

## **RECOMMENDED ADDITIONAL DATA COLLECTION BRENDA 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 Brenda SEZ presented below. Action plans described useful additional data for individual SEZs and proposed data sources and methods for collecting that additional data. The BLM will make additional data and analyses for SEZs available through the Solar Implementation Web Page as they become available.

The Brenda SEZ has a total area of 3,348 acres (13.5 km<sup>2</sup>). It is located in La Paz County in west-central Arizona. 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.

### **Recommended Additional Data Collection for the Brenda SEZ**

#### **Recreation**

In the Supplement to the Draft Solar PEIS, a review was recommended on whether the portion of the SEZ on the west side of the county road should be identified as a non-development area to reduce impacts on the Plomosa Special Recreation Management Area (SRMA). Through the Final Solar PEIS and Record of Decision, this area west of the county road was eliminated from the SEZ. No other data collected with regard to recreational impacts was recommended.

#### **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 Brenda SEZ (BLM 2012). According to the Mineral Report, there has been no documented mining with the SEZ, and there are no known locatable mineral

deposits within the land withdrawal area. Also, there are no recorded mining claims within the land withdrawal area.

## **Water Resources**

The Final Solar PEIS provided a planning-level water resources inventory of the Renegras Plain 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 Brenda 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 alluvial fan features for non-development areas through consultation with BLM Arizona, Arizona Game and Fish Department (AZGFD), U.S. Environmental Protection Agency (EPA), and U.S. Army Corps of Engineers (USACE) with a focus on:
  - Alluvial fans and ephemeral wash features surrounding the eastern faces of the Plomosa Mountains and the Bear Hills (potential non-development areas; potentially important ecologically), and
  - Bouse Wash.
- 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 (Los Angeles District) regarding jurisdictional water determinations for the SEZ. Water features to be considered include:
  - Bouse Wash and its tributaries.
- Identify 100-year floodplain non-development areas (if they exist) for Bouse Wash. This task would require coordination with the Federal Emergency Management Agency and the following agencies:
  - Arizona Department of Water Resources (Flood Mitigation Section), and
  - La Paz County.
- 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,
  - Providing recommendations for surface monitoring of ephemeral stream networks, and

## Brenda SEZ Data Needs

- Develop a three-dimensional numerical groundwater model for the Renegras Plain Basin to evaluate the potential impacts of full build-out. This activity would entail:
  - Assessing the potential for drawdown impacts on the basin, which is already in overdraft, including the potential for land subsidence, and
  - Obtaining hydrogeologic information on aquifer properties for adjacent and similar groundwater basins due to the lack of information available for the Renegras Plain basin.(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 Brenda SEZ:

- Identify and map the location and areal extent of desert dry wash, dry wash woodland, and chenopod scrub habitats within the SEZ. Identify and map the location and areal extent of these habitats, as well as mesquite bosque, 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 effort could help determine habitat characteristics, including water source, hydrologic regime, and dominant plant species.
- Identify and map the location and areal extent of saguaro cactus communities within the SEZ.

***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 extent of wash 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. Temporary ponding may occur near Bouse Wash, and seasonal aquatic invertebrate communities may be present. Therefore, Bouse Wash could be surveyed for aquatic invertebrates. Other ephemeral surface water features within the Brenda SEZ may or may not contain aquatic biota; therefore, preliminary evaluations of these surface water features could be conducted to determine the potential for aquatic communities to be present.

***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) designated as sensitive by the Arizona BLM State Office. These species are listed in Table 1. Surveys should focus on areas 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 USFWS and AZGFD.

The Draft Solar PEIS presents a table of Special Status Species for which potential impacts need to be evaluated prior to development in the Brenda SEZ. The list of species presented in Table 8.1.12.1-1 of the Draft Solar PEIS also includes species listed by the State of Arizona and species ranked by the State of Arizona as S1 or S2. 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 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 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. A species potentially associated with these habitats includes the lowland leopard frog.

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

Common Name	Scientific Name	Listing Status <sup>b</sup>	Habitat <sup>c</sup>
<b>Amphibians</b>			
Lowland leopard frog	<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. Nearest recorded quad-level occurrence is approximately 22 mi <sup>d</sup> east of the SEZ. About 189,500 acres <sup>e</sup> of potentially suitable habitat occurs within the SEZ region.
<b>Reptiles</b>			
Desert rosy boa	<i>Charina trivirgata gracia</i>	BLM-S	Scrublands, rocky deserts, and canyons with permanent or intermittent streams. Nearest recorded quad-level occurrence is approximately 7 mi east of the SEZ. About 3,583,000 acres of potentially suitable habitat occurs within the SEZ region.
<b>Desert tortoise (Sonoran population)<sup>f</sup></b>	<b><i>Gopherus agassizii</i></b>	ESA-C; BLM-S	Desert creosotebush communities on firm soils for digging burrows; often along riverbanks, washes, canyon bottoms, creosote flats, and desert oases. Quad-level occurrences for this species intersect the SEZ. About 3,381,000 acres of potentially suitable habitat occurs within the SEZ region.
<b>Birds</b>			
American peregrine falcon	<i>Falco peregrinus anatum</i>	BLM-S	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. <sup>g</sup> When not breeding, activity is concentrated in areas with ample prey, such as farmlands, marshes, lakes, rivers, and urban areas. Nearest recorded quad-level occurrence is from the vicinity of Alamo Lake, approximately 40 mi northeast of the SEZ. About 4,315,000 acres of potentially suitable habitat occurs within the SEZ region.
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 throughout the project area. Populations are known to occur in La Paz County, Arizona. About 216,500 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. Transient in the SEZ affected area. Primarily associated with open water areas such as marshes, estuaries, lagoons, lakes, ponds, rivers and flooded fields. Nearest recorded quad-level occurrence is from the Colorado River, approximately 35 mi west of the SEZ. About 27,700 acres of potentially suitable year-round foraging and nesting habitat occurs within the SEZ region.

## Brenda SEZ Data Needs

TABLE 1 (Cont.)

Common Name	Scientific Name	Listing Status <sup>b</sup>	Habitat <sup>c</sup>
<b>Birds (Cont.)</b>			
Western burrowing owl	<i>Athene cunicularia hypugaea</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 dogs, badgers, etc.). Nearest recorded quad-level occurrence is approximately 50 mi southwest of the SEZ. About 4,124,000 acres of potentially suitable habitat occurs within the SEZ region.
<b>Mammals</b>			
<b>California leaf-nosed bat</b>	<b><i>Macrotus californicus</i></b>	BLM-S	Year-round resident in southern California and southwestern Arizona. May be locally common in some areas. Occurs in desert riparian, desert wash, desert scrub, and palm oasis habitats at elevations below 2,000 ft. Roosts in mines, caves, and buildings. Quad-level occurrences for this species intersect the SEZ. About 3,576,500 acres of potentially suitable habitat occurs within the SEZ region.
Townsend's big-eared bat	<i>Corynorhinus townsendii</i>	BLM-S	Near forests and shrubland habitats below 9,000-ft elevation throughout the SEZ region. The species may use caves, mines, and buildings for day roosting and winter hibernation. May be a summer or year-round resident throughout the SEZ region. Nearest recorded quad-level occurrence is approximately 20 mi south of the SEZ. About 4,434,500 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 recorded quad-level occurrence is approximately 20 mi south of the SEZ. About 4,068,000 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.

<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 mi to km, multiply by 1.609.

<sup>e</sup> To convert acres to km<sup>2</sup>, multiply by 0.004047.

<sup>f</sup> Species in bold text have been recorded or have designated critical habitat in the affected area.

<sup>g</sup> To convert ft to m, multiply by 0.3048.

## Visual Resources

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

- Plomosa SRMA

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

- I-10
- U.S. 60
- Community of Brenda
- Community of Vicksburg

The following steps could be taken to better understand potential impacts on these areas from solar development in the Brenda 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.

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

Feature Type	Feature Name/ Linear Distance (Total Acreage <sup>b</sup> )	Feature Area or Linear Distance <sup>c</sup>		
		Visible Between		
		Visible within 5 mi	5 and 15 mi	15 and 25 mi
SRMA	Plomosa (109,314 acres)	15,931 acres (15%)	34,717 acres (32%)	3,078 acres (3%)

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

<sup>b</sup> To convert acres to km<sup>2</sup>, multiply by 0.004047.

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

<sup>d</sup> 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 the Final Solar PEIS is for the combined SRMA.

### Paleontological Resources

The BLM Regional Paleontologist may have additional information regarding Potential Fossil Yield Classification (PFYC) identifications in Arizona. A preliminary paleontological survey could be conducted to determine the PFYC of the SEZ, in order to update the temporary assignment of PFYC Class 3b used in the Draft Solar PEIS.

### Cultural Resources and Native American Concerns

A Class II sample survey of 164 acres, or roughly 5% of the SEZ, was conducted by SWCA Environmental Consultants (SWCA 2013). A summary of the results of the survey are available on the Brenda SEZ page of the BLM Solar Energy Program Implementation Web site (<http://blmsolar.anl.gov/sez/az/brenda/>). 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:

- 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 through existing ethnographic reports, and (3) overall cultural sensitivity of the landscape. (Prior to the Class II sample survey, SWCA conducted archival research of previous surveys and recorded sites within the Brenda SEZ and a 1-mi radius; the recommended Class I should include a broader area.)



## Brenda SEZ Data Needs

- 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 Brenda SEZ falls in the traditional use area of primarily the Yavapai, Quechan, and Mohave. Potential topics to be discussed during consultation include the Ranegras Plain, Granite Wash Pass, Harquahala Mountains, bighorn sheep, nearby ACECs and Special Cultural Resource Management Areas, 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, *California Solar Energy Zones (SEZs): Class II Cultural Resources Inventory of the Imperial East and Riverside East SEZs, Riverside and Imperial Counties, California*, 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)

## Brenda 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. 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 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.