NOTATION

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

GENERAL ACRONYMS AND ABBREVIATIONS

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

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

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

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

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

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

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

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

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

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

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

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

CHEMICALS

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

UNITS OF MEASURE

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

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

8 UPDATE TO AFFECTED ENVIRONMENT AND IMPACT ASSESSMENT FOR PROPOSED SOLAR ENERGY ZONES IN ARIZONA

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 Arizona, Brenda and Gillespie, as well as a summary of the Bullard Wash SEZ and why it was 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 Arizona SEZs presented in the Draft Solar PEIS. As stated previously, the Bullard Wash SEZ was dropped from further consideration through the Supplement to the Draft Solar PEIS. For the remaining two Arizona SEZs, Brenda and Gillespie, the information presented in this chapter supplements and updates, but does not replace, the information provided in the corresponding Chapter 8 on proposed SEZs in Arizona in the Draft Solar PEIS. Corrections to incorrect information in Sections 8.1 and 8.3 of the Draft Solar PEIS and in Sections C.1.1 and C.1.2 of the Supplement to the Draft are provided in Sections 8.1.26 and 8.3.26 of this Final Solar PEIS.

8.1 BRENDA

8.1.1 Background and Summary of Impacts

8.1.1.1 General Information

The proposed Brenda SEZ is located in La Paz County in west-central Arizona, 32 mi (52 km) east of the California border. In 2008, the county population was 20,005, while adjacent Riverside County to the west in California had a population of 2,087,917. The towns of Quartzsite and Salome in La Paz County are about 18 mi (29 km) west of and 18 mi (29 km) east of the SEZ, respectively.

The nearest major road access to the SEZ is via U.S. 60, which runs southwest to northeast along the southeast border of the Brenda SEZ. The nearest railroad stop is 11 mi (18 km) away. 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 and the Supplement to the Draft, the proposed Brenda SEZ had a total area of 3,878 acres (16 km^2) (see Figure 8.1.1.1-1). For this Final Solar PEIS, the SEZ boundaries were reduced, thus eliminating the area of Bouse Wash on the east side of the SEZ and eliminating the area on the west side of the SEZ to the west of the county road (a total of 530 acres [2.1 km^2]) (see Figure 8.1.1.1-2). Eliminating the area of Bouse Wash is primarily intended to avoid impacts on habitats and species that utilize the wash. Eliminating the area of the SEZ west of the county road avoids splitting solar development on the SEZ and associated internal access and security issues. In addition, the new boundary limits solar development to a distance of about 0.75 mi (1.2 km) east of the Plomosa Special Resource Management Area (SRMA) and avoids crossing a well-vegetated drainage with wildlife values. The remaining SEZ area is 3,348 acres (13.5 km^2). No additional areas for non-development were identified within the SEZ.

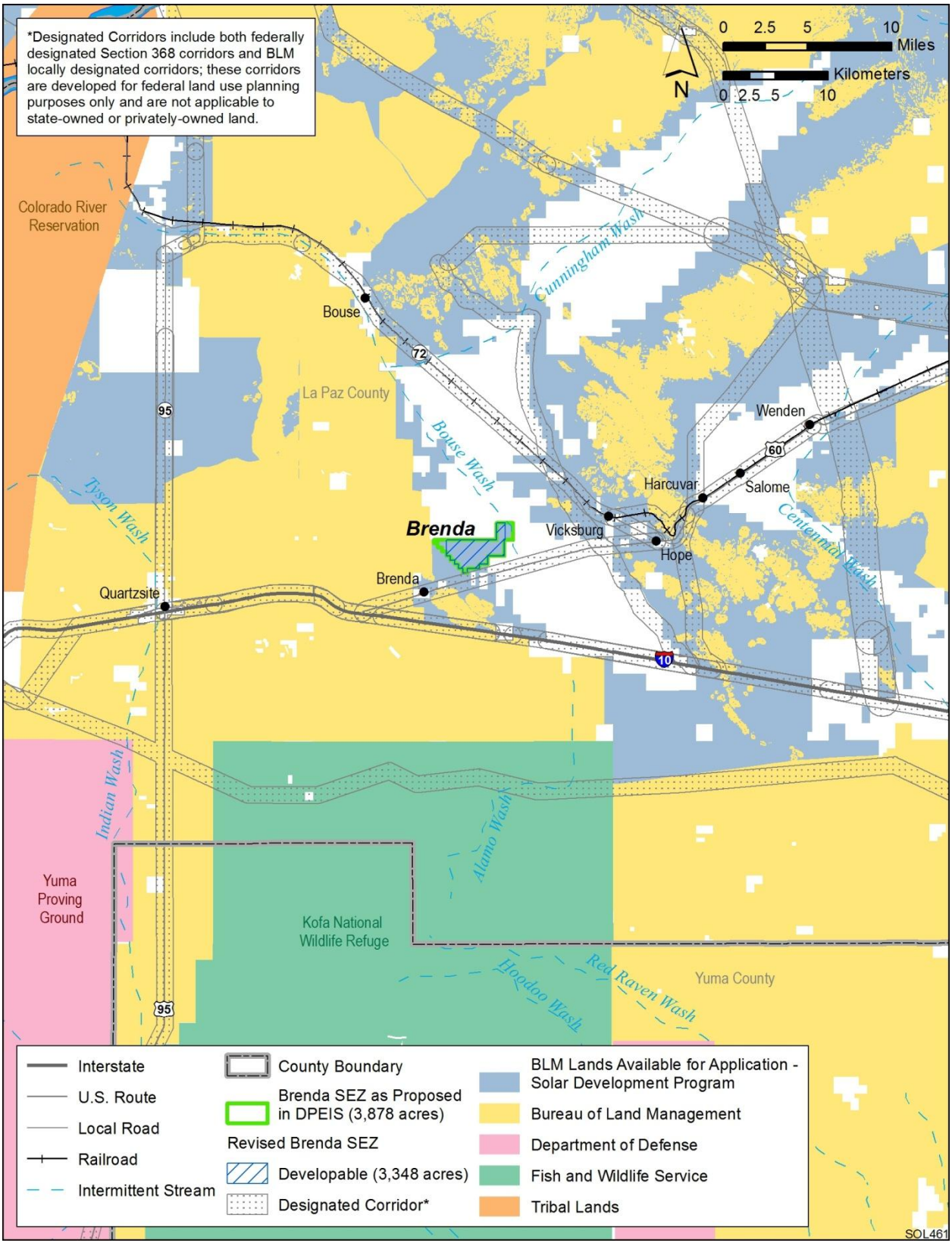

FIGURE 8.1.1.1-1 Proposed Brenda SEZ as Revised

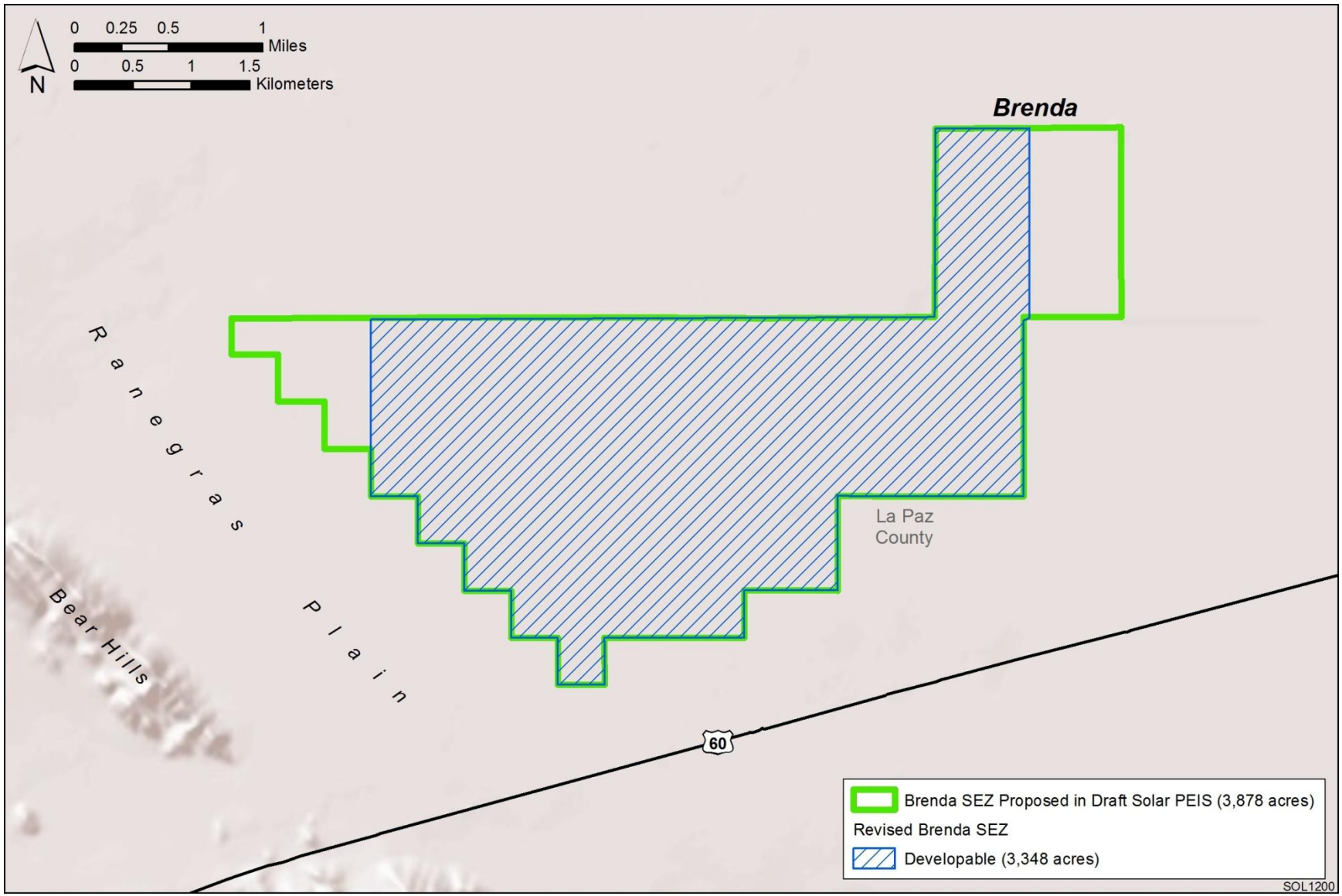

FIGURE 8.1.1.1-2 Developable Area for the Proposed Brenda SEZ as Revised

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

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 Brenda SEZ as described in the Draft Solar PEIS.

8.1.1.2 Development Assumptions for the Impact Analysis

Maximum solar development of the Brenda SEZ is assumed to be 80% of the SEZ area over a period of 20 years, a maximum of 2,678 acres (10.8 km^2). Full development of the Brenda SEZ would allow development of facilities with an estimated total of between 298 MW (power tower, dish engine, or photovoltaic [PV] technologies, 9 acres/MW [0.04 km^2/MW]) and 536 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 Brenda SEZ, updated data indicate that the nearest existing transmission line is a 500-kV east–west line located about 12 mi (19 km) south of the SEZ (the Draft Solar PEIS had indicated that the closest existing line was a 161-kV line 19 mi [31 km] to the west of the SEZ). It is possible that a new transmission line could be constructed from the SEZ to the existing line, but the available capacity on the existing 500-kV could be inadequate for 298 to 536 MW of new capacity. Therefore, at full build-out capacity, new transmission and/or upgrades of existing transmission lines would likely be required to bring electricity from the proposed Brenda SEZ to load centers. An assessment of the most likely load center destinations for power generated at the Brenda SEZ and a general assessment of the impacts of constructing and operating new transmission facilities to those load centers are provided in Section 8.1.23. 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 Brenda SEZ has been updated, and the hypothetical transmission corridor assessed in the Draft Solar PEIS is no longer applicable. For this updated assessment, the 575 acres (2.3 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 8.1.23).

For the proposed Brenda SEZ, existing road access should be adequate to support construction and operation of solar facilities, because U.S. 60 runs along the southeast border of the SEZ. Thus, no additional road construction outside of the SEZ was assumed to be required to support solar development, as summarized in Table 8.1.1.2-1.

TABLE 8.1.1.2-1 Assumed Development Acreages, Solar MW Output, and Nearest Major Access Road and Transmission Line for the Proposed Brenda 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]
3,348 acres[a] and 2,678 acres	298 MW[b] 536 MW[c]	U.S. 60 adjacent	12 mi[d,e] and 500 kV	0 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] In the Draft Solar PEIS, the nearest transmission line identified was a 161-kV line 19 mi (31 km) from the SEZ; this information has been updated.

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

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

8.1.1.3 Programmatic and SEZ-Specific Design Features

The proposed programmatic design features for each resource area to be required under 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 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 8.1.2 through 8.1.22) 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 Brenda SEZ may be required in addition to the programmatic design features. The proposed SEZ-specific design features for the Brenda 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 8.1.2 through 8.1.22.

8.1.2 Lands and Realty

8.1.2.1 Affected Environment

The overall size of the proposed SEZ has been reduced to 3,348 acres (13.5 km^2). The area west of the county road containing 211 acres (0.9 km^2) has been dropped from the SEZ, and 284 acres (1.1 km^2) that contain a portion of Bouse Wash in the former northeastern corner of the SEZ have also been dropped from the SEZ. The remainder of the description of the SEZ in the Draft Solar PEIS continues to be valid.

8.1.2.2 Impacts

The description of impacts in the Draft Solar PEIS remains the same with the exception of the lands removed from development because of boundary modification and identification of non-development areas. Full development of the SEZ (80%) now would disturb up to 2,678 acres (10.8 km^2). Solar development within the proposed SEZ would introduce a new and dominant industrial character to the landscape that may conflict with the residential and commercial landowners nearby. It is possible that if the public lands are developed for solar energy production, similar development could be induced on neighboring state and private lands with landowner agreement.

8.1.2.3 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 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 Brenda SEZ through the process of preparing them for competitive offer and subsequent project-specific analysis.

8.1.3 Specially Designated Areas and Lands with Wilderness Characteristics

8.1.3.1 Affected Environment

As described in the Draft Solar PEIS, there are 8 specially designated areas within 25 mi (40 km) of the proposed Brenda SEZ that potentially could be affected by solar development in the SEZ. These areas include designated wilderness, a Wilderness Study Area (WSA), Areas of Critical Environmental Concern (ACECs), an SRMA, and a National Wildlife Refuge (NWR).

8.1.3.2 Impacts

Impacts are expected to be the same as those described in the Draft Solar PEIS, with the exception that because of the removal of the lands west of the existing county road from the SEZ, the distance to the Plomosa SRMA is increased to about 0.9 mi (1.5 km). This decreases the potential impact on the recreational use of that area. The remaining specially designated areas are far enough from the proposed SEZ that no impacts on these areas are anticipated.

8.1.3.3 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 adequate mitigation for the identified impacts.

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.

8.1.4 Rangeland Resources

8.1.4.1 Livestock Grazing

8.1.4.1.1 Affected Environment

The proposed Brenda SEZ is located within the 234,645-acre (950-km^2) Crowder–Weisser grazing allotment, and the land within the SEZ constitutes less than 2% of the allotment.

8.1.4.1.2 Impacts

The analysis in the Draft Solar PEIS identified the potential for a loss of 315 animal unit months (AUMs) of livestock forage (less than 2% of the total amount of the permitted forage) from the allotment, based on impacts from development within the SEZ. It was recognized that because of the large size of the allotment, it might be possible to accommodate any lost AUMs elsewhere in the allotment; however, should that not be possible, there would be an undetermined adverse economic impact upon the permittee. The overall impact is anticipated to be small.

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 ranch, including private land values and other grazing associated assets.

8.1.4.1.3 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 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.

8.1.4.2 Wild Horses and Burros

8.1.4.2.1 Affected Environment

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

8.1.4.2.2 Impacts

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

8.1.4.2.3 SEZ-Specific Design Features and Design Feature Effectiveness

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 wild horses and burros are required for the proposed Brenda SEZ.

8.1.5 Recreation

8.1.5.1 Affected Environment

The description of the area within and around the proposed Brenda SEZ in the Draft Solar PEIS remains valid. The proposed SEZ is located within 15 mi (24 km) of Quartzsite, Arizona, an area that attracts large numbers of winter visitors to the area. The Plomosa SRMA provides a recreational outlet to winter visitors and to others interested in desert and backcountry driving.

8.1.5.2 Impacts

Recreational users would be excluded from areas developed for solar energy production, and they might avoid areas near the SEZ within the Plomosa SRMA. With the removal of the portion of the SEZ west of the county road on the western boundary of the SEZ, impacts on recreational access to the SRMA would no longer be a concern. 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.

8.1.5.3 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 adequate mitigation for the identified impacts but will not mitigate the loss of recreational access to public lands developed for solar energy production.

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 recreation for the proposed Brenda SEZ have been identified. Some SEZ-specific design features may be identified through the process of preparing parcels for competitive offer and subsequent project-specific analysis.

8.1.6 Military and Civilian Aviation

8.1.6.1 Affected Environment

The description in the Draft Solar PEIS remains valid. The proposed Brenda SEZ is covered by three military training routes (MTRs) with 300-ft (91-m) above-ground-level (AGL) operating limits.

8.1.6.2 Impacts

Through comments on the Draft Solar PEIS, the military has indicated that construction of solar energy and related facilities higher than 250 ft (76 m) could interfere with military training activities and could be a safety concern.

8.1.6.3 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, avoid, minimize, and/or mitigate, if possible, potential impacts on the use of military airspace.

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

8.1.7 Geologic Setting and Soil Resources

8.1.7.1 Affected Environment

8.1.7.1.1 Geologic Setting

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

- The terrain of the proposed Brenda SEZ slopes gently to the northeast (Figure 8.1.7.1-1). The boundaries of the proposed SEZ have been changed to eliminate a portion of the Bouse Wash floodplain (to the east) and the small area to the west of the county road. Based on these changes, the elevations range from about 1,240 ft (380 m) along its southwest border to about 1,105 ft (340 m) at the northeast corner.

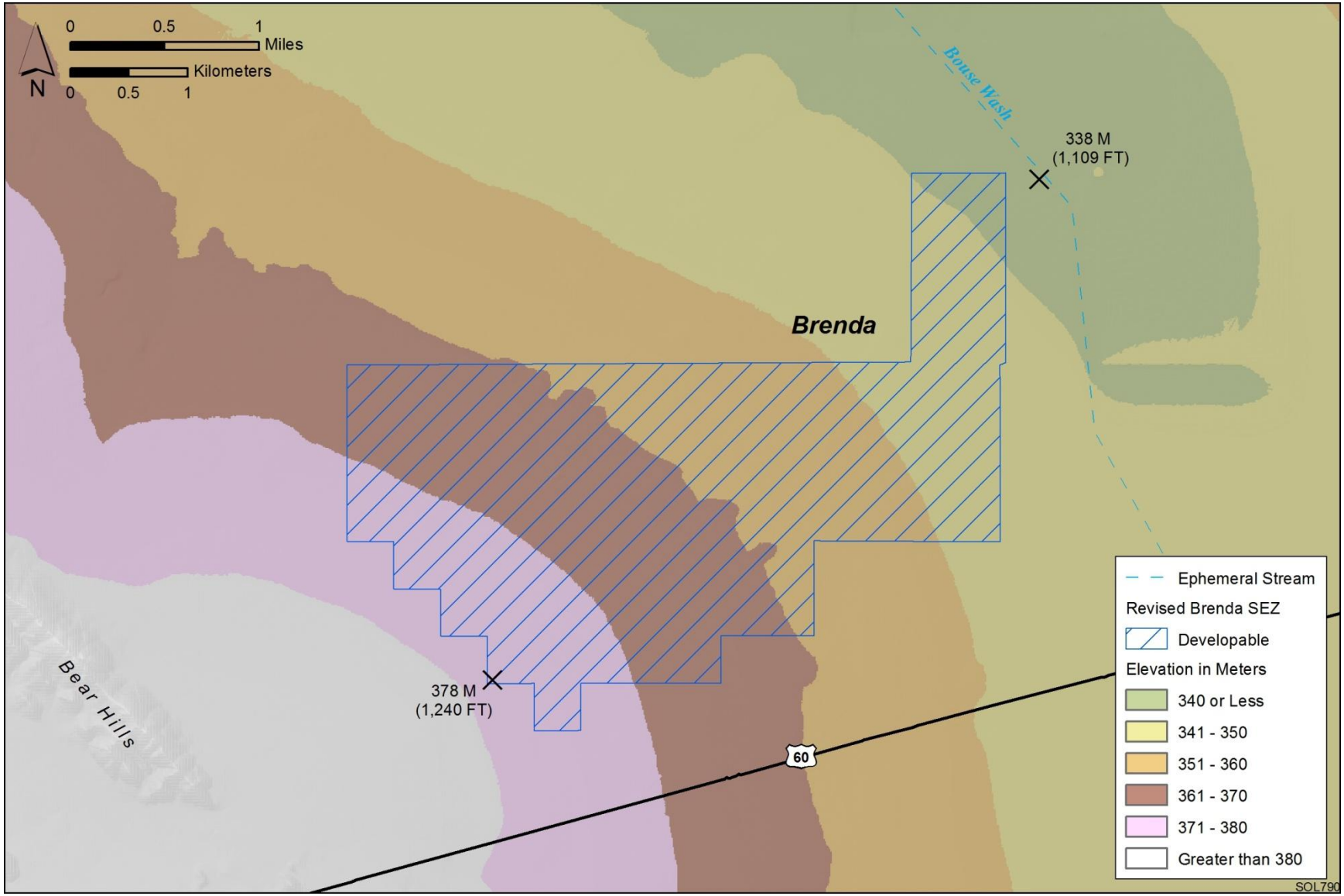

FIGURE 8.1.7.1-1 General Terrain of the Proposed Brenda SEZ as Revised

8.1.7.1.2 Soil Resources

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

- Soils within the proposed Brenda SEZ as revised are predominantly the sandy loams and gravelly sandy loams of the Denure–Pahaka–Growler and Gunsight family–Rillito complexes, which now make up about 19% of the soil coverage at the site (Table 8.1.7.1-1). Most of the map unit composition (about 72%) within the proposed SEZ has not been delineated.

- Soil unit coverage at the proposed Brenda SEZ as revised is shown in Figure 8.1.7.1-2. The new SEZ boundaries eliminate 217 acres (0.88 km^2) of the western portion of the site that has not been mapped for soils; 149 acres (0.60 km^2) of the Gadsden–Glenbar complex; 118 acres (0.48 km^2) of the Mohali–Contine complex, and 48 acres (0.19 km^2) of the Denure–Pahaka–Growler complex.

8.1.7.2 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 impacts on soil resources result from ground-disturbing activities in the project area, soil impacts would be roughly proportional to the size of a given solar facility, with larger areas of disturbed soil having a greater potential for impacts than smaller areas (Section 5.7). 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 change in boundaries eliminates 315 acres (1.3 km^2) of moderately erodible soils from development.

- Impacts related to water erodibility are somewhat reduced because the change in boundaries eliminates 267 acres (1.1 km^2) of moderately erodible soils from development.

8.1.7.3 SEZ-Specific Design Features and Design Feature Effectiveness

Required programmatic design features that would reduce impacts on soils are described in Appendix A of this Final Solar PEIS. Implementing the programmatic design features described in Section A.2.2 of Appendix A, as required under BLM's Solar Energy Program, will reduce the potential for soil impacts during all project phases.

TABLE 8.1.7.1-1 Summary of Soil Map Units within the Proposed Brenda SEZ as Revised

Map Unit Symbol	Map Unit Name	Erosion Potential		Description	Area in Acres[c] (percentage of SEZ)
		Water[a]	Wind[b]		
NOTCOM	Area not mapped	Not rated	Not rated	Map units not available. Soils belong to the following Soil Series: Pahaka–Estraella–Antho; Pahaka–Mohall–Laveen-Denure; and Hyder-Coolidge–Cipriano-Cherioni.	2,418 (72.3)
205	Denure–Pahaka–Growler complex (0 to 3% slopes)	Slight	Moderate (WEG 3)[d]	Consists of 30% Denure sandy loam, 30% Pahaka fine sandy loam, and 25% Growler fine sandy loam. Level to nearly level soils on alluvial fans. Parent material is fan alluvium from mixed sources. Soils are very deep and well drained, with low surface-runoff potential (high infiltration rate) depending on slope and moderate to moderately rapid permeability. Available water capacity is low to moderate. Soil has features favorable to dust formation; high compaction potential. Used for rangeland, wildlife habitat, and irrigated cropland.	363 (10.9)
330	Gunsight family–Rillito complex (1 to 10% slopes)	Moderate	Moderate (WEG 5)	Consists of 55% Gunsight gravelly sandy loam and 35% Rillito gravelly sandy loam. Nearly level to gently sloping soils on alluvial fan terraces. Parent material is fan alluvium from mixed sources. Soils are very deep and somewhat excessively drained, with low surface-runoff potential (high infiltration rate) and moderate permeability. Available water capacity is very low to low. Resists compaction. Used for rangeland, wildlife habitat, and irrigated cropland.	259 (7.7)
200	Gunsight family–Pinamt complex (1 to 15% slopes)	Moderate	Moderate (WEG 6)	Consists of 50% Gunsight very gravelly loam and 40% Pinamt extremely gravelly loam. Nearly level to gently sloping soils on alluvial fan terraces. Parent material is fan alluvium from mixed sources. Soils are very deep and well drained, with low surface-runoff potential (high infiltration rate) and moderate to high permeability. Available water capacity is very low. High compaction potential. Used mainly for livestock grazing and wildlife habitat; unsuitable for cultivation.	159 (4.8)

TABLE 8.1.7.1-1 (Cont.)

Map Unit Symbol	Map Unit Name	Erosion Potential		Description	Area in Acres[c] (percentage of SEZ)
		Water[a]	Wind[b]		
340	Mohall–Contine complex (1 to 5% slopes)	Moderate	Moderate (WEG 3)	Consists of 50% Mohall sandy loam and 40% Contine sandy loam. Level to nearly level soils on basin floors. Parent material is mixed stream alluvium. Soils are very deep and well drained, with slow to moderate surface runoff potential and moderately slow to slow permeability. Available water capacity is low. Soil has moderate resistance to dust propagation. Used for rangeland, wildlife habitat, and irrigated cropland.	146 (4.4)

[a] Water erosion potential rates the hazard of soil loss from off-road and off-trail areas after disturbance activities that expose the soil surface. The ratings are based on slope and soil erosion factor K (whole soil; does not account for the presence of rock fragments) and represent soil loss caused by sheet or rill erosion where 50 to 75% of the surface has been exposed by ground disturbance. A rating of "slight" indicates that erosion is unlikely under ordinary climatic conditions. A rating of "moderate" indicates that erosion could be expected under ordinary climatic conditions.

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

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

[d] WEGs are based on soil texture, content of organic matter, effervescence of carbonates, content of rock fragments, and mineralogy, and also take into account soil moisture, surface cover, soil surface roughness, wind velocity and direction, and the length of unsheltered distance (USDA 2004). Groups range in value from 1 (most susceptible to wind erosion) to 8 (least susceptible to wind erosion). The NRCS provides a wind erodibility index, expressed as an erosion rate in tons per acre (4,000 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.

Source: NRCS (2010).

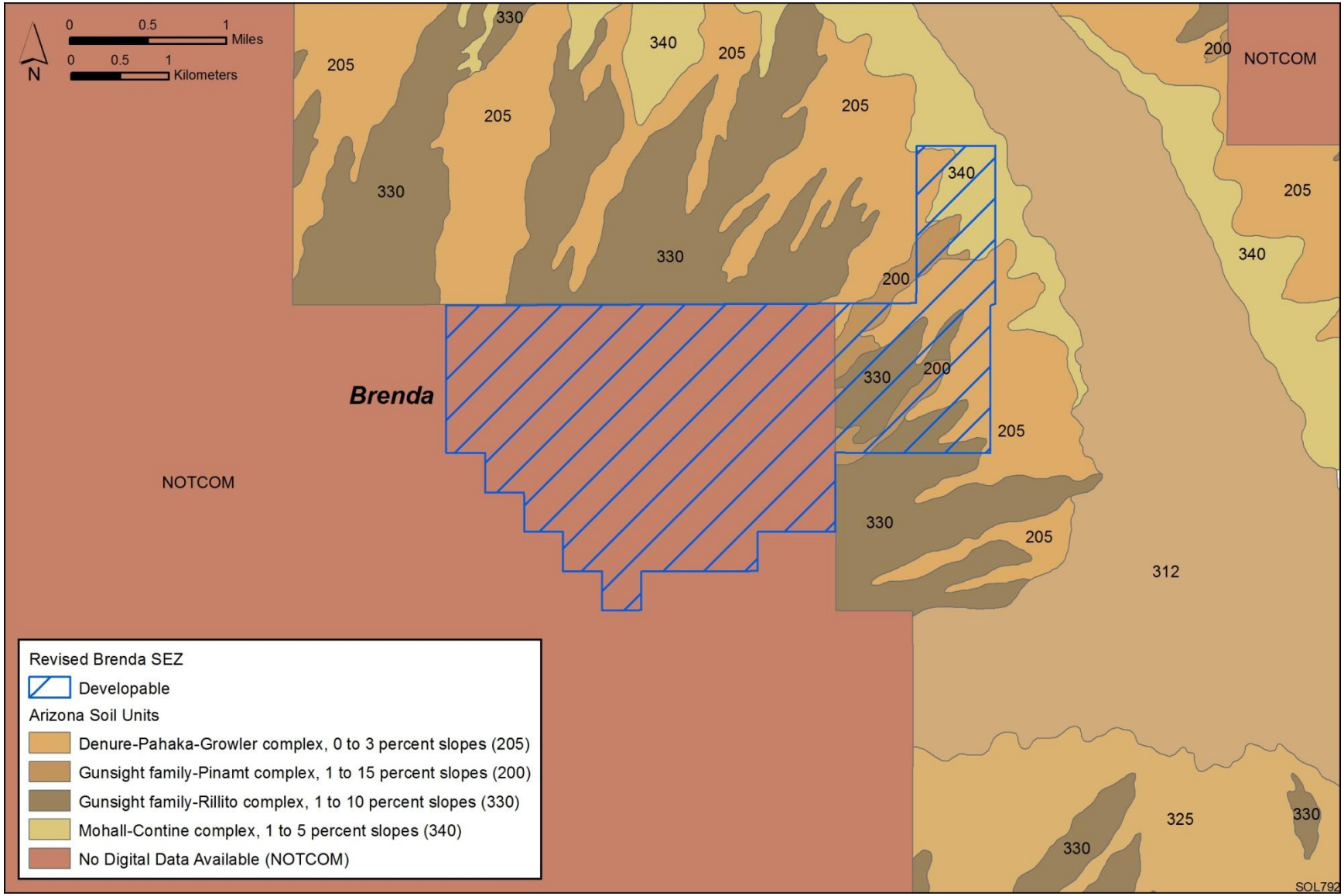

FIGURE 8.1.7.1-2 Soil Map for the Proposed Brenda SEZ as Revised (NRCS 2008)

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 were identified for soil resources at the proposed Brenda SEZ as revised. Some SEZ-specific design features may be identified through the process of preparing parcels for competitive offer and subsequent project-specific analysis.

8.1.8 Minerals (Fluids, Solids, and Geothermal Resources)

A mineral potential assessment for the proposed Brenda SEZ has been prepared and reviewed by BLM mineral specialists knowledgeable about the region where the SEZ is located (BLM 2012). The BLM is proposing to withdraw the SEZ from settlement, sale, location, or entry under the general land laws, including the mining laws, for a period of 20 years (see Section 2.2.2.2.4 of the Final Solar PEIS). The potential impacts of this withdrawal are discussed in Section 8.1.24.

8.1.8.1 Affected Environment

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

8.1.8.2 Impacts

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

8.1.8.3 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, updates to those analyses due to 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.

8.1.9 Water Resources

8.1.9.1 Affected Environment

The overall size of the Brenda SEZ has been reduced by 15% from the area described in the Draft Solar PEIS, resulting in a total area of 3,348 acres (13.5 km^2). The description of the affected environment given in the Draft Solar PEIS relevant to water resources at the Brenda SEZ remains valid and is summarized in the following paragraphs.

The proposed Brenda SEZ is located within the Lower Colorado hydrologic subregion of the Lower Colorado hydrologic region. The valley region is known as the Ranegras Plain, a desert valley nestled between mountain ranges to the east and west–southwest. Precipitation in the valley is between 4 in./yr (10 cm/yr) and 8 in./yr (20 cm/yr), and evaporation is estimated to be 115 in./yr (292 cm/yr). No perennial surface water features, flood hazards, or wetlands have been identified within the Brenda SEZ. Bouse Wash and an unnamed intermittent/ephemeral stream flow through portions of the eastern and western sides of the Brenda SEZ, and these braided stream channel areas have been classified as non-development areas. The proposed SEZ is located in the Ranegras Plain groundwater basin where available groundwater occurs primarily in basin-fill deposits, with a general southeast to northwest flow pattern. Reported groundwater recharge estimates range from 1,000 to 6,000 ac-ft/yr (1.2 million to 7.4 million m^3/yr), which primarily occurs through focused recharge in intermittent/ephemeral stream channels. Groundwater surface elevations have declined over several decades resulting from agricultural use, which has also resulted in land subsidence. Levels of total dissolved solids (TDS) and fluoride in the basin are considered high, and both contaminants are often found present above the secondary maximum contaminant level (MCL). In addition, concentrations of hexavalent chromium, selenium, arsenic, and nitrate have all been recorded above the MCL.

The Arizona Department of Water Resources (ADWR) is responsible for water conservation and distribution throughout the state and created guidelines in 2010 to manage water for solar-generating facilities. While there are no surface water rights available in the Ranegras Plains Basin, it is legal to pump groundwater without a permit; however, current groundwater withdrawals exceed the estimated recharge of the basin. Between 2000 and 2005, groundwater withdrawals from the Ranegras Plain Basin for agriculture averaged 28,800 ac-ft/yr (35 million m^3/yr) and for municipal water use averaged 400 ac-ft/yr (490,000 m^3/yr).

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 Brenda SEZ and surrounding basin. Additional data regarding climate, surface water, and groundwater conditions are presented in Tables 8.1.9.1-1 through 8.1.9.1-7 and in Figures 8.1.9.1-1 and 8.1.9.1-2. 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 Brenda SEZ that are found to be within a 100-year floodplain will be identified as non-development areas. Any water features within the Brenda SEZ determined to be jurisdictional will be subject to the permitting process described in the Clean Water Act (CWA).

TABLE 8.1.9.1-1 Watershed and Water Management Basin Information Relevant to the Proposed Brenda SEZ as Revised

Basin	Name	Area (acres)[b]
Subregion (HUC4)[a]	Lower Colorado (1503)	12,016,053
Cataloging unit (HUC8)	Bouse Wash (15030105)	1,048,871
Groundwater basin	Rangegras Plain	583,680
SEZ	Brenda	3,348

[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 8.1.9.1-2 Climate Station Information Relevant to the Proposed Brenda 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.)
Bouse, Arizona (020949)	925	17	1932–2011	5.50	0.10
Quartzsite, Arizona (026865)	875	20	1908–2011	4.99	0.10
Salome 17 SE (027462)	1,599	23	1987–1998	6.31	0.00

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

[b] Surface elevations for the proposed Brenda SEZ range from 1,110 to 1,235 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 8.1.9.1-3 Total Lengths of Selected Streams at the Subregion, Cataloging Unit, and SEZ Scale Relevant to the Proposed Brenda SEZ as Revised

Water Feature	Subregion, HUC4 (ft)[a]	Cataloging Unit, HUC8 (ft)	SEZ (ft)
Unclassified streams	11,539	0	0
Perennial streams	1,433,435	79	0
Intermittent/ephemeral streams	213,542,849	14,746,951	19,469
Canals	8,079,744	744,695	2,398

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

Source: USGS (2012a).

TABLE 8.1.9.1-4 Stream Discharge Information Relevant to the Proposed Brenda SEZ as Revised

Parameter	Station (USGS ID)	
	Bouse Wash Tributary near Bouse, Arizona (09428550)	Cunningham Wash Tributary near Wenden, Arizona (09428545)
Period of record	1963–1976	1964–1976
No. of observations	13	14
Discharge, median (ft^3/s)	319	48
Discharge, range (ft^3/s)	20–2,920	0.4–173
Discharge, most recent observation (ft^3/s)	1,500	48
Distance to SEZ (mi)	14	27

[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 8.1.9.1-5 Surface Water Quality Data Relevant to the Proposed Brenda SEZ as Revised

Station (USGS ID)	Period of Record	No of Records
No water quality data are available for surface water stations in the SEZ's HUC8.	NA[a]	NA

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

Source: USGS (2012b).

8.1.9.2 Impacts

8.1.9.2.1 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 Brenda SEZ could potentially affect drainage patterns, along with groundwater recharge and discharge properties. The alteration of natural drainage pathways during construction can 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 exclude Bouse Wash and another intermittent/ephemeral stream on the west side of the SEZ 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 Brenda SEZ is a subset of the Bouse Wash watershed (HUC8), for which information regarding stream channels is presented in Tables 8.1.9.1-3 and 8.1.9.1-4 of this Final Solar PEIS. The results of the intermittent/ephemeral stream evaluation are shown in Figure 8.1.9.2-1, which depicts flow lines from the National Hydrography Dataset (USGS 2012a) labeled as low, moderate, and high sensitivity to land disturbance. Within the study area, 69% of the intermittent/ephemeral stream channels had low sensitivity, and 31% had moderate sensitivity to land disturbance. One intermittent/ephemeral channel reach within the Brenda SEZ was classified with moderate sensitivity to land disturbance (Figure 8.1.9.2-1).

TABLE 8.1.9.1-6 Water Quality Data from Groundwater Samples Relevant to the Proposed Brenda SEZ as Revised

	Station (USGS ID)[a]							
Parameter	334040113572101	334147113460301	334320113420601	334722113562001	334826113513801	335028113532101	335234113585601	335517114003101
Period of record	1948–1999	1986–1999	1974–1999	1946–1989	1990–2000	1967–1985	1974–1980	1958–1965
No. of records	12	4	5	7	10	4	4	4
Temperature (°C)[b]	30.5 (21.5–32)	31.75 (31–32)	32 (28–33)	29 (28.7–29.5)	27 (26.5–28)	27 (26–30)	25.5 (25–26)	26.7 (26.5–26.7)
Total dissolved solids (mg/L)	396 (380–443)	1,224.5 (978–2,110)	279 (277–280)	825.5 (758–847)	2,730 (1,630–5,130)	2,780 (1,020–4,260)	424.5 (373–477)	914
Dissolved oxygen (mg/L)	6.15 (5.4–7.3)	4 (3.9–4.2)	5 (4.6–5.2)	5.1	2.05 (0.8–3.3)	4.9	NA	NA
pH	7.95 (7.8–8.0)	8.2 (7.8–8.3)	8.55 (8.5–8.6)	7.65 (7.4–8)	7.7 (7.6–8)	7.7 (6.7–8)	7.2 (7–7.4)	6.85 (6.5–7.2)
Nitrate + nitrite (mg/L as N)	5.2 (3.4–7.07)	8.4 (5.8–13.1)	2 (1.9–2.08)	4.9 (4.4–5)	6.85 (5.67–24)	14 (4.5–19)	6.5 (4.8–8.2)	NA
Phosphate (mg/L)	0.043 (<0.031–0.123)	<0.031	<0.031 (0–<0.031)	<0.031 (0–<0.031)	<0.031 (<0.031–0.037)	0.03 (<0.031–0.03)	0.015 (0–0.03)	NA
Organic carbon (mg/L)	NA[c]	NA	NA	NA	NA	NA	NA	NA
Calcium (mg/L)	15 (13–16.4)	81.5 (48–176)	4.34 (3.9–4.7)	44.5 (42–47)	140.5 (71–344)	112.5 (50–340)	57 (52–62)	59 (58–60)
Magnesium (mg/L)	13 (12–15)	2.94 (1.8–7.75)	0.42 (0.3–0.51)	6.55 (6.4–8.6)	30.4 (14–72)	27 (12–80)	8.3 (7.8–8.8)	7.9 (3.8–186)
Sodium (mg/L)	110 (100–123)	330 (280–507)	96.6 (92–97)	230 (220–230)	712 (470–1,210)	610 (270–950)	75 (65–85)	NA
Chloride (mg/L)	24 (17–34)	355.5 (240–508)	31.7 (30–33)	230 (206–240)	510 (340–1,200)	425 (220–800)	49.5 (18–81)	193 (179–200)
Sulfate (mg/L)	13.5 (8.17–27)	347.5 (290–777)	43 (40.8–47)	227 (200–230)	1,175 (580–2,100)	765 (320–1,900)	5.15 (3.5–6.8)	340 (328–380)
Arsenic (µg/L)	6 (5–7)	34 (30–36)	15 (13–16)	32 (28–36)	0.5 (<1–1)	12	8	NA
Fluoride (mg/L)	0.4 (0.2–0.5)	7.22 (< 0.10–8.6)	0.84 (0.5–0.9)	4.7 (4.3–5.2)	4.46 (2.8–7)	4.7 (4–4.9)	0.95 (0.8–1.1)	4.85 (4.5–5)
Hexavalent chromium (µg/L)	19.5 (7–23)	14.5 (< 1–28)	20 (16–24)	28.5 (12–45)	<1	23.5 (5–42)	0	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 8.1.9.1-7 Groundwater Surface Elevations Relevant to the Proposed Brenda SEZ as Revised

	Station (USGS ID)					
Parameter	332848113425101	333121113413001	334144113510601	334422113524001	335555114000901	335622114005601
Period of record	1963–1998	1965–2006	1948–1993	1967–2006	1983–1993	1945–1991
No. of observations	6	26	5	22	13	49
Surface elevation (ft)[a]	1,438	1,350	1,129	1,123	955	925
Well depth (ft)	350	455	1,005	1,459	130	176
Depth to water, median (ft)	241.2	337.5	130.9	154.5	71.3	36.6
Depth to water, range (ft)	228–333	330–343.7	128–132.1	146.05–158.7	67.5–71.6	26.92–51.95
Depth to water, most recent observation (ft)	238.5	343.6	132.1	158.7	71.6	49.5
Distance to SEZ (mi)[b]	19	17	3	2	16	17

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

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

Source: USGS (2012b).

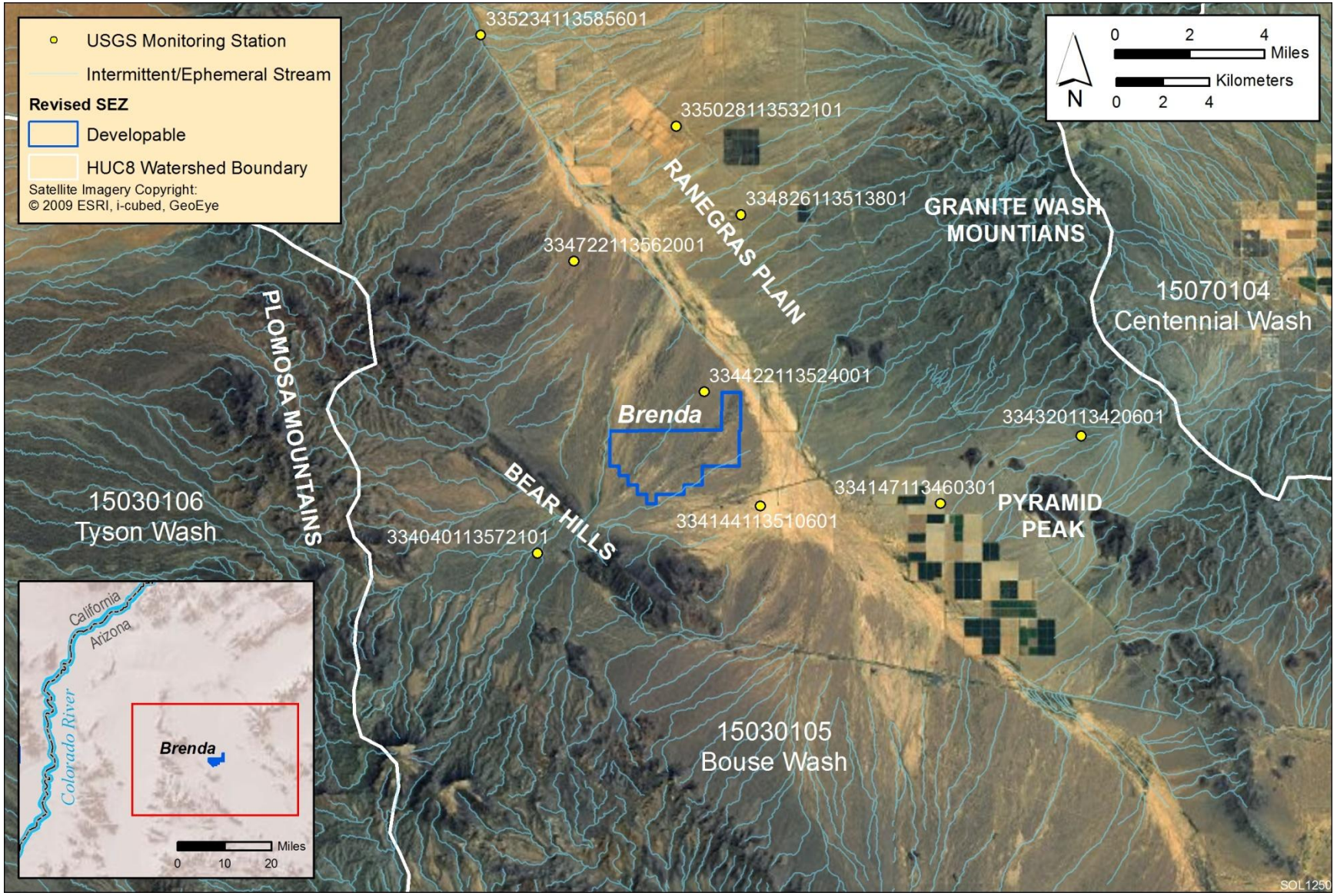

FIGURE 8.1.9.1-1 Water Features near the Proposed Brenda SEZ as Revised

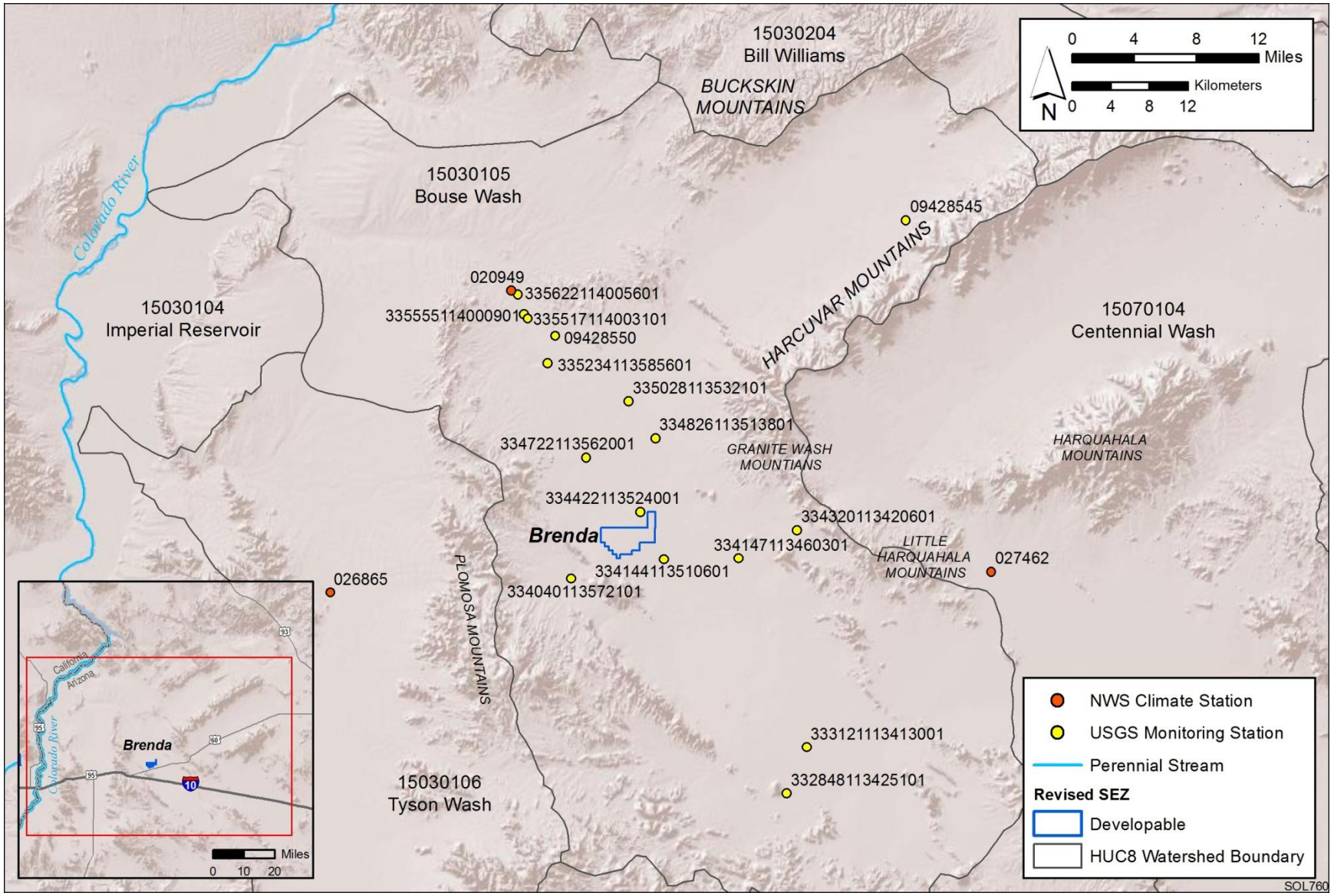

FIGURE 8.1.9.1-2 Water Features within the Bouse Wash Watershed, Which Includes the Proposed Brenda SEZ as Revised

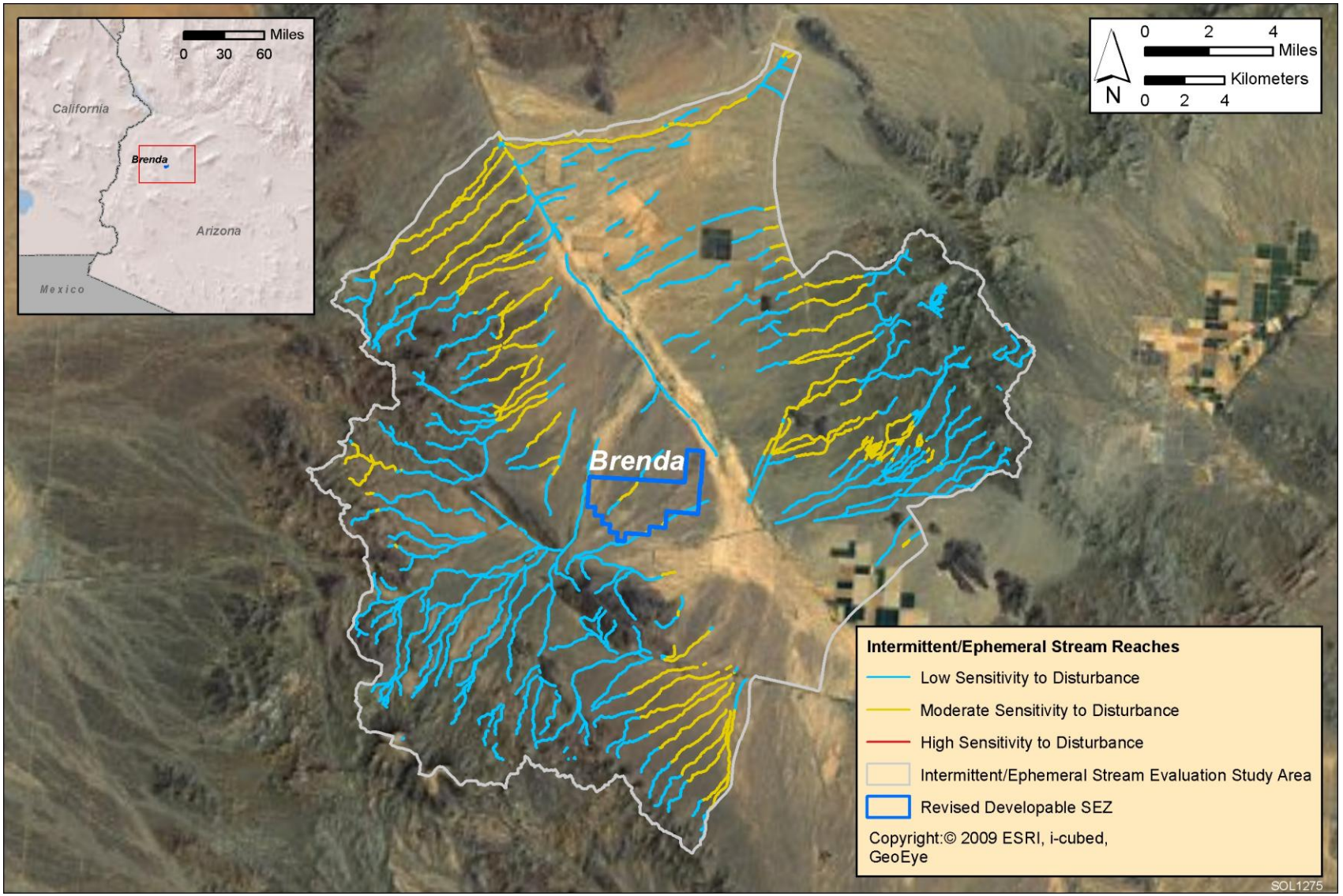

FIGURE 8.1.9.2-1 Intermittent/Ephemeral Stream Channel Sensitivity to Surface Disturbances in the Vicinity of the Proposed Brenda SEZ as Revised

8.1.9.2.2 Water Use Requirements for Solar Energy Technologies

Changes in the Brenda SEZ boundaries resulted in changes 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. 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 8.1.9.2-1 presents the revised estimates of water requirements for both construction and operation of solar facilities at the Brenda SEZ, assuming full build-out of the SEZ and accounting for its decreased size. A basin-scale groundwater budget was assembled using available data on groundwater inputs, outputs, and storage, with results presented in Table 8.1.9.2-2.

The estimated total water use requirements during the peak construction year are as high as 1,758 ac-ft/yr (2.2 million m^3/yr), which is potentially greater than the average annual recharge to the basin but constitutes a minor portion of current groundwater withdrawals and estimated groundwater storage in the Ranegras Plain 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 15 to 2,687 ac-ft/yr (18,500 to 3.3 million m^3/yr), or 300 to 53,750 ac-ft (370,000 to 66.3 million m^3) over the 20-year operational period. From a groundwater budgeting perspective, the high pumping scenario would represent 76% of the low-end estimate of total annual groundwater inputs to the basin and 1% of the estimated groundwater storage over the 20-year operational period. However, given the current imbalance between groundwater inputs and outputs (Table 8.1.9.2-2), this groundwater withdrawal rate could potentially result in a 5% decrease in the estimated aquifer storage over the 20-year operational period. The low and medium pumping scenarios have annual withdrawals that represent less than 1% and 11%, respectively, of the low estimate of groundwater inputs to the basin (Table 8.1.9.2-2), which 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 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

TABLE 8.1.9.2-1 Estimated Water Requirements for the Proposed Brenda SEZ as Revised[a]

Activity	Parabolic Trough	Power Tower	Dish Engine	PV
Construction—Peak Year				
Water use requirements				
Fugitive dust control (ac-ft)[b]	1,313	1,758	1,758	1,758
Potable supply for workforce (ac-ft)	74	40	17	8
Total water use requirements (ac-ft)	1,387	1,798	1,775	1,766
Wastewater generated				
Sanitary wastewater (ac-ft)	74	40	17	8
Operations				
Water use requirements				
Mirror/panel washing (ac-ft/yr)	268	149	149	15
Potable supply for workforce (ac-ft/yr)	8	3	3	<1
Dry cooling (ac-ft/yr)	107–536	60–298	NA	NA
Wet cooling (ac-ft/yr)	2,411–7,767	1,339–4,315	NA	NA
Total water use requirements				
Non-cooled technologies (ac-ft/yr)	NA[c]	NA	152	15
Dry-cooled technologies (ac-ft/yr)	383–812	212–450	NA	NA
Wet-cooled technologies (ac-ft/yr)	2,687–8,043	1,491–4,467	NA	NA
Wastewater generated				
Blowdown (ac-ft/yr)	152	85	NA	NA
Sanitary wastewater (ac-ft/yr)	8	2	3	<1

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

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

[c] NA = not applicable.

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 8.1.9.2-3) 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 160 and 240 ft (49 and 73 m) in the vicinity of the SEZ. The modeling results suggest that groundwater withdrawals for solar energy development would result in groundwater drawdown in the vicinity of the SEZ (approximately a

TABLE 8.1.9.2-2 Groundwater Budget for the Ranegras Plain Groundwater Basin, Which Includes the Proposed Brenda SEZ as Revised

Process	Amount
Inputs	
Groundwater recharge (ac-ft/yr)[a,b]	400–5,500
Underflow from Butler Valley (ac-ft/yr)	300
Irrigation return flow (ac-ft/yr)	2,800
Outputs	
Underflow to Bouse Wash (ac-ft/yr)	860
Irrigation withdrawals (ac-ft/yr)	27,500
Public withdrawals (ac-ft/yr)	400
Evapotranspiration (ac-ft/yr)	800–1,300
Storage	
Aquifer storage (ac-ft)[c]	9,000,000–27,000,000

[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: ADWR (2011).

Source: Tillman et al. (2011).

2-mi [3.2-km] radius) that ranges from 15 to 75 ft (4.6 to 23 m) for the high pumping scenario, 3 to 10 ft (1 to 3 m) for the medium pumping scenario, and less than 1 ft (0.3 m) for the low pumping scenario (Figure 8.1.9.2-2). The modeled groundwater drawdown for the high pumping scenario suggests a potential for 10 ft (3 m) of drawdown at a 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 Bouse Wash and the unnamed intermittent/ephemeral stream along the western edge of the SEZ.

8.1.9.2.3 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

TABLE 8.1.9.2-3 Aquifer Characteristics and Assumptions Used in the One-Dimensional Groundwater Model for the Proposed Brenda SEZ as Revised

Parameter	Value[a]
Aquifer type/conditions	Basin fill/unconfined
Aquifer thickness (ft)[b,c]	1,100–1,493 (1,493)
Hydraulic conductivity (ft/day)[d]	0.1–43 (3.5)
Transmissivity (ft^2/day)[d]	1,000–41,000 (5,225)
Storage coefficient[d]	0.05–0.15 (0.05)
Analysis period (yr)	20
High pumping scenario (ac-ft/yr)[e]	2,687
Medium pumping scenario (ac-ft/yr)[f]	383
Low pumping scenario (ac-ft/yr)[g]	15

[a] Values used for the model are in parentheses.

[b] See Metzger (1951) and Johnson (1990).

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

[d] See Anderson and Freethey (1995).

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

[f] Equivalent to full build-out water use requirements for wet-cooled, parabolic trough, and a 30% operational time.

[g] Equivalent to full build-out water use requirements for dry-cooled, parabolic trough, and a 30% operational time.

[h] Equivalent to full build-out water use requirements for PV.

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.

8.1.9.2.4 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 Brenda 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 has led to groundwater declines ranging from 25 to 146 ft (7.6 to 44 m) from 1946 to 2006, along with land subsidence of 1.9 in. (5 cm) that occurred between 2004 and 2010. These baseline conditions suggest that water resources are scarce in the vicinity of the Brenda SEZ, and that the primary

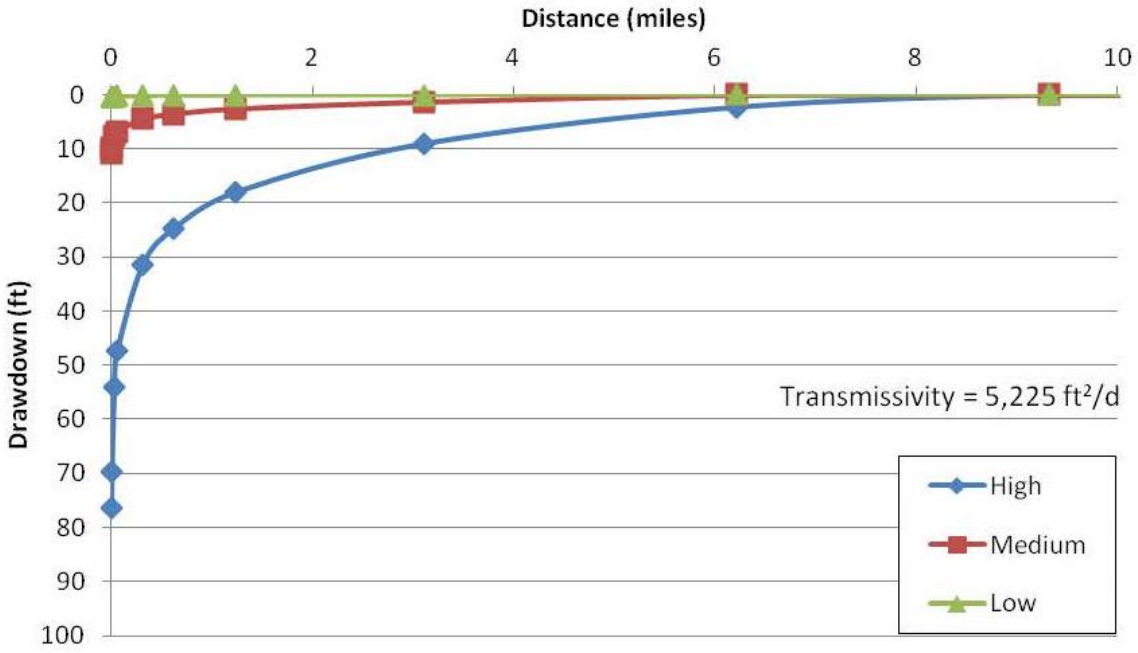

FIGURE 8.1.9.2-2 Estimated One-Dimensional Groundwater Drawdown Resulting from High, Medium, and Low Groundwater Pumping Scenarios over the 20-Year Operational Period at the Proposed Brenda SEZ as Revised

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

The change in boundaries of the Brenda SEZ resulted in a decrease in total water demand by approximately 15% for all technologies (Table 8.1.9.2-1), and the areas excluded from the SEZ contain portions of Bouse Wash along the northeastern edge of the SEZ and an unnamed wash along the western edge of the SEZ. 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 Brenda SEZ should not pose a significant impact on the critical functions of groundwater recharge, sediment transport, flood conveyance, and ecological habit given the relatively small footprint of the Brenda SEZ with respect to the study area, along with the sensitivity of identified intermittent/ephemeral streams. The proposed water use for full build-out scenarios at the Brenda 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 Bouse Wash and the unnamed intermittent/ephemeral stream along the western 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 BLM is currently working on the development of a more detailed numerical groundwater model for the Brenda SEZ, which would more accurately predict potential impacts on surface water features and groundwater drawdown. This modeling framework can also be used to interpret groundwater monitoring data and guide adaptive management plans. 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.

8.1.9.3 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 has 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.

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.

8.1.10 Vegetation

8.1.10.1 Affected Environment

Revisions to the boundaries of the proposed Brenda SEZ have eliminated the Bouse Wash area on the east side and the area to the west of the county road on the west side from the SEZ. In addition, the assumed transmission line was removed from consideration.

As presented in the Draft Solar PEIS, four cover types were identified within the area of the proposed Brenda SEZ, while nine cover types were identified in the area of indirect effects, including the previously assumed transmission line corridor and within 5 mi (8 km) of the SEZ boundary. For this updated assessment, a specifically located hypothetical transmission line is no longer being assumed (see Section 8.1.23 for an updated transmission assessment for this SEZ). Sensitive habitats on the SEZ include desert dry wash and dry wash woodland. Characteristic

Sonoran Desert species observed on the SEZ include creosotebush, saguaro cactus, palo verde, ironwood, acacia, and ocotillo. Because of the change in SEZ boundaries, the Agriculture and Sonora-Mojave Mixed Salt Desert Scrub cover types no longer occur within the SEZ. Figure 8.1.10.1-1 shows the cover types within the affected area of the Brenda SEZ as revised.

8.1.10.2 Impacts

As presented in the Draft Solar PEIS, the construction of solar energy facilities within the proposed Brenda 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 boundaries of the proposed SEZ, approximately 2,678 acres (10.8 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; (3) *large*: >10% of a cover type would be lost.

8.1.10.2.1 Impacts on Native Species

The analysis presented in the Draft Solar PEIS based on the original Brenda SEZ developable area indicated that development would result in a small impact on all land cover types occurring within the SEZ (Table 8.1.10.1-1 in the Draft Solar PEIS). Development within the revised Brenda SEZ could still directly affect some of the cover types evaluated in the Draft Solar PEIS, with the exception of Agriculture and Sonora-Mojave Mixed Salt Desert Scrub. The small reduction in the developable area would result in reduced impact levels on these cover types in the affected area; however, the impact magnitudes would remain unchanged compared to original estimates in the Draft Solar PEIS.

With the change in SEZ boundaries and the change in transmission analysis, direct impacts on Bouse Wash or the previously identified hypothetical transmission corridor are no longer predicted. However, direct impacts on dry washes, dry wash woodland, ironwood (including those outside of washes) could still occur. Indirect impacts on habitats associated with washes or chenopod scrub habitats within or near the SEZ, as described in the Draft Solar PEIS, could also occur. Groundwater use within the SEZ could affect groundwater-dependent communities, such as mesquite bosque communities and microphyll (palo verde/ironwood) woodland communities (including ironwood and palo verde located outside of washes).

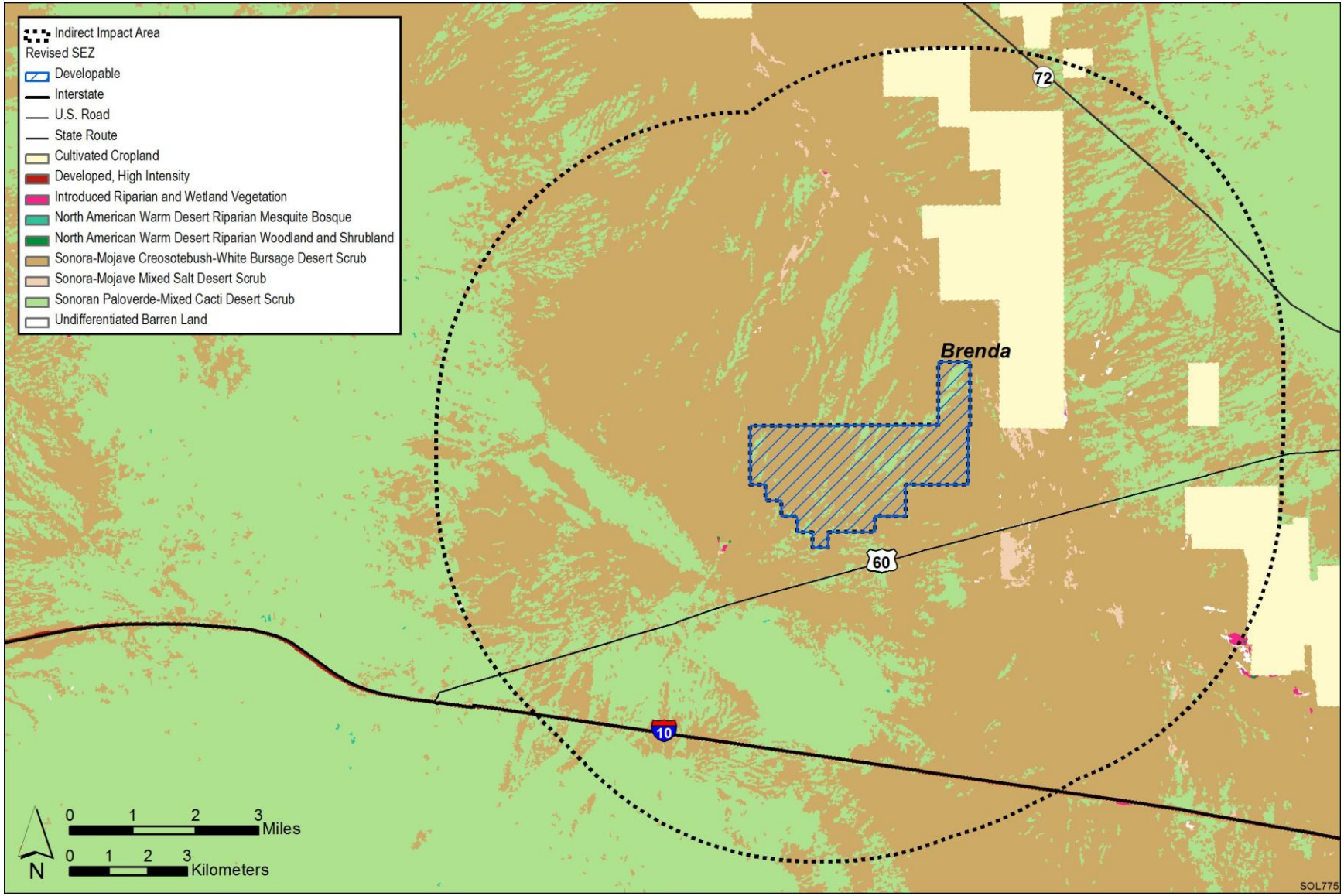

FIGURE 8.1.10.1-1 Land Cover Types within the Proposed Brenda SEZ as Revised

8.1.10.2.2 Impacts from Noxious Weeds and Invasive Plant Species

As presented the Draft Solar PEIS, land disturbance from project activities and indirect effects of construction and operation within the Brenda SEZ could potentially result in the establishment or expansion of noxious weeds and invasive species populations, potentially including those species listed in Section 8.1.10.1 of 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.

8.1.10.3 SEZ-Specific Design Features and Design Feature Effectiveness

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

- All dry wash, dry wash woodland, saguaro cactus, and ironwood (including those outside of washes) communities within the SEZ shall be avoided to the extent practicable, and any impacts minimized and mitigated in consultation with appropriate agencies. A buffer area should be maintained around dry washes and dry wash woodland habitats to reduce the potential for impacts.

- Appropriate engineering controls shall be used to minimize impacts on dry wash, dry wash woodland, and chenopod scrub, 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 mesquite bosque communities, and microphyll (palo verde/ironwood) communities.

It is anticipated that implementation of these programmatic design features will reduce a high potential for impacts from invasive species and impacts on dry wash, dry wash woodland, mesquite bosque, and saguaro cactus communities to a minimal potential for impact. Residual impacts on groundwater-dependent habitats could result from limited groundwater withdrawal and the like; 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.

8.1.11 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.

8.1.11.1 Amphibians and Reptiles

8.1.11.1.1 Affected Environment

As presented in the Draft Solar PEIS, representative amphibian and reptile species expected to occur within the Brenda SEZ include the Great Basin spadefoot (*Spea intermontana*), red-spotted toad (*Bufo punctatus*), desert horned lizard (*Phrynosoma platyrhinos*), Great Basin collared lizard (*Crotaphytus bicinctores*), side-blotched lizard (*Uta stansburiana*), western whiptail (*Cnemidophorus tigris*), zebra-tailed lizard (*Callisaurus draconoides*), coachwhip (*Masticophis flagellum*), common kingsnake (*Lampropeltis gentula*), glossy snake (*Arizona elegans*), gophersnake (*Pituophis catenifer*), groundsnake (*Sonora semiannulata*), and nightsnake (*Hypsiglena torquata*). The Mohave rattlesnake (*Crotalus scutulatus*), sidewinder (*C. cerastes*), and western diamond-backed rattlesnake (*C. atrox*) would be the most common poisonous snake species expected to occur on the SEZ. The reduction in size of the Brenda SEZ does not alter the potential for these species to occur in the affected area.

8.1.11.1.2 Impacts

As presented in the Draft Solar PEIS, solar energy development within the Brenda SEZ could affect potentially suitable habitats for the representative amphibian and reptile species. The analysis presented in the Draft Solar PEIS for the original Brenda SEZ indicated that development would result in a small overall impact on the representative amphibian and reptile species (Table 8.1.11.1-1 in the Draft Solar PEIS). The reduction in size of the Brenda 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.

8.1.11.1.3 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. With the implementation of required programmatic design features, impacts on amphibian and reptile species are anticipated to be small.

Because of the change in the SEZ boundaries, the SEZ-specific design feature identified in the Draft Solar PEIS (i.e., Bouse Wash should be avoided) is no longer applicable. On the

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

8.1.11.2 Birds

8.1.11.2.1 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 Brenda SEZ. Representative bird species identified in the Draft Solar PEIS included (1) shorebirds: killdeer (*Charadrius vociferus*); (2) passerines: ash-throated flycatcher (*Myiarchus cinerascens*), black-tailed gnatcatcher (*Polioptila melanura*), black-throated sparrow (*Amphispiza bilineata*), Brewer's sparrow (*Spizella breweri*), cactus wren (*Campylorhynchus brunneicapillus*), common poorwill (*Phalaenoptilus nuttallii*), common raven (*Corvus corax*), Costa's hummingbird (*Calypte costae*), Gila woodpecker (*Melanerpes uropygialis*), greater roadrunner (*Geococcyx californianus*), horned lark (*Eremophila alpestris*), ladder-backed woodpecker (*Picoides scalaris*), Le Conte's thrasher (*Toxostoma lecontei*), lesser nighthawk (*Chordeiles acutipennis*), loggerhead shrike (*Lanius ludovicianus*), Lucy's warbler (*Vermivora luciae*), phainopepla (*Phainopepla nitens*), Say's phoebe (*Sayornis saya*), and verdin (*Auriparus flaviceps*); (3) raptors: American kestrel (*Falco sparverius*), golden eagle (*Aquila chrysaetos*), 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*), and white-winged dove (*Zenaida asiatica*). The reduction in size of the Brenda SEZ does not alter the potential for these species or other bird species to occur in the affected area.

8.1.11.2.2 Impacts

Solar energy development within the Brenda 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 8.1.11.2-1 in the Draft Solar PEIS). The reduction in size of the Brenda SEZ would result in reduced habitat impacts for all representative bird species; the resultant impact levels for all the representative bird species would be small.

8.1.11.2.3 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. With the implementation of required programmatic design features, impacts on bird species are anticipated to be small.

Because of the change in the SEZ boundaries, one of the SEZ-specific design features identified in the Draft Solar PEIS (i.e., Bouse Wash shall be avoided) is no longer applicable. On the basis of impact analyses conducted for the Draft Solar PEIS, updates to those analyses due to changes to the SEZ boundaries, and consideration of comments received as applicable, no SEZ-specific design features have been identified for birds. Some SEZ-specific design features may be identified through the process of preparing parcels for competitive offer and subsequent project-specific analysis.

8.1.11.3 Mammals

8.1.11.3.1 Affected Environment

As presented in the Draft Solar PEIS, a large number of mammal species were identified that could occur or have potentially suitable habitat within the affected area of the proposed Brenda SEZ. Representative mammal species identified in the Draft Solar PEIS included (1) big game species: cougar (*Puma concolor*) and mule deer (*Odocoileus hemionus*); (2) furbearers and small game species: 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 species: Arizona pocket mouse (*Perognathus amplus*), Botta's pocket gopher (*Thomomys bottae*), cactus mouse (*Peromyscus eremicus*), canyon mouse (*P. crinitis*), deer mouse (*P. maniculatus*), desert pocket mouse (*Chaetodipus penicillatus*), desert shrew (*Notiosorex crawfordi*), desert woodrat (*Neotoma lepida*), Merriam's pocket mouse (*Dipodomys merriami*), round-tailed ground squirrel (*Spermophilus tereticaudus*), southern grasshopper mouse (*Onychomys torridus*), 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 (*Pipistrellus 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. Several other special status bat species that could occur within the SEZ area are addressed in Section 8.1.12.1.

8.1.11.3.2 Impacts

As presented in the Draft Solar PEIS, solar energy development within the Brenda 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 analyzed (Table 8.1.11.3-1 in the Draft Solar PEIS). The reduction in size of the Brenda SEZ would result in reduced habitat impacts for all representative mammal species; resultant impact levels for all representative mammal species would still be small.

8.1.11.3.3 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 are anticipated to be small.

Because of the change in the SEZ boundaries, one of the SEZ-specific design features identified in Section 8.1.11.3.3 of the Draft Solar PEIS (i.e., Bouse Wash should be avoided) is no longer applicable. On the basis of impact analyses conducted for the Draft Solar PEIS, updates to those analyses due to changes to the SEZ boundaries, and consideration of comments received as applicable, no SEZ-specific design features for mammals 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.

8.1.11.4 Aquatic Biota

8.1.11.4.1 Affected Environment

There are no permanent water bodies or perennial streams within the boundaries of the Brenda SEZ. The boundaries of the Brenda SEZ given in the Draft Solar PEIS have been reduced. Based on the boundary changes, updates to the Draft Solar PEIS include the following:

- Bouse Wash is no longer located within the SEZ, but it is located within the area of potential indirect effects within 5 mi (8 km) of the SEZ.

- Intermittent streams are the only surface water feature in the area of direct and indirect effects, and their area represents less than 2% of the total amount of intermittent stream present in the 50-mi (80-km) SEZ region.

Aquatic biota present in the surface water features in the Brenda 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 Bouse Wash.

8.1.11.4.2 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 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:

- Bouse Wash is no longer located within the SEZ; therefore, Bouse Wash would not be directly affected by construction activities. However, as described in the Draft Solar PEIS, Bouse Wash could be affected indirectly by solar development activities within the SEZ.

8.1.11.4.3 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. 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 Bouse Wash.

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 Brenda 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.

8.1.12 Special Status Species

8.1.12.1 Affected Environment

As presented in the Draft Solar PEIS, 20 special status species were identified that could occur or have potentially suitable habitat within the affected area of the proposed Brenda SEZ. The reduction in size of the Brenda SEZ by 530 acres (2.1 km^2) does not alter the potential for these species or any additional special status species to occur in the affected area. In the Draft Solar PEIS, the Sonoran population of the desert tortoise (*Gopherus agassizii*) was described as under review for listing under the Endangered Species Act (ESA). Since publication of the Draft Solar PEIS, the Sonoran population of the desert tortoise was determined to be a candidate for listing under the ESA with a Listing Priority Number (LPN) of 6 (75 CFR 78094).

8.1.12.2 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 Brenda SEZ could affect potentially suitable habitats of special status species. The analysis presented in the Draft Solar PEIS for the original Brenda SEZ indicated that development would result in no impact or a small overall impact on all special status species. Development within the revised Brenda SEZ could still affect the same 20 special status species as evaluated in the Draft Solar PEIS. The reduction in size of the Brenda SEZ would result in reduced (but still small) impact levels compared to original estimates in the Draft Solar PEIS.

8.1.12.3 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 area of direct effects to determine the presence and abundance of special status species, including those identified in Table 8.1.12.1-1 of the Draft 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 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.

- Disturbance of dunes and sand flats in the area of direct effects shall be avoided or minimized to reduce impacts on the arid tansy-aster.

- Disturbance of any agricultural and riparian habitats in the area of direct effects shall be avoided or minimized to reduce impacts on the lowland leopard frog.

- Consultation with the USFWS and the Arizona Game and Fish Department (AZGFD) shall be conducted to address the potential for impacts on the Sonoran population of bald eagle, a species listed as threatened under the ESA and California Endangered Species Act (CESA). Consultation would identify

an appropriate survey protocol, avoidance measures, and, if appropriate, reasonable and prudent alternatives, reasonable and prudent measures, and terms and conditions for incidental take statements.

- Coordination with the USFWS and AZGFD should be conducted to address the potential for impacts on the Sonoran population of the desert tortoise, a species under review for listing under the ESA. Coordination would identify an appropriate survey protocol and mitigation requirements, which may include avoidance, minimization, translocation, or compensation.

It is anticipated that 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, updates to those analyses due to changes to the SEZ boundaries, and consideration of comments received as applicable, no new 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.

8.1.13 Air Quality and Climate

8.1.13.1 Affected Environment

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

8.1.13.1.1 Existing Air Emissions

The Draft Solar PEIS presented La Paz County emissions data for 2002. More recent data for 2008 (EPA 2011a) were reviewed for this Final Solar PEIS. The two emissions inventories used different sources and assumptions. For example, the 2008 data did not include biogenic volatile organic compound (VOC) emissions. All emissions except PM_{10} (particulate matter with an aerodynamic diameter of 10 μm or less) were lower in the more recent data; PM_{10} emissions were about 2% higher in the 2008 data. These changes would not affect the modeled air quality impacts presented in this update.

8.1.13.1.2 Air Quality

The calendar quarterly average National Ambient Air Quality Standard (NAAQS) of 1.5 $\mu g/m^3$ for lead (Pb) presented in Table 8.1.13.1-2 of the Draft Solar PEIS has been replaced by the rolling 3-month standard (0.15 $\mu g/m^3$). The federal 24-hour and annual sulfur dioxide

(SO_2), 1-hour ozone (O_3), and annual PM_{10} (particulate matter with a diameter of 10 μm or less) standards have been revoked as well (EPA 2011b). Arizona adopted the NAAQS, and these changes are thus reflected in the Arizona State Ambient Air Quality Standards (SAAQS). These changes will not affect the modeled air quality impacts presented in this update.

8.1.13.2 Impacts

8.1.13.2.1 Construction

Methods and Assumptions

Except as noted below, the methods and modeling assumptions have not changed from those presented in the Draft Solar PEIS.

The developable area of the proposed Brenda SEZ was reduced by 530 acres (2.1 km^2) by eliminating the area of Bouse Wash on the east side of the SEZ and eliminating the area on the west side of the SEZ to the west of the county road. In the Draft Solar PEIS, concentrations at human receptors and cities were estimated indirectly from contours based on modeled concentrations at gridded receptors. In this Final Solar PEIS, concentrations are estimated directly at those receptors.

Modeling for the Draft Solar PEIS assumed that up to 3,000 acres (12.1 km^2) would be disturbed at any one time. This Final Solar PEIS assumed that up to 2,678 acres (10.8 km^2), or 80% of the developable area, would be disturbed at any one time.

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.

As noted in Table 8.1.13.2-1 of the Draft Solar PEIS, the background levels of 24-hour PM_{10} and $PM_{2.5}$ (particulate matter with an aerodynamic diameter of 2.5 μm or less) available for the Draft Solar PEIS were above the standard levels, and any increase from construction emissions would increase levels already above the standard levels. Background levels of annual $PM_{2.5}$ were about 90% of the standard level.

With the reduced size of the Brenda SEZ, predicted concentrations for this Final Solar PEIS, as shown in Table 8.1.13.2-1, would be lower than or comparable to those presented in the Draft Solar PEIS. However, the conclusions in the Draft Solar PEIS remain valid at the boundary. 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

TABLE 8.1.13.2-1 Maximum Air Quality Impacts from Emissions Associated with Construction Activities for the Proposed Brenda 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	400	204	604	150	267	403
$PM_{2.5}$	24 hours	H8H	26.3	42.3	68.6	35	75	196
	Annual	–[d]	7.3	13.5	20.8	15	49	139

[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 8.1.13.1-2 of the Draft Solar PEIS.

[d] A dash indicates not applicable.

the construction of solar facilities. High PM_{10} concentrations would be limited, however, to the immediate areas surrounding the SEZ boundary and would decrease quickly with distance.

Given that background particulate levels appear to be high, the Draft Solar PEIS presented concentration increments at human receptors. For this Final Solar PEIS, these increments were remodeled directly as noted above.[1] Predicted maximum 24-hour PM_{10} concentration increments would be about 141 $\mu g/m^3$ at Pioneer (about 0.4 mi [0.6 km] south of the SEZ), about 13 $\mu g/m^3$ at Brenda, about 15 $\mu g/m^3$ at Vicksburg, about 7 $\mu g/m^3$ at Bouse, and about 4 $\mu g/m^3$ at Quartzsite. At Pioneer, predicted maximum 24-hour and annual $PM_{2.5}$ concentration increments would be about 9.3 and 0.9 $\mu g/m^3$, respectively. Given that even these small impacts would, during the construction period, add to air quality levels already exceeding standard levels, refined modeling and a site-specific determination of local particulate background levels should be undertaken for specific projects.

[1] At this programmatic level, detailed information on construction activities, such as facility size, type of solar technology, heavy equipment fleet, activity level, work schedule, and so on, is not known; thus air quality modeling cannot be conducted. Therefore, it has been assumed that an area of 2,678 acres (10.8 km^2), that is, 80% of the developable area, would be disturbed continuously; thus the modeling results and discussion here should be interpreted in that context. During the site-specific project phase, more detailed information would be available and more realistic air quality modeling analysis could be conducted. It is likely that impacts on ambient air quality predicted for specific projects would be much lower than those in this Final Solar PEIS.

Updated 24-hour and annual PM_{10} concentration increments at the surrogate receptors[2] for the nearest Class I Area—Joshua Tree National Park (NP) in California—would still be less than Prevention of Significant Deterioration (PSD) increments for the Class I area. These surrogate receptors are more than 45 mi (72 km) from Joshua Tree NP, and thus concentrations in Joshua Tree NP would be much lower than those at the surrogates and would not exceed the Class I PSD increments.

In conclusion, predicted 24-hour PM_{10} and 24-hour and annual $PM_{2.5}$ concentration levels could exceed the NAAQS 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 concentrations of particulates at nearby communities would be much lower, but would still add to impacts on those communities because background particulate levels are high. 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 (Joshua Tree NP in California). Construction activities are not subject to the PSD program, and the comparison provides only a screen for gauging the magnitude of the impact. Accordingly, it is anticipated that impacts of construction activities on ambient air quality would be moderate and temporary.

The transmission assessment for the proposed Brenda SEZ has been updated; the hypothetical transmission corridor assessed in the Draft Solar PEIS is no longer applicable. General air quality impacts associated with construction and operation of transmission lines are discussed in Section 5.11 of the Draft Solar PEIS and this Final Solar PEIS.

8.1.13.2.2 Operations

The reduction in the developable area of the proposed Brenda SEZ by 13.7% from 3,878 acres (15.7 km^2) to 3,348 acres (13.5 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 298 to 536 MW is estimated for the Brenda SEZ for various solar technologies (see Section 8.1.2). 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 use that is avoided. Updated estimates for emissions potentially avoided by a solar facility can be obtained from the table in the Draft Solar PEIS by reducing the tabulated estimates by about 13.7%, as shown in the revised Table 8.1.13.2-2. For example, for the technologies estimated to require 9 acres/MW (power tower, dish engine, and PV), up to 618 tons/yr of NO_x (= 86.3% × the value of 716 tons/yr tabulated in the Draft Solar PEIS) could be avoided by full solar development of the Brenda SEZ as revised for this Final Solar PEIS. Even with the reduction in size of the proposed Brenda SEZ, the conclusions of the Draft Solar PEIS remain valid. Full solar development of the proposed

[2] 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.

TABLE 8.1.13.2-2 Annual Emissions from Combustion-Related Power Generation Avoided by Full Solar Development of the Proposed Brenda 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
3,847	342–616	599–1,078	461–830	710–1,279	0.007–0.012	509–917
Percentage of total emissions from electric power systems in the state of Arizona[e]			0.87–1.6%	0.87–1.6%	0.87–1.6%	0.87–1.6%
Percentage of total emissions from all source categories in the state of Arizona[f]			0.42–0.75%	0.20–0.35%	–[g]	0.48–0.86%
Percentage of total emissions from electric power systems in the six-state study area[e]			0.18–0.33%	0.19–0.35%	0.22–0.40%	0.19–0.35%
Percentage of total emissions from all source categories in the six-state study area[f]			0.10–0.18%	0.03–0.05%	–	0.06–0.11%

[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 aces (0.036 km^2) per MW (power tower, dish engine, and PV technologies) would be required.

[c] Assumed a capacity factor of 20%.

[d] Composite combustion-related emission factors for SO_2, NO_x, Hg, and CO_2 of 1.54, 2.37, 2.2×10^{-5}, and 1,700 lb/MWh, respectively, were used for the state of Arizona.

[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] A dash indicates not estimated.

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

Brenda SEZ could reduce fuel combustion–related emissions in Arizona to some extent, but relatively less so than those built in other states with higher fossil use rates.

8.1.13.2.3 Decommissioning and Reclamation

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

8.1.13.3 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.

8.1.14 Visual Resources

8.1.14.1 Affected Environment

The SEZ boundaries have been revised and extend approximately 2 mi (3.2 km) north to south at its greatest extent and 3.5 mi (5.6 km^2) east to west. The SEZ has been revised to eliminate 530 acres (2.1 km^2). The proposed Brenda SEZ now occupies an area of 3,348 acres (13.5 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.

The Lake Havasu Final Environmental Impact Statement identifies the areas within the Brenda SEZ as having low scenic quality and low visual sensitivity (BLM 2006). The International Dark Sky Association also has identified lands in the vicinity of the Brenda SEZ as important night sky–observing sites.

8.1.14.2 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 approximately 14% of the original SEZ. The resulting visual contrast reduction for any given point within 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 wide-angle views of these areas. In general, contrast reductions also would be larger for elevated viewpoints relative to nonelevated 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.

8.1.14.2.1 Impacts on the Proposed Brenda SEZ

Although the reduction in size of the SEZ discussed in Section 8.1.14.2 would reduce visual contrasts associated with solar development, solar development within the SEZ still would involve major modification of the existing character of the landscape and would likely dominate the views from most locations within the 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.

8.1.14.2.2 Impacts on Lands Surrounding the Proposed Brenda 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 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. Figure 8.1.14.2-1 shows the combined results of the viewshed analyses for all four solar technologies. The colored portions 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 light brown and the additional areas shaded light purple. Transmission towers and short solar power towers would be visible from the areas shaded light brown, light purple, and the additional areas shaded 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 could be visible from the additional areas shaded medium brown.

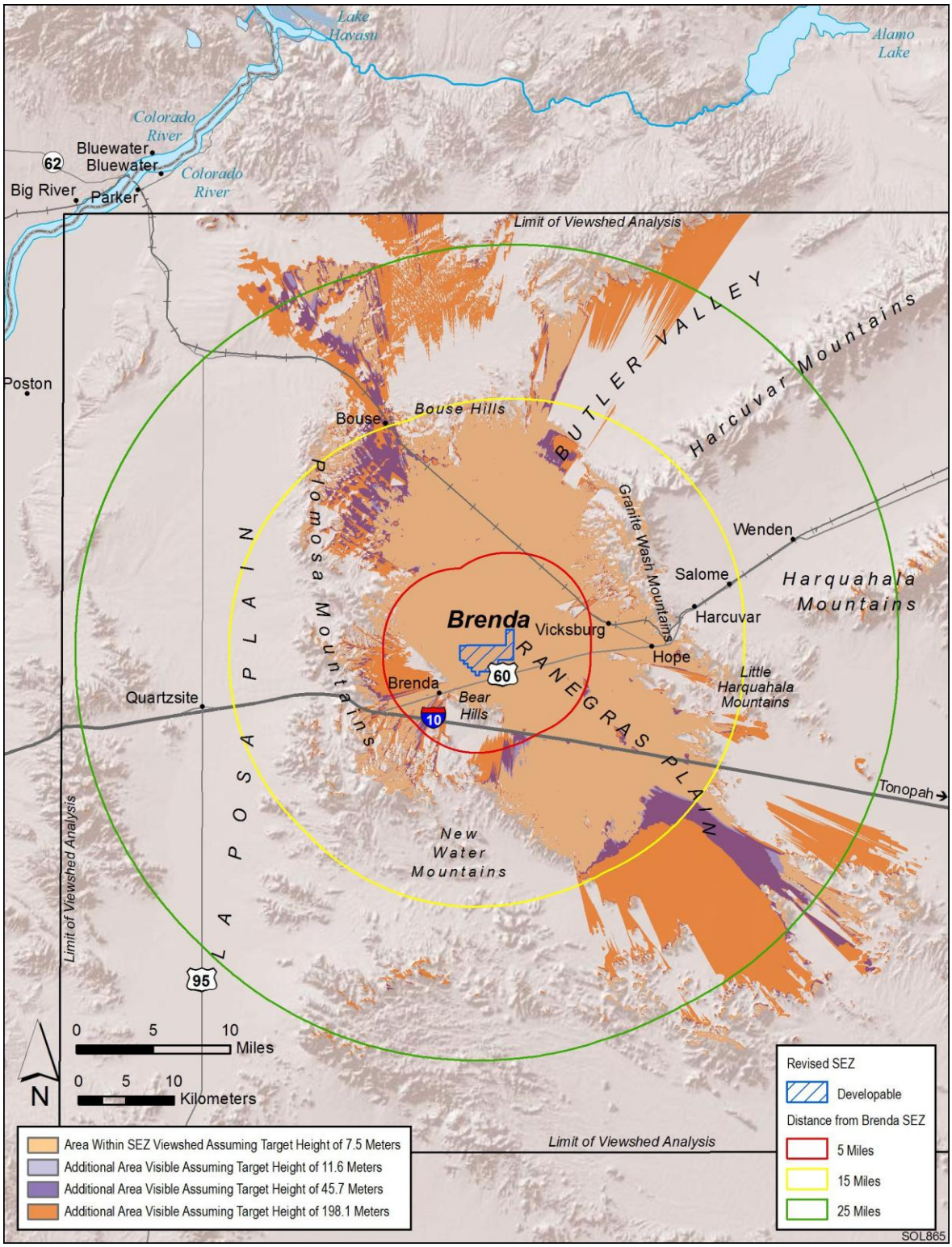

FIGURE 8.1.14.2-1 Viewshed Analyses for the Proposed Brenda SEZ as Revised and Surrounding Lands, Assuming Viewshed Heights of 24.6 ft (7.5 m), 38 ft (11.6 m), 150 ft (45.7 m), and 650 ft (198.1 m) (shaded areas indicate lands from which solar development and/or associated structures within the SEZ could be visible)

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

Figure 8.1.14.2-2 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, in order to illustrate which of these sensitive visual resource areas could 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 Visual Resource Management (VRM) System-specified foreground-middleground 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 8.1.14.2-1. The change in size of the SEZ alters the viewshed of the SEZ, such that the visibility of the SEZ and solar facilities within the SEZ from the surrounding lands would be reduced.

With the reduction in size of the SEZ, solar energy development within the SEZ would be expected to create minimal or weak visual contrasts for viewers within most of the surrounding scenic resource areas listed in Table 8.1.14.2-1. An exception includes the Plomosa SRMA,

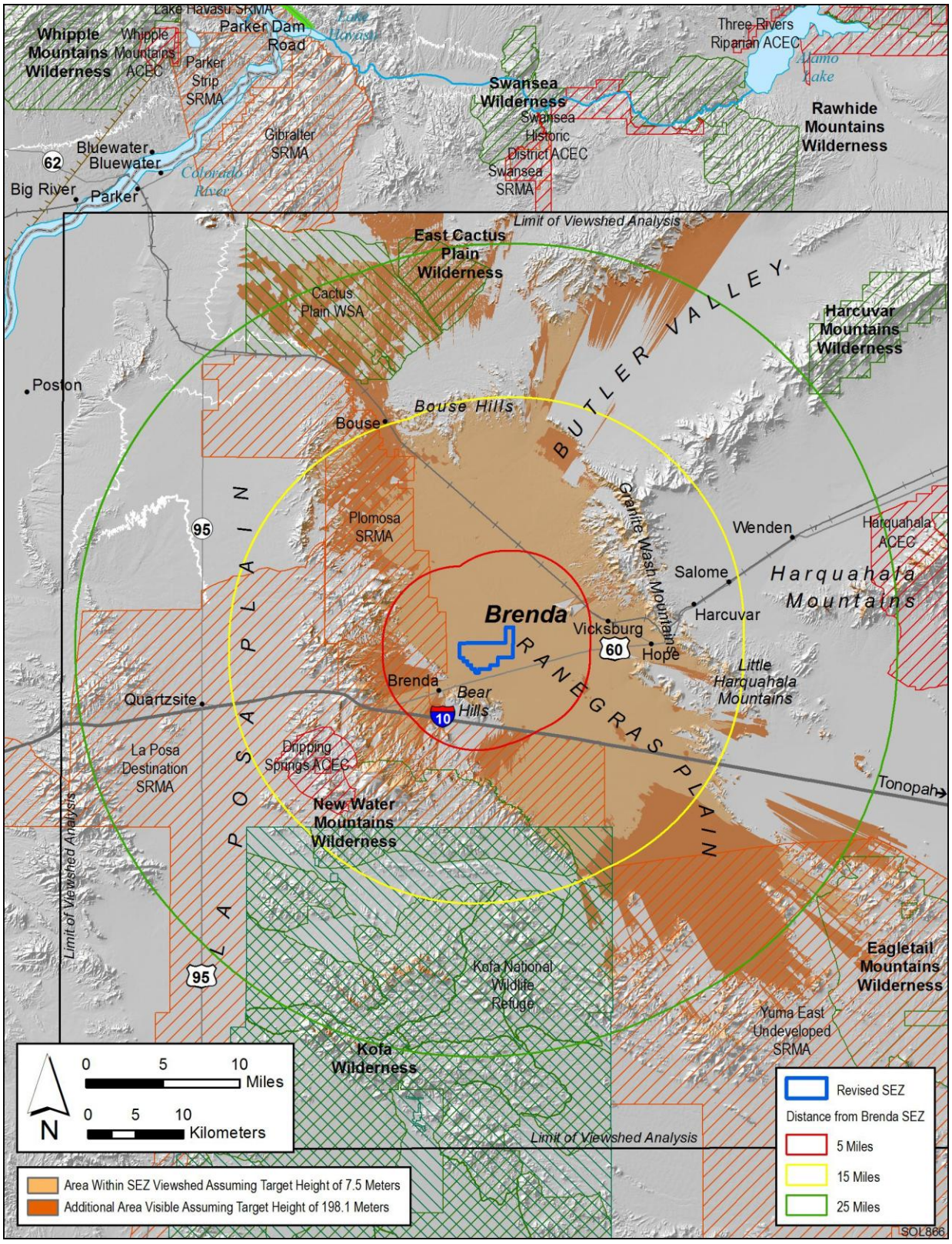

FIGURE 8.1.14.2-2 Overlay of Selected Sensitive Visual Resource Areas onto Combined 650-ft (198.1-m) and 24.6-ft (7.5-m) Viewsheds for the Proposed Brenda SEZ as Revised

TABLE 8.1.14.2-1 Selected Potentially Affected Sensitive Visual Resources within a 25-mi (40-km) Viewshed of the Proposed Brenda SEZ as Revised, Assuming a Target Height of 650 ft (198.1 m)

Feature Type	Feature Name (Total Acreage/Linear Distance)[a]	Feature Area or Linear Distance[b,c]		
		Visible within 5 mi	Visible Between 5 and 15 mi	Visible Between 15 and 25 mi
Wilderness Areas (WAs)	East Cactus Plain (14,317 acres)	0 acres (0%)	0 acres (0%)	9,218 acres (64%)
	Kofa (547,730 acres)	0 acres (0%)	1,481 acres (0%)	4,247 acres (1%)
	New Water Mountains (24,627 acres)	0 acres (0%)	3,871 acres (16%)	0 acres (0%)
WSA	Cactus Plain (58,893 acres)	0 acres (0%)	0 acres (0%)	24,899 acres (42%)
NWR	Kofa (665,435 acres)	0 acres (0%)	6,950 acres (1%)	5,055 acres (1%)
SRMA	Plomosa[d] (109,314 acres)	15,931 acres (15%)	34,717 acres (32%)	3,078 acres (3%)
ACEC	Dripping Springs (11,081 acres)	0 acres (0%)	378 acres (3%)	0 acres (0%)
	Harquahala (77,201 acres)	0 acres (0%)	0 acres (0%)	34 acres (0%)

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

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

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

[d] The Plomosa Backcountry Byway, Plomosa Bouse Plain, and the Plomosa Mountains SRMAs were combined into one SRMA since the Draft Solar PEIS was published. The acreage reported in this Final Solar PEIS is for the combined SRMA.

which still would be subject to minimal to strong contrasts, depending on viewer location within the SRMA.

In addition to these areas, impacts on other lands and resource areas also were evaluated. These areas include U.S. 60, Interstate-10 (I-10), and the communities of Vicksburg, Brenda, and Hope.

8.1.14.2.4 Summary of Visual Resource Impacts for the Proposed Brenda SEZ

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

The revision 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 can be summarized as follows:

- Within the Brenda SEZ: Contrasts experienced by viewers within the SEZ would be reduced due to the elimination of acreage within the Bouse Wash and a small area within the western portion of the SEZ. However, strong contrasts still could be observed in the remaining developable area.

- East Cactus Plain Wilderness Area (WA): A very slight reduction in contrasts would be anticipated; however, solar energy development within the SEZ still would cause minimal contrasts.

- Kofa WA: A very slight reduction in contrasts would be anticipated; however, solar energy development within the SEZ still would cause minimal to weak contrasts.

- New Water Mountains: A slight reduction in contrasts would be anticipated; however, solar energy development within the SEZ still would cause minimal to weak contrasts, with higher levels of contrast expected for the higher elevation viewpoints within the WA.

- Cactus Plain WSA: A very slight reduction in contrasts would be anticipated; however, solar energy development within the SEZ still would cause minimal contrasts.

- Kofa NWR: A very slight reduction in contrasts would be anticipated; however, solar energy development within the SEZ still would cause minimal to weak contrasts. Higher levels of contrast would be expected for the higher elevation viewpoints within the NWR.

- Plomosa SRMA: The Plomosa Backcountry Byway, Plomosa Bouse Plain, and the Plomosa Mountains SRMAs were combined into one SRMA since the Draft Solar PEIS was published. As presented in the Draft Solar PEIS, a range of minimal to strong contrasts would have been observed in the three SRMAs, depending on viewer location within the SRMAs.

- Because of the elimination of acreage within the western portions of the SEZ, a slight overall reduction in contrasts would be anticipated for observers within the combined SRMA; however, solar energy development within the SEZ still would cause minimal to strong contrasts, dependent on the viewer location within the combined Plomosa SRMA.

- Dripping Springs (and Dripping Springs ACEC): A very slight reduction in contrasts would be anticipated; however, solar development within the SEZ still would cause minimal to weak contrasts, depending on viewer location within the ACEC. Higher levels of contrast would be expected for the higher elevation viewpoints within the ACEC.

- Harquahala ACEC: No reduction in contrasts would be anticipated; solar development within the SEZ still would cause minimal contrasts. Higher levels of contrast would be expected for the higher elevation viewpoints within the ACEC.

- U.S. 60: A slight reduction in contrasts would be anticipated due to the elimination of acreage within the eastern and western portions of the SEZ; however, solar development within the SEZ still would cause weak to strong contrasts, depending on viewer location on U.S. 60.

- I-10: The view from I-10, immediately south of the SEZ, largely is screened by the Bear Hills. Views of the SEZ, however, would be possible from locations east and west of the hills. A slight reduction in contrasts would be anticipated due to the elimination of acreage within the eastern and western portions of the SEZ; solar development within the SEZ still would cause weak to moderate contrasts, depending on viewer location on I-10.

- Vicksburg: A slight reduction in contrasts would be anticipated; however, solar development within the SEZ still would cause weak to moderate contrasts, depending on viewer location in Vicksburg.

- Brenda: A slight reduction in contrasts would be anticipated; however, solar development within the SEZ still would cause weak to moderate contrasts, depending on viewer location in Brenda.

- Hope: A slight reduction in contrasts would be anticipated; solar development within the SEZ still would cause weak contrasts.

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

- La Posa Destination SRMA: This SRMA is located to the south and west of the Brenda SEZ. A portion immediately south of the SEZ would be screened from view of the solar development by the Bear Hills. The northeastern

boundary of this SRMA is the I-10 corridor. Solar development within the SEZ would be expected to cause minimal to moderate contrasts, dependent on the viewer's location within the SRMA.

- Yuma East Undeveloped SRMA: This SRMA is located approximately 15 mi (24 km) to the southeast of the Brenda SEZ. The western boundary of the SRMA abuts the Kofa NWR. Solar development within the SEZ would be expected to cause minimal contrasts.

Table 8.4.14.2-2 provides the acreage of these areas that would be visible within the 650 ft (198.1 m) viewshed.

8.1.14.3 SEZ-Specific Design Features and Design Feature Effectiveness

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

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 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.

8.1.15 Acoustic Environment

8.1.15.1 Affected Environment

The developable area of the proposed Brenda SEZ was reduced by about 13.7% from 3,878 acres (15.7 km^2) to 3,348 acres (13.5 km^2). Distances between the SEZ and nearby noise receptors in this Final Solar PEIS remain the same or increase about 1 mi (1.6 km) compared to the corresponding distance in the Draft Solar PEIS. Except as noted below, the conclusions in the Draft Solar PEIS remain valid.

TABLE 8.1.14.2-2 Potentially Affected Sensitive Visual Resources within a 25-mi (40-km) Viewshed of the Proposed Brenda SEZ as Revised, Assuming a Target Height of 650 ft (198.1 m)

		Feature Area or Linear Distance[b,c]		
			Visible Between	
Feature Type	Feature Name (Total Acreage/Linear Distance)[a]	Visible within 5 mi	5 and 15 mi	15 and 25 mi
SRMA	La Posa Destination (362,523 acres)	2,547 acres (1%)	38,115 acres (11%)	15 acres (0%)
	Yuma East Undeveloped (517,443 acres)	0 acres (0%)	0 acres (0%)	47,084 acres (9%)

[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.

8.1.15.2 Impacts

8.1.15.2.1 Construction

Except for wildlife impacts in the Plomosa SRMA, the results and conclusion presented in the Draft Solar PEIS remain valid.

On the basis of comments received and recent references as applicable, this Final Solar PEIS used an updated approximate significance threshold of 55 dBA corresponding to the onset of adverse physiological impacts (Barber et al. 2010) to update the analysis of potential noise impacts on terrestrial wildlife in areas of special concern. As a result of this updated analysis, the assessment of impacts has been updated as follows. The estimated noise level at the boundary of the Plomosa SRMA (as close as bout 0.85 mi [1.4 km] to the west of the SEZ) from construction activities occurring near the western edge of the proposed Brenda SEZ is about 44 dBA. This estimated level is below the significance threshold, and thus noise from construction in the proposed Brenda SEZ is not anticipated to considerably affect wildlife in the nearby specially designated areas. As discussed in Section 5.10.2 of the Draft Solar PEIS and this Final Solar PEIS, there is the potential for other effects to occur at lower noise levels (Barber et al. 2011). On the basis of the approximate significance threshold of 55 dBA and the potential for impacts at

lower noise levels, impacts on terrestrial wildlife from construction noise would have to be considered on a project-specific basis, including consideration of site-specific background levels and hearing sensitivity for terrestrial wildlife of concern.

Given the small changes in the boundaries of the SEZ, construction noise and vibration impacts would be the same or slightly less than those presented in the Draft Solar PEIS. Construction would cause some unavoidable but localized short-term noise impacts on neighboring communities, particularly for activities occurring near the southern proposed SEZ boundary, close to the nearby residences along U.S. 60. No adverse impacts from vibration, including vibration from pile driving for dish engines, are anticipated from construction activities.

8.1.15.2.2 Operations

Except for wildlife impacts in the Plomosa SRMA, the results and conclusions presented in the Draft Solar PEIS remain valid.

Parabolic Trough and Power Tower

Given the small change in the developable area in the proposed SEZ, the conclusions of the Draft Solar PEIS for parabolic trough and power tower technologies remain valid. If thermal energy storage (TES) were not used for parabolic trough and power tower technologies, estimated noise levels at the nearest residences would be 47 dBA L_{dn}, exceeding the 40-dBA typical daytime mean rural background noise level, but for 12 hours of daytime operation, 45 dBA L_{dn}, would not exceed the EPA guideline level of 55 dBA L_{dn} for residential areas. If TES were used (resulting in a longer daily operating period), facilities located near the SEZ boundary could result in adverse noise impacts at the nearest residences, depending on background noise levels and meteorological conditions.

As stated above under construction impacts, for this Final Solar PEIS, an updated approximate significance threshold of 55 dBA was used to evaluate potential noise impacts on terrestrial wildlife in areas of special concern. With operation of a parabolic trough or power tower facility with TES at the SEZ, revised estimated daytime and nighttime noise levels at the boundary of the Plomosa SRMA are about 42 and 52 dBA, respectively. These estimated levels are below the significance threshold, and thus noise from operations in the proposed Brenda SEZ is not anticipated to considerably affect wildlife in the nearby specially designated areas. However, there is the potential for other effects to occur at lower noise levels. On the basis of these impacts and the potential for impacts at lower noise levels, impacts on terrestrial wildlife from operation noise from parabolic trough or power tower facilities would have to be considered on a project-specific basis, including consideration of site-specific background levels and hearing sensitivity for terrestrial wildlife of concern.

Dish Engine

Even though the total number of dish engines would be reduced by about 14% if the proposed Brenda were fully developed, the conclusions of the Draft Solar PEIS for dish engine technologies remain valid, because the overall noise level at any receptor is mostly influenced by the nearest dish engines. The expected noise level of 51 dBA at the nearest residences exceeds 40 dBA, a typical daytime mean rural background noise level. For 12 hours of daytime operations, the estimated level of 49 dBA L_{dn} at these residences would be below the EPA guideline of 55 dBA L_{dn} for residential areas. However, noise from dish engines could adversely impact the nearest residences, depending on background noise levels and meteorological conditions. Consideration of minimizing noise impacts is very important during the siting of dish engine facilities.

As stated above for construction impacts, for this Final Solar PEIS, an updated approximate significance threshold of 55 dBA was used to evaluate potential noise impacts on terrestrial wildlife in areas of special concern. With operation of a dish engine facility at the SEZ, the revised estimated noise level at the boundary of the Plomosa SRMA is about 46 dBA, which is below the updated significance threshold. Accordingly, noise from operations of a dish engine facility in the proposed Brenda SEZ would not be anticipated to adversely affect wildlife in the Plomosa SRMA. However, considering the potential for impacts at lower noise levels, impacts on terrestrial wildlife from dish engine operation noise would have to be considered on a project-specific basis, including consideration of site-specific background levels and hearing sensitivity for terrestrial wildlife of concern.

Given the small changes in the boundaries of the SEZ, the discussions of vibration and transformer and switchyard noise presented in the Draft Solar PEIS remain valid. Noise impacts from these sources would be negligible.

8.1.15.2.3 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 moderate and temporary. Potential noise and vibration impacts on surrounding communities would be less than those for construction activities.

8.1.15.3 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, the following SEZ-specific design feature for noise has been identified:

- Because of the proximity of the proposed Brenda SEZ to nearby residences and the Plomosa SRMA and the relatively high noise levels around the SEZ due to U.S. 60, refined modeling would be warranted along with background noise measurements during project-specific assessments.

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.

8.1.16 Paleontological Resources

8.1.16.1 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 update the temporary assignment of potential fossil yield classification (PFYC) Class 3b as used in the Draft Solar PEIS.

8.1.16.2 Impacts

The potential for impacts on significant paleontological resources is unknown. 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.

8.1.16.3 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, updates to those analyses due to changes in the SEZ boundaries, and consideration of comments received as applicable, no SEZ-specific design features for paleontological resources have been identified. Because the PFYC of the proposed Brenda SEZ is Class 3b (unknown potential), paleontological surveys would be needed to identify those areas that may have significant paleontological resources; therefore, the need for and nature of any SEZ-specific design features will depend on the findings 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 paleonotological 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.

8.1.17 Cultural Resources

8.1.17.1 Affected Environment

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

- A total of 530 acres (2.1 km^2) of land previously within the Brenda SEZ are now outside of the SEZ boundary.

- 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 192 acres (0.8 km^2), or roughly 5.7% of the proposed SEZ. The Class II survey is being conducted by the BLM to meet its ongoing Section 110 responsibilities under the National Historic Preservation Act (NHPA). The objectives of the Class II surveys currently under contract are to reliably predict the density, diversity, and distribution of archaeological sites within each SEZ in Arizona, California, and Nevada and to create sensitivity zones based on projected site density, complexity, likely presence of human burials, and/or other tribal concerns. The BLM will continue to request funding to support additional Class II sample inventories in the SEZ areas. Areas of specific local interest, as determined through a Class I review, and, if appropriate, subsurface testing of dune and/or colluvium areas should be considered in the sampling strategies for future surveys.
  - 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 covering some SEZs in Nevada and Utah with tribes not included in the original studies, to determine whether those tribes have similar concerns.

8.1.17.2 Impacts

As stated in the Draft Solar PEIS, direct impacts on significant cultural resources could occur in the proposed Brenda SEZ; however, further investigation is needed. Data provided in the Draft Solar PEIS remain valid, with the following update:

- Previously identified potential impacts on cultural resources along the Bouse Wash are no longer applicable with the reduction in size of the SEZ.

8.1.17.3 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, updates to those analyses due to changes in the SEZ boundaries, and consideration of comments received as applicable, no SEZ-specific design features for cultural resources have been identified.

The need for and nature of SEZ-specific design features would be determined in consultation with the Arizona State Historic Preservation Office (SHPO) and affected tribes and would depend on the results of future investigations. Impacts on culturally significant sites and landscapes in the vicinity of the Brenda SEZ at locations such as Ranegras Plain, Granite Wash Pass, Harquahala Mountains, and nearby ACECs and Special Cultural Resource Management Areas (SCRMAs) would need to be avoided, minimized, or otherwise mitigated if solar energy development were to be initiated in the proposed Brenda SEZ. Some SEZ-specific design features may be identified through the process of preparing parcels for competitive offer and subsequent project-specific analysis.

8.1.18 Native American Concerns

8.1.18.1 Affected Environment

Data provided in the Draft Solar PEIS remain valid.

8.1.18.2 Impacts

The description of potential concerns provided in the Draft Solar PEIS remains valid. No comments have been received to date concerning the Brenda SEZ; however, the Quechan Indian Tribe has indicated that some of the land in the SEZs lies within their tribal traditional use area. This Tribe has stressed the importance of evaluating impacts on the surrounding landscape as a whole. 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.

In relation to past transmission line projects in the area, the Quechan and Yavapai Tribes have expressed concerns regarding the loss of many resources, including among others natural habitat, wild plant resources, game animals, viewsheds, and cremation or burial sites (see also Section 8.1.18.2 of the Draft Solar PEIS). 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.

8.1.18.3 SEZ-Specific Design Features and Design Feature Effectiveness

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

On the basis of impact analyses conducted for the Draft Solar PEIS, updates to those analyses due to changes in 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. The Quechan Tribe has requested that they be consulted at the inception of any solar energy project that would affect resources important to them. The Quechan also suggest that the clustering of large solar energy facilities be avoided; that priority for development be given to lands already disturbed by agricultural or military use; and that the feasibility of placing solar collectors on existing structures be considered, thus minimizing or avoiding the use of undisturbed lands (Jackson 2009). Potentially significant sites and landscapes in the vicinity of the SEZ associated with the Ranegras Plain, Granite Wash Pass, Harquahala Mountains, and nearby ACECs and SCRMAs, as well as traditional plant and animal resources and important water sources, should be considered and discussed during consultation.

8.1.19 Socioeconomics

8.1.19.1 Affected Environment

Although the boundaries of the Brenda 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 the affected environment information given in the Draft are required.

8.1.19.2 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 has been updated in the following sections.

8.1.19.2.1 Solar Trough

Construction

Total construction employment impacts in the ROI (including direct and indirect impacts) from the use of solar trough technologies would be up to 4,683 jobs (Table 8.1.19.2-1). Construction activities would constitute 0.4% of total ROI employment. A solar facility would also produce $275.9 million in income. Direct sales taxes would be $12.3 million, and direct income taxes, $5.6 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 local workforce, 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 663 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 229 rental units expected to be occupied in the ROI. This occupancy rate would represent 0.4% 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 service employment (education, health, and public safety). An increase in such employment would be required to meet existing levels of service in the ROI. Accordingly, up to six new teachers, one physician, and one public safety employee (career firefighters and uniformed police officers) would be required in the ROI. These increases would represent less than 0.1% of total ROI employment expected in these occupations.

TABLE 8.1.19.2-1 ROI Socioeconomic Impacts Assuming Full Build-out of the Proposed Brenda SEZ as Revised with Trough Facilities

Parameter	Maximum Annual Construction Impacts[a]	Annual Operations Impacts[b]
Employment (no.)		
Direct	1,557	117
Total	4,683	191
Income[c]		
Total	275.9	7.2
Direct state taxes[c]		
Sales	12.3	0.2
Income	5.6	0.2
BLM payments[c]		
Rental	NA[d]	0.2
Capacity[e]	NA	3.5
In-migrants (no.)	663	15
Vacant housing[f] (no.)	229	9
Local community service employment		
Teachers (no.)	6	0
Physicians (no.)	1	0
Public safety (no.)	1	0

[a] Construction impacts are based on the development at the site in a single year; it was assumed that one facility with a combined capacity of up to 536 MW (corresponding to 2,678 acres [11 km^2] of land disturbance) could be built.

[b] Operations impacts are based on full build-out of the site, producing a total output of 536 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 2010a), assuming a solar facility with no storage capability and full build-out of the site. Projects with 3 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) of a full build-out of the SEZ using solar trough technologies would be 191 jobs (Table 8.1.19.2-1). Such a solar facility would also produce $7.2 million in income. Direct sales taxes would be $0.2 million, and direct income taxes, $0.2 million. On the basis of fees established by the BLM (BLM 2010a), acreage rental payments would be $0.2 million, and solar generating capacity payments would total at least $3.5 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 15 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 nine owner-occupied units expected to be occupied in the ROI.

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

8.1.19.2.2 Power Tower

Construction

Total construction employment impacts in the ROI (including direct and indirect impacts) from the use of power tower technologies would be up to 1,865 jobs (Table 8.1.19.2-2). Construction activities would constitute 0.2% of total ROI employment. Such a solar facility would also produce $109.9 million in income. Direct sales taxes would be less than $4.9 million, with direct income taxes of $2.2 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 local workforce, 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 264 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 91 rental units expected to be occupied in the ROI. This occupancy rate would represent 0.1% 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 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, up to

TABLE 8.1.19.2-2 ROI Socioeconomic Impacts Assuming Full Build-out of the Proposed Brenda SEZ as Revised with Power Tower Facilities

Parameter	Maximum Annual Construction Impacts[a]	Annual Operations Impacts[b]
Employment (no.)		
Direct	620	60
Total	1,865	83
Income[c]		
Total	109.9	2.9
Direct state taxes[c]		
Sales	<4.9	<0.1
Income	2.2	0.1
BLM payments[c]		
Rental	NA[d]	0.2
Capacity[e]	NA	2.0
In-migrants (no.)	264	8
Vacant housing[f] (no.)	91	5
Local community service employment		
Teachers (no.)	2	0
Physicians (no.)	0	0
Public safety (no.)	0	0

[a] Construction impacts are based on the development at the site in a single year; it was assumed that one facility with a combined capacity of up to 298 MW (corresponding to 2,678 acres [11 km^2] of land disturbance) could be built.

[b] Operations impacts are based on full build-out of the site, producing a total output of 298 MW.

[c] Values are reported in $ million 2008.

[d] NA = not applicable.

[e] The BLM annual capacity payment was based on a fee of $6,570/per MW, established by the BLM in its Solar Energy Interim Rental Policy (BLM 2010a), assuming a solar facility with no storage capability, and full build-out of the site. Projects with 3 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.

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) of a full build-out of the SEZ using power tower technologies would be 83 jobs (Table 8.1.19.2-2). Such a solar facility would also produce $2.9 million in income. Direct sales taxes would be less than $0.1 million, and direct income taxes, $0.1 million. On the basis of fees established by the BLM (BLM 2010a), acreage rental payments would be $0.2 million, and solar generating capacity payments would total at least $2.0 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 eight 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 five owner-occupied units expected to be required in the ROI.

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

8.1.19.2.3 Dish Engine

Construction

Total construction employment impacts in the ROI (including direct and indirect impacts) from the use of dish engine technologies would be up to 758 jobs (Table 8.1.19.2-3). Construction activities would constitute 0.1% of total ROI employment. Such a solar facility would also produce $44.7 million in income. Direct sales taxes would be less than $2.0 million, and direct income taxes, $0.9 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 local workforce, 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 107 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 37 rental units expected to be occupied in the ROI. This occupancy rate would represent 0.1% of the vacant rental units expected to be available in the ROI.

TABLE 8.1.19.2-3 ROI Socioeconomic Impacts Assuming Full Build-out of the Proposed Brenda SEZ as Revised with Dish Engine Facilities

Parameter	Maximum Annual Construction Impacts[a]	Annual Operations Impacts[b]
Employment (no.)		
Direct	252	59
Total	758	81
Income[c]		
Total	44.7	<2.8
Direct state taxes[c]		
Sales	<2.0	<0.1
Income	0.9	0.1
BLM payments[c]		
Rental	NA[d]	0.2
Capacity[e]	NA	2.0
In-migrants (no.)	107	7
Vacant housing[f] (no.)	37	5
Local community service employment		
Teachers (no.)	1	0
Physicians (no.)	0	0
Public safety (no.)	0	0

[a] Construction impacts are based on the development at the site in a single year; it was assumed that one facility with a combined capacity of up to 298 MW (corresponding to 2,678 acres [11 km^2] of land disturbance) could be built.

[b] Operations impacts are based on full build-out of the site, producing a total output of 298 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 2010a), assuming a solar facility with no storage capability and full build-out of the site. Projects with 3 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 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. 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) of a full build-out of the SEZ using dish engine technologies would be 81 jobs (Table 8.1.19.2-3). Such a solar facility would also produce less than $2.8 million in income. Direct sales taxes would be less than $0.1 million, and direct income taxes, $0.1 million. On the basis of fees established by the BLM (BLM 2010a), acreage rental payments would be $0.2 million, and solar generating capacity payments would total at least $2.0 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 five owner-occupied units expected to be required in the ROI.

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

8.1.19.2.4 Photovoltaic

Construction

Total construction employment impacts in the ROI (including direct and indirect impacts) from the use of PV technologies would be up to 354 jobs (Table 8.1.19.2-4). Construction activities would constitute less than 0.1% of total ROI employment. Such a solar development would also produce $20.8 million in income. Direct sales taxes would be $0.9 million, and direct income taxes, $0.4 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 local workforce, 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 50 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

TABLE 8.1.19.2-4 ROI Socioeconomic Impacts Assuming Full Build-out of the Proposed Brenda SEZ as Revised with PV Facilities

Parameter	Maximum Annual Construction Impacts[a]	Annual Operations Impacts[b]
Employment (no.)		
Direct	118	6
Total	354	8
Income[c]		
Total	20.8	0.3
Direct state taxes[c]		
Sales	0.9	<0.1
Income	0.4	<0.1
BLM payments[c]		
Rental	NA[d]	0.2
Capacity[e]	NA	1.6
In-migrants (no.)	50	1
Vacant housing[f] (no.)	17	0
Local community service employment		
Teachers (no.)	0	0
Physicians (no.)	0	0
Public safety (no.)	0	0

[a] Construction impacts are based on the development at the site in a single year; it was assumed that one facility with a combined capacity of up to 298 MW (corresponding to 2,678 acres [11 km^2] of land disturbance) could be built.

[b] Operations impacts are based on full build-out of the site, producing a total output of 298 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 2010a), assuming full build-out of the site.

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

rental housing units would not be expected to be large, with up to 17 rental units expected to be occupied in the ROI. This occupancy rate would represent less than 0.1% of the vacant rental units expected to be available in the ROI.

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

Operations

Total operations employment impacts in the ROI (including direct and indirect impacts) of a full build-out of the SEZ using PV technologies would be eight jobs (Table 8.1.19.2-4). Such a solar facility would also produce $0.3 million in income. Direct sales taxes would be less than $0.1 million, and direct income taxes, less than $0.1 million. On the basis of fees established by the BLM (BLM 2010a), acreage rental payments would be $0.2 million, and solar generating capacity payments would total at least $1.6 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 one person 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 no owner-occupied units expected to be required in the ROI.

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

8.1.19.3 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. 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 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.

8.1.20 Environmental Justice

8.1.20.1 Affected Environment

The data presented in the Draft Solar PEIS for the proposed Brenda SEZ have not substantially changed. There are no minority or low-income populations in the Arizona portion of the 50-mi (80-km) radius of the SEZ. There is a minority population in the California portion of the 50-mi (80-km) radius of the SEZ.

8.1.20.2 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, although there are minority populations defined by Council on Environmental Quality (CEQ) guidelines (CEQ 1997) (see Section 8.1.20.1 of the Draft Solar PEIS) within the 50-mi (80-km) radius around the boundary of the SEZ. That is, any adverse impacts of solar projects could disproportionately affect minority populations. Because there are no low-income populations within the 50-mi (80-km) radius, there would be no impacts on low-income populations.

8.1.20.3 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, updates to those analyses due to changes in 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.

8.1.21 Transportation

8.1.21.1 Affected Environment

The reduction in developable area of the proposed Brenda SEZ does not change the information on affected environment for transportation provided in the Draft Solar PEIS.

8.1.21.2 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 U.S. 60 would represent an increase in traffic of about 130% in the area of the Brenda SEZ for a solar project. Such traffic levels would represent about a 10 or 100% increase in the traffic levels experienced on I-10 or State Route 72 at their junctions with U.S. 60, respectively, if all project traffic were to be routed through I-10 or State Route 72. Because higher traffic volumes would be experienced during shift changes, traffic on I-10 or State Route 72 could experience minor slowdowns during these time periods in the area of their junctions with U.S. 60. Local road improvements would be necessary on any portion of U.S. 60 that might be developed so as not to overwhelm the local access roads near any site access point(s).

Solar development within the SEZ would affect public access along off-highway vehicle (OHV) routes that are designated open and available for public use. Although open routes crossing areas granted 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.

8.1.21.3 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 in the SEZ boundaries, and consideration of comments received as applicable, no SEZ-specific design features to address transportation impacts in the proposed Brenda SEZ have been identified. Some SEZ-specific design features may be identified through the process of preparing parcels for competitive offer and subsequent project-specific analysis.

8.1.22 Cumulative Impacts

The analysis of potential impacts in the vicinity of the proposed Brenda 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 about 14%. The following sections include an update to the information presented in the Draft Solar PEIS regarding cumulative effects for the proposed Brenda SEZ.

8.1.22.1 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., impacts on air quality may have a greater geographic extent than impacts on visual resources). The BLM, the U.S. Forest Service (USFS), and DoD administer most of the land around the SEZ; the Colorado River Reservation Tribal lands are also about 25 mi (40 km) northwest of the SEZ. The BLM administers approximately 58% of the lands within a 50-mi (80-km) radius of the SEZ.

8.1.22.2 Overview of Ongoing and Reasonably Foreseeable Future Actions

The Draft Solar PEIS included two other proposed SEZs in Arizona. One of these, Bullard Wash, has been removed from consideration.

There are approximately 26 pending ROW applications for solar facilities within 50 mi (80 km) of the Brenda SEZ that could generate up to about 16,900 MW of electricity on public lands in Arizona (see Table B-1 of Appendix B of this Final Solar PEIS). However, these applications are in various stages of approval, and for many, environmental assessments have not been completed. Only one, the Quartzsite Solar Energy Project (discussed below), has firm near-term plans and environmental documentation and is thus considered a reasonably foreseeable action. As of the end of October 2011, the remainder of the applications were not considered reasonably foreseeable future actions.

The ongoing and reasonably foreseeable future actions described below are grouped into two categories: (1) actions related to energy production and distribution (Section 8.1.22.2.1); and (2) other ongoing and reasonably foreseeable actions, including those related to electric power generation and distribution, water management, wildlife management, military facility improvement, and mining (Section 8.1.22.2.2). Together, these actions and trends have the potential to affect human and environmental receptors within the geographic range of potential impacts over the next 20 years.

8.1.22.2.1 Energy Production and Distribution

The list of reasonably foreseeable future actions that relate to energy production and distribution near the proposed Brenda SEZ has been updated and is presented in Table 8.1.22.2-1. Both projects were described in the Draft Solar PEIS. Projects listed in the table are shown in Figure 8.1.22.2-1.

TABLE 8.1.22.2-1 Reasonably Foreseeable Future Actions Related to Energy Development and Distribution near the Proposed Brenda SEZ as Revised[a]

Description	Status	Resources Affected	Primary Impact Location
Renewable Energy Projects on BLM-Administered Lands			
Solar Millennium Blythe Solar Project (CACA 48811), **1000-MW originally planned as parabolic trough facility converting to PV**; **7,025 total acres**[b]	**ROD, October 22, 2010, construction started February 2011, construction on hold pending receipt of revised data**[c]	Land use, visual, terrestrial habitats, wildlife, groundwater	About 45 mi[d] west of the Brenda SEZ, within the Riverside East SEZ
Quartzsite Solar Energy Project (AZA 34 666), 100-MW power tower, 1,500 BLM acres	**NOI, January 1, 2010 Draft EIS, November 10, 2011**	**Land use, visual, terrestrial habitats, wildlife**	**10 mi west–northwest of the Brenda SEZ**
Transmission and Distribution Systems			
None			

[a] Includes projects in later stages of agency environmental review and project development. For projects on BLM-administered lands, includes those approved in 2010, and priority projects for 2011 and 2012 (BLM 2011c). Projects with status changed from that given in the Draft Solar PEIS are shown in bold text.

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

[c] Project modified; see BLM (2011d) for details.

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

Quartzsite Solar Energy Project

Quartzsite Solar, LLC, proposes to construct a 100-MW power tower solar facility. The proposed site is located on about 1,500 acres (6.1 km^2) of BLM land, approximately 10 mi (16 km) north of Quartzsite, Arizona, and 10 mi (16 km) west–northwest of the Brenda SEZ The facility will interconnect to Western's transmission system throughout the existing Bouse–Kofa transmission line (BLM 2011b).

The plant will utilize a solar power boiler at the top of a 538-ft (164-m) tower, surrounded by a field of approximately 17,500 heliostats (mirrors) that focus the solar energy on the solar power boiler. The receiver would be composed of tube panels through which liquid salt flows.

The cooling system will be dry cooling. Approximately 1,000 ac-ft (1,233,000 m^3) of water will be required during the first year of construction. An estimated 150 ac-ft (185,000 m^3) would be required during the remainder of construction. Approximately 200 ac-ft/yr

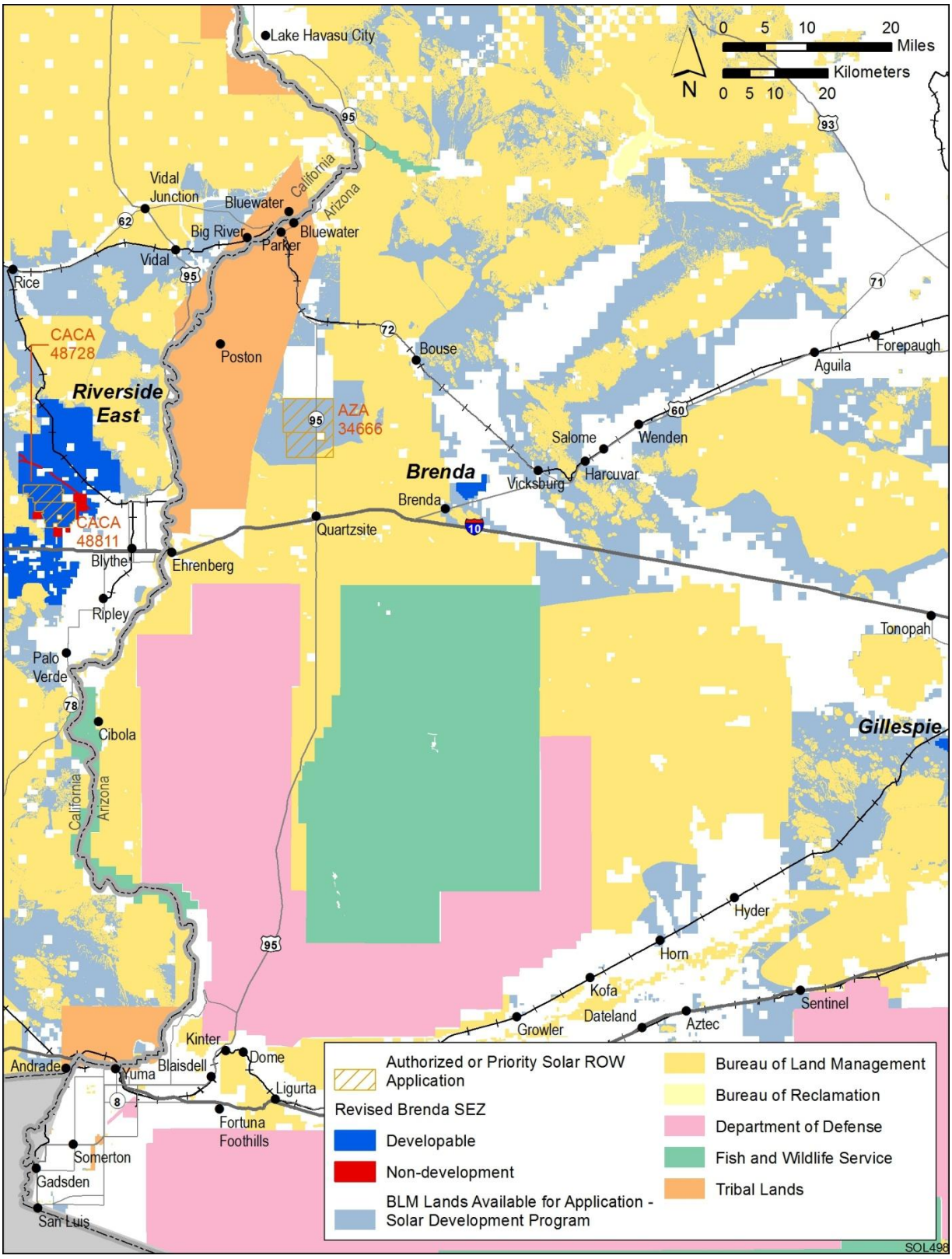

FIGURE 8.1.22.2-1 Locations of Existing and Reasonably Foreseeable Renewable Energy Projects on Public Land within a 50-mi (80-km) Radius of the Proposed Brenda SEZ as Revised

(250,000 m^3) of water would be required during operation. Water will be provided from on-site wells. Construction of the facility will require about 400 to 500 workers at the peak of construction. Operation and maintenance will employ up to 47 workers.

8.1.22.2.2 Other Actions

Other major ongoing and foreseeable actions identified within 50 mi (80 km) of the proposed Brenda SEZ have been updated and are listed in Table 8.1.22.2-2. All but one of these projects was described in the Draft Solar PEIS.

Fancher Project

Luxicor Gold, LP, proposes to extract 60,000 tons (54,000 metric tons) of gold ore from an underground mine at a site 26 mi (42 km) south–southeast of the SEZ. The mine site has been extensively disturbed by past mining and exploration. The proposed mining operation would be complete within 3 years, and reclamation would require an additional month. The ore would be hauled to a mill site at the Rio del Monte Mine, located 16 mi (28 km) east of the SEZ on private property near Salome, Arizona. The total project area would be 12.25 acres (0.05 km^2), of which only 0.80 acres (0.003 km^2) would be new disturbance. Approximately 15 jobs would be created (BLM 2011e).

8.1.22.3 General Trends

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

8.1.22.4 Cumulative Impacts on Resources

Total disturbance over 20 years in the proposed Brenda SEZ would be about 2,678 acres (10.8 km^2), or 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 from development in the Brenda SEZ may include impacts on water quantity and quality, air quality, ecological resources such as habitat and species, cultural and visual resources, and specially designated lands.

One reasonably foreseeable project on BLM-administered land will require additional case processing and environmental review prior to authorization to consider a request to change technology from CSP to PV—the Blythe Solar Millenium Project. The change in technology for this project is expected to result in lower water use. One additional major action within 50 mi (80 km) of the SEZ has been identified that was not known at the time of the Draft Solar PEIS, the Fancher Project. Luxicor Gold, LP, proposes to extract 60,000 tons (54,000 metric tons) of gold ore from an underground mine at a site 26 mi (42 km) south–southeast of the SEZ.

TABLE 8.1.22.2-2 Other Major Actions near the Proposed Brenda SEZ as Revised[a]

Description	Status	Resources Affected	Primary Impact Location
Algae Biomass Project	Private enterprise expected to begin operation in 2010; **project on hold[b]**	Land use, terrestrial habitat, visual	Near Vicksburg, about 6 mi[c] east of the SEZ
Bouse-Kofa 161-kV Transmission Line	Operating	Terrestrial habitat, wildlife, vegetation, visual	Corridor runs parallel to U.S. 95 in Quartzsite, Arizona, about 18 mi west of the SEZ
Fancher Project	**EA, September 2011**	**Terrestrial habitat, wildlife, air quality, noise/vibration, cultural, visual**	**Mine site 26 mi south–southeast of the SEZ; mill site 16 mi east of the SEZ**
Impact Area Expansion Yuma Proving Ground	EA, March 2010	Terrestrial habitat, wildlife	Boundary about 30 mi south–southwest of the SEZ
Limiting Mountain Lion Predation on Desert Bighorn Sheep on the Kofa NWR	EA, December 2009	Wildlife	Boundary 10 mi south of the SEZ
Palo Verde–Devers 500-kV Transmission Line	Operating	Terrestrial habitat, wildlife, vegetation, visual	Corridor passes 20 mi south of the SEZ
Parker Dam and Power Plant	Operating since 1942	Aquatic biota	40 mi northwest of the SEZ
Reopening of the Copperstone Mine	EA, May 2010; **FONSI October 20, 2010[d]**	Groundwater, terrestrial habitat, wildlife, air quality, noise/vibration, cultural, visual	9.5 mi north of Quartzite and 18 mi northwest of the SEZ
Wild Burro Reduction Cibola-Trigo HMA	EA, July 2010; **FONSI July 13, 2010[e]**	Terrestrial habitat, wildlife	About 20 mi west of the SEZ

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

[b] See Schwartz (2011) for details.

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

[d] See BLM (2010b) for details.

[e] See BLM (2010c) for details.

In total, reasonably foreseeable solar projects (i.e., the Blythe Solar Millenium Project and the Quartzsite Project) near the proposed Brenda SEZ would have a combined capacity of 1,100 MW and encompass approximately 8,525 acres (34.5 km^2). No new solar projects have advanced to consideration as reasonably foreseeable since publication of the Draft Solar PEIS,

Overall, the incremental cumulative impacts associated with development in the proposed Brenda SEZ during construction, operation, and decommissioning are expected to be the same as or less than those discussed in the Draft Solar PEIS. This is because the proposed Bullard Wash SEZ (one of three SEZs in Arizona proposed in the Draft) has been eliminated from consideration, and also because the technology for one of the reasonably foreseeable projects (the Blythe Solar Millenium Project) has been changed from CSP to PV, thus decreasing the projected water use impacts.

8.1.23 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 Brenda 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 8.1.2 through 8.1.22, this section is not an update of previous analysis for the Brenda 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 Brenda SEZ is estimated to have the potential to generate 536 MW of marketable solar power at full build-out.

8.1.23.1 Identification and Characterization of Load Areas

The primary candidates for Brenda SEZ load areas are the major surrounding cities. Figure 8.1.23.1-1 shows the possible load areas for the Brenda SEZ and the estimated portion of their market that could be served by solar generation. Possible load areas for the Brenda SEZ include Phoenix, Arizona; the major cities of San Bernardino and Riverside Counties, California; Las Vegas, Nevada; and San Diego, California, via two different routes (one through Yuma, Arizona, and El Centro, California, and the other through Riverside County, California).

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

1. Phoenix, Arizona, and

2. Major cities of San Bernardino and Riverside Counties, California.

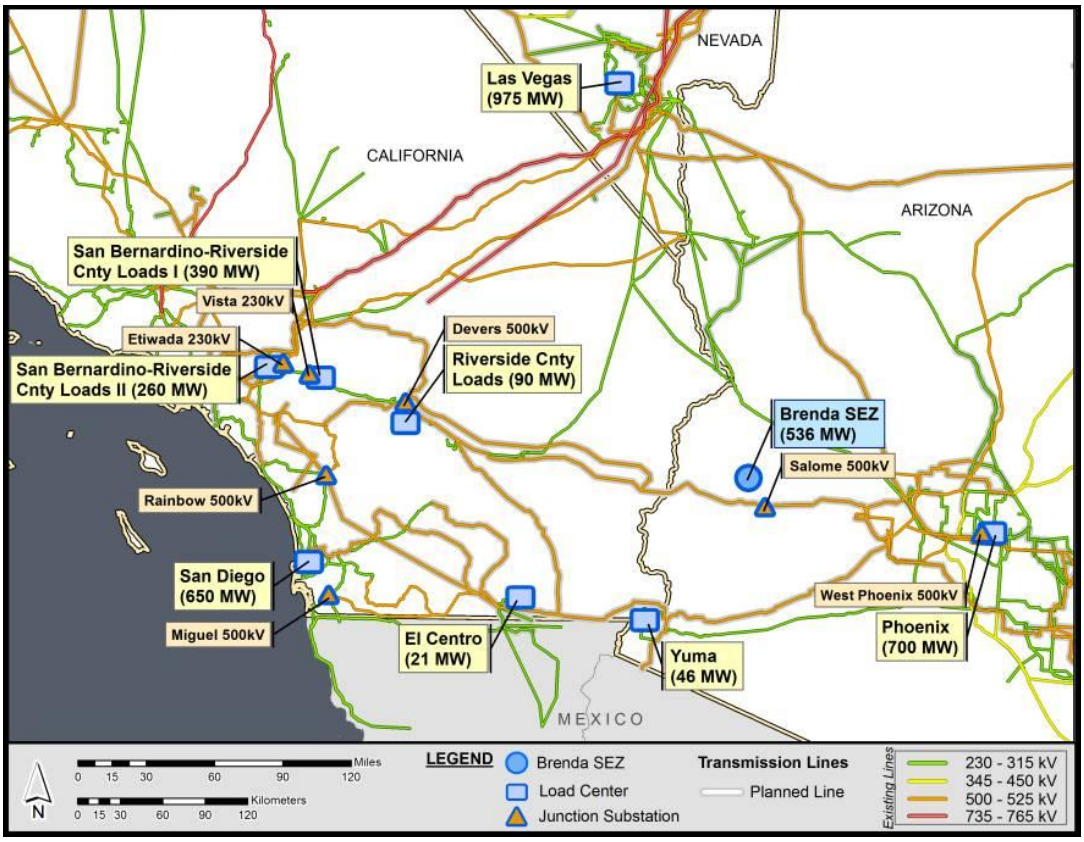

FIGURE 8.1.23.1-1 Location of the Proposed Brenda SEZ and Possible Load Areas (Source for background map: Platts 2011)

Figure 8.1.23.1-2 shows the most economically viable transmission scheme for the Brenda SEZ (transmission scheme 1), and Figure 8.1.23.1-3 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 536 MW could be fully allocated.

Table 8.1.23.1-1 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.

8.1.23.2 Findings for the DLT Analysis

The DLT analysis approach assumes that the Brenda SEZ will require all new construction for transmission lines (i.e., dedicated lines) and substations. The new transmission lines(s) would directly convey the 536-MW output of the Brenda 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

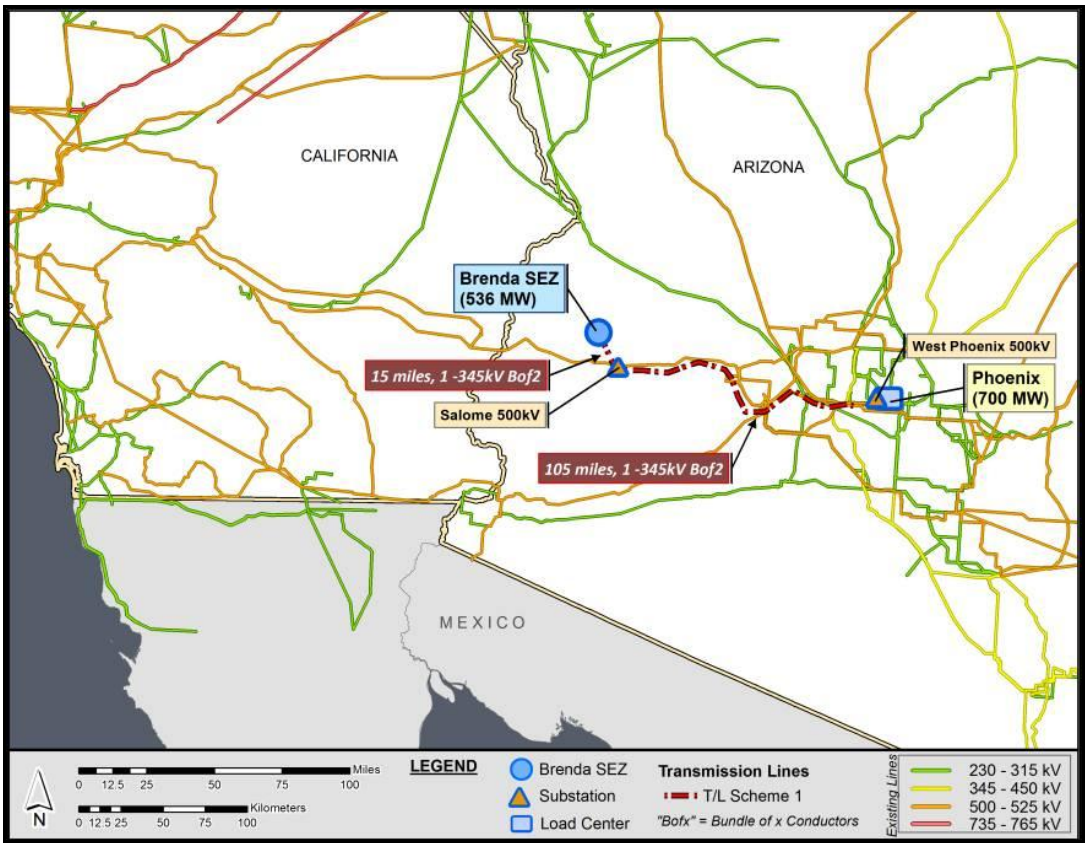

FIGURE 8.1.23.1-2 Transmission Scheme 1 for the Proposed Brenda SEZ (Source for background map: Platts 2011)

and have little or no available capacity to accommodate the SEZ's output throughout the entire 10-year study horizon.

Figures 8.1.23.1-2 and 8.1.23.1-3 display the pathways that new dedicated lines might follow to distribute solar power generated at the Brenda SEZ via the two identified transmission schemes described in Table 8.1.23.1-1. These pathways parallel existing 500-, 345-, 230-kV, and/or lower voltage lines. The intent of following existing lines is to avoid pathways that may be infeasible due to topographical limitations or other concerns.

For transmission scheme 1, serving Phoenix, with a potential solar market capacity of 700 MW, a new line would be constructed following two segments. The first segment would extend about 15 mi (24 km) from the SEZ to the Salome Substation, and the second segment would extend about 105 mi (167 km) from the Salome Substation to Phoenix. The transmission configuration options for each segment were determined by using the line "loadability" curve 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.

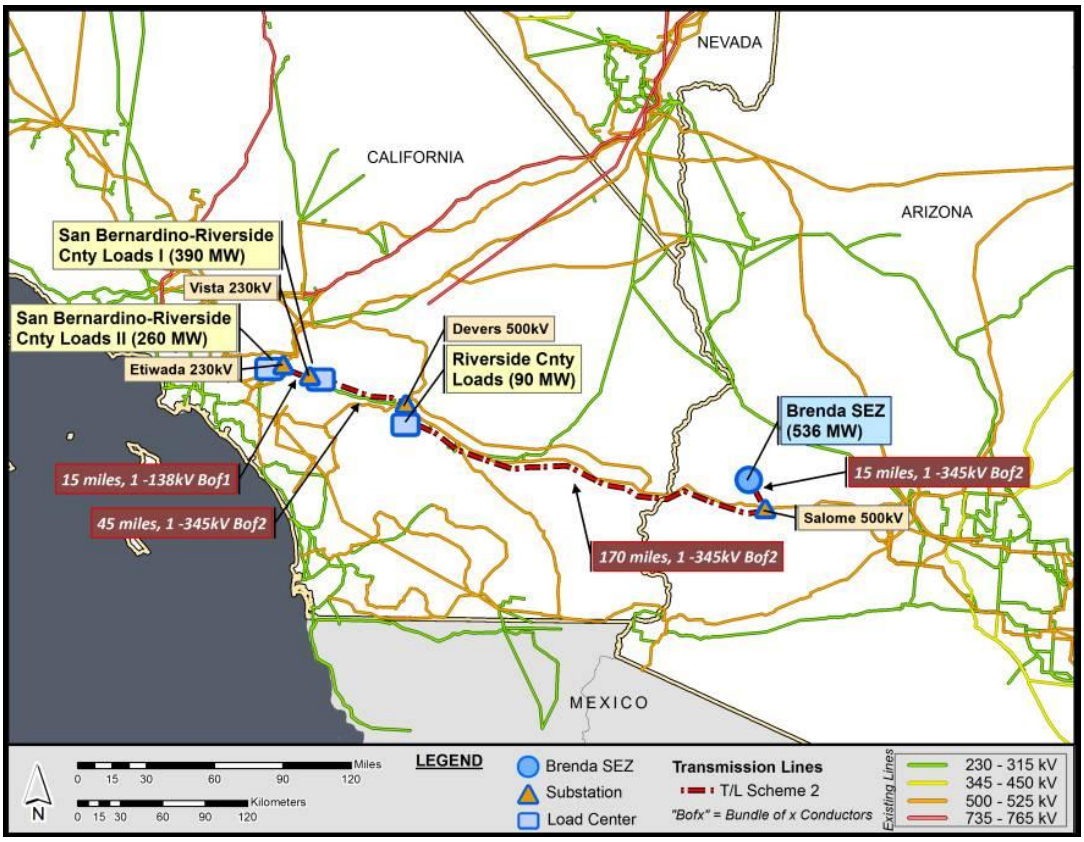

FIGURE 8.1.23.1-3 Transmission Scheme 2 for the Proposed Brenda SEZ (Source for background map: Platts 2011)

For transmission scheme 2, the target load centers are the major cities within Riverside and San Bernardino Counties, California. This scheme has four segments. The first segment, from the SEZ to the Salome Substation, is 15 mi (24 km) long; the second segment, from the Salome Substation to the Devers Substation, is about 170 mi (274 km) long; the third segment, from the Devers Substation to the Vista Substation, is about 45 mi (72 km) long; and the last leg, from the Vista Substation to the Etiwanda Substation, is about 15 mi (24 km) long. The design of the transmission lines takes into account the thermal, voltage drop, and stability limits associated with the operation of the various line segments.

Table 8.1.23.2-1 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 will consist of one or more step-down transformers, while the originating substation at the SEZ would consist of several step-up transformers. For schemes that require the branching of the lines, a switching substation is assumed to be constructed at the appropriate junction. In general, switching stations carry no local load but are assumed to be equipped with switching gears (e.g., circuit breakers and connecting switches) to reroute power as well as, in some cases, with

TABLE 8.1.23.1-1 Candidate Load Area Characteristics for the Proposed Brenda 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	Phoenix, Arizona[a]	East	1,400,000	3,614	700
2	Riverside County load, California[b]	West	180,000	429	90
	San Bernardino–Riverside County load I, California[c]	West	780,000	1,967	390
	San Bernardino–Riverside County load II, California[d]	West	520,000	1,312	260

[a] The load area represents the city named.

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

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

additional equipment to regulate voltage. The originating substation would have a combined substation rating of at least 536 MW (to match the SEZ's output), while the combined load substations would have a similar total rating of 536 MW.

Table 8.1.23.2-2 provides estimates 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 Phoenix market and for which the construction of new transmission lines and substations is estimated to disturb about 2,558 acres (10.4 km^2) of land. The less favorable transmission scheme with respect to minimizing the costs and area disturbed would be scheme 2 (serving Riverside and San Bernardino Counties). For scheme 2, the construction of new transmission lines and substations is estimated to disturb a land area in the order of 5,037 acres (20.4 km^2).

Table 8.1.23.2-3 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 focuses on serving Phoenix. The secondary case (transmission scheme 2),

TABLE 8.1.23.2-1 Potential Transmission Schemes, Estimated Solar Markets, and Distances to Load Areas for the Proposed Brenda 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	Salome, Arizona[a]	0	700	15	120	345	3
	Phoenix, Arizona[a]	700		105			
2	Salome, Arizona[a]	0	740	15	245	345, 138	5
	Riverside County load, California[b]	90		170			
	San Bernardino–Riverside County load I, California[c]	390		45			
	San Bernardino–Riverside County load II, California[d]	260		15			

[a] The load area represents the city named.

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

[e] From Table 8.1.23.1-1.

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

which excludes one or more of the primary pathways used in scheme 1, is the less economically attractive option and focuses on delivering power to major cities in Riverside and Bernardino Counties, California. Note that both schemes exhibit positive NPV under the current assumption of a 20% utilization factor.

Table 8.1.23.2-4 shows the effect of varying the value of the utilization factor on the NPV of the transmission schemes. The table shows that at about 20% utilization, 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.

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

- Transmission scheme 1, which identifies Phoenix as the primary market, represents the most favorable option based on NPV and land use requirements. This scheme would result in new land disturbance of about 2,558 acres (10.4 km^2).

TABLE 8.1.23.2-2 Comparison of the Various Transmission Line Configurations with Respect to Land Use Requirements for the Proposed Brenda SEZ

Transmission Scheme	City/Load Area Name	Total Distance (mi)[e]	No. of Substations	Land Use (acres)[f]		
				Transmission Line	Substation	Total
1	Salome, Arizona[a] Phoenix, Arizona[a]	120	3	2,545	13	2,558
2	Salome, Arizona[a] Riverside County load, California[b] San Bernardino–Riverside County load I California[c] San Bernardino-Riverside County load II, California[d]	245	5	5,024	13	5,037

[a] The load area represents the city named.

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

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

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

- Transmission scheme 2 represents an alternative configuration if Phoenix is excluded and serves the major cities in San Bernardino and Riverside Counties. This configuration would result in new land disturbance of about 5,037 acres (20.4 km^2).

- Other load area configurations are possible but would be less favorable than scheme 1 in terms of NPV and, in most cases, also in terms of land use requirements. If new electricity generation at the proposed Brenda 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 Brenda SEZ indicates no reduction of impacts from increasing the solar-eligible load assumption for transmission scheme 1, which brings power to Phoenix. 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

TABLE 8.1.23.2-3 Comparison of Potential Transmission Lines with Respect to NPV (Base Case) for the Proposed Brenda 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	Salome, Arizona[a] Phoenix, Arizona[a]	264.0	35.4	93.9	725.1	425.8
2	Salome, Arizona[a] Riverside County load, California[b] San Bernardino–Riverside County load I, California[c] San Bernardino–Riverside County load II, California[d]	515.2	35.4	93.9	725.1	174.6

[a] The load area represents the city named.

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

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, increasing the 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.

8.1.24 Impacts of the Withdrawal

The BLM is proposing to withdraw 3,878 acres (15.7 km^2) of public land comprising the proposed Brenda 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

TABLE 8.1.23.2-4 Effect of Varying the Utilization Factor on the NPV of the Transmission Schemes for the Proposed Brenda SEZ

Transmission Scheme	City/Load Area Name	NPV ($ million) at Different Utilization Factors					
		20%	30%	40%	50%	60%	70%
1	Salome, Arizona[a] Phoenix, Arizona[a]	425.8	788.3	1,150.9	1,513.4	1,876.0	2,238.6
2	Salome, Arizona[a] Riverside County load, California[b] San Bernardino–Riverside County load I, California[c] San Bernardino–Riverside County load II, California[d]	174.6	537.1	899.7	1,262.3	1,624.8	1,987.4

[a] The load area represents the city named.

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

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 Brenda SEZ, the impacts of the proposed withdrawal on mineral resources and related economic activity and employment are expected to be negligible because the mineral potential of the lands within the SEZ is low (BLM 2012). There has been no documented mining with 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 Brenda 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).

8.1.25 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.

ADWR (Arizona Department of Water Resources), 2011, "Ranegras Plain Basin," Section 7.7 of *Arizona Water Atlas, Volume 7: Lower Colorado River Planning Area Water Atlas*. Available at http://www.azwater.gov/AzDWR/StatewidePlanning/WaterAtlas/LowerColoradoRiver/default.htm. Accessed April 9, 2012.

AEP (American Electric Power), 2010, *Transmission Facts*. Available at http://www.aep.com/about/transmission/docs/transmission-facts.pdf. Accessed July 2010.

Anderson, T.W., and G.W. Freethey, 1995, *Simulation of Ground-Water Flow in Alluvial Basins in South-Central Arizona and Parts of Adjacent States*, U.S. Geological Survey Professional Paper 1406-D.

Barber, J.R., et al., 2010, "The Costs of Chronic Noise Exposure for Terrestrial Organisms," *Trends in Ecology and Evolution* 25(3):180–189.

Barber, J.R., et al., 2011, "Anthropogenic Noise Exposure in Protected Natural Areas: Estimating the Scale of Ecological Consequences," *Landscape Ecology* 26:1281–1295.

BLM (Bureau of Land Management), 2006, *Lake Havasu Field Office Proposed Resource Management Plan and Final Environmental Impact Statement,* Vol. II – Chapters 3, 4, and 5, prepared for U.S. Department of the Interior Bureau of Land Management, Lake Havasu Field Office, Ariz., Sept.

BLM, 2010a, *Solar Energy Interim Rental Policy*, U.S. Department of the Interior. Available at http://www.blm.gov/wo/st/en/info/regulations/Instruction_Memos_and_Bulletins/nationalinstruction/2010/IM_2010-141.html.

BLM, 2010b, *Finding of No Significant Impact, Proposed Reopening of the Copperstone Mine*, Oct. 20. Available at http://www.blm.gov/pgdata/etc/medialib/blm/az/pdfs/nepa/projects/yuma/10.Par.18412.File.dat/CO20-10-0015-EA-DR-FONSI-copperstone.pdf. Accessed Jan. 24, 2010.

BLM, 2010c, *Finding of No Significant Impact for Wild Burro Reduction Cibola–Triga Herd Management Area*, July 13. Available at http://www.blm.gov/pgdata/etc/medialib/blm/az/pdfs/nepa/projects/yuma/10.Par.1887.File.dat/C020-2010-0012-EA_DR_FONSI.pdf. Accessed Jan. 25, 2012.

BLM, 2011a, *Instruction Memorandum 2012-032, Native American Consultation and Section 106 Compliance for the Solar Energy Program Described in Solar Programmatic Environmental Impact Statement*, U.S. Department of the Interior, Bureau of Land Management, Washington, D.C., Dec. 1.

BLM, 2011b, *Quartzsite Solar Energy Project*. Available at http://www.blm.gov/az/st/en/prog/energy/solar/quartzsite_solar_energy/maps.html. Accessed Jan. 22, 2010.

BLM, 2011c, *2012 Renewable Energy Priority Projects*. Last updated Nov. 22, 2011. Available at http://www.blm.gov/wo/st/en/prog/energy/renewable_energy/2012_priority_projects.html. Accessed Feb. 21, 2012.

BLM. 2011d, *Immediate Temporary Suspension of Activities Issued*, Aug. 23. Available at http://www.blm.gov/pgdata/etc/medialib/blm/ca/pdf/palmsprings/blythe_feis0.Par.62829.File.dat/Temporary%20Suspension%20Blythe.pdf. Accessed Jan. 22, 2012.

BLM, 2011e, *Fancher Project Environmental Assessment*, Sept. Available at http://www.blm.gov/pgdata/etc/medialib/blm/az/pdfs/nepa/projects/yuma/10.Par.63709.File.dat/AZ-C020-2010-0017-EA-fancher.pdf. Accessed Jan. 24, 2012.

BLM, 2012, *Assessment of the Mineral Potential of Public Lands Located within Proposed Solar Energy Zones in Arizona*, prepared by Argonne National Laboratory, Argonne, Ill., July. Available at http://solareis.anl.gov/documents/index.cfm.

BLM and DOE (BLM and U.S. Department of Energy), 2010, *Draft Programmatic Environmental Impact Statement for Solar Energy Development in Six Southwestern States*, DES 10-59, DOE/EIS-0403, Dec.

BLM and DOE, 2011, *Supplement to the Draft Programmatic Environmental Impact Statement for Solar Energy Development in Six Southwestern States*, DES 11-49, DOE/EIS-0403D-S, Oct.

CEQ (Council on Environmental Quality), 1997, *Environmental Justice: Guidance under the National Environmental Policy Act*, Executive Office of the President, Dec. Available at http://ceq.hss.doe.gov/nepa/regs/ej/justice.pdf.

EPA (U.S. Environmental Protection Agency), 2009a, *Energy CO_2 Emissions by State.* Last updated June 12, 2009. Available at http://www.epa.gov/climatechange/emissions/state_energyco2inv.html. Accessed June 23, 2008.

EPA, 2009b, *eGRID.* Last updated Oct. 16, 2008. Available at http://www.epa.gov/cleanenergy/energy-resources/egrid/index.html. Accessed Jan. 12, 2009.

EPA, 2011a, *2008 National Emissions Inventory Data*, May 24. Available at http://neibrowser.epa.gov/eis-public-web/home.html. Accessed Jan. 3, 2012.

EPA, 2011b, *National Ambient Air Quality Standards (NAAQS)*. Available at http://www.epa.gov/air/criteria.html. Last updated Nov. 8, 2011. Accessed Nov. 23, 2011.

FERC (Federal Energy Regulatory Commission), 2011, *FERC Form 715: Load Flow Data Set for Western Electricity Coordinating Council,* transmitted by D. Burnham (FERC) to Argonne National Laboratory, July 2011.

Jackson, M., Sr., 2009, "Quechan Indian Tribe's Comments on Programmatic Environmental Impact Statement for Solar Energy Development," letter from Jackson (President, Quechan Indian Tribe, Fort Yuma, Ariz.) to Argonne National Laboratory (Argonne, Ill.), Sept. 3.

Johnson, B.J., 1990, *Depth to Water and Altitude of Water Level, Spring 1988 Change in Water Level, 1975–1988, Hydrographs of the Water Level In Selected Wells, and Chemical Quality of Water, 1984–1989*, D.W.R. Hydrologic Map Series Report No. 18.

Metzger, D.G., 1951, *Geology and Ground-Water Resources of the Northern Part of the Ranegras Plain Area, Yuma County, Arizona*, U.S. Geological Survey, Ground-Water Resources of Arizona No. 23.

NOAA (National Oceanic and Atmospheric Administration), 2012, *National Climatic Data Center (NCDC)*. Available at http://www.ncdc.noaa.gov/oa/ncdc.html. Accessed Jan. 16, 2012.

NRCS (Natural Resources Conservation Service), 2008, *Soil Survey Geographic (SSURGO) Database for La Paz County, Colorado*. Available at http://SoilDataMart.nrcs.usds.gov.

NRCS, 2010, *Custom Soil Resource Report for Kofa Area, Arizona, Parts of La Paz and Yuma Counties (covering the proposed Brenda SEZ), Colorado*, U.S. Department of Agriculture, Washington, D.C.

Platts, 2011, POWERmap, Strategic Desktop Mapping System, The McGraw Hill Companies. Available at http://www.platts.com/Products/powermap.

Schwartz, D., (editor), 2011, "The A.I.M. Interview: Phyco Biosciences' Ben Cloud," *Algae Industry Magazine*.com, Feb. 6. Available at http://www.algaeindustrymagazine.com/a-i-m-interview-ben-cloud-ceo-phyco biosciences/?utm_source=feedburner&utm_medium=email&utm_campaign=Feed%3A+AlgaeIndustryMagazine+%28Algae+Industry+Magazine%29. Accessed Jan. 26, 2012.

Tillman, F.D., et al., 2011, *Water Availability and Use Pilot: Methods Development for a Regional Assessment of Groundwater Availability, Southwest Alluvial Basins, Arizona*, Scientific Investigations Report 2011-5071, U.S. Geological Survey.

U.S. Bureau of the Census, 2010, *American FactFinder*. Available at http://factfinder2.census.gov. Accessed April 6, 2012.

USDA (U.S. Department of Agriculture), 2004, *Understanding Soil Risks and Hazards—Using Soil Survey to Identify Areas with Risks and Hazards to Human Life and Property*, G.B. Muckel (ed.).

USGS (U.S. Geological Survey), 2012a, *National Hydrography Dataset (NHD)*. Available at http://nhd.usgs.gov. Accessed Jan. 16, 2012.

USGS, 2012b, *National Water Information System (NWIS)*. Available at http://waterdata.usgs.gov/nwis. Accessed Jan. 16, 2012.

WRAP (Western Regional Air Partnership), 2009, *Emissions Data Management System (EDMS)*. Available at http://www.wrapedms.org/default.aspx. Accessed June 4, 2009.

Zhou, Y., 2009, "A Critical Review of Groundwater Budget Myth, Safe Yield, and Sustainability," *Journal of Hydrology* (370):207–213.

8.1.26 Errata for the Proposed Brenda SEZ

This section presents corrections to material presented in the Draft Solar PEIS and the Supplement to the Draft Solar PEIS. 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 8.1.26-1 provides corrections to information presented in the Draft Solar PEIS and the Supplement to the Draft.

TABLE 8.1.26-1 Errata for the Proposed Brenda SEZ (Section 8.1 of the Draft Solar PEIS and Section C.1.1 of the Supplement to the Draft Solar PEIS)

Section No.	Page No.	Line No.	Figure No.	Table No.	Correction
8.1.11.2					All uses of the term "neotropical migrants" in the text and tables of this section should be replaced with the term "passerines."
8.1.14.1	8.1-171	25-27			The Draft PEIS incorrectly indicated that a VRI was completed for the areas included within the Brenda SEZ in 2010. According to the Lake Havasu RMP, the VRI was completed in mid-2004.

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