

RECOMMENDED ADDITIONAL DATA COLLECTION AFTON SOLAR ENERGY ZONE

Introduction

The Solar PEIS provides in-depth data collection and environmental analysis for solar energy zones (SEZs). The primary purpose of this rigorous analysis is to provide documentation from which the BLM can tier future project authorizations, thereby limiting the required scope and effort of project-specific NEPA analyses in these priority areas. As part of the Solar Energy Program, the BLM committed to collecting additional SEZ-specific data and conducting additional analysis in order to more effectively facilitate future development in SEZs. In the Supplement to the Draft Solar PEIS (BLM and DOE 2011), the BLM presented an action plan for each SEZ; that action plan, with appropriate updates, was used as the basis for recommended additional data collection for the Afton SEZ presented below. Action plans described useful additional data for individual SEZs and proposed data sources and methods for collecting that additional data. Additional data and analyses for SEZs will be publicly released through the Solar Energy Program Implementation Web Site (<http://blmsolar.anl.gov>) as they become available.

The Afton SEZ has a total area of 29,964 acres (121.2 km²). It is located in Doña Ana County in southern New Mexico. The towns of Las Cruces, Mesilla, Mesquite, University Park, and Vado are all within a 5-mi (8-km) radius of the SEZ. Las Cruces is the largest, with a population of approximately 90,000.

Recommended Additional Data Collection for the Afton SEZ

Minerals

Additional information to inform the Department of the Interior's decision on a proposed 20-year withdrawal of SEZ lands has been provided through six Mineral Reports addressing each SEZ (one report for each state in the study area). The Mineral Report for New Mexico addresses the status of Minerals within the Afton SEZ (BLM 2012).

Water Resources

The Final Solar PEIS provided a planning-level water resources inventory of the Mesilla basin, an assessment of ephemeral stream reaches sensitive to land disturbance, and a simplified one-dimensional groundwater modeling analysis of potential groundwater withdrawal impacts associated with solar development. The following additional data and actions would help further characterize potential impacts on water resources for the Afton SEZ. A more detailed discussion of each of these activities is included in the water resources action plan for the SEZs (Attachment A).

- Identify additional ephemeral stream channels and wetland features for non-development areas through consultation with the New Mexico Water Quality

Afton SEZ Data Needs

Control Commission (Watershed Protection Section), U.S. Environmental Protection Agency, and U.S. Army Corps of Engineers (USACE) with a focus on:

- Tributaries to the Rio Grande (eastern edge of SEZ), and
 - Ephemeral stream channels and wetlands located in the north and western portions of the SEZ (region approximately follows County Road B-006 from southwest to northeast).
- Perform field surveys and hydrologic analyses to support jurisdictional water determinations and floodplain identifications. Tasks include:
 - Surveying select stream channels and alluvial fan features for elevations, high water marks, sediment conditions, and
 - Conducting hydrologic rainfall-runoff-routing analyses to identify 100-year floodplain areas.
 - Coordinate with the USACE (Albuquerque District) regarding jurisdictional water determinations for the SEZ. Water features to be considered include:
 - Tributaries to the Rio Grande (eastern edge of SEZ), and
 - Ephemeral stream channels and wetlands located in the north and western portions of the SEZ (region approximately follows County Road B-006 from southwest to northeast)
 - Monitoring and adaptive management for the SEZ should include the formation of a stakeholder committee to conduct long-term monitoring of water resources. This activity would entail:
 - Identifying key stakeholder agencies,
 - Discussing general features of a monitoring program, and
 - Working with the U.S. Geological Survey (USGS) to develop groundwater monitoring well design and numerical groundwater models. (Groundwater monitoring should coordinate with the current USGS Mesilla Basin Monitoring Program [USGS 2011].)
 - Develop a superposition groundwater model for the Mesilla Basin in order to estimate potential impacts of full build-out groundwater pumping scenarios (according to estimated, technology-specific water requirements). This activity would entail:
 - Assessing the potential for drawdown impacts on the Rio Grande, other groundwater uses, and surface water-groundwater connectivity, and
 - Using the USGS Mesilla Basin groundwater monitoring well program to support model development and calibration.(Note: This work is being conducted as a part of follow-on analyses for the Solar PEIS.)

Ecological Resources

Vegetation and Plant Communities. The following additional data-gathering actions would help further characterize potential impacts on vegetation and plant communities for the Afton SEZ:

- Identify and map the location and areal extent of desert dry wash, playa, wetland, and riparian habitats within the SEZ. Identify and map the location and areal extent of these habitats outside the SEZ that may be affected by hydrologic changes, including groundwater elevations and changes in water, sediment, and contaminant inputs associated with runoff. Such efforts could help determine habitat characteristics, including water source, hydrologic regime, and dominant plant species.
- Identify and map the location and areal extent of cliffs, sand dunes, and sand transport systems within the SEZ.
- Identify and map the location of all yucca, agave, and ocotillo cacti and other succulent plant species.

Wildlife. The following additional data-gathering actions would help further characterize potential impacts on wildlife resources for the SEZ:

- Conduct pre-disturbance surveys within the SEZ to determine the use of the SEZ as a movement/migratory corridor or as important habitat for mule deer.
- Identify and map the location and areal extent of dry lake and floodplain habitat within the SEZ. These areas are important habitat for a number of wildlife species.

Aquatic Biota. Investigations recommended under the water resources action plan would be useful in characterizing and protecting habitat available to aquatic biota. Water may be temporarily present in the intermittent and ephemeral wetlands, pools, and streams located in the Afton SEZ. Therefore, seasonal aquatic invertebrate communities may be present. Wetlands, streams, and pools could be surveyed for aquatic biota.

Special Status Species. The following additional data-gathering actions would be useful in further characterizing and protecting habitat available to special status species:

Conduct pre-disturbance surveys within the SEZ to determine the presence and abundance of those special status species that are (1) federally listed, proposed for listing, or candidates for listing under the Endangered Species Act (ESA); or (2) listed by the State of New Mexico as threatened or endangered; or (3) designated as sensitive by the New Mexico BLM State Office. These species are listed in Table 1. Surveys should focus on areas

TABLE 1 Special Status Species That May Occur on the Afton SEZ^a

Common Name	Scientific Name	Listing Status ^b	Habitat ^c
Plants			
Arizona coralroot	<i>Hexalectris spicata</i> var. <i>arizonica</i>	BLM-S; NM-E	Oak and pinyon-juniper woodland communities in areas of heavy leaf litter. Known to occur in Doña Ana County, New Mexico. About 47,500 acres ^d of potentially suitable habitat occurs in the SEZ region.
Desert night-blooming cereus	<i>Peniocereus greggii</i> var. <i>greggii</i>	BLM-S; NM-E	Sandy to silty gravelly soils in desert grassland communities, gravelly flats, and washes. Nearest recorded occurrence is 6 mi ^e north of the SEZ. About 1,052,000 acres of potentially suitable habitat occurs in the SEZ region.
Grama grass cactus	<i>Sclerocactus papyracanthus</i>	BLM-S	Pinyon-juniper woodlands and desert grasslands on sandy soils at elevations between 4,900 and 7,200 ft. ^f Nearest recorded occurrence is 29 mi northeast of the SEZ. About 1,037,800 acres of potentially suitable habitat occurs in the SEZ region.
Marble Canyon rockcress	<i>Sibara grisea</i>	BLM-S	Rock crevices and the bases of limestone cliffs in chaparral and pinyon-juniper woodland communities at elevations between 4,500 and 6,000 ft. Known to occur in Doña Ana County, New Mexico. About 82,700 acres of potentially suitable habitat occurs in the SEZ region.
New Mexico rock daisy	<i>Perityle staurophylla</i> var. <i>staurophylla</i>	BLM-S	Endemic to south-central New Mexico in crevices of limestone cliffs and boulders at elevations between 4,900 and 7,000 ft. Known to occur in Doña Ana County, New Mexico. About 4,400 acres of potentially suitable habitat occurs in the SEZ region.
Sand prickly-pear cactus^g	<i>Opuntia arenaria</i>	NM-E	Sandy areas, particularly semi-stabilized sand dunes among open Chihuahuan desertscrub, often associated with sparse cover of grasses at elevations between 3,800 and 4,300 ft. Known to occur on the SEZ and in other portions of the affected area. About 913,000 acres of potentially suitable habitat occurs in the SEZ region.
Sandhill goosefoot	<i>Chenopodium cycloides</i>	BLM-S	Open sandy areas, frequently along the edges of sand dunes. Known to occur in Doña Ana County, New Mexico. About 1,009,000 acres of potentially suitable habitat occurs in the SEZ region.
Sneed's pincushion cactus	<i>Escobaria sneedii</i> var. <i>sneedii</i>	ESA-E; NM-E	Limestone cracks of broken terrain on steep slopes and on limestone edges and rocky slopes in mountainous regions at elevations between 4,000 and 6,000 ft. Nearest recorded occurrences are approximately 10 mi southeast of the SEZ. About 4,500 acres of potentially suitable habitat occurs in the SEZ region.
Villard pincushion cactus	<i>Escobaria villardii</i>	BLM-S; NM-E	Franklin and Sacramento Mountains in Otero and Doña Ana Counties, New Mexico, on loamy soils of desert grassland on broad limestone benches at elevations between 4,500 and 6,500 ft. Known to occur in Doña Ana County, New Mexico. About 1,038,000 acres of potentially suitable habitat occurs in the SEZ region.

Afton SEZ Data Needs

Table 1 (Cont.)

Common Name	Scientific Name	Listing Status ^b	Habitat ^c
Invertebrates			
Anthony blister beetle	<i>Lytta mirifica</i>	BLM-S	On flowering plants, often in agricultural areas where the species may be a pest of certain crops. Known to occur in Doña Ana County, New Mexico. About 138,500 acres of potentially suitable habitat occurs in the SEZ region.
Reptiles			
Texas horned lizard	<i>Phrynosoma cornutum</i>	BLM-S	Flat, open, generally dry habitats with little plant cover, except for bunchgrass, cactus, and desertscrub in areas of sandy or gravelly soil. Nearest quad-level occurrence intersects the affected area within 5 mi north of the SEZ. About 3,844,800 acres of potentially suitable habitat occurs in the SEZ region.
Birds			
American peregrine falcon	<i>Falco peregrinus anatum</i>	BLM-S; NM-T	Year-round resident in the SEZ region. Open habitats, including deserts, shrublands, and woodlands that are associated with high, near-vertical cliffs and bluffs above 200 ft. When not breeding, activity is concentrated in areas with ample prey, such as farmlands, marshes, lakes, rivers, and urban areas. Known to occur in Doña Ana County, New Mexico. About 1,997,000 acres of potentially suitable habitat occurs in the SEZ region.
Bald eagle	<i>Haliaeetus leucocephalus</i>	BLM-S; NM-T	Winter resident in the SEZ region. Large bodies of water or free-flowing rivers with abundant fish and waterfowl prey. Wintering areas are associated with open water. May occasionally forage in arid shrubland habitats. Known to occur in Doña Ana County, New Mexico. About 1,277,000 acres of potentially suitable habitat occurs in the SEZ region.
Bell's vireo	<i>Vireo bellii</i>	NM-T	Summer breeding resident in the SEZ region. Dense shrublands or woodlands along lower elevation riparian areas among willows, scrub oak, and mesquite. May potentially nest in any successional stage with dense understory vegetation. Known to occur in Doña Ana County, New Mexico. About 386,000 acres of potentially suitable habitat occurs in the SEZ region.
Ferruginous hawk	<i>Buteo regalis</i>	BLM-S	Winter resident in grasslands, sagebrush and saltbrush habitats, and the periphery of pinyon-juniper woodlands. Known to occur in Doña Ana County, New Mexico. About 131,300 acres of potentially suitable habitat occurs in the SEZ region.
Gray vireo	<i>Vireo vicinior</i>	NM-T	Summer breeding resident in the SEZ region. Semiarid, shrubby habitats, especially mesquite and brushy pinyon-juniper woodlands; also chaparral, desertscrub, thorn scrub, oak-juniper woodland, pinyon-juniper, mesquite, and dry chaparral. Nests in shrubs or trees. Known to occur in Doña Ana County, New Mexico. About 549,500 acres of potentially suitable habitat occurs in the SEZ region.
Northern aplomado falcon	<i>Falco femoralis septentrionalis</i>	ESA-XN; NM-E	Year-round resident in the SEZ region. Open rangeland and savanna, semiarid grasslands with scattered trees, mesquite, and yucca. Nests in old stick nests of other raptors or ravens that are located in trees or shrubs in desert grassland. Nearest occurrences are 9 mi west of the SEZ. About 2,138,000 acres of potentially suitable habitat occurs in the SEZ region.

Afton SEZ Data Needs

Table 1 (Cont.)

Common Name	Scientific Name	Listing Status ^b	Habitat ^c
Birds (Cont.)			
Western burrowing owl	<i>Athene cunicularia</i>	BLM-S	Year-round resident in the SEZ region. Open grasslands and prairies, as well as disturbed sites such as golf courses, cemeteries, and airports throughout the SEZ region. Nests in burrows constructed by mammals (prairie dog, badger, etc.). Known to occur in Doña Ana County, New Mexico. About 3,800,000 acres of potentially suitable habitat occurs in the SEZ region.
Western yellow-billed cuckoo	<i>Coccyzus americanus occidentalis</i>	ESA-C	May occur as a summer resident in the SEZ region. Riparian obligate, usually found in large tracts of cottonwood/willow habitats with dense sub-canopies. Known to occur in Doña Ana County, New Mexico. About 9,300 acres of potentially suitable habitat occurs in the SEZ region.
Mammals			
Desert bighorn sheep	<i>Ovis canadensis mexicana</i>	NM-T	Visually open, steep rocky terrain in mountainous habitats in desert regions. Rarely uses desert lowlands, but may use them as corridors for travel between mountain ranges. Known to occur in Doña Ana County, New Mexico. About 208,500 acres of potentially suitable habitat occurs in the SEZ region.
Fringed myotis	<i>Myotis thysanodes</i>	BLM-S	Wide range of habitats, including lowland riparian, desert shrub, pinyon-juniper, and sagebrush habitats. Roosts in buildings and caves. May be a summer or year-round resident in project area. Nearest quad-level occurrence intersects the affected area about 5 mi north of the SEZ. About 3,040,800 acres of potentially suitable habitat occurs in the SEZ region.
Long-legged myotis	<i>Myotis volans</i>	BLM-S	Primarily in montane coniferous forests; also riparian and desert habitats. Hibernates in caves and mines. Roosts in abandoned buildings, rock crevices, and under the bark of trees. Known to occur in Doña Ana County, New Mexico. About 2,705,000 acres of potentially suitable habitat occurs in the SEZ region.
Townsend's big-eared bat	<i>Corynorhinus townsendii</i>	BLM-S	Near forests and shrubland habitats below 9,000-ft elevation. Roosts and hibernates in caves, mines, and buildings. May be a summer or year-round resident in the project area. Nearest quad-level occurrence intersects the affected area about 5 mi north of the SEZ. About 2,627,600 acres of potentially suitable habitat occurs in the SEZ region.
Western small-footed myotis	<i>Myotis ciliolabrum</i>	BLM-S	Variety of woodlands and riparian habitats at elevations below 9,000 ft. Roosts in caves, buildings, mines, and crevices of cliff faces. May be a summer or year-round resident in the project area. Known to occur in Doña Ana County, New Mexico. About 3,805,400 acres of potentially suitable habitat occurs in the SEZ region.

^a The listings for (1) federally listed, proposed for listing, or candidates for listing under the ESA, and (2) Arizona BLM State Office sensitive species have been updated since the release of the Draft Solar PEIS.

^b BLM-S = listed as a sensitive species by the BLM; ESA-C = candidate for listing under the ESA; ESA-E = listed as endangered under the ESA; NM-E = listed as endangered by the State of New Mexico; NM-T = listed as threatened by the State of New Mexico.

Footnotes continued on next page.

TABLE 1 (Cont.)

- ^c For plant species, potentially suitable habitat was determined by using Southwest Regional Gap Analysis Project (SWReGAP) land cover types (USGS 2005). For terrestrial vertebrate species, potentially suitable habitat was determined by using SWReGAP habitat suitability and land cover models. Area of potentially suitable habitat for each species is presented for the SEZ region, which is defined as the area within 50 mi (80 km) of the SEZ center.
- ^d To convert acres to km², multiply by 0.004047.
- ^e To convert mi to km, multiply by 1.609.
- ^f To convert ft to m, multiply by 0.3048.
- ^g Species in bold text have been recorded or have designated critical habitat in the affected area.

identified as potentially suitable, and the suitability of these habitats to support these special status species should be determined in the field. All field-determined suitable habitats for special status species should be mapped. Target species and survey protocols should be developed in coordination with the U.S. Fish and Wildlife Service (USFWS) and NMDGF.

- The Draft Solar PEIS presents a table of Special Status Species for which potential impacts need to be evaluated prior to development in the Afton SEZ. The list of species presented in Table 12.1.12.1-1 of the Draft Solar PEIS also includes species listed by the State of New Mexico and species ranked by the State of New Mexico as S1 or S2, or species of concern. No additional special status species were identified as potentially present in the SEZ in the Final Solar PEIS. On the basis of the design features presented in the Final Solar PEIS, the potential for impacts on these additional species will also need to be addressed before development could occur in the SEZ.
- Identify and map the location and areal extent of rocky slopes, cliffs, and outcrops within the SEZ. The suitability of these habitats for special status species should be determined. Species potentially associated with these habitats include the Marble Canyon rockcress, New Mexico rock daisy, Sneed's pincushion cactus, American peregrine falcon, fringed myotis, long-legged myotis, Townsend's big-eared bat, and western small-footed myotis.

Identify and map the location and areal extent of desert grassland habitat within the SEZ. The suitability of this habitat for special status species should be determined. Species potentially associated with desert grassland habitat include the desert night-blooming cereus, grama grass cactus, Villard pincushion cactus, and northern aplomado falcon.

- Identify and map the location and areal extent of woodland habitat within the SEZ. The suitability of this habitat for special status species should be determined. Species potentially associated with woodland habitat include the Arizona coralroot grama-grass cactus, Marble Canyon rockcress, American

Afton SEZ Data Needs

- peregrine falcon, Bell's vireo, ferruginous hawk, gray vireo, fringed myotis, and long-legged myotis.
- Identify and map the location and areal extent of riparian habitat within the SEZ. The suitability of this habitat for special status species should be determined. Species potentially associated with riparian habitat include the bald eagle, Bell's vireo, western yellow-billed cuckoo, and long-legged myotis.
 - Identify and map the location and areal extent of sand dune habitat and associated sand transport systems within the SEZ. The suitability of this habitat for special status species should be determined. Species potentially associated with sand dune habitat include the sand prickly-pear cactus and sandhill goosefoot.

Visual Resources

A summary of the Final Solar PEIS visual contrast analysis for the Afton SEZ is provided in Table 2. This table includes only the sensitive visual resource areas (SVRAs) and sensitive viewing locations (SVLs) that would be subject to moderate or strong visual contrast from solar energy development in the Afton SEZ, which are the following:

- Prehistoric Trackways National Monument
- Aden Lava Flow Wilderness Study Area (WSA)
- Organ Mountains WSA
- Organ Needles WSA
- Pena Blanca WSA
- Robledo Mountains WSA
- West Potrillo Mountains/Mount Riley WSA
- Aden Hills Special Recreation Management Area (SRMA)
- Organ/Franklin Mountains SRMA
- Organ/Franklin Mountain Area of Critical Environmental Concern (ACEC)
- Robledo Mountain ACEC
- Kilbourne Hole National Natural Landmark

TABLE 2 Summary of Potential Visual Impacts on SVRAs and SVLs within the 25-mi (40 km) Viewshed of the Afton SEZ^a

Feature Type	Feature Name (Total Acreage/ Linear Distance) ^{b,c}	Feature Area or Linear Distance ^d		
		Visible within 5 mi	Visible Between	
			5 and 15 mi	15 and 25 mi
National Monument	Prehistoric Trackways (5,255 acres)	0 acres (0%)	2,526 acres (48%)	0 acres (0%)
WSAs	Aden Lava Flow (25,978 acres)	6,367 acres (25%)	18,981 acres (73%)	0 acres (0%)
	Organ Mountains (7,186 acres)	0 acres (0%)	0 acres	3,693 acres (51%)
	Organ Needles (5,936 acres)	0 acres (0%)	0 acres	2,258 acres (38%)
	Peña Blanca (4,648 acres)	0 acres (0%)	2,170 acres (47%)	1,290 acres (28%)
	Robledo Mountains (13,049 acres)	0 acres (0%)	1,193 acres (9%)	728 acres (6%)
	West Potrillo Mountains/Mt. Riley (159,323 acres)	0 acres (0%)	35,532 acres (22%)	13,941 acres (9%)
SRMAs	Aden Hills OHV Area (8,053 acres)	7,157 acres (89%)	0 acres	0 acres (0%)
	Organ/Franklin Mountains RMZ (60,823 acres)	0 acres (0%)	22,876 acres (38%)	18,722 acres (31%)
ACECs	Organ/Franklin Mountains (58,512 acres)	0 acres (0%)	20,914 acres (36%)	18,467 acres (32%)
	Robledo Mountains (8,659 acres)	0 acres (0%)	1,098 acres (13%)	352 acres (4%)

Afton SEZ Data Needs

Table 2 (Cont.)				
Feature Type	Feature Name (Total Acreage/ Linear Distance) ^{a,b}	Feature Area or Linear Distance ^c		
		Visible within 5 mi	Visible Between	
			5 and 15 mi	15 and 25 mi
National Natural Landmark	Kilbourne Hole (Acreage Not Available)	0 acres (0%)	Not available	0 acres (0%)

^a As revised for the Final Solar PEIS, assuming a target height of 650 ft (198.1 m).

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

^c To convert mi to km, multiply by 1.609.

^d Percentage of total feature acreage or road length viewable.

^e Source: America's Byways (2012).

^f Source: NPS (2010).

In addition, the following other lands and resource areas would be subject to moderate or strong visual contrasts from solar development:

- I-25
- I-10
- U.S. 70
- Picacho SRMA
- Talavera SRMA
- Tortugas Mountains SRMA

The following steps could be taken to better understand potential impacts on these areas from solar development in the Afton SEZ:

- Identify key observation points (KOPs) within these areas through working with the management agency or other local stakeholders.
- Conduct viewshed analyses from the KOPs to determine how much of the SEZ would be in view from each KOP.

Afton SEZ Data Needs

- As deemed necessary, based on viewshed analysis results, prepare wireframe Google Earth™ visualizations of hypothetical solar facilities in the SEZ depicting the 80% development scenario to better estimate potential impacts.

This additional analysis may help judge potential visual contrast more accurately for most KOP. For KOPs of particularly high sensitivity, a site visit with photography and superimposition of the wireframe models onto the photos might be required or desired.

Paleontological Resources

The BLM Regional Paleontologist may have additional information regarding Potential Fossil Yield Classification (PFYC) identifications in New Mexico; the PFYC is currently identified as Class 4/5 for 99% of the Afton SEZ. As a result of the high potential for impacts on paleontological resources, a paleontological survey should be conducted to determine whether significant paleontological resources are present in the SEZ.

Cultural Resources and Native American Concerns

The following additional data collection efforts would reduce the uncertainty about potential impacts on cultural resources:

- Conduct a Class I literature file search to better understand (1) the site distribution pattern in the vicinity of the SEZ, (2) trail networks through existing ethnographic reports, and (3) overall cultural sensitivity of the landscape.
- Conduct a Class II Stratified Random Sample Survey of the SEZ to obtain a 10% sample (approximately 3,071 acres [12.4 km²]). If the approximately 1,840 acres (7.4 km²) previously surveyed meets current survey standards, then approximately 1,231 acres (5.0 km²) of survey could satisfy a 10% sample. Areas of interest, as determined through a Class I review, should also be identified prior to establishing the survey design and sampling strategy, such as any dune areas in the SEZ. Subsurface testing of any dune areas should be a component of the sampling strategy.
- Prepare a cultural sensitivity map based on results of the Class II survey and Class I review.
- Identify any high potential segments of the El Camino Real de Tierra Adentro National Historic Trail and conduct viewshed analyses from key points along those portions of the trail.
- Conduct a viewshed analysis from Mesilla Plaza, a National Historic Landmark.

Afton SEZ Data Needs

- Identify key points within nearby ACECs (Los Tules, Organ/Franklin Mountains, Robledo Mountain, Doña Ana Mountain, and San Diego Mountain) and Special Management Areas (Butterfield Trail) and conduct viewshed analyses to determine visual impacts on these resource areas designated for cultural values.
- Continue with government-to-government consultation, including follow-up to recent ethnographic studies with Tribes not included in the original studies in Utah and Nevada to determine whether those Tribes have similar concerns. The Afton SEZ falls in the traditional use area of primarily the Chiricahua Apache, but also the Manso and the Piro Pueblo. Descendants of the latter two groups are found among members of the Ysleta del Sur Pueblo and in the Tortuga Community in Las Cruces. Potential topics to be discussed during consultation include Potrillo and Florida Mountains, Salinas Peak, the above-mentioned ACECs, trail systems, mountain springs, habitation sites as places of cultural importance, burial sites, rock art, ceremonial areas, water resources, and plant and animal resources.

References

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.

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

USGS, 2011, *Monitoring Network of the Ground-Water Flow System and Stream-Aquifer Relations in the Mesilla Basin, Doña Ana County, New Mexico and El Paso County, Texas*. Available at: <http://nm.water.usgs.gov/projects/mesilla/>.

ATTACHMENT A: WATER RESOURCES ACTION PLAN

As part of the Solar Energy Program, the BLM committed to collecting additional SEZ-specific data and conducting additional analysis in order to more effectively facilitate future development in SEZs. In the Supplement to the Draft Solar PEIS (BLM and DOE 2011), the BLM presented a water resources action plan applicable for each SEZ; that action plan is presented below with appropriate updates. Additional data and analyses obtained on the basis of recommendations in this water resources action plan will be publicly released through the Solar Energy Program Implementation Web Site (<http://blmsolar.anl.gov>) as they become available.

The main action plan items relating to water resources applicable for all SEZs were discussed in the water resources action plan presented in the Supplement to the Draft Solar PEIS. The following sections explain each action plan item, identify items that were completed as part of the Final Solar PEIS, and provide some additional consideration for consultation with other federal, state, and local agencies and feasible timelines for the additional work.

1 Planning-Level Inventory of Water Resources

The Draft Solar PEIS summarized surface water and groundwater resources for individual SEZs at the programmatic level, but a more in depth or planning-level inventory was needed to provide a common resource for developers of individual SEZs. The following planning-level inventory data was provided in the Final Solar PEIS for all of the SEZs (sources in parentheses):

- Maps of basin valley and surrounding mountain ranges
 - All canals and perennial, intermittent, ephemeral streams (U.S. Geological Survey [USGS] National Hydrography Dataset [NHD])
 - HUC8 (8-digit, 4th-level hydrologic unit code) watersheds (USGS NHD)
 - Groundwater wells (USGS National Water Information System [NWIS] and Water Science Centers, National Resources Conservation Service [NRCS])
 - Springs (USGS NWIS)
 - Groundwater basin(s) (state water agency)
 - Wetlands (USFWS National Wetlands Inventory [NWI] or state agency)
 - Playas and dry lakes (USGS NHD or state agency)
 - Meteorological station locations (USGS NWIS, Western Regional Climate Center [WRCC], state agency climate stations, e.g., California Irrigation Management Information System [CIMIS] in California)
- Tabular information
 - Canals and perennial and intermittent streams (USGS NHD)
 - Total length of ephemeral stream channels (USGS NHD)
 - Total length of stream channels by stream order (USGS NHD)
 - Annual, seasonal, peak discharge values (USGS NWIS and Water Science Centers)
 - HUC8 watershed areas (USGS NHD)

Afton SEZ Data Needs

- Groundwater basins—area, generic properties (state water agency, PEIS, USGS NWIS and Water Science Centers, NRCS)
- Wetlands—areas, types (USFWS NWI or state agency)
- Springs—names, elevations, flows (USGS NWIS or state agency)
- Climate—precipitation, snowfall, evapotranspiration (USGS NWIS, WRCC, state agencies)

The following planning-level inventory data were not provided in the Final Solar PEIS, but would be useful to assemble prior to solar development in any SEZ:

- Google Earth™/geographic information system (GIS) data files, providing links to datasets (USGS NWIS)
 - Stream gages—flows and water quality
 - Groundwater wells—depth to groundwater and water quality
 - Meteorological stations—temperatures, precipitation, snowfall, etc.

2 Floodplain Determinations

In May 27, 1977, the President signed Executive Order 11988 “Floodplain Management,” which states that federal agencies should avoid surface disturbance activities within identified 100-year floodplains (*Federal Register*, Volume 42, page 117, May 27, 1977). Only a few SEZs (Afton, Dry Lake, Imperial East, and Gillespie) have prior floodplain analyses available to map exclusion floodplain areas. Identifying 100-year floodplain areas must be performed in order to define non-development areas within SEZs. Given the episodic and sometimes catastrophic nature of rainfall-runoff events in the desert southwest, floodplain analyses could extend beyond the 100-year floodplain to regions susceptible to extreme flooding events (e.g. alluvial fans, high gradient areas).

Except for the SEZs listed above, floodplain determinations had not been completed at the time of publication of the Final Solar PEIS and are still needed. Floodplain determinations require field surveys, consultations with the Federal Emergency Management Agency (FEMA) and state/local flood control agencies, and hydrologic analyses. The primary steps to identifying floodplain areas include the following:

- Identifying of main surface drainage pathways within and adjacent to SEZs
- Consulting with FEMA and state/local flood control agencies regarding floodplain mapping protocols
- Conducting field surveys
 - Channel geometries
 - High-water-mark indicator maps
 - Ground-truthing NHD channel networks
- Performing hydrologic analyses
 - Analysis of flood frequency
 - Hydraulic modeling of runoff routing

- Determination of inundation areas
- Obtaining approvals (BLM-coordinated)
 - FEMA/agency for floodplains

3 Jurisdictional Waters Determinations

Section 404 of the Clean Water Act (CWA) requires a permitting process for dredging and filling activities affecting “jurisdictional waters” of the United States. The U.S. Army Corps of Engineers (USACE) and EPA oversee the permitting process and make determinations on what constitutes jurisdictional water on a case-by-case basis. Jurisdictional water determinations can be made by using a variety of techniques, including topographic maps and aerial photographs, field surveys, and hydrologic analyses. The appropriate method for jurisdictional water determinations must be coordinated with the appropriate offices of the USACE and EPA. If field surveys are required, coordination with field surveys for floodplain determinations should be made. Jurisdictional water determinations for the SEZs had not been completed at the time of publication of the Final Solar PEIS and are still needed. Jurisdictional water determinations will not define non-development areas within SEZs but will determine where CWA Section 404 permitting will be required.

4 Significant Ephemeral Waters Determinations

In addition to floodplains and jurisdictional waters, several commenters and cooperators on the Draft Solar PEIS had concerns regarding the loss of ephemeral stream networks because of their importance to hydrology, geomorphology, and habitat. The Draft Solar PEIS identified significant washes to be excluded from development that showed physical evidence of conveying substantial flood flows (these areas will likely overlap with 100-year floodplain mapping). The Final Solar PEIS identified sensitive stream reaches for each SEZ on the basis of available geospatial datasets and professional judgment. Further analyses should be performed to identify dense ephemeral stream networks that overlap with critical habitat, provide significant groundwater connectivity, or constitute critical geomorphic features necessary for maintaining connected features (e.g., dunes, eolian transport corridors, and active alluvial fans). These additional analyses should use high-resolution imagery to identify stream reaches not accounted for in FPEIS analysis, as well as include consultation with local BLM offices, cooperating federal agencies, and state agencies regarding critical ephemeral stream networks for habitat, hydrologic, and geomorphic value.

5 Monitoring and Adaptive Management Programs

Careful siting and planning of solar facilities can reduce adverse impacts on surface water and groundwater resources, but there are many unknowns regarding both surface water and groundwater processes. Establishing a robust monitoring program and analysis tools for SEZs would gain important information on whether surface water or groundwater resources are being affected by solar facilities. Monitoring programs would need to incorporate stakeholder involvement including appropriate federal/state/local agencies (e.g., local BLM offices, USGS Water Science Centers, USFWS, National Park Service [NPS], state water resources agencies)

that conduct water resources monitoring. The Final Solar PEIS recommended a process and methods and tools for developing SEZ monitoring programs for water resources. The process should include identifying a stakeholder monitoring committee including agencies involved with water rights and resources. The committee should oversee the development and implementation of a monitoring program. The basic components of surface water and groundwater monitoring programs should include recommended monitoring parameters, measuring frequency, a plan for stakeholder involvement. The monitoring program could also include new or modified design features for the SEZ, such as a requirement to have water flow meters on groundwater pumps to accurately measure extractions (to be used in groundwater models and analyses to support long, term monitoring programs).

6 Groundwater Analyses

Utility-scale solar energy facilities have the potential to affect groundwater. For the Final Solar PEIS, an analysis of potential groundwater impacts for each SEZ was done quantitatively using a simple one-dimensional groundwater modeling approach (BLM and DOE 2012, Appendix O) and qualitatively by summarizing available information relative to groundwater processes and comparing that information to estimates of potential groundwater extractions for the four main solar energy technologies evaluated. The level of groundwater analysis needed for each SEZ will vary depending on the proposed level of water use (e.g., less detailed analyses may be needed for photovoltaic [PV] facilities than for higher water use facilities such as parabolic trough).

Seven SEZs were identified in the Final PEIS that would benefit from a more quantitative analysis: Afton, Amargosa Valley, Brenda, Dry Lake, Dry Lake Valley North, Imperial East, and Riverside East. At these seven SEZs, numerical groundwater models are being used to better address two major concerns: potential drawdown impacts on surface water features (e.g., loss of springs, change in river discharge) and drawdown impacts on other groundwater users and groundwater processes. Where there are existing groundwater models, the following will be added:

- Groundwater model refinements for SEZ analysis, and
- Analyses of full build-out pumping scenarios.

Where there are not existing groundwater models, the following will be provided:

- Simplified, superposition-based, groundwater modeling; and
- Analyses of full build-out pumping scenarios.

The groundwater models and reports for these SEZ will be released through the SEZ pages of the Solar Energy Program Implementation Web Site (<http://blmsolar.anl.gov/sez>) as they become available.