 mi (37 km) away in Milford. As of October 28, 2011, there were no pending ROW applications for solar projects within the SEZ.

As published in the Draft Solar PEIS (BLM and DOE 2010), the proposed Wah Wah Valley SEZ had a total area of 6,097 acres (25 km^2) (see Figure 13.3.1.1-1). 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 Wah Wah Valley SEZ, 224 acres (0.91 km^2) of the Wah Wah Wash was identified as a non-development area (see Figure 13.3.1.1-2). The remaining developable area within the SEZ is 5,873 acres (23.8 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 Wah Wah Valley SEZ as described in the Draft Solar PEIS.

13.3.1.2 Development Assumptions for the Impact Analysis

Maximum solar development of the Wah Wah Valley SEZ was assumed to be 80% of the developable SEZ area over a period of 20 years, a maximum of 4,698 acres (19 km^2). Full development of the Wah Wah Valley SEZ would allow development of facilities with an estimated total of between 522 MW (power tower, dish engine, or PV technologies, 9 acres/MW [0.04 km^2/MW]) and 940 MW (solar trough technologies, 5 acres/MW [0.02 km^2/MW]) of electrical power capacity (Table 13.3.1.2-1).

Availability of transmission from SEZs to load centers will be an important consideration for future development in SEZs. For the proposed Wah Wah Valley SEZ, the nearest existing transmission line as identified in the Draft Solar PEIS is a 138-kV line 42 mi (68 km) east of the SEZ. It is possible that a new transmission line could be constructed from the SEZ to this existing line, but the capacity of the line would be inadequate for the possible 522 to 940 MW

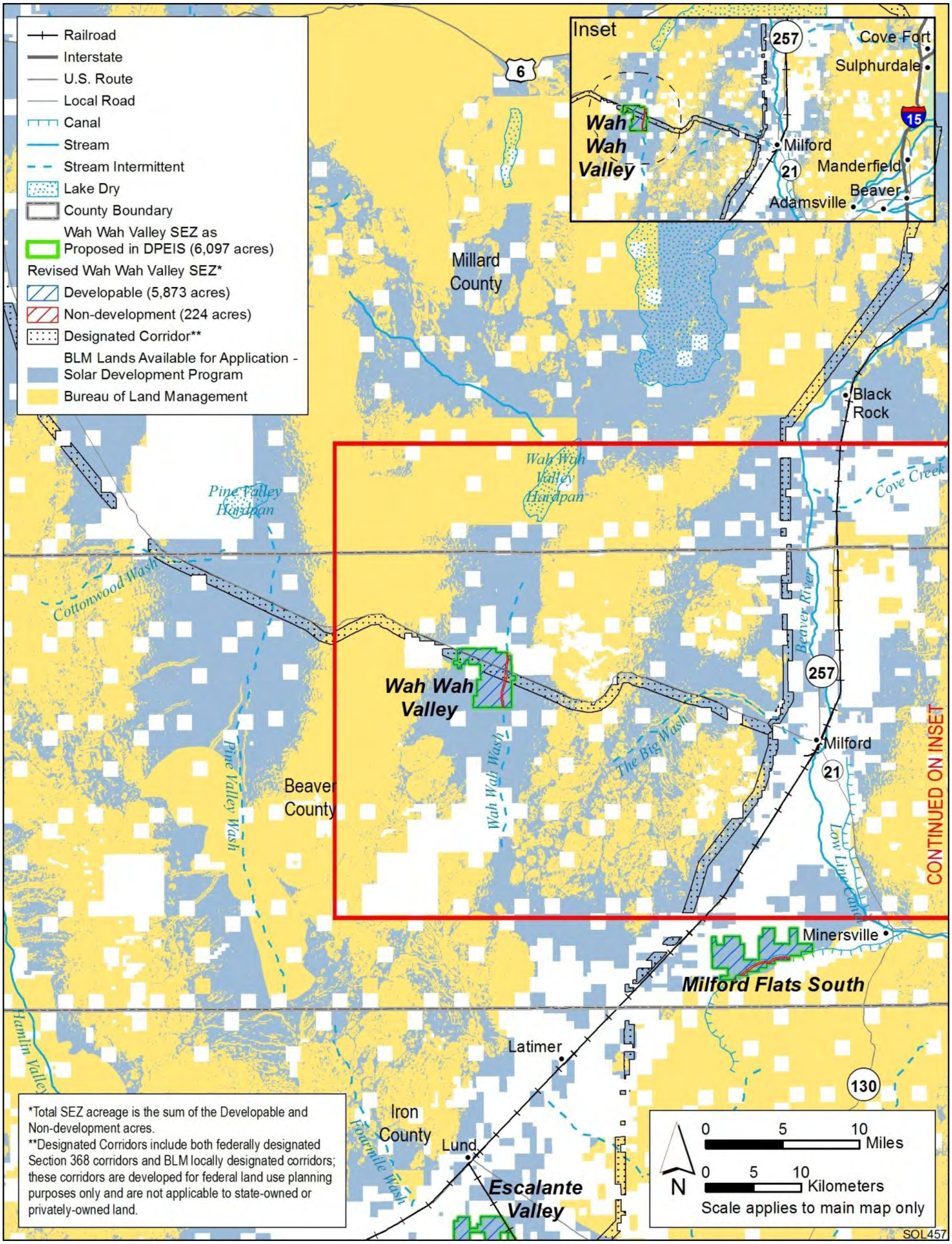

FIGURE 13.3.1.1-1 Proposed Wah Wah Valley SEZ as Revised

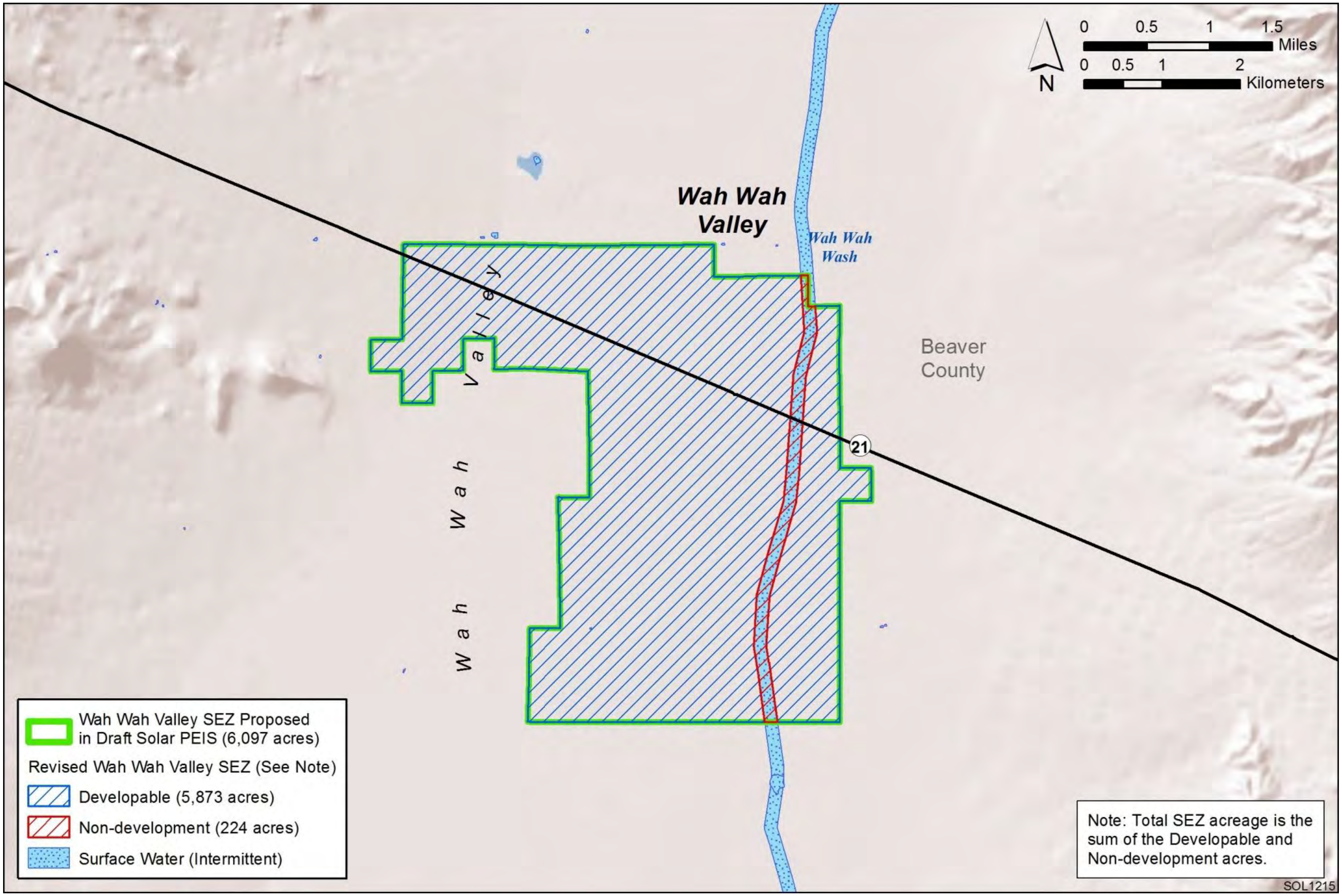

FIGURE 13.3.1.1-2 Developable and Non-development Areas for the Proposed Wah Wah Valley SEZ as Revised

TABLE 13.3.1.2-1 Assumed Development Acreages, Solar MW Output, and Nearest Major Access Road and Transmission Line for the Proposed Wah Wah 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 Corridor[f]
5,873 acres[a] and 4,698 acres	522 MW[b] 940 MW[c]	State Route 21: adjacent	42 mi[d] and 130 kV	NA[e]	Adjacent

[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] NA = no access road construction is assumed necessary for Wah Wah Valley.

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

of new capacity. Therefore, at full build-out capacity, new transmission and possibly also upgrades of existing transmission lines would be required to bring electricity from the proposed Wah Wah Valley SEZ to load centers. An assessment of the most likely load center destinations for power generated at the Wah Wah Valley SEZ and a general assessment of the impacts of constructing and operating new transmission facilities to those load centers are provided in Section 13.3.23. In addition, the generic impacts of transmission and associated infrastructure construction and of line upgrades for various resources are discussed in Chapter 5 of this Final Solar PEIS. Project-specific analyses would also be required to identify the specific impacts of new transmission construction and line upgrades for any projects proposed within the SEZ.

The transmission assessment for the Wah Wah 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 1,273 acres (5.2 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 13.3.23).

The Wah Wah Valley SEZ partially overlaps a Section 368 federally designated energy corridor that runs east–west through the SEZ along State Route 21.[1] For this impact assessment, it is assumed that up to 80% of the proposed SEZ could be developed. This does not take into account the potential limitations to solar development that may result from siting constraints associated with the corridor. The development of solar facilities and the existing corridor will be dealt with by the BLM on a case-by-case basis; see Section 13.3.2.2 on impacts on lands and realty for further discussion.

For the proposed Wah Wah Valley SEZ, existing road access should be adequate to support construction and operation of solar facilities, because State Route 21 runs from west to east through the northern portion of the SEZ. Thus, no additional road construction outside of the SEZ is assumed to be required to support solar development, as summarized in Table 13.3.1.2-1.

13.3.1.3 Programmatic and SEZ-Specific Design Features

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

The discussions below addressing potential impacts of solar energy development on specific resource areas (Sections 13.3.2 through 13.3.22) 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 Wah Wah Valley SEZ may be required in addition to the programmatic design features. The proposed SEZ-specific design features for the Wah Wah 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 Solar PEIS. All applicable SEZ-specific design features identified to date (including those from the Draft Solar PEIS that are still applicable) are presented in Sections 13.3.2 through 13.3.22.

[1] Section 368 of the Energy Policy Act of 2005 (P.L. 109-58) required federal agencies to engage in transmission corridor planning (see Section 1.6.2.1 of the Draft Solar PEIS). As a result of this mandate, the BLM, DOE, USFS, and DoD prepared a PEIS to evaluate the designation of energy corridors on federal lands in 11 western states, including the 6 states evaluated in this study (DOE and DOI 2008). The BLM and USFS issued RODs to amend their respective land use plans to designate numerous corridors, often referred to as Section 368 corridors.

13.3.2 Lands and Realty

13.3.2.1 Affected Environment

The boundaries of the Wah Wah Valley SEZ as proposed in the Draft Solar PEIS have not changed. A total of 224 acres (0.91 km^2) of Wah Wah Wash have been identified as non-development areas. The northern boundary of the SEZ is immediately adjacent to a ranch homeplace, ranch buildings, and a feedlot and the access road to the ranch is within the SEZ. The remaining description of the area in the Draft Solar PEIS is still valid.

13.3.2.2 Impacts

Full development of the SEZ would disturb up to 5,873 acres (23.8 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. Solar development along the northern boundary of the SEZ would dramatically conflict with development on the adjacent private land.

The proposed Wah Wah Valley SEZ partially overlaps a Section 368 federally designated energy corridor. This existing corridor will be used primarily for the siting of transmission lines and other infrastructure such as pipelines. The existing corridor will be the preferred location for any transmission development that is required to support solar development and future transmission grid improvements related to the build-out of the Wah Wah Valley SEZ. Any use of the corridor lands within the Wah Wah Valley SEZ for solar energy facilities, such as solar panels or heliostats, must be compatible with the future use of the existing corridor. The BLM will assess solar projects in the vicinity of existing corridor on a case-by-case basis. The BLM will review and approve individual project plans of development to ensure compatible development that maintains the use of the corridor.

13.3.2.3 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 SEZ-specific design feature for lands and realty has been identified:

- Development may need to be restricted in the northern portion of the SEZ near the ranch development on private land to provide a buffer between private land developments and solar energy facility development.

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.

13.3.3 Specially Designated Areas and Lands with Wilderness Characteristics

13.3.3.1 Affected Environment

Two WSAs and two wilderness inventory units are within 25 mi (40 km) of the proposed Wah Wah Valley SEZ. The description of the area in the Draft Solar PEIS remains valid.

13.3.3.2 Impacts

Solar energy development within the proposed SEZ is anticipated to have adverse impacts on wilderness characteristics of the Wah Wah Mountains WSA and on the Central and Northern Wah Wah Mountains wilderness inventory units. The analysis in the Draft Solar PEIS remains valid.

13.3.3.3 SEZ-Specific Design Features and Design Feature Effectiveness

Required programmatic design features that would reduce impacts on specially designated areas are described in Section A.2.2 of Appendix A of this Final Solar PEIS (design features for both specially designated areas and visual resources would address impacts). Implementing the programmatic design features may provide some mitigation for the identified impacts, but the adverse impacts on wilderness characteristics in the WSAs and the two wilderness inventory units would not be fully mitigated.

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 and lands with wilderness characteristics 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.

13.3.4 Rangeland Resources

13.3.4.1 Livestock Grazing

13.3.4.1.1 Affected Environment

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

13.3.4.1.2 Impacts

Less than 3% of the Wah Wah Lawson allotment would be directly affected by full development of the SEZ, but the permittee has indicated that because of the location of the SEZ, he will encounter difficulties with watering his livestock. Because of the size of the allotment, it is possible that the potential loss of 221 AUMs within the SEZ could be replaced elsewhere in the allotment, but it is not clear at the current level of analysis how issues associated with livestock watering can be effectively addressed. Should the 221 AUMs be lost, there would be an economic loss to the ranch operation. Should the livestock-watering issue not be solvable, an additional loss of AUMs would likely occur. This will have to be addressed at the site-specific level when a proposal for solar energy development is being considered.

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 the Draft Solar PEIS is still applicable.

13.3.4.1.3 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 could provide adequate mitigation for identified impacts associated with the livestock watering issues but will not mitigate for any 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.

13.3.4.2 Wild Horses and Burros

13.3.4.2.1 Affected Environment

As presented in the Draft Solar PEIS, no wild horse or burro HMAs occur within the proposed Wah Wah Valley SEZ or in close proximity to it.

13.3.4.2.2 Impacts

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

13.3.4.2.3 SEZ-Specific Design Features and Design Feature Effectiveness

Because solar energy development within the proposed Wah Wah 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.

13.3.5 Recreation

13.3.5.1 Affected Environment

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

13.3.5.2 Impacts

Recreational users would be excluded from any portions of the SEZ developed for solar energy production, but recreational impacts are anticipated to be low.

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.

The remaining discussion of impacts on recreation in the Draft Solar PEIS remains valid.

13.3.5.3 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 ultimately be identified through the process of preparing parcels for competitive offer and subsequent project-specific analysis.

13.3.6 Military and Civilian Aviation

13.3.6.1 Affected Environment

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

13.3.6.2 Impacts

The southeastern boundary of the Utah Test and Training Range is about 5 mi (8 km) northwest of the SEZ. There are no identified impacts on military or civilian aviation facilities associated with the proposed Wah Wah Valley SEZ.

13.3.6.3 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.

13.3.7 Geologic Setting and Soil Resources

13.3.7.1 Affected Environment

13.3.7.1.1 Geologic Setting

Data provided in the Draft Solar PEIS remain valid. The boundaries of the proposed Wah Wah Valley SEZ remain the same, but 224 acres (0.91 km^2) of the Wah Wah Wash have been identified as non-development areas.

13.3.7.1.2 Soil Resources

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

- Table 13.3.7.1-1 provides revised areas for soil map units taking into account the non-development area within the Wah Wah Valley SEZ as revised.

13.3.7.2 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 4%, 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 205 acres (0.82 km^2) of moderately erodible soils from development (riverwash soils are not rated for wind erodibility).

- Impacts related to water erodibility are somewhat reduced, because the identification of non-development areas eliminates 61 acres (0.25 km^2) of moderately erodible soils from development (riverwash soils are not rated for water erosion potential).

13.3.7.3 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.

1 **TABLE 13.3.7.1-1 Summary of Soil Map Units within the Proposed Wah Wah 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]		
182	Siltcliffe silty clay loam (0 to 3% slopes)	Moderate	Moderate (WEG 6)[e]	Nearly level soils on alluvial flats. Parent material consists of alluvium from igneous and sedimentary rocks. Soils are very deep and well drained, with moderate surface-runoff potential and high permeability. Available water capacity is moderate. Partially hydric. Severe rutting hazard. Used for livestock grazing and wildlife habitat.	3,363 (55.2)[f]
183	Siltcliffe–Hiko Springs–Dera complex (0 to 3% slopes)	Slight	Moderate (WEG 3)	Nearly level soils (very fine sandy loams) on alluvial flats. Parent material consists of alluvium from igneous and sedimentary rocks. Soils are very deep and well drained, with moderate surface-runoff potential and high permeability. Available water capacity is moderate. Moderate rutting hazard. Used for rangeland and wildlife habitat.	1,386 (22.7)[g]
180	Siltcliffe–Thermosprings complex (0 to 2% slopes)	Slight	Moderate (WEG 3)	Nearly level soils (sandy loams) on alluvial flats. Parent material consists of alluvium from igneous and sedimentary rocks. Soils are very deep and well drained, with moderate surface-runoff potential and high permeability. Available water capacity is moderate. Partially hydric. Moderate rutting hazard. Used for rangeland and wildlife habitat.	442 (7.3)[h]
176	Dera–Lynndyl complex (0 to 3% slopes)	Slight	Moderate (WEG 4)	Nearly level soils (sandy clay loams) on alluvial fan skirts. Parent material consists of eolian material, alluvium, and colluvium from igneous and sedimentary rocks and lacustrine deposits. Soils are very deep and well drained, with moderate surface-runoff potential and high permeability. Available water capacity is low. Moderate rutting hazard. Used for rangeland and wildlife habitat.	363 (6.0)
177	Dera sandy clay loam (0 to 5% slopes)	Slight	Moderate (WEG 4)	Nearly level soils on alluvial fan skirts and relict longshore bars. Parent material consists of alluvium from igneous and sedimentary rocks. Soils are very deep and well drained, with moderate surface-runoff potential and high permeability. Available water capacity is low. Moderate rutting hazard. Used for rangeland and wildlife habitat.	260 (4.3)

TABLE 13.3.7.1-1 (Cont.)

Map Unit Symbol[a]	Map Unit Name	Erosion Potential: Water[b]	Erosion Potential: Wind[c]	Description	Area in Acres[d] (Percentage of SEZ)
181	Siltcliffe sandy clay loam (0 to 2% slopes)	Slight	Moderate (WEG 4)	Nearly level soils on alluvial flats. Parent material consists of alluvium from igneous and sedimentary rocks and lacustrine deposits. Soils are very deep and well drained, with moderate surface-runoff potential and high permeability. Available water capacity is high. Severe rutting hazard. Used for rangeland and wildlife habitat.	143 (2.3)
175	Hiko Peak, dry-Lynndyl association	Slight	Moderate (WEG 5)	Nearly level soils (cobbly sandy loams) on alluvial fan skirts and relict longshore bars. Parent material consists of alluvium from igneous and sedimentary rocks. Soils are very deep and well drained, with low surface-runoff potential (high infiltration rate) and high permeability. Available water capacity is low. Moderate rutting potential. Used for rangeland and wildlife habitat.	111 (1.8)
135	Riverwash (4 to 15% slopes)	Not rated	Not rated	Riverwash soils within streams and channels; occasional flooding. All hydric. Rutting hazard not rated.	29 (<1.0)[i]

[a] Map unit symbols are shown in Figure 13.3.7.1-5 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 “severe” indicates that erosion is expected; loss of soil productivity and damage are likely and erosion control measures may be costly or impractical. A rating of “moderate” indicates that erosion could be expected under ordinary climatic conditions.

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

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

Footnotes continued on next page.

1

TABLE 13.3.7.1-1 (Cont.)

[e] WEGs are based on soil texture, content of organic matter, effervescence of carbonates, content of rock fragments, and mineralogy, and also take into account soil moisture, surface cover, soil surface roughness, wind velocity and direction, and the length of unsheltered distance (USDA 2004). Groups range in value from 1 (most susceptible to wind erosion) to 8 (least susceptible to wind erosion). The NRCS provides a wind erodibility index, expressed as an erosion rate in tons per acre per year, for each of the wind erodibility groups: WEG 1, 220 tons (200 metric tons) per acre (4,000 m^2) per year (average); WEG 2, 134 tons (122 metric tons) per acre (4,000 m^2) per year; WEGs 3 and 4 (and 4L), 86 tons (78 metric tons) per acre (4,000 m^2) per year; WEG 5, 56 tons (51 metric tons) per acre (4,000 m^2) per year; WEG 6, 48 tons (44 metric tons) per acre (4,000 m^2) per year; WEG 7, 38 tons (34 metric tons) per acre (4,000 m^2) per year; and WEG 8, 0 tons (0 metric tons) per acre (4,000 m^2) per year.

[f] A total of 61 acres (0.25 km^2) within the Siltcliffe silty clay loam in the northern portion of the SEZ is currently categorized as a non-development area.

[g] A total of 123 acres (0.50 km^2) within Siltcliffe–Hiko Springs–Dera complex is currently categorized as a non-development area.

[h] A total of 21 acres (0.085 km^2) within the Siltcliffe–Thermosprings complex is currently categorized as a non-development area.

[i] A total of 19 acres (0.077 km^2) of riverwash in the southern portion of the SEZ is currently categorized as a non-development area.

Source: NRCS (2010).

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. Some SEZ-specific design features may be identified through the process of preparing parcels for competitive offer and subsequent project-specific analysis.

13.3.8 Minerals (Fluids, Solids, and Geothermal Resources)

A mineral potential assessment for the proposed Wah Wah 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 13.3.24.

13.3.8.1 Affected Environment

No known locatable minerals are present within the proposed Wah Wah Valley SEZ, and there are no oil and gas leases in the SEZ. There were geothermal leases located southeast of the SEZ, but those are now closed. No geothermal development has occurred within or near the SEZ. The description in the Draft Solar PEIS remains valid.

13.3.8.2 Impacts

No impacts on mineral resources were identified in the Draft Solar PEIS. The analysis in the Draft Solar PEIS remains valid.

13.3.8.3 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 minerals have been identified in this Final Solar PEIS. Some SEZ-specific design features may be identified through the process of preparing parcels for competitive offer and subsequent project-specific analysis.

13.3.9 Water Resources

13.3.9.1 Affected Environment

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

The Wah Wah Valley SEZ is located within the Escalante Desert–Sevier Lake subregion of the Great Basin hydrologic region. The SEZ is located in the Wah Wah Valley, which is a closed basin, with the Wah Wah Mountains to the west, San Francisco Mountain to the east, low-lying hills to the south, and a drainage divide to the north. Average precipitation is estimated to be 7 in./yr (18 cm/yr), with snowfalls of 5 in./yr (13 cm/yr), and the average pan evaporation rate is estimated to be 71 in./yr (180 cm/yr). There are no perennial surface water features within the Wah Wah Valley, but the Wah Wah Wash runs northward through the SEZ. The area around the Wah Wah Wash has been identified as non-development lands totaling 224 acres (0.91 km^2). The area has not been examined for flood risk, but any flooding would be limited to local ponding and erosion. No wetlands have been identified in or around the SEZ.

Groundwater in the Wah Wah Valley is found in basin-fill deposits and in underlying regional carbonate-rock aquifers. The basin-fill aquifer is on the order of 1,000 to 4,000 ft (305 to 1,219 m) in thickness and is composed of intermixed particles ranging from clays to boulders. The carbonate-rock aquifer under the Wah Wah Valley is highly fractured and connected to the Fish Springs Flow System, which includes Pine Valley, Snake Valley, Tule Valley, and Fish Springs Flat, all located to the north and west of Wah Wah Valley in Nevada. Wah Wah Spring is a series of springs located 2 mi (3.2 km) west of the SEZ and is a local discharge point of the carbonate rock aquifer. Recent studies estimate the discharge of Wah Wah Spring to be 1,530 ac-ft/yr (1.9 million m^3/yr). Groundwater recharge is estimated to be 10,000 ac-ft/yr (12.3 million m^3/yr) and is primarily supplied by groundwater discharge from adjacent basins and mountain front recharge in the Wah Wah Valley. Groundwater typically flows northward along the axis of the valley in the basin-fill aquifer, while groundwater flows toward Fish Springs Flat in the regional carbonate-rock aquifer. A monitoring well around the SEZ indicates a depth to groundwater of 660 ft (201 m). The water quality of the groundwater is considered hard, with a majority of water samples having total dissolved solids (TDS) concentrations above the secondary MCL; a small number of samples had sulfate concentrations greater than the secondary MCL.

In Utah, water resources are considered public, and water rights are allocated by the UDWR. The Wah Wah Valley is under the jurisdiction of the southwestern region office of the UDWR and is located in Policy Area 69 (Wah Wah Valley and Sevier Lake). Two pending groundwater applications have the potential to withdraw substantial groundwater quantities. The limited information on groundwater resources in Wah Wah Valley, in addition to information regarding the connectivity of the basin-fill aquifer to the regional carbonate aquifer, has prompted the U.S. Department of the Interior to initiate a groundwater investigation to assess potential impacts on groundwater resources in this region. Preliminary groundwater modeling results consider five projected groundwater pumping scenarios, all of which include the proposed applications in the Wah Wah Valley, and suggest that several hundred feet of drawdown could occur in the vicinity of the Wah Wah Valley (Durbin and Loy 2010).

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 Wah Wah Valley SEZ and the surrounding basin. Additional data regarding climate, surface water, and groundwater conditions are presented in Tables 13.3.9.1-1 through 13.3.9.1-7 and in Figures 13.3.9.1-1 and 13.3.9.1-2. 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 Wah Wah Valley SEZ that are found to be within a 100-year floodplain will be identified as non-development areas. Any water features within the Wah Wah Valley SEZ determined to be jurisdictional will be subject to the permitting process described in the CWA.

13.3.9.2 Impacts

13.3.9.2.1 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 Wah Wah Valley SEZ could result in increased erosion and sedimentation along the Wah Wah Wash. The identification of Wah Wah Wash and portions of its riparian regions as non-development areas reduces the potential for adverse impacts associated with land disturbance activities.

TABLE 13.3.9.1-1 Watershed and Water Management Basin Information Relevant to the Proposed Wah Wah Valley SEZ as Revised

Basin	Name	Area (acres)[b]
Subregion (HUC4)[a]	Escalante Desert–Sevier Lake (1603)	10,544,005
Cataloging unit (HUC8)	Sevier Lake (16030009)	854,940
Groundwater basin	Wah Wah Valley	384,000
SEZ	Wah Wah Valley	6,097

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

[b] To convert acres to km2, multiply by 0.004047.

TABLE 13.3.9.1-2 Climate Station Information Relevant to the Proposed Wah Wah 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.)
Milford, Utah (425654)	5,010	21	1906–2011	9.10	34.10
Minersville, Utah (425723)	5,280	31	1897–2011	11.18	22.30
Sevier Dry Lake, Utah (427747)	4,525	22	1987–1993	6.96	20.80
Wah Wah Ranch, Utah (429152)	4,880	2	1955–2008	6.77	5.20

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

[b] Surface elevations for the proposed Wah Wah Valley SEZ range from 4,880 to 5,125 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 13.3.9.1-3 Total Lengths of Selected Streams at the Subregion, Cataloging Unit, and SEZ Scale Relevant to the Proposed Wah Wah 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	32,963	0
Intermittent/ephemeral streams	160,714,376	11,846,101	94,170
Canals	10,978,835	126,155	5,389

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

Source: USGS (2012a).

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

TABLE 13.3.9.1-4 Stream Discharge Information Relevant to the Proposed Wah Wah Valley SEZ as Revised

Parameter	Station (USGS ID): Wah Wah Valley Tributary near Milford, Utah (10231700)
Period of record	1961–1968
No. of records	7
Discharge, range (ft^3/s)[a]	0–1,270
Discharge, most recent observation (ft^3/s)	1,270
Distance to SEZ (mi)[b]	7

[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).

The study region considered for the intermittent/ephemeral stream evaluation relevant to the Wah Wah Valley SEZ is a subset of the Sevier Lake watershed (HUC8), for which information regarding stream channels is presented in Tables 13.3.9.1-3 and 13.3.9.1-4 in this Final Solar PEIS. The evaluation categorized flow lines from the National Hydrography Dataset (USGS 2012a) as having low, moderate, and high sensitivity to land disturbance. Within the study area, 30% of the intermittent/ephemeral stream channels had low sensitivity, 55% had moderate sensitivity, and 15% had high sensitivity to land disturbance (Figure 13.3.9.2-1). Within the Wah Wah Valley SEZ, the majority of intermittent/ephemeral stream channels were low sensitivity reaches, one channel in the western portion of the SEZ had moderate sensitivity, and the majority of the high sensitivity reaches were just to the west of the SEZ found in channels draining the Wah Wah Mountains (Figure 13.3.9.2-1). 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).

13.3.9.2.2 Water Use Requirements for Solar Energy Technologies

The water use requirements for full build-out scenarios of the Wah Wah Valley SEZ have not changed from the values presented in the Draft Solar PEIS (see Tables 13.3.9.2-1 and 13.3.9.2-2 in the Draft Solar PEIS). This section presents additional analyses of groundwater, which includes a basin-scale water budget and a simplified, one-dimensional groundwater model to assess groundwater drawdown for various development scenarios. Only a summary of the results from these groundwater analyses is presented in this section; more information on methods and results is presented in Appendix O.

TABLE 13.3.9.1-5 Surface Water Quality Data Relevant to the Proposed Wah Wah Valley SEZ as Revised

	Station (USGS ID)[a]			
Parameter	381835113361701	382340113302401	382843113291401	383617113140201
Period of record	1972	1972	1972	1987
No. of records	1	1	1	1
Temperature (°C)[b]	11	14	16	13
Total dissolved solids (mg/L)	322	586	348	422
Dissolved oxygen (mg/L)	NA[c]	NA	NA	NA
pH	8.1	7.5	8.1	7.6
Nitrate + nitrite (mg/L as N)	0.74	2.8	1.4	1.4
Phosphate (mg/L)	0.06	0.18	0.03	NA
Organic carbon (mg/L)	NA	NA	NA	NA
Calcium (mg/L)	100	120	64	64
Magnesium (mg/L)	10	39	31	17
Sodium (mg/L)	6.3	33	21	64
Chloride (mg/L)	10	110	38	86
Sulfate (mg/L)	14	39	15	39
Arsenic (µg/L)	NA	NA	NA	NA

a Median values are listed.

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

c NA = no data collected for this parameter.

Source: USGS (2012b).

TABLE 13.3.9.1-6 Water Quality Data from Groundwater Samples Relevant to the Proposed Wah Wah Valley SEZ as Revised

Parameter	Station (USGS ID)[a] 382350113231901	384351113150501	390623113084101
Period of record	1974	1987	1981
No. of records	1	1	1
Temperature (°C)[b]	24.5	16	15
Total dissolved solids (mg/L)	344	23,900	49,300
Dissolved oxygen (mg/L)	NA[c]	NA	NA
pH	7.8	7.7	7.5
Nitrate + nitrite (mg/L as N)	1.2	<0.100	1.5
Phosphate (mg/L)	0.15	NA	NA
Organic carbon (mg/L)	NA	NA	NA
Calcium (mg/L)	23	350	1,600
Magnesium (mg/L)	7.3	390	1,700
Sodium (mg/L)	67	6,700	13,000
Chloride (mg/L)	28	10,000	28,000
Sulfate (mg/L)	66	6,300	4,600
Arsenic (µg/L)	NA	NA	84

[a] Median values are listed.

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

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

Source: USGS (2012b).

TABLE 13.3.9.1-7 Groundwater Surface Elevations Relevant to the Proposed Wah Wah Valley SEZ as Revised

Parameter	Station (USGS ID) 382350113231901	390623113084101	384351113150501
Period of record	1974–2011	1980–2011	1981–2011
No. of observations	46	102	45
Surface elevation (ft)[a]	5,195	4,544	4,555
Well depth (ft)	1,475	150	145
Depth to water, median (ft)	663.39	55.19	96.52
Depth to water, range (ft)	662.65–670	54.42–57.57	94.53–107.27
Depth to water, most recent observation (ft)	663.3	57.57	96.17
Distance to SEZ (mi)[b]	4	47	21

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

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

Source: USGS (2012b).

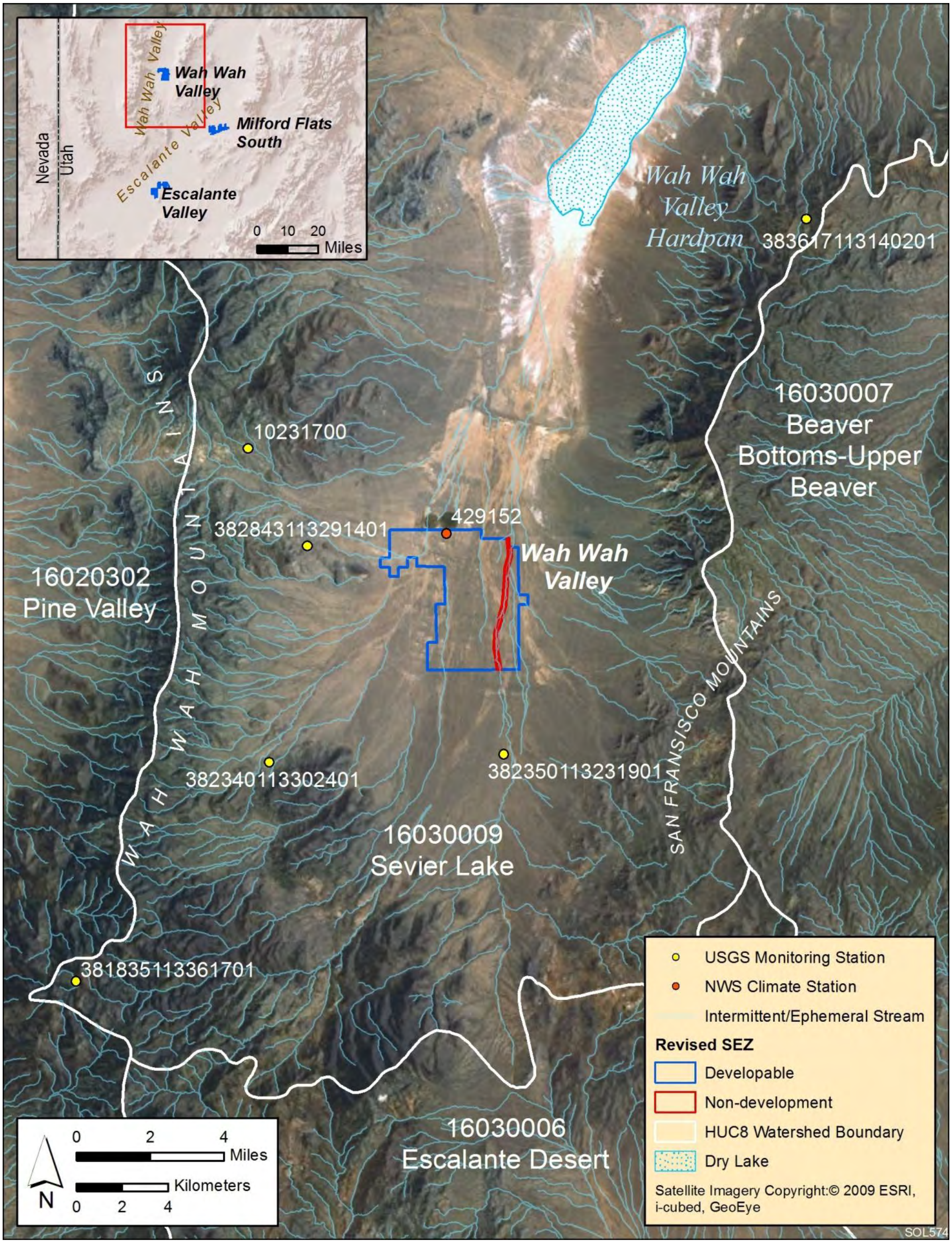

FIGURE 13.3.9.1-1 Water Features near the Proposed Wah Wah Valley SEZ as Revised

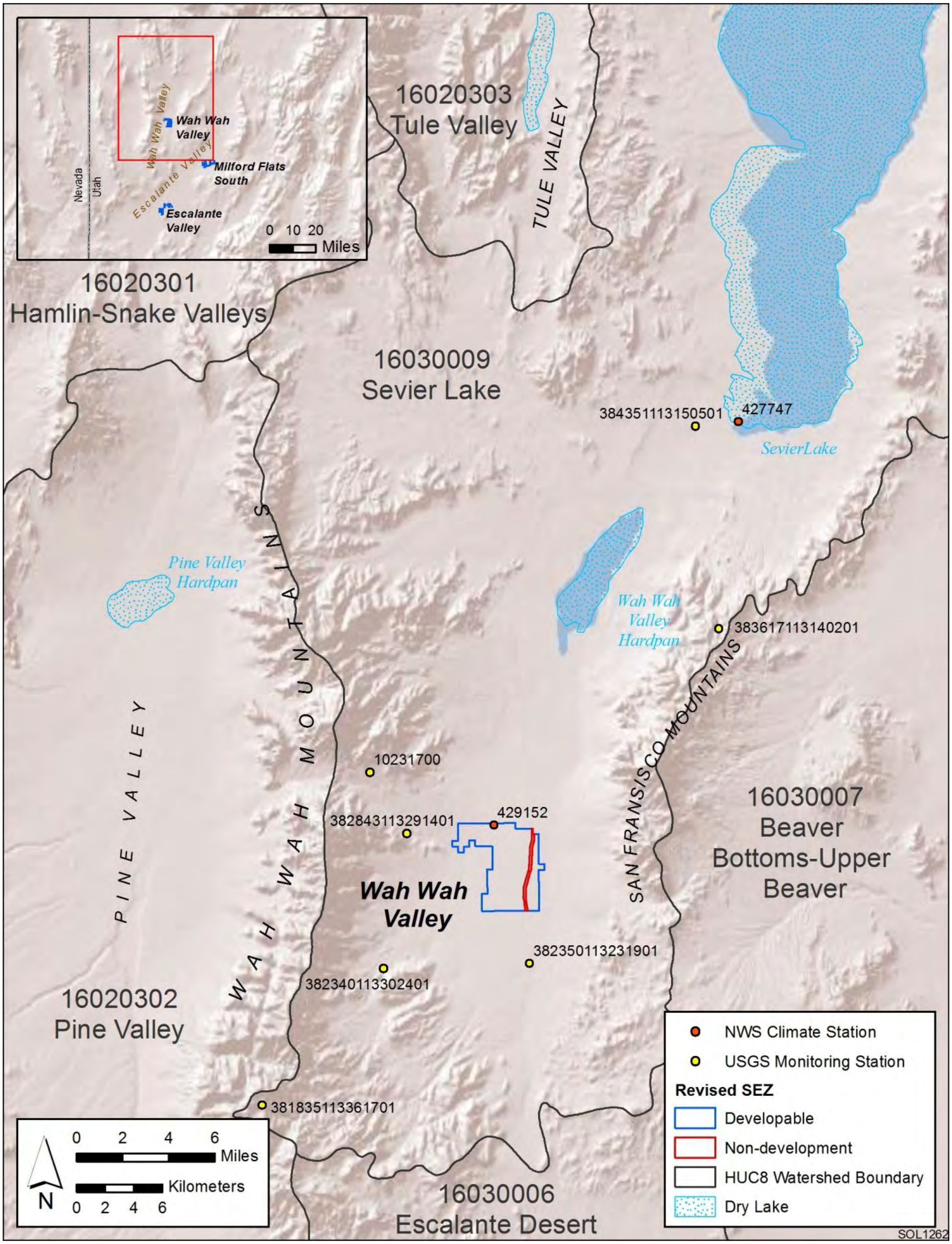

FIGURE 13.3.9.1-2 Water Features within the Sevier Lake Watershed, Which Includes the Proposed Wah Wah Valley SEZ as Revised

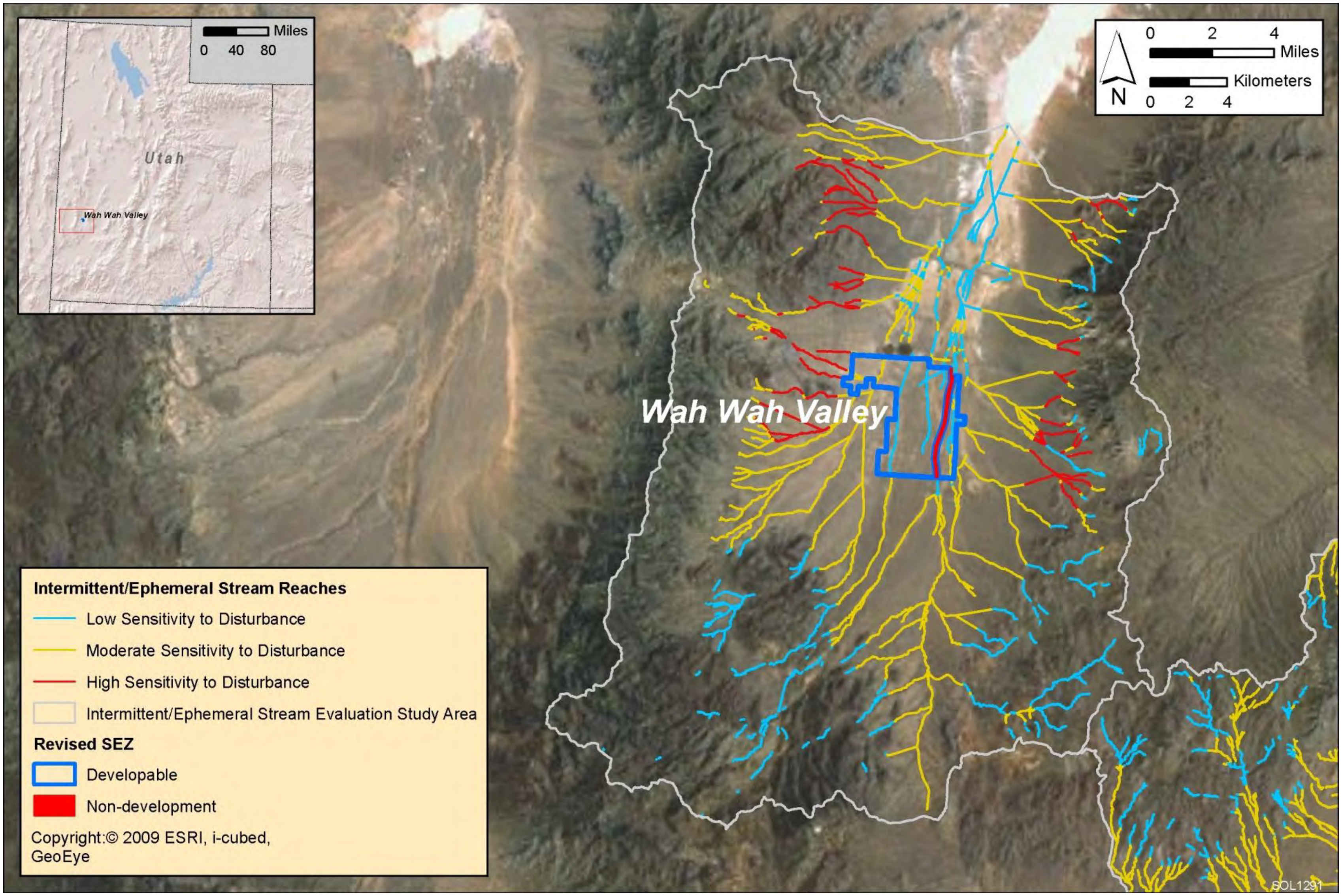

FIGURE 13.3.9.2-1 Intermittent/Ephemeral Stream Channel Sensitivity to Surface Disturbances in the Vicinity of the Proposed Wah Wah Valley SEZ as Revised

A basin-scale groundwater budget was assembled using available data on groundwater inputs, outputs, and storage (Table 13.3.9.2-1) in order to compare with water use estimates related 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), which represents 23% of the annual recharge from precipitation for the 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. 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 the 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 28 to 4,892 ac-ft/yr (34,500 to 6 million m^3/yr), or a total of 560 to 97,840 ac-ft (690,700 to 121 million m^3) over the 20-year analysis period. From a groundwater budgeting perspective, the high pumping scenario would represent 90% of the recharge by precipitation and 22% of the total groundwater inputs to the basin. The groundwater withdrawals associated with the low and medium pumping scenarios represent 1% and 13%, respectively, of the amount of recharge by precipitation to the basin. The low and medium pumping scenario groundwater withdrawal rates are more in the realm of suitable recharge-based sustainable yield estimates, although sustainable yield estimates based solely on recharge are typically not recommended (Zhou 2009).

Groundwater budgeting allows 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. The specifics of the groundwater modeling analysis are presented in Appendix O; however, the aquifer parameters used for the one-dimensional groundwater model (Table 13.3.9.2-2) represent available literature data, and the model aggregates these value ranges into a simplistic representation of the aquifer.

Currently, depth to groundwater in the basin-fill aquifer is on the order of 600 ft (183 m) in the vicinity of the SEZ. The connectivity between the basin-fill and the regional-scale carbonate rock aquifer, which lies underneath the basin and outcrops along the Wah Wah Mountains as the source water for the Wah Wah Springs area, is not fully realized. Modeling results suggest that groundwater withdrawals for solar energy development would result in groundwater drawdown in the vicinity of the SEZ (approximately a 2-mi [3.2-km] radius) ranging up to 100 ft (30 m) for the high pumping scenario, 15 ft (5 m) for the medium pumping scenario, and less than 1 ft (0.3 m) for the low pumping scenario (Figure 13.3.9.2-2). The modeled groundwater drawdown is primarily limited to a 3-mi (5-km) radius of the SEZ for all pumping scenarios; however, the Wah Wah Springs discharge area is located 2 mi (3.2 km) to the west of the SEZ, and groundwater drawdown could affect this spring discharge area.

TABLE 13.3.9.2-1 Groundwater Budget for the Wah Wah Valley Groundwater Basin, Which Includes the Proposed Wah Wah Valley SEZ as Revised

Process	Amount
Inputs	
Precipitation recharge (ac-ft/yr)[a]	5,400
Underflow from Pine Valley (ac-ft/yr)	16,600
Outputs	
Underflow to Sevier Desert (ac-ft/yr)	10,800
Underflow to Tule Valley (ac-ft/yr)	9,900
Discharge to springs[b] (ac-ft/yr)	24
Discharge to Wah Wah Springs (ac-ft/yr)	1,161

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

[b] Includes Antelope Spring, Kiln Spring, and Will Creek Spring.

Source: Durbin and Loy (2010).

TABLE 13.3.9.2-2 Aquifer Characteristics and Assumptions Used in the One-Dimensional Groundwater Model for the Proposed Wah Wah Valley SEZ as Revised

Parameter	Value
Aquifer type/conditions	Unconfined/basin fill
Aquifer thickness (ft)[a]	1,000
Hydraulic conductivity (ft/day)	6.6
Transmissivity (ft^2/day)	6,620
Specific yield	0.15
Analysis period (yr)	20
High pumping scenario (ac-ft/yr)[b]	4,892
Medium pumping scenario (ac-ft/yr)	697
Low pumping scenario (ac-ft/yr)	28

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

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

Source: Durbin and Loy (2010).

FIGURE 13.3.9.2-2 Estimated One-Dimensional Groundwater Drawdown Resulting from High, Medium, and Low Groundwater Pumping Scenarios over the 20-Year Operational Period at the Proposed Wah Wah Valley SEZ as Revised

13.3.9.2.3 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.

13.3.9.2.4 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 indicate that the Wah Wah Valley SEZ is located in high-elevation desert valley with intermittent/ephemeral surface water features, and groundwater is contained in a basin-fill aquifer overlaying a regional-scale carbonate rock aquifer system. The depth to groundwater, more than 600 ft (183 m), suggests limited groundwater availability in the basin, but the potential for connectivity with the regional-scale carbonate rock aquifer system has generated two pending water right applications with a combined groundwater withdrawal rate of more than 15,000 ac-ft/yr (18.5 million m^3/yr). Information regarding these pending water right applications is described in Section 13.3.9.1.3 of the Draft Solar PEIS, and these applications are currently under review by the Utah DWR.

Disturbances to intermittent/ephemeral streams within the Wah Wah Valley SEZ could potentially affect natural drainage patterns along Wah Wah Wash, causing an increase in sedimentation and erosion of this incised channel. Channel reaches that drain the Wah Wah Mountains and just along the western edge of the SEZ have a high sensitivity to land disturbance and could disrupt groundwater recharge processes. While several design features described in Appendix A of this Final Solar PEIS attempt to protect and mitigate impacts on intermittent/ ephemeral streams, additional protection is provided by the Utah DWR's Stream Allocation permitting program.

The analysis of water use requirements in comparison to the basin-scale groundwater budget and groundwater modeling analyses suggest that the low and medium pumping scenarios are preferred. The high pumping scenario has groundwater withdrawal rates that match precipitation recharge to the basin and can potentially cause groundwater drawdown in the vicinity of the Wah Wah Springs discharge area, which is connected to the regional-scale carbonate rock aquifer. The availability of groundwater in the Wah Wah Valley will largely depend on the outcome of the two large water right applications that are currently being reviewed by the Utah DWR.

Predicting impacts associated with groundwater withdrawals 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) for the regional-scale carbonate rock aquifer 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 Wah Wah Valley SEZ.

13.3.9.3 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 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.

13.3.10 Vegetation

13.3.10.1 Affected Environment

In the Supplement to the Draft Solar PEIS, 224 acres (0.91 km^2) of the Wah Wah Wash was identified as a non-development area in the Wah Wah Valley SEZ.

As presented in the Draft Solar PEIS, 8 cover types were identified within the area of the proposed Wah Wah Valley SEZ, while 29 cover types were identified within the area of indirect effects, including the assumed transmission line corridor and within 5 mi (8 km) of the SEZ boundary. For this updated assessment, a specifically located hypothetical transmission line is no longer being assumed (see Section 13.3.23 for an updated transmission assessment for this SEZ). Sensitive habitats on the SEZ include ephemeral dry wash and playa habitats. Figure 13.3.10.1-1 shows the cover types within the affected area of the Wah Wah Valley SEZ as revised.

13.3.10.2 Impacts

As presented in the Draft Solar PEIS, the construction of solar energy facilities within the proposed Wah Wah 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. With consideration of the newly identified non-development area, approximately 4,698 acres (19.01 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.

13.3.10.2.1 Impacts on Native Species

The analysis presented in the Draft Solar PEIS for the original Wah Wah Valley SEZ developable area indicated that development would result in a small impact on all land cover types occurring within the SEZ (Table 13.3.10.1-1 in the Draft Solar PEIS). Development within the revised Wah Wah Valley SEZ could still directly affect all the cover types evaluated in the

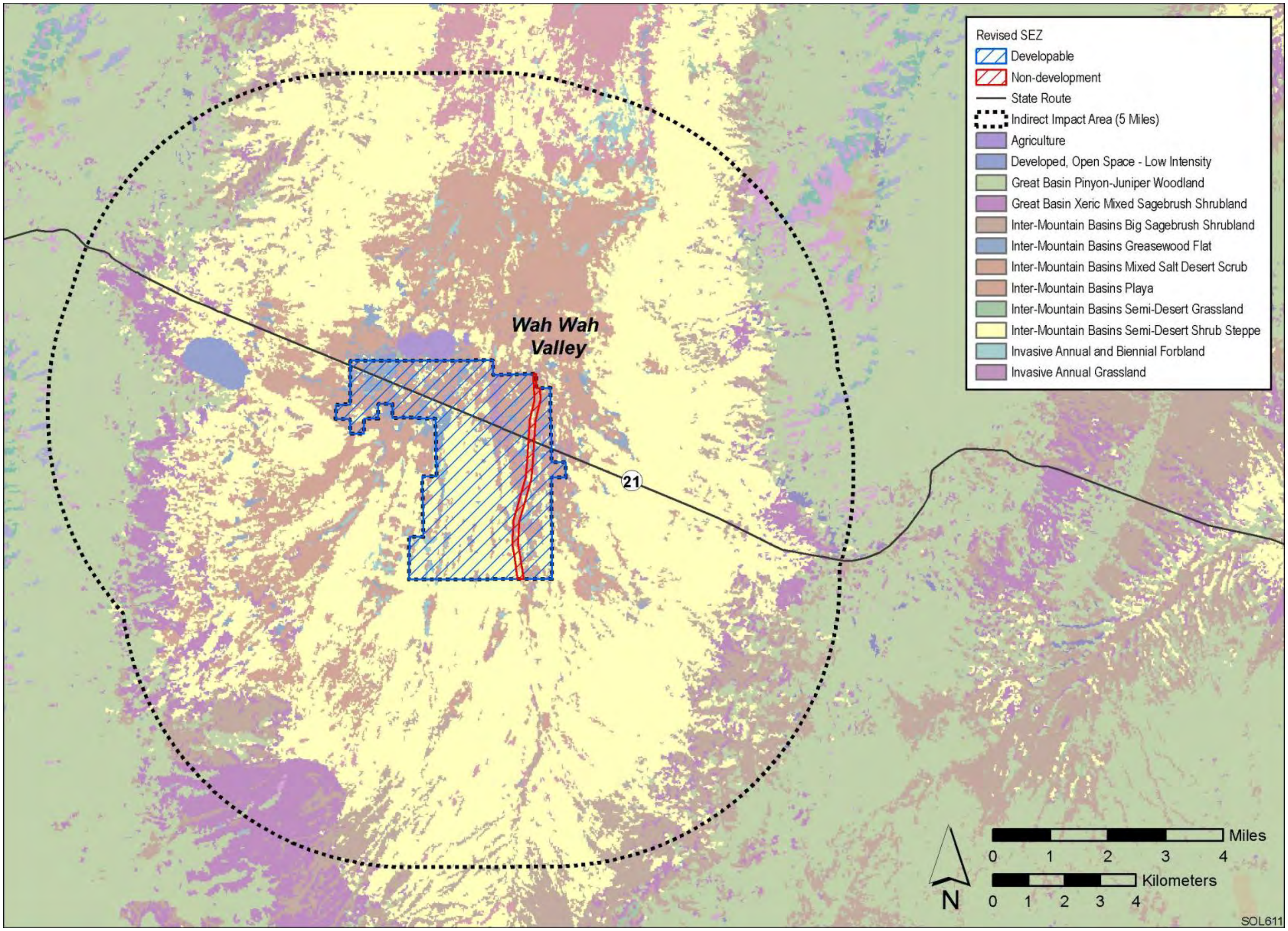

FIGURE 13.3.10.1-1 Land Cover Types within the Proposed Wah Wah Valley SEZ as Revised

Draft Solar PEIS; the reduction in the developable area would result in reduced impact levels on most land cover types in the affected area, but the impact magnitudes would remain unchanged compared to original estimates in the Draft Solar PEIS.

Because Wah Wah Wash has been identified as a non-development area, direct impacts on the wash would not occur, although indirect impacts could still occur. Because a specific transmission line route is no longer assumed, direct impacts on habitats that occur within the previously identified transmission corridor also would not occur. As a result, direct impacts on 19 cover types that were present only within the transmission corridor, would not occur. However, direct and indirect impacts on plant communities associated with playa habitats, greasewood flats, or other intermittently flooded areas, or dry washes, within or near the SEZ, as described in the Draft Solar PEIS, could still occur. Indirect impacts from groundwater use on plant communities in the region that depend on groundwater, such as riparian communities associated with springs, could also occur.

13.3.10.2.2 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 Wah Wah Valley SEZ could potentially result in the establishment or expansion of noxious weeds and invasive species populations, potentially including those species listed in Section 13.3.10.1 in the Draft Solar PEIS. Such impacts 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.

13.3.10.3 SEZ-Specific Design Features and Design Feature Effectiveness

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

- All dry wash and playa habitats within the SEZ shall be avoided to the extent practicable, and any impacts should be minimized and mitigated in consultation with appropriate agencies. A buffer area shall be maintained around dry washes and playa habitats to reduce the potential for impacts.

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

- Groundwater studies shall be conducted to evaluate the potential for indirect impacts on springs located in the vicinity of the SEZ or those in hydrologically connected basins.

It is anticipated that implementation of these programmatic design features will reduce a high potential for impacts from invasive species and impacts on dry washes, playas, and springs 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.

13.3.11 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.

13.3.11.1 Amphibians and Reptiles

13.3.11.1.1 Affected Environment

As presented in the Draft Solar PEIS, representative amphibian and reptile species expected to occur within the Wah Wah Valley SEZ include the Great Basin spadefoot (*Spea intermontana*), Great Plains toad (*Bufo cognatus*), 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).

13.3.11.1.2 Impacts

As presented in the Draft Solar PEIS, solar energy development within the Wah Wah 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 13.3.11.1-1 in the Draft Solar PEIS). The reduction in the developable area of the Wah Wah Valley SEZ would result in reduced habitat impacts for all representative amphibian and reptile species; the resultant impact levels for all the representative species would be small.

13.3.11.1.3 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 reduced.

Because of changes to the developable areas within the SEZ boundaries, the SEZ-specific design feature identified in the Draft Solar PEIS (i.e., the Wah Wah Wash should be avoided) is no longer applicable. On the basis of impact analyses conducted for the Draft Solar PEIS and consideration of comments received as applicable, no SEZ-specific design features for amphibian and reptile 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.

13.3.11.2 Birds

13.3.11.2.1 Affected Environment

As presented in the Draft Solar PEIS, a large number of bird species could occur or have potentially suitable habitat within the affected area of the proposed Wah Wah 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*).

13.3.11.2.2 Impacts

As presented in the Draft Solar PEIS, solar energy development within the Wah Wah 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 the representative bird species (Table 13.3.11.2-1 in the Draft Solar PEIS). The reduction in the developable area of the Wah Wah Valley SEZ would result in reduced habitat impacts for all representative bird species; however, the resultant impact levels for all the representative bird species would be small.

13.3.11.2.3 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 implementation of required programmatic design features and the applicable SEZ-specific design features, impacts on bird species will be reduced.

Because of the reduction in the developable area within the SEZ, one of the SEZ-specific design feature identified in Section 13.3.11.2.3 of the Draft Solar PEIS (i.e., the Wah Wah Wash should be avoided) is no longer applicable. 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 bird species has been identified:

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

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.

13.3.11.3 Mammals

13.3.11.3.1 Affected Environment

As presented in the Draft Solar PEIS, a large number of mammal species were identified that could occur or have potentially suitable habitat within the affected area of the proposed Wah Wah 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.

13.3.11.3.2 Impacts

As presented in the Draft Solar PEIS, solar energy development within the Wah Wah Valley SEZ could affect potentially suitable habitats of mammal species. The analysis presented in the Draft Solar PEIS indicated that development would result in a small overall impact on the representative mammal species (Table 13.3.11.3-1 in the Draft Solar PEIS). The reduction in the developable area of the Wah Wah Valley SEZ would result in reduced habitat impacts for all representative mammal species; resultant impact levels for all the representative mammal species would be small. On the basis of mapped activity areas, direct potential loss of crucial pronghorn range would be reduced from 4,878 acres (20 km^2) to 4,698 acres (19 km^2). No mapped cougar habitat or crucial habitat for the other big game species occurs within the SEZ. Direct impact levels for these big game mapped habitat areas would be small (pronghorn) to none (other big game species).

13.3.11.3.3 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 feature, impacts on mammal species will be reduced.

Because of changes in the developable area within the boundary of the SEZ, one of the SEZ-specific design features identified in the Draft Solar PEIS (i.e., the Wah Wah Wash should be avoided) is no longer applicable. 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 mammal species has been identified:

- The intermontane basin big sagebrush shrubland land cover type in the southeastern portion of the SEZ, which is the only identified suitable land cover type for the elk and sagebrush vole and about a third of the suitable habitat for the American black bear in the SEZ, should be avoided.

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

13.3.11.4 Aquatic Biota

13.3.11.4.1 Affected Environment

No permanent water bodies or perennial streams occur within the boundaries of the Wah Wah Valley SEZ. Because the boundaries of the Wah Wah 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 is still valid. Updates to the Draft Solar PEIS include the following:

- The 4-mi (6-km) segment of Wah Wah Wash located within the eastern portion of the SEZ has been identified as a non-development area.

- The route of a new transmission line described in the Draft Solar PEIS is no longer assumed.

Aquatic biota present in the surface water features in the Wah Wah 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, in Wah Wah Wash.

13.3.11.4.2 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 Solar PEIS and this 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, with the following updates:

- The segment of Wah Wah Wash located within the SEZ has been identified as a non-development area; therefore, construction activities would not directly affect Wah Wah Wash. However, as described in the Draft Solar PEIS, Wah Wah Wash could be affected indirectly by solar development activities within the SEZ.

- The route of a new transmission line described in the Draft Solar PEIS is no longer assumed; therefore the impacts on the Beaver River from the transmission line crossing described in the Solar Draft PEIS are no longer assumed to occur.

13.3.11.4.3 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. SEZ-specific resources and conditions will guide how programmatic design features are applied, for example:

- Appropriate engineering controls shall be implemented to minimize the amount of contaminants and sediment entering Wah Wah Wash.

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

13.3.12 Special Status Species

13.3.12.1 Affected Environment

Twenty-two 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 Wah Wah Valley SEZ. The transmission assessment for the Wah Wah Valley SEZ has been updated, and the specific route and land disturbance of a hypothetical transmission corridor are no longer being assumed (see Section 13.3.23 for an updated transmission assessment for this SEZ). There were no additional special status species identified that could occur in the SEZ affected area. However, the reduction in the developable area of the Wah Wah Valley SEZ and elimination of the analysis for the hypothetical transmission corridor reduces or eliminates the potential for several species and their habitat to occur in the SEZ affected area. As presented in Table 13.3.12.1-1 of the Draft Solar PEIS, special status species that were previously determined to occur only outside of the SEZ within the assumed transmission corridor and area of indirect effects include the following six species: (1) plants: Frisco buckwheat (*Eriogonum soredium*), Frisco clover (*Trifolium friscanum*), Ostler's ivesia (*Ivesia Shockley ostleri*); (2) birds: greater sage-grouse (*Centrocercus urophasianus*) and northern goshawk (*Accipiter gentilis*); and (3) mammals: pygmy rabbit (*Brachylagus idahoensis*). With the elimination of the analysis for the hypothetical transmission corridor, it is assumed that these six species have the potential to occur only in the area of indirect effects of the Wah Wah Valley SEZ.

The previously assumed transmission corridor was determined to intersect approximately 5,800 acres (23 km^2) of crucial brooding habitat for the greater sage-grouse. With the elimination of analysis for the hypothetical transmission corridor, no crucial brooding habitat for the greater sage-grouse is assumed to occur in the affected area of the Wah Wah Valley SEZ.

13.3.12.2 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 Wah Wah Valley SEZ could affect potentially suitable habitats of special status species. The analysis presented in the Draft Solar PEIS for the original Wah Wah Valley SEZ developable area indicated that development would result in no impact or a small overall impact on all special status species (Table 13.3.12.1-1 in the Draft Solar PEIS). Development within the SEZ could still affect the same 22 special status species evaluated in the Draft Solar PEIS; however, the reduction in the developable area and elimination of the analysis for the hypothetical transmission corridor would result in reduced (but still small) impact levels compared to original estimates in the Draft Solar PEIS.

As presented in the Draft Solar PEIS, special status species that were previously determined to only occur outside of the SEZ within the hypothetical transmission corridor and area of indirect effects include the following six species: (1) plants: Frisco buckwheat, Frisco clover, Ostler's ivesia; (2) birds: greater sage-grouse and northern goshawk; and (3) mammals: pygmy rabbit. With the elimination of analysis for the hypothetical transmission corridor, it is assumed that these six species have the potential to occur only in the area of indirect effects of the Wah Wah Valley SEZ. Therefore, only indirect effects on these species are assumed to be possible. Indirect impacts on these species are expected to be reduced to negligible levels with the implementation of programmatic and SEZ-specific design features.

13.3.12.3 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 to determine the presence and abundance of special status species, including those identified in Table 13.3.12.1-1 of the Draft Solar PEIS. Disturbance to occupied habitats for these species shall be avoided or impacts on occupied habitats minimized to the extent practicable. If avoiding or minimizing impacts on occupied habitats is not possible, translocation of individuals from areas of direct effect 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 development shall be prepared in coordination with the appropriate federal and state agencies.

- Consultations with the USFWS and the UDWR shall be conducted to address the potential for impacts on the Utah prairie dog (*Cynomys parvidens*), a species listed as threatened under the 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 UDWR shall be conducted to address the potential for impacts on the greater sage-grouse—a candidate species for listing under the ESA. Coordination with the USFWS and UDWR shall also be conducted for the following species that are under review for listing under the ESA: Frisco buckwheat, Frisco clover, and Ostler's pepper-grass. Coordination with the USFWS and UDWR would identify an appropriate pre-disturbance survey protocol, avoidance measures, and any potential compensatory mitigation actions for each of these species.

It is anticipated that the implementation of these programmatic design features will reduce the majority of impacts on the special status species from habitat disturbance and groundwater use.

On the basis of impact analyses conducted for the Draft Solar PEIS and consideration of comments received as applicable, no SEZ-specific design features 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.

13.3.13 Air Quality and Climate

13.3.13.1 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.

13.3.13.1.1 Existing Air Emissions

The Draft Solar PEIS presented Beaver County emissions data for 2002. More recent data for 2008 (UDEQ 2010) were reviewed. The two emissions inventories are from different sources and assumptions. In the more recent data, emissions of SO_2, NO_x, CO, and VOCs were lower, while PM_{10} and $PM_{2.5}$ emissions were higher. These changes would not affect modeled air quality impacts presented in this update.

13.3.13.1.2 Air Quality

The calendar quarterly average NAAQS of 1.5 μg/m^3 for lead (Pb) presented in Table 13.3.13.1-2 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 O_3, and annual PM_{10} standards have been revoked as well (EPA 2011). Utah adopts the NAAQS; thus, Utah SAAQS will reflect the same changes. These changes will not affect the modeled air quality impacts presented in this update.

Because the boundaries of the proposed Wah Wah Valley SEZ have not changed, the distances to the nearest Class I areas are the same as presented in the Draft Solar PEIS. There are several Class I areas around the proposed Wah Wah Valley SEZ, none of which are situated within 62 mi (100 km). The nearest Class I area is Zion NP, about 65 mi (105 km) south–southeast of the SEZ, and the other nearby Class I areas include Bryce Canyon NP and Capital Reef NP, about 85 mi (136 km) southeast and 105 mi (169 km) east–southeast of the SEZ, respectively.

13.3.13.2 Impacts

13.3.13.2.1 Construction

Methods and Assumptions

The methods and modeling assumptions remain the same as presented in the Draft Solar PEIS. The area of the proposed Wah Wah Valley SEZ was reduced by less than 4%, from 6,097 acres (24.7 km^2) to 5,873 acres (23.8 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 13.3.13.2-1 has been updated for this Final Solar PEIS. The tabulated concentrations as presented in the Draft Solar PEIS remain valid.

TABLE 13.3.13.2-1 Maximum Air Quality Impacts from Emissions Associated with Construction Activities for the Proposed Wah Wah 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	576	83	659	150	384	439
$PM_{2.5}$	24-hour	H8H	42.0	18	60.0	35	120	171
	Annual	NA[d]	8.8	8	16.8	15	58	112

[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 13.3.13.1-2 of the Draft Solar PEIS (Prey 2009).

[d] NA = not applicable.

Because the air quality impacts remain the same as those presented in the Draft Solar PEIS, the conclusions presented there remain valid.[2] Predicted 24-hour PM_{10} and 24-hour and annual $PM_{2.5}$ concentration levels could exceed the standard levels used for comparison 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.

At the nearest residence located adjacent to the northern boundary of the SEZ, the predicted maximum 24-hour concentration increment from construction activities is about 353 $\mu g/m^3$, above the standard level used for comparison, and the predicted maximum 24-hour and annual $PM_{2.5}$ concentration increments would be about 28 and 5.1 $\mu g/m^3$, respectively.

Modeling indicates that emissions from construction activities are not anticipated to exceed Class I 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

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

gauge the size of the impact. Overall, 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 in the Draft Solar PEIS and this Final Solar PEIS, emissions from construction equipment and vehicles would be the same as those discussed in the Draft Solar PEIS and the conclusions of the Draft Solar PEIS remain valid. Construction emissions from the engine exhaust from heavy equipment and vehicles could cause impacts on AQRVs (e.g., visibility and acid deposition) at the nearest federal Class I area, Zion NP, which is not located directly downwind of prevailing winds. Construction-related emissions are temporary and thus would cause some unavoidable but short-term impacts.

13.3.13.2.2 Operations

The change in the developable area of the proposed Wah Wah Valley SEZ by less than 4%, from 6,097 acres (24.7 km^2) to 5,873 acres (23.8 km^2), reduces the generating capacity and annual power generation and thus reduces the potentially avoided emissions presented in the Draft Solar PEIS. Total revised power generation capacity ranging from 522 to 940 MW is estimated for the Wah Wah 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 13.3.13.2-2 in the Draft Solar PEIS provided estimates for emissions potentially avoided by a solar facility. Those estimates were updated by reducing the tabulated estimates by 3.68%, as shown in the revised Table 13.3.13.2-2. For example, for the technologies estimated to require 9 acres/MW (power tower, dish engine, and PV), up to 1,741 tons of NO_X per year (= 96.32% × the value of 1,807 tons per year tabulated in the Draft Solar PEIS) could be avoided by full solar development of the proposed Wah Wah Valley SEZ as revised for this Final Solar PEIS. Because the total emissions potentially avoided by full solar development of the proposed Wah Wah Valley SEZ are about the same as those presented in the Draft Solar PEIS, the conclusions of the Draft Solar PEIS remain valid. Full solar development of the proposed Wah Wah Valley SEZ could result in substantial avoided emissions. Solar facilities to be built in the Wah Wah Valley SEZ could avoid relatively more fossil fuel emissions than those built in other states that rely less on fossil fuel–generated power.

13.3.13.2.3 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.

TABLE 13.3.13.2-2 Annual Emissions from Combustion-Related Power Generation Avoided by Full Solar Development of the Proposed Wah Wah Valley SEZ as Revised

Area Size (acres)[a]	Capacity (MW)[b]	Power Generation (GWh/yr)[c]	Emissions Avoided (tons/yr; 10^3 tons/yr for CO_2)[d]			
			SO_2	NO_x	Hg	CO_2
5,873	522–940	915–1,646	910–1,638	1,741–3,133	0.004–0.006	987–1,776
Percentage of total emissions from electric power systems in the state of Utah[e]			2.5-4.4%	2.5-4.4%	2.5-4.4%	2.5-4.4%
Percentage of total emissions from all source categories in the state of Utah[f]			1.7–3.0%	0.71–1.3%	–[g]	1.4-2.4%
Percentage of total emissions from electric power systems in the six-state study area[e]			0.36–0.65%	0.47–0.85%	0.12–0.22%	0.38–0.68%
Percentage of total emissions from all source categories in the six-state study area[f]			0.19–0.35%	0.06–0.12%	–	0.12–0.21%

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

[b] It is assumed that the SEZ would eventually have development on 80% of the lands and that a range of 5 acres (0.020 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.

[c] A capacity factor of 20% is assumed.

[d] Composite combustion-related emission factors for SO_2, NO_x, Hg, and CO_2 of 1.99, 3.81, 7.8×10^{-6}, and 2,158 lb/MWh, respectively, were used for the state of Utah.

[e] Emission data for all air pollutants are for 2005.

[f] Emission data for SO_2 and NO_x are for 2002, while those for CO_2 are for 2005.

[g] NA = not estimated.

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

13.3.13.3 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.

13.3.14 Visual Resources

13.3.14.1 Affected Environment

No boundary revisions were identified for the proposed Wah Wah Valley SEZ in the Supplement to the Draft Solar PEIS; however, 224 acres (0.91 km^2) of Wah Wah Wash was identified as a non-development area. The remaining developable area within the SEZ is 5,873 acres (23.8 km^2).

13.3.14.2 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. The residents nearest to the SEZ could be subjected to large visual impacts from solar energy development within the SEZ. State Route 21 passes through the SEZ, and travelers on that road could be subjected to very strong visual contrasts from solar development within the SEZ, but typically their exposure would be brief.

Utility-scale solar energy development within the proposed Wah Wah Valley SEZ could cause moderate levels of visual contrast as observed from the Wah Wah Mountains WSA at distances between 5 and 10 mi (8 and 16 km) from the SEZ. A very small portion of the King Top WSA is within the viewshed of the SEZ, but it is too far away to be affected significantly by visual impacts resulting from solar development within the SEZ. The closest community is more than 25 mi (40 km) from the SEZ, and therefore is likely to experience minimal or no visual impacts from solar development within the SEZ.

13.3.14.3 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. Given the large scale, reflective surfaces, and strong regular geometry of utility-scale solar energy facilities and the lack of screening vegetation and landforms within the SEZ viewshed, siting the facilities away from sensitive visual resource areas and other sensitive viewing areas would be the primary means of mitigating visual impacts. The effectiveness of other visual impact mitigation measures generally would be limited.

On the basis of the 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.

13.3.15 Acoustic Environment

13.3.15.1 Affected Environment

The developable area of the proposed Wah Wah Valley SEZ was reduced by less than 4%, from 6,097 acres (24.7 km^2) to 5,873 acres (23.8 km^2). The boundaries of the SEZ were not changed; thus the information for acoustic environment remains the same as presented in the Draft Solar PEIS.

13.3.15.2 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.

13.3.15.2.1 Construction

The conclusions in the Draft Solar PEIS remain valid. For construction activities occurring near the northern SEZ boundary, estimated noise levels at the nearest residence (adjacent to the northern SEZ boundary) would be about 74 dBA, which is above the neighboring Iron County regulation level of 50 dBA and above a typical daytime mean rural background level of 40 dBA. The estimated 70 dBA L_{dn} at the residence is well above the EPA guideline of 55 dBA L_{dn} for residential areas.

No specially designated areas are within 5 mi (8 km) of the Wah Wah 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 at the Wah Wah Valley SEZ would cause negligible impacts on nearby communities because of considerable separation distances. However, for activities occurring near the northern SEZ boundary, construction would cause unavoidable but localized short-term noise impacts on the nearest residence.

No adverse vibration impacts are anticipated from construction activities except for pile driving, which could affect the nearest residence when it occurs near the residence along the northern border of the SEZ.

13.3.15.2.2 Operations

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

Parabolic Trough and Power Tower

For operating parabolic trough and power tower technologies along the northern boundary of the SEZ, the predicted noise level would be about 51 dBA at the nearest residence; this noise level is comparable to the neighboring Iron County regulation of 50 dBA and above the typical daytime mean rural background level of 40 dBA. If TES were not used, the EPA guideline level of 55 dBA L_{dn} would not be exceeded outside the SEZ boundary, including at the nearest residence. If TES were used, the estimated nighttime noise level at the nearest residence would be about 61 dBA, higher than both the neighboring Iron County regulation of 50 dBA and the typical nighttime mean rural background level of 30 dBA. The day-night average noise level would be about 63 dBA L_{dn}, higher than the EPA guideline of 55 dBA L_{dn} for residential areas. Thus, operating parabolic trough or power tower facilities using TES and located near the northern SEZ boundary could result in adverse noise impacts on the nearest residence, 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 engine facilities, the estimated noise level at the nearest residence adjacent to the northern boundary would be about 58 dBA, above both the neighboring Iron County regulation level of 50 dBA and the typical daytime mean rural background level of 40 dBA. For 12-hour daytime operations, the estimated 55 dBA L_{dn} at the residence is equivalent to the EPA guideline for residential areas. Thus, a dish engine facility near the northern SEZ boundary, close to the nearest residence, could result in adverse impacts on the residence, depending on background noise levels and meteorological conditions. Consideration of minimizing noise impacts is very important in 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 minimal to negligible.

13.3.15.2.3 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 vibration impacts on surrounding communities and vibration-sensitive structures would be minimal.

13.3.15.3 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.

13.3.16 Paleontological Resources

13.3.16.1 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 PFYC of the SEZ as Class 2 as used in the Draft Solar PEIS.

13.3.16.2 Impacts

Few, if any, impacts on significant paleontological resources are likely to occur in the proposed Wah Wah 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.

13.3.16.3 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 above and remain classified as PFYC Classes 1 and 2, SEZ-specific design features for mitigating impacts on paleontological resources within the Wah Wah Valley SEZ and associated ROWs are not likely to be necessary. Therefore, the need for and nature of any SEZ-specific design features for 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 on the project Web site (http://solareis.anl.gov) for use by applicants, the BLM, and other stakeholders.

13.3.17 Cultural Resources

13.3.17.1 Affected Environment

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

- A tribally approved ethnographic study of the proposed Wah Wah 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. New cultural landscapes, important water sources, and traditional plants and animals were identified (see Section 13.3.18 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 stated that the Wah Wah Valley is part of a large ceremonial landscape that includes important geological features, such as the Wah Wah Mountains, Wallaces Peak, Wah Wah Springs, Seiver Lake, and important volcanic features.

- 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) potential 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 587 acres [2.38 km^2]) as funding to support additional Class II sample inventories in the SEZ areas becomes available. Areas of interest, such as dune areas and along washes, as determined through a Class I review, should also be identified prior to establishing the survey design and sampling strategy. If appropriate, some subsurface testing of dune and/or colluvium areas should be considered in the sampling strategies for future surveys. The sample inventory combined with the Class I review would be used to project cultural sensitivity zones as an aid in planning future solar developments.
- Continuation of government-to-government consultation as described in Section 2.4.3 of the Supplement to the Draft Solar PEIS and IM 2012-032 (BLM 2011c), including follow-up to recent ethnographic studies with tribes not included in the original studies to determine whether those tribes have similar concerns.

13.3.17.2 Impacts

As stated in the Draft Solar PEIS, direct impacts on significant cultural resources could occur in the proposed Wah Wah Valley SEZ. The potential for impacts on cultural resources is believed to be low; however, further investigation is needed.

13.3.17.3 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, consideration of comments received as applicable, and a review of the ethnographic report, no SEZ-specific design features for cultural resources have been identified. SEZ-specific design features would be determined in consultation with the Utah SHPO and affected tribes and would depend on the results of future investigations. Some SEZ-specific design features may be identified through the process of preparing parcels for competitive offer and subsequent project-specific analysis.

13.3.18 Native American Concerns

13.3.18.1 Affected Environment

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

- A tribally approved ethnographic study of the proposed Wah Wah 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. 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://solarpeis.anl.gov).

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

- Matters of particular concern to the representatives of the Confederated Tribes of the Goshute Reservation are the amount of light that will be reflected off solar panels and the loss of *Puha* (power) that may occur, interfering with prayer and distracting individuals who come to the area to receive a vision; the amount of water needed to sustain a solar energy plant; and the effect on plant and animal life from using a lot of water.

- 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 Wah Wah Valley SEZ should be managed as a spiritual cultural landscape and that significant areas (e.g., Wah Wah Springs, Sevier Lake, Pleistocene Lake Bonneville, the Wah Wah Mountains, and Wallaces Peak) should be nominated as traditional cultural properties.

- Wah Wah Springs, Sevier Lake, and Lake Bonneville have been identified as important sources of water to the tribes. Wah Wah Springs was identified as an important place of ceremonial, spiritual, and healing activity.

- The Wah Wah Mountains and Wallaces Peak have been identified as important ceremonial and spiritual locations often used for prayer and vision questing.

- Indian Graves Peak was identified as the location of Native American burials.

- Fields of Indian ricegrass have been identified as “traditional crops actively managed and cared for by Indian people” (SWCA and University of Arizona 2011). Tribal representatives have expressed interest in traditionally managing and harvesting these fields.

- Areas that contain evidence of volcanic activity have been identified as culturally important parts of the landscape.

- Several historic events in and around the Escalante Valley have contributed to the history of both tribes. These include the period of European contact, travel, and exploration, which greatly reduced the Goshute and Paiute traditional use areas (i.e., the establishment of the Old Spanish Trail; the influx of Mormon settlers, and the forty-niner gold rush); the spread of European diseases, which decimated Native American populations; the U.S. Military Conflict of 1863; the forced abandonment of the tribal horticultural way of life into a herding and ranching lifestyle; and the establishment of mines and mining communities in which Native Americans were employed.

- The following traditional plants have been identified in addition to those listed in Table 13.3.18.1-2 of the Draft Solar PEIS: banana yucca (*Yucca baccata*), big sagebrush (*Artemisia tridentate*), black sagebrush (*Artemisia nova*), broom snakeweed (*Gutierrezia sorothrae*), buckbrush (*Purshia glandulosa*), bud sagebrush (*Picrothamnus desertorum*), desert globemallow (*Sphaeralcea ambigua*), desert saltbush (*Atriplex polycarpa*), fishhook cactus (*Escobaria vivipara*), Great Basin gishook cactus (*Sclerocactus pubispinus*), hairspine pricklypear (*Opuntia polyacantha*), hedgehog cactus (*Echinocereus*), Mexican cliffrose (*Purshia Mexicana*), Nevada Indian tea (*Ephedra nevadensis*), orange linchen (*Caloplaca trachyphylla*), ryegrass (*Elymus*), sedge (*Carex* sp.), Spanish bayonet (*Yucca harrimaniae*), Utah juniper (*Juniperus osteoperma*), watercress (*Nasturtium officinale*), and wild carrot (*Lepidium* sp.).

- The following traditional animals have been identified in addition to those listed in Table 13.3.18.1-3 of the Draft Solar PEIS: American black bear (*Ursus americanus*), American badger (*Taxidea taxus*), cougar (*Puma concolor*), elk (*Cervis Canadensis*), American kestrel (*Falco sparverius*), greater roadrunner (*Geococcyx californianus*), loggerhead shrike (*Lanius ludovicianus*), rock wren (*Salpinctes obsoletus*), turkey vulture (*Cathartes aura*), western kingbird (*Tyrannus verticalis*), dragonfly (suborder Anisoptera), and red ants (family Formicidae).

13.3.18.2 Impacts

The description of potential concerns provided in the Draft Solar PEIS remains valid. During past project-related consultation, the Southern Paiutes and Western Shoshone have expressed concern over project impacts on a variety of resources. Potential impacts could occur 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 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 Wah Wah Valley SEZ identified the following impacts:

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

- Development within the proposed Wah Wah Valley SEZ may affect the spiritual connection both tribes have to water and magma, through *Puha*, especially for developments near spiritual water sources, such as Wah Wah Springs, and any prominent volcanic feature located within the SEZ.

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

13.3.18.3 SEZ-Specific Design Features and Design Feature Effectiveness

Required programmatic design features that would reduce impacts on Native Americans 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 assume that the necessary surveys, evaluations, and consultations will occur. The tribes would be notified regarding the results of archaeology 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, the following SEZ-specific design feature to address Native American concerns has been identified:

- Compensatory programs of mitigation could be implemented to provide access to and/or deliberately cultivate patches of culturally significant plants, like the Indian ricegrass fields present within the Wah Wah Valley SEZ, on other public lands nearby where tribes have ready access.

The need for and nature of additional SEZ-specific design features regarding potential issues of concern 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 Wah Wah Springs, Sevier Lake, Lake Bonneville, Wah Wah Mountains, Wallaces Peak, and the Wasatch Mountains, as well as important water sources, ceremonial areas, and traditionally important plant and animal species, should be considered and discussed during consultation.

13.3.19 Socioeconomics

13.3.19.1 Affected Environment

The boundaries of the Wah Wah Valley SEZ have not changed. The socioeconomic 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.

13.3.19.2 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 Wah Wah Valley SEZ remain unchanged and the reduction of the developable area was small (less than 4%), the impacts of full build-out of the SEZ estimated in the Draft Solar PEIS remain essentially unchanged. During construction, between 213 and 2,817 jobs and between \$11.2 million and \$148 million in income could be associated with solar development in the SEZ. During operations at full build-out, between 14 and 316 jobs and between \$0.4 million and \$9.7 million in income could be produced. In-migration of workers and their families would mean between 48 and 631 rental housing units would be needed during construction, and between 4 and 81 owner-occupied units during operations.

13.3.19.3 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.

13.3.20 Environmental Justice

13.3.20.1 Affected Environment

The data presented in the Draft Solar PEIS have not changed substantially for the proposed Wah Wah Valley SEZ. 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.

13.3.20.2 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 CEQ guidelines (CEQ 1997) (see Section 13.3.20.1 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.

13.3.20.3 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.

13.3.21 Transportation

13.3.21.1 Affected Environment

The reduction in developable area of the proposed Wah Wah Valley SEZ of less than 4% does not change the information on affected environment provided in the Draft Solar PEIS.

13.3.21.2 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 State Route 21 and other regional corridors would be more than double the current values near the SEZ. Local road improvements would be necessary on any portion of State Route 21 that might be developed so as not to overwhelm the local access roads near any site access point(s). Depending on the locations of the worker population, roads connecting to State Route 21 may also require upgrades (e.g., State Route 130). Potential existing site access roads would require improvements, including asphalt pavement.

Solar development within the SEZ would affect public access along OHV routes 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.

13.3.21.3 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.

13.3.22 Cumulative Impacts

The analysis of potential impacts in the vicinity of the proposed Wah Wah 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 4%. The following sections include an update to the information presented in the Draft Solar PEIS regarding cumulative effects for the proposed Wah Wah Valley SEZ.

13.3.22.1 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 the impacts may occur (e.g., air quality impacts may have a greater geographic extent than visual resources impacts). Most of the lands around the SEZ are state owned, administered by the USFS, or administered by the BLM. The BLM administers approximately 75% of the lands within a 50-mi (80-km) radius of the SEZ.

13.3.22.2 Overview of Ongoing and Reasonably Foreseeable Future Actions

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

13.3.22.2.1 Energy Production and Distribution

The list of reasonably foreseeable future actions related to energy production and distribution near the proposed Wah Wah Valley SEZ has been updated and is presented in Table 13.3.22.2-1. The locations of these projects are shown in Figure 13.3.22.2-1. All these projects were described in the Draft Solar PEIS.

13.3.22.2.2 Other Actions

Only two of the major ongoing and foreseeable actions within 50 mi (80 km) of the proposed Wah Wah Valley SEZ listed in Table 13.3.22.2-3 of the Draft Solar PEIS have had a change in their status: Utah's Copper King Mining has filed for Chapter 11 and suspended operations at the Hidden Treasure Mine (Oberbeck 2010), and the Environmental Assessment on the Hamlin Valley Resource Protection and Habitat Improvement Project was issued on February 2, 2012 (BLM 2012b).

13.3.22.3 General Trends

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

13.3.22.4 Cumulative Impacts on Resources

Total disturbance in the proposed Wah Wah Valley SEZ over 20 years is assumed to be up to about 4,698 acres (19.0 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 Wah Wah Valley SEZ may include impacts on water quantity and quality, air

TABLE 13.3.22.2-1 Ongoing and Reasonably Foreseeable Future Actions Related to Energy Development and Distribution near the Proposed Wah Wah Valley SEZ as Revised[a]

Description	Status	Resources Affected	Primary Impact Location
Renewable Energy Development			
Milford Wind (UTU 82972) **97 turbines, 204 MW[b]**	**Operating since November 2009[b]**	Land use, ecological resources, visual	About 25 mi[c] east-northeast of the Wah Wah Valley SEZ (Beaver and Millard Counties)
Milford Wind Phase II (UTU 83073) **68 turbines, 102 MW[b]**	**Operating since May 2011[b]**	Land use, ecological resources, visual	About 25 mi east-northeast of the Wah Wah Valley SEZ (Beaver and Millard Counties)
Milford Wind Phases III (UTU 8307301) **140 turbines, 16,068 acres[d] (private)**	**Draft Environmental Assessment Report October 2011[e]**	Land use, ecological resources, visual	About 25 mi east-northeast of the Wah Wah Valley SEZ (Beaver and Millard Counties)
Milford Wind Phases IV–V (UTU 8307301)	Planned	Land use, ecological resources, visual	About 25 mi east–northeast of the Wah Wah Valley SEZ (Beaver and Millard Counties)
Geothermal Energy Project UTU 66583O	Authorized	Land use, groundwater, terrestrial habitats, visual	About 30 mi east of the Wah Wah Valley SEZ (Beaver County)
Geothermal Energy Project UTU 66583X	Authorized	Land use, groundwater terrestrial habitats, visual	About 30 mi east of the Wah Wah Valley SEZ (Beaver County)
Blundell Geothermal Power Station **Units 1 & 2, 26 & 12 MW, 2,000 acres[f]**	Ongoing	Land use, groundwater, terrestrial habitats, visual	About 30 mi northeast of the Wah Wah Valley SEZ (Beaver County)
Transmission and Distribution System			
Sigurd to Red Butte No. 2, 345-kV Transmission Line Project	**DEIS May 2011[g]**	Land use, ecological resources, visual	About 17 mi east of the Wah Wah ValleySEZ
Energy Gateway South, 500-kV AC Transmission Line Project	**ROW modified and no longer within 50 mi (80 km) of the SEZ[h]**		

TABLE 13.3.22.2-1 (Cont.)

Description	Status	Resources Affected	Primary Impact Location
Transmission and Distribution System (Cont.)			
TransWest Express, 600-kV DC Transmission Line Project	**Scoping Report July 2011**[i]	Land use, ecological resources, visual	About 17 mi east of the Wah Wah ValleySEZ
UNEV Liquid Fuel Pipeline (UTU-79766)	**ROD July 1, 2010**[j]	Disturbed areas, terrestrial habitats along pipeline ROW	About 17 mi east of the Wah Wah Valley SEZ

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

[b] See First Wind (2011) for details.

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

[d] To convert acres to km^2, multiply by 0.04047.

[e] See CH2MHILL (2011) for details.

[f] See PacifiCorp (2011) for details.

[g] See BLM (2011a) for details.

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

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

[j] See BLM (2010) for details.

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. The incremental cumulative impacts associated with development in the proposed Wah Wah Valley SEZ during construction, operation, and decommissioning are expected to be the same as those projected in the Draft Solar PEIS.

13.3.23 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 Wah Wah Valley SEZ, including the identification of potential load areas to be served by power generated at the SEZ and the results of the DLT analysis. Unlike Sections 13.3.2 through 13.3.22, this section is not an update of previous analysis for the Wah Wah 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

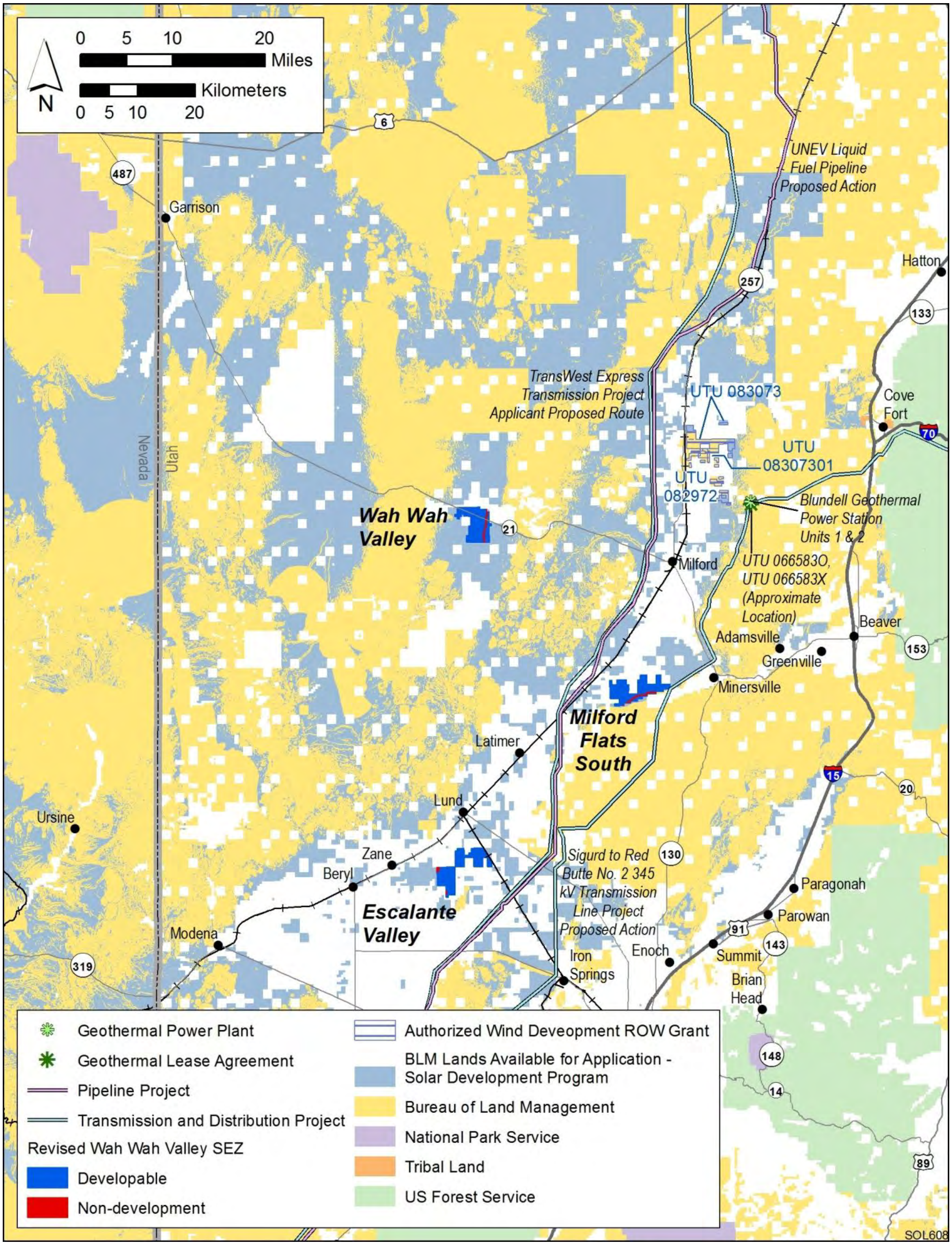

FIGURE 13.3.22.2-1 Locations of Existing and Reasonably Foreseeable Renewable Energy Projects on Public Land within a 50-mi (80-km) Radius of the Proposed Wah Wah Valley SEZ as Revised

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 Wah Wah Valley SEZ is estimated to have the potential to generate 940 MW of marketable solar power at full build-out.

13.3.23.1 Identification and Characterization of Load Areas

The primary candidates for Wah Wah Valley SEZ load areas are the major surrounding cities. Figure 13.3.23.1-1 shows the possible load areas for the Wah Wah Valley SEZ and the estimated portion of their market that could be served by solar generation. Possible load areas for the Wah Wah 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 Wah Wah Valley SEZ are as follows:

1. Las Vegas, Nevada; and

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

Figure 13.3.23.1-2 shows the most economically viable load groups and transmission scheme for the Wah Wah Valley SEZ (transmission scheme 1), and Figure 13.3.23.1-3 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 940 MW could be fully allocated.

Table 13.3.23.1-1 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.

13.3.23.2 Findings for the DLT Analysis

The DLT analysis approach assumes that the Wah Wah 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 940-MW output of the Wah Wah Valley SEZ to the prospective load areas for each possible transmission scheme. The approach also assumes that all existing transmission lines in the WECC region are saturated and have little or no available capacity to accommodate the SEZ's output throughout the entire 10-year study horizon.

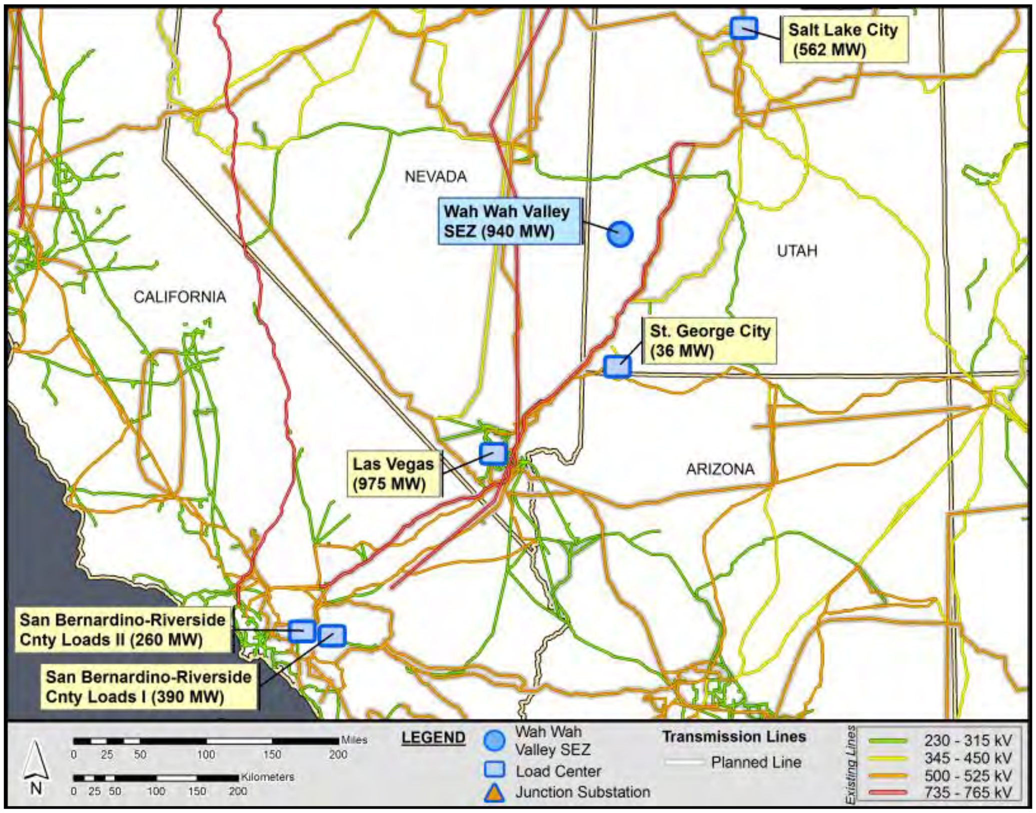

FIGURE 13.3.23.1-1 Location of the Proposed Wah Wah Valley SEZ and Possible Load Areas (Source for background map: Platts 2011)

Figures 13.3.23.1-2 and 13.3.23.1-3 display the pathways that new dedicated lines might follow to distribute solar power generated at the Wah Wah Valley SEZ via the two identified transmission schemes described in Table 13.3.23.1-1. 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 the southwest, a new line would be constructed to connect with Las Vegas, so that the 940-MW output of the Wah Wah Valley SEZ could be fully utilized (Figure 13.3.23.1-2). This particular scheme has three segments. The first segment extends to the southwest from the SEZ to the first switching station over a distance of about 29 mi (47 km). On the basis of engineering and operational considerations, this segment would require a double-circuit 345-kV (2–345 kV) bundle of two (Bof2) transmission line design. The second leg goes about 72 mi (116 km) from the first switching station to a second switching station, and the third and final segment extends about 125 mi (201 km) from the second switching station to Las Vegas. 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.

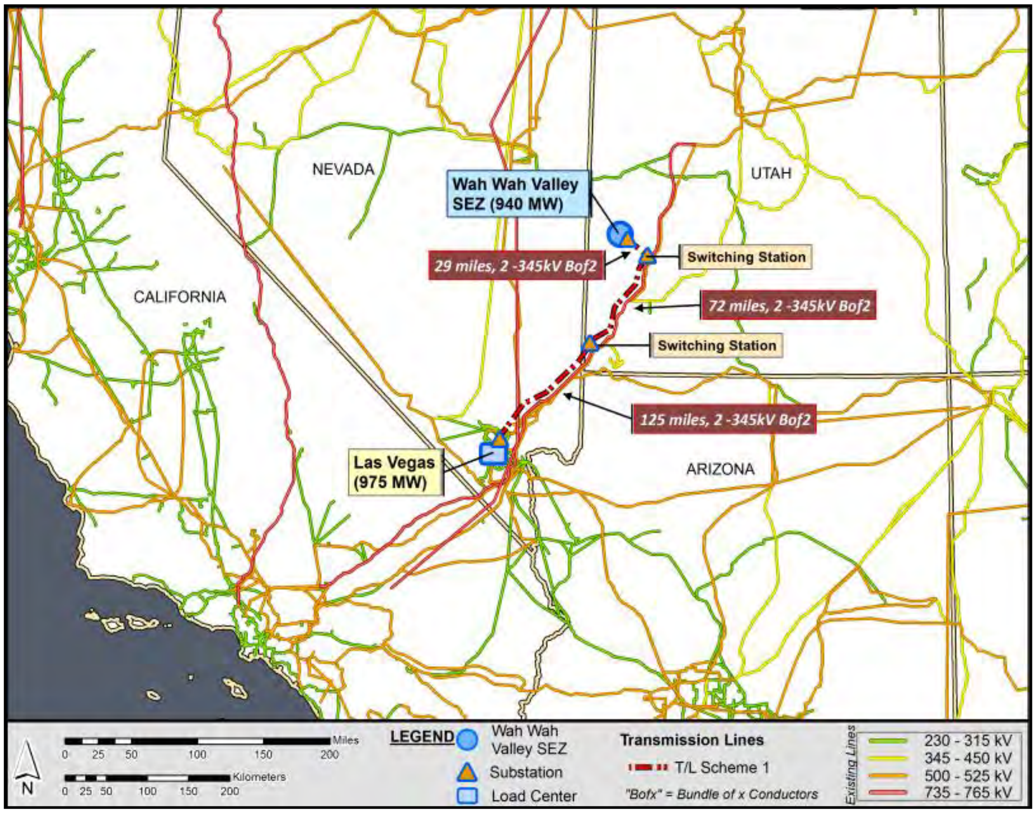

FIGURE 13.3.23.1-2 Transmission Scheme 1 for the Proposed Wah Wah Valley SEZ (Source for background map: Platts 2011)

Transmission scheme 2, which assumes the Las Vegas market is not available, serves load centers to the southwest and northwest. Figure 13.3.23.1-3 shows that new lines would be constructed to connect with Salt Lake City, San Bernardino–Riverside County load II (260 MW) and San Bernardino–Riverside County load I (562 MW), so that the 940-MW output of the Wah Wah Valley SEZ could be fully utilized. This scheme has six segments. The first segment extends to the southwest from the SEZ to the first switching station over a distance of about 29 mi (47 km). This segment would require a double-circuit 345-kV (2–345 kV) bundle of two (Bof2) transmission line design. The second leg goes about 72 mi (116 km) from the first switching station to the second switching station, and the third leg extends about 125 mi (201 km) from the second switching station to the Las Vegas switching station. The fourth segment runs from the Las Vegas switching station to the San Bernardino–Riverside County load II (260 MW) via a 237-mi (381-km) line, while the fifth leg links San Bernardino–Riverside County load II with San Bernardino–Riverside County load I (390 MW) via a 15-mi (24-km) line. The seventh leg extends to the northeast from the first switching station near the SEZ to Salt Lake City (562 MW) over a distance of 190 mi (306 km).

Table 13.3.23.2-1 summarizes the distances to the various load areas over which new transmission lines would need to be constructed, as well as the assumed number of substations that would be required. One substation is assumed to be installed at each load area and an

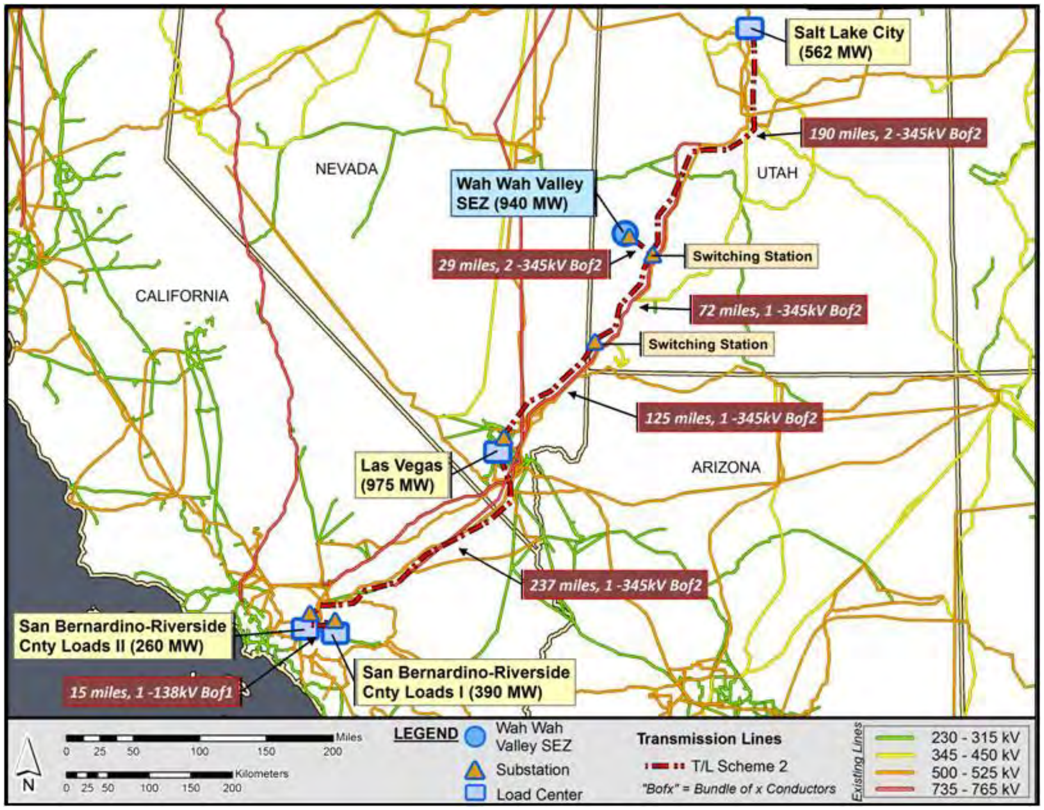

FIGURE 13.3.23.1-3 Transmission Scheme 2 for the Proposed Wah Wah Valley SEZ (Source for background map: Platts 2011)

TABLE 13.3.23.1-1 Candidate Load Area Characteristics for the Proposed Wah Wah Valley SEZ

Transmission Scheme	City/Load Area Name	Position Relative to SEZ	2010 Population[d]	Estimated Total Peak Load (MW)	Estimated Peak Solar Market (MW)
1	Las Vegas, Nevada[a]	South	1,950,000	4,878	975
2	San Bernardino–Riverside County load II, California[b]	Southwest	520,000	1,312	260
	San Bernardino–Riverside County load I, California[c]	South	780,000	1,967	390
	Salt Lake City, Utah[a]	Northeast	1,124,000	2,810	562

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

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

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

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

TABLE 13.3.23.2-1 Potential Transmission Schemes, Estimated Solar Markets, and Distances to Load Areas for the Proposed Wah Wah Valley SEZ

Transmission Scheme	City/Load Area Name	Estimated Peak Solar Market (MW)[d]	Total Solar Market (MW)	Sequential Distance (mi)[e]	Total Distance (mi)[e]	Line Voltage (kV)	No. of Substations
1	Las Vegas, Nevada[a]	975	975	226	226	345	4
2	San Bernardino–Riverside County load II, California[b]	260	1,212	463	668	345, 138	7
	San Bernardino–Riverside County load I, California[c]	390		15			
	Salt Lake City, Utah[a]	562		190			

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

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

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

[d] From Table 13.3.23.1-1.

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

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 rating of at least 940 MW (to match the plant's output), while the combined load substations would have a similar total rating of 940 MW. Switching stations are introduced at appropriate junctions where there is the need to branch out to simultaneously serve two or more load areas in different locations.

Table 13.3.23.2-2 provides an estimate of the total land area disturbed for construction of new transmission facilities under each of the schemes evaluated. The most favorable transmission scheme with respect to minimizing costs and the area disturbed would be scheme 1, which serves Las Vegas. This scheme is estimated to potentially disturb about 4,862 acres (19.7 km^2) of land. The less favorable transmission scheme with respect to minimizing costs and the area disturbed would be scheme 2 (serving San Bernardino–Riverside County loads and Salt Lake City, but excluding Las Vegas). For this scheme, the construction of new transmission lines and substations is estimated to disturb a land area on the order of 14,060 acres (56.9 km^2).

Table 13.3.23.2-3 shows the estimated NPV of both transmission schemes and takes into account the cost of constructing the lines, the substations, and the projected revenue stream over the 10-year horizon. A positive NPV indicates that revenues more than offset investments. This calculation does not include the cost of producing electricity.

TABLE 13.3.23.2-2 Comparison of the Various Transmission Line Configurations with Respect to Land Use Requirements for the Proposed Wah Wah Valley SEZ

Transmission Scheme	City/Load Area Name	Total Distance (mi)[d]	No. of Substations	Land Use (acres)[e] Transmission Line	Land Use (acres)[e] Substation	Land Use (acres)[e] Total
1	Las Vegas, Nevada[a]	226	4	4,793.9	67.6	4,861.5
2	San Bernardino–Riverside County load II, California[b] San Bernardino–Riverside County load I, California[c] Salt Lake City, Utah[a]	668	7	13,997.0	63.2	14,060.2

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

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

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

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

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

TABLE 13.3.23.2-3 Comparison of Potential Transmission Lines with Respect to NPV (Base Case) for the Proposed Wah Wah 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	Las Vegas, Nevada[a]	565.0	186.1	164.7	1,271.7	664.6
2	San Bernardino–Riverside County load II, California[b] San Bernardino–Riverside County load I, California[c] Salt Lake City, Utah[a]	1,511.5	207.5	164.7	1,271.7	−301.8

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

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

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

The most economically attractive configuration (transmission scheme 1) has the highest positive NPV and serves Las Vegas. The secondary case (transmission scheme 2), which excludes the Las Vegas market, 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.

Table 13.3.23.2-4 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 transmission schemes are positive. It also shows that as the utilization factor is increased, the economic viability of the lines 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.

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

- Transmission scheme 1, which identifies Las Vegas as the primary market, represents the most favorable option based on NPV and land use requirements. This configuration would result in new land disturbance of about 4,862 acres (19.7 km^2).

- Transmission scheme 2, which represents an alternative configuration if Las Vegas is excluded, serves the major cities in San Bernardino and Riverside Counties and Salt Lake City. This configuration would result in new land disturbance of about 14,060 acres (56.9 km^2).

TABLE 13.3.23.2-4 Effect of Varying the Utilization Factor on the NPV of the Transmission Schemes for the Proposed Wah Wah Valley SEZ

Transmission Scheme	City/Load Area Name	NPV ($ million) at Different Utilization Factors					
		20%	30%	40%	50%	60%	70%
1	Las Vegas, Nevada[a]	644.6	1,280.5	1,916.3	2,552.2	3,188.0	3,823.8
2	San Bernardino–Riverside County load II, California[b] San Bernardino–Riverside County load I, California[c] Salt Lake City, Utah[a]	–301.8	334.0	969.8	1,605.7	2,241.5	2,877.4

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

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

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

- 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 Wah Wah Valley 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 Wah Wah Valley SEZ indicates no reduction of impacts from increasing the solar-eligible load assumption for transmission scheme 1, which brings power to St. George. Increasing the solar-eligible percentage would have no effect, because an adequate load area was identified under the 20% assumption that would accommodate all of the SEZ's capacity. Thus, line distances and voltages would not be affected by increasing the solar-eligible load assumption, and similarly the associated costs and land disturbance would not be affected. However, for transmission scheme 2, which serves the major cities in San Bernardino and Riverside Counties and Salt Lake City, increasing the assumed solar-eligible load assumption could result in lower cost and land disturbance estimates, because it is possible that fewer load areas would be needed to accommodate the SEZ's capacity.

13.3.24 Impacts of the Withdrawal

The BLM is proposing to withdraw 6,097 acres (25 km^2) of public land comprising the proposed Wah Wah 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 Wah Wah 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 with the SEZ, and there are no known locatable mineral deposits within the land withdrawal area. According to the 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 Wah Wah 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).

13.3.25 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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13.3.26 Errata for the Proposed Wah Wah 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 13.3.26-1 provides corrections to information presented in the Draft Solar PEIS and the Supplement to the Draft.

TABLE 13.3.26-1 Errata for the Proposed Wah Wah Valley SEZ (Section 13.3 of the Draft Solar PEIS and Section C.6.3 of the Supplement to the Draft Solar PEIS)

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

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