

**RECOMMENDED ADDITIONAL DATA COLLECTION  
GILLESPIE 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 Gillespie 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 Gillespie SEZ has a total area of 2,618 acres (11 km<sup>2</sup>). It is located in Maricopa County in west-central Arizona. The towns of Arlington and Buckeye are about 7 mi (11 km) and 17 mi (27 km) northeast of the SEZ, respectively.

**Recommended Additional Data Collection for the Gillespie SEZ**

**Military and Civilian Aviation**

The BLM should continue to consult with the U.S. Department of Defense regarding potential issues with military training routes.

**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 Arizona addresses the status of minerals within the Gillespie SEZ (BLM 2012).

**Water Resources**

The Final Solar PEIS provided a planning-level water resources inventory of the Lower Hassayampa 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

1 water resources for the Gillespie SEZ. A more detailed discussion of each of these  
2 activities is included in the water resources action plan for the SEZs (Attachment A).

- 3
- 4 • Identify additional ephemeral stream channels and alluvial fan features  
5 for non-development areas through consultation BLM Arizona, Arizona  
6 Game and Fish Department (AZGFD), Arizona Department of Water  
7 Resources (ADWR), U.S. Environmental Protection Agency, and U.S. Army  
8 Corps of Engineers (USACE) with a focus on:
  - 9 – The unnamed wash tributaries to Centennial Wash.
- 10
- 11 • Perform field surveys and hydrologic analyses to support jurisdictional water  
12 determinations and floodplain identifications. Tasks include:
  - 13 – Surveying unnamed wash tributaries of Centennial Wash for surface  
14 elevations, high water marks, and sediment conditions; and
  - 15 – Conducting hydrologic rainfall-runoff-routing analyses to identify  
16 100-year floodplain areas.
- 17
- 18 • Coordinate with the USACE (Los Angeles District) regarding jurisdictional  
19 water determinations for the SEZ. Water features that need to be considered  
20 include:
  - 21 – The unnamed wash tributaries to Centennial Wash.
- 22
- 23 • Identify 100-year floodplain non-development areas (if they exist) for  
24 unnamed wash tributaries to Centennial Wash. This task would require  
25 coordination with the Federal Emergency Management Agency (FEMA)  
26 and the following agencies:
  - 27 – AZDWR (Flood Mitigation Section), and
  - 28 – The Flood Control District of Maricopa County.
- 29
- 30 • Monitoring and adaptive management for the SEZ should include the  
31 formation of a stakeholder committee to conduct long-term monitoring of  
32 water resources. This activity would entail:
  - 33 – Identifying key stakeholder agencies,
  - 34 – Discussing general features of a monitoring program, and
  - 35 – Working with the U.S. Geological Survey to develop groundwater  
36 monitoring well design and numerical groundwater models.
- 37

### 38 **Ecological Resources**

39  
40 *Vegetation and Plant Communities.* The following additional data-gathering actions  
41 would help further characterize potential impacts on vegetation and plant communities for the  
42 Gillespie SEZ:

- 43
- 44 • Identify and map the location and areal extent of desert dry wash, dry wash  
45 woodland, and wetland habitats within the SEZ. Identify and map the location  
46 and areal extent of these habitats, as well as mesquite bosque and riparian

1 habitats, outside the SEZ that may be affected by hydrologic changes,  
2 including groundwater elevations, and changes in water, sediment, and  
3 contaminant inputs associated with runoff. Such effort could help determine  
4 habitat characteristics, including water source, hydrologic regime, and  
5 dominant plant species.  
6

- 7 • Identify and map the location and areal extent of saguaro cactus communities  
8 within the SEZ. Identify and map the locations of all cacti occurring on the  
9 SEZ, including saguaro, pencil cholla, barrel cactus, and others.

10  
11 ***Aquatic Biota.*** Investigations recommended under the water resources action plan would  
12 be useful in characterizing and protecting habitat available to aquatic biota. Most washes and  
13 wetlands in the SEZ are typically dry and contain water only for brief periods following  
14 precipitation. These features may or may not contain aquatic biota; therefore, preliminary  
15 evaluations of these surface water features could be conducted to determine the potential for  
16 aquatic communities to be present.  
17

18 ***Special Status Species.*** The following additional data-gathering actions would be useful  
19 in further characterizing and protecting habitat available to special status species:  
20

- 21 • Conduct pre-disturbance surveys within the SEZ to determine the presence  
22 and abundance of those special status species that are (1) federally listed,  
23 proposed for listing, or candidates for listing under the Endangered Species  
24 Act; or (2) designated as sensitive by the Arizona BLM State Office. These  
25 species are listed in Table 1. Surveys should focus on areas identified  
26 as potentially suitable, and the suitability of these habitats to support these  
27 special status species should be determined in the field. All field-determined  
28 suitable habitats for special status species should be mapped. Target species  
29 and survey protocols should be developed in coordination with the U.S. Fish  
30 and Wildlife Service (USFWS) and AZGFD.  
31

32 The Draft Solar PEIS presents a table of special status species for which  
33 potential impacts need to be evaluated prior to development in the Gillespie  
34 SEZ. The list of species presented in Table 8.3.12.1-1 of the Draft Solar PEIS  
35 also includes species listed by the State of Arizona and species ranked by the  
36 State of Arizona as S1 or S2. No additional special status species were  
37 identified as potentially present in the SEZ in the Final Solar PEIS. On the  
38 basis of the design features presented in the Final Solar PEIS, the potential for  
39 impacts on these additional species will also need to be addressed before  
40 development could occur in the SEZ.

Gillespie SEZ Data Needs

1 **TABLE 1 Special Status Species That May Occur on the Gillespie SEZ<sup>a</sup>**

Common Name	Scientific Name	Listing Status <sup>b</sup>	Habitat <sup>c</sup>
<b>Plants</b>			
Hohokam agave	<i>Agave murpheyi</i>	BLM-S	Endemic to Arizona and Sonora, Mexico on benches or alluvial terraces on gentle bajada slopes above major drainages in desert scrub communities. Elevation ranges between 1,300 and 3,200 ft. <sup>d</sup> Nearest recorded quad-level occurrences are approximately 45 mi <sup>e</sup> north of the SEZ. About 50,800 acres <sup>f</sup> of potentially suitable habitat occurs within the SEZ region.
Tumamoc globeberry	<i>Tumamoca macdougalii</i>	BLM-S	Endemic to southern Arizona and northern Mexico in xeric situations, in shady areas of nurse plants along gullies and sandy washes at elevations below 3,000 ft. Nearest quad-level occurrence is approximately 35 mi southeast of the SEZ. About 50,800 acres of potentially suitable habitat occurs within the SEZ region.
<b>Fish</b>			
<b>Roundtail chub<sup>g</sup></b>	<i>Gila robusta</i>	BLM-S	Larger tributaries in the Colorado Basin, from Wyoming south to Arizona and New Mexico; cool to warm water streams and rivers consisting of pools adjacent to riffles and runs and with boulders, tree roots, submerged trees and branches, and undercut cliff walls. Historic quad-level occurrence intersects the affected area from the Gila River, within 5 mi east of the SEZ. The species is currently not known to occur in the affected area. About 300 mi of potentially suitable habitat within the Gila and Hassayampa Rivers occurs within the SEZ region.
<b>Amphibians</b>			
<b>Lowland leopard frog</b>	<i>Lithobates yavapaiensis</i>	BLM-S	Aquatic systems in desert grasslands, pinyon-juniper woodlands, and agricultural areas, including rivers, streams, beaver ponds, springs, earthen cattle tanks, livestock guzzlers, canals, and irrigation sloughs. Quad-level occurrences intersect the affected area. About 246,500 acres of potentially suitable habitat occurs within the SEZ region.
<b>Reptiles</b>			
<b>Desert tortoise (Sonoran population)</b>	<i>Gopherus agassizii</i>	ESA-C; BLM-S	Desert creosotebush communities on firm soils for digging burrows, along riverbanks, washes, canyon bottoms, creosote flats, and desert oases. Quad-level occurrences intersect the affected area. About 3,750,000 acres of potentially suitable habitat occurs within the SEZ region.
Mexican rosy boa	<i>Charina trivirgata trivirgata</i>	BLM-S	Sonoran Desert near rocky hillsides and rock outcroppings. Nearest quad-level occurrence is approximately 20 mi southeast of the SEZ. About 3,800,000 acres of potentially suitable habitat occurs within the SEZ region.
Tucson shovel-nosed snake	<i>Chionactis occipitalis klauberi</i>	ESA-C	Endemic to Arizona from Pima, Pinal, and Maricopa Counties in creosote-mesquite floodplain habitats with soft sandy loam soils and sparse gravel. Nearest quad-level occurrence is approximately 20 mi southeast of the SEZ. About 1,436,500 acres of potentially suitable habitat occurs within the SEZ region.

**TABLE 1 (Cont.)**

Common Name	Scientific Name	Listing Status <sup>b</sup>	Habitat <sup>c</sup>
<b>Birds</b>			
Ferruginous hawk	<i>Buteo regalis</i>	BLM-S	Winter resident in the SEZ region. Grasslands, sagebrush and saltbrush habitats, as well as the periphery of pinyon-juniper woodlands. Nests in tall trees or on rock outcrops along cliff faces. Known to occur in Maricopa County, Arizona. About 395,000 acres of potentially suitable foraging habitat occurs within the SEZ region.
Great egret	<i>Ardea alba</i>	BLM-S	Year-round resident in the lower Colorado River Valley in open water areas such as marshes, estuaries, lagoons, lakes, ponds, rivers and flooded fields. Nearest quad-level occurrence is from Painted Rock Reservoir, approximately 11 mi (18 km) south of the SEZ. About 28,750 acres of potentially suitable habitat occurs within the SEZ region.
Snowy egret	<i>Egretta thula</i>	BLM-S	Year-round resident in the lower Colorado River Valley in open water areas such as marshes, estuaries, lagoons, lakes, ponds, rivers and flooded fields. Nearest quad-level occurrence is from Painted Rock Reservoir, approximately 11 mi (18 km) south of the SEZ. About 675,200 acres of potentially suitable habitat occurs within the SEZ region. The species is expected to occur as a transient only on the SEZ.
<b>Southwestern willow flycatcher</b>	<i>Empidonax traillii extimus</i>	ESA-E	Riparian shrublands and woodlands, thickets, scrubby and brushy areas, open second growth, swamps, and open woodlands. Quad-level occurrences intersect the affected area. About 50,000 acres of potentially suitable habitat occurs within the SEZ region.
Western burrowing owl	<i>Athene cunicularia hypugaea</i>	BLM-S	Open grasslands and prairies, as well as disturbed sites such as golf courses, cemeteries, and airports throughout the SEZ region. Nests in burrows constructed by mammals (prairie dog, badger, etc.). Nearest quad-level occurrence is approximately 14 mi (22 km) east of the SEZ. About 4,376,000 acres of potentially suitable habitat occurs within the SEZ region.
<b>Western yellow-billed cuckoo</b>	<i>Coccyzus americanus</i>	ESA-C	Considered to be a riparian obligate, usually found in large tracts of cottonwood/willow habitats with dense sub-canopies. Quad-level occurrences intersect the affected area. About 50,000 acres of potentially suitable habitat occurs within the SEZ region.
<b>Yuma clapper rail</b>	<i>Rallus longirostris yumanensis</i>	ESA-E	Year-round resident in the SEZ region. Freshwater marshes containing dense stands of cattails. Nests on dry hummocks or in small shrubs among dense cattails or bulrushes along the edges of shallow ponds in freshwater marshes with stable water levels. Quad-level occurrences intersect the affected area. About 50,000 acres of potentially suitable habitat occurs within the SEZ region.

Gillespie SEZ Data Needs

**TABLE 1 (Cont.)**

Common Name	Scientific Name	Listing Status <sup>b</sup>	Habitat <sup>c</sup>
<b>Mammals</b>			
<b>California leaf-nosed bat</b>	<b><i>Macrotus californicus</i></b>	BLM-S	Year-round resident in desert riparian, desert wash, desert scrub, and palm oasis habitats at elevations below 2,000 ft (600 m). Roosts in mines, caves, and buildings. Quad-level occurrences intersect the affected area. About 3,960,000 acres of potentially suitable habitat occurs within the SEZ region.
<b>Mammals (Cont.)</b>			
Western red bat	<i>Lasiurus blossevillii</i>	BLM-S	Year-round resident in SEZ region. Forages in riparian and other wooded areas. Roosts primarily in cottonwood trees along riparian areas. Nearest recorded quad-level occurrence is from the Hassayampa River, approximately 50 mi north of the SEZ. About 17,400 acres of potentially suitable habitat occurs within the SEZ region.
Western yellow bat	<i>Lasiurus xanthinus</i>	BLM-S	Year-round resident in desert riparian, desert wash, and palm oasis habitats at elevations below 2,000 ft. Roosts in trees. Nearest quad-level occurrence is from the vicinity of Phoenix, approximately 40 mi (64 km) northeast of the SEZ. About 4,407,500 acres of potentially suitable habitat occurs within the SEZ region.

- <sup>a</sup> 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.
- <sup>b</sup> 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.
- <sup>c</sup> 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.
- <sup>d</sup> To convert ft to m, multiply by 0.3048.
- <sup>e</sup> To convert mi to km, multiply by 1.609.
- <sup>f</sup> To convert acres to km<sup>2</sup>, multiply by 0.004047.
- <sup>g</sup> Species in bold text have been recorded or have designated critical habitat in the affected area.

- Identify and map the areal extent of wetland and riparian habitats within the SEZ, including habitat characteristics (such as water source, hydrologic regime, and dominant plant species) both within the wetland boundaries and in adjacent non-wetland habitats. Species potentially associated with these habitats include the Hohokam agave, Tumamoc globeberry, lowland leopard frog, snowy egret, southwestern willow flycatcher, western yellow-billed cuckoo, Yuma clapper rail, and western yellow bat.

## Visual Resources

A summary of the Final Solar PEIS visual contrast analysis for the Gillespie 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 Gillespie SEZ, which are the following:

- Signal Mountain Wilderness Area (WA)
- Woolsey Peak WA
- Saddle Mountain Special Recreation Management Area (SRMA)

**TABLE 2 Summary of Potential Visual Impacts on SVRAs and SVLs within the 25-mi (40 km) Viewshed of the Gillespie SEZ<sup>a</sup>**

Feature Type	Feature Name (Total Acreage/ Linear Distance) <sup>b</sup>	Feature Area or Linear Distance <sup>c</sup>		
		Visible within 5 mi	Visible Between	
			0 and 15 mi	0 and 25 mi
WAs	Signal Mountains (13,467 acres)	1,920 acres (14%)	594 acres (4%)	0 acres
	Woolsey Peak (64,465 acres)	5,552 acres (9%)	5,552 acres (9%)	5,552 acres (9%)
SRMA	Saddle Mountain (47,696 acres)	661 acres (1%)	26,562 acres (56%)	14 acres (0.03%)

<sup>a</sup> As revised for the Final PEIS, assuming a target height of 650 ft (198.1 m).

<sup>b</sup> To convert mi to km, multiply by 1.609.

<sup>c</sup> Percentage of total feature acreage or road length viewable.

## Gillespie SEZ Data Needs

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

- Agua Caliente Road
- Salome Highway
- Old U.S. 80
- Community of Arlington.

The following steps could be taken to better understand potential impacts on these areas from solar development in the Gillespie 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.
- 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 KOPs. 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 the Potential Fossil Yield Classification (PFYC) of the SEZ. A preliminary paleontological survey could be conducted to update the temporary assignment of PFYC Class 3b as used in the Draft Solar PEIS.

### **Cultural Resources and Native American Concerns**

A Class II sample survey was conducted by SWCA Environmental Consultants (SWCA 2013) on 138 acres, or approximately 5% of the SEZ. A summary of the results of the survey are available on the Gillespie SEZ page of the BLM Solar Energy Program Implementation Web site (<http://blmsolar.anl.gov/sez/az/gillespie/>). A cultural sensitivity map was also prepared as part of the sample survey effort and is presented with the survey summary.

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

## Gillespie SEZ Data Needs

- Conduct a Class I literature file search to better understand (1) the site distribution pattern in the vicinity of the SEZ; (2) potential trail networks; and (3) overall cultural sensitivity of the landscape.
- 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 Gillespie SEZ falls in the traditional use area of primarily the Maricopa, Akimel O’odham (Pima), and Tohono O’odham (Papago). Potential topics to be discussed during consultation include: water rights, the Gila River corridor, sacred mountains in the area, local Hohokam sites, 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 Arizona*, prepared by Argonne National Laboratory, Argonne, Ill., July. Available at <http://solareis.anl.gov/documents/index.cfm>.

SWCA Environmental Consultants, 2013, *Arizona Solar Energy Zones (SEZs): Class II Cultural Resource Inventories of the Brenda, Gillespie, and Agua Caliente SEZs, La Paz, Maricopa, and Yuma Counties, Arizona*, prepared for the Bureau of Land Management, January.

## 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)

## Gillespie 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.