

APPENDIX B

DESIGN FEATURES AND BEST MANAGEMENT PRACTICES

This section provides an overview of RDEP Design Features and Best Management Practices associated with siting and design, construction, operation and maintenance, and decommissioning of renewable energy projects. Design features are requirements that must be met by the applicant and must be incorporated into project-specific Plans of Development (PODs), Plans of Operations, and ROW grants. In general, the design features are accepted practices that are known to be effective when implemented properly at the project level. However, their applicability and overall effectiveness cannot be fully assessed except at the project-specific level when the project location and design are known.

Table B-1, Design Features, has a suite of design features that would establish the minimum specifications for management of individual renewable energy projects and mitigate adverse impacts. These measures are organized by major resource topics and identify the phase(s) during which each measure would be implemented: S – siting and design; C – construction; O – operation and maintenance; and D – decommissioning and reclamation. Many of the potential design features indicate the need for project-specific plans or studies. The plans are included in **Table B-2**, Required Plans, and the studies are included in **Table B-3**, Required Studies. The content and applicability of these plans and studies will depend on specific project requirements and locations; however, some guidance is provided for what to include in specific plans. The authorizing officer would need to determine the adequacy of such plans or studies before approving a specific project.

Best management practices (BMPs) provided in **Table B-4**, Best Management Practices, are state-of-the-art mitigation measures applied on a site-specific basis to avoid, minimize, reduce, rectify, or compensate for adverse environmental or social impacts. They are selectively applied to projects too aid in achieving

desired outcomes for safe, environmentally responsible development, by preventing, minimizing, or mitigating adverse impacts and reducing conflicts. BMPs can also be proposed by project applicants for activities on public lands (e.g., for solar and wind development). BMPs not incorporated into the permit application by the applicant may be considered and evaluated through the environmental review process and incorporated into the use authorization as conditions of approval or rights of way stipulations.

**Table B-1
Design Features**

No.	Technology	Topic	Description of Measure	Phase
Air Quality				
1	Solar/Wind	Emissions	All heavy equipment shall meet emission standards specified in the state code of regulations, and routine preventive maintenance, including tune-up to the manufacturer's specification, shall be implemented to ensure efficient combustion and minimum emissions. Newer and cleaner equipment with more stringent emission controls shall be leased or purchased.	C, O, D
2	Solar/Wind	Emissions	All diesel engines used in the facility shall be fueled only with ultra-low sulfur diesel with 15-ppm sulfur content.	C, O, D
3	Solar/Wind	Emissions	Staging and queuing areas will not be located within 1,000 feet of sensitive receptors.	C, O, D
4	Solar/Wind	Fugitive dust	All soil disturbance activities and travel on unpaved roads shall be suspended during periods of high winds. A critical site-specific wind speed shall be established based on soil properties determined during site characterization, and wind speed monitoring would be required at the site during construction, operation, and reclamation.	C, O, D
Aviation				
5	Solar/Wind	Restricted airspace	<p>In applications to appropriate lead agencies, provide a copy of a letter stating that the proposed project is compatible with the Airport Land Use Compatibility Plan. The following locations and design features may contribute to a decision that the facility is incompatible with operations of a nearby airport:</p> <ul style="list-style-type: none"> • Siting the facility within 5,000 feet from a heliport or 20,000 feet (3.8 miles) of a runway that is at least 3,200 feet in actual length. • Locating portions of a facility within a designated airport safety zone, airport influence area, or airport referral area. • Introducing a thermal plume, visible plume, glare, or electrical interference into navigable airspace on or near an airport. • Proposing a structure that will exceed 200 feet in height above ground level. 	S
6	Solar/Wind	Restricted airspace	Consult with the FAA regarding the heights of the project structures and avoid conflicts with aviation. Design the project to comply with FAA regulations, including lighting regulations, and to avoid potential safety issues associated with proximity to airports or landing strips.	S
7	Solar/Wind	Restricted airspace	Consult with representatives from the appropriate military installation for projects to be located under low-level military airspace. Design the project to address military concerns.	S

Table B-1 (continued)
Design Features

No.	Technology	Topic	Description of Measure	Phase
8	Solar/Wind	Restricted airspace	The Construction, Operation, and Maintenance Plan will display the location of project infrastructure (i.e. towers, access roads, substations) and will include mitigation measures to be implemented for site-specific and resource-specific environmental impacts.	S
Cultural Resources				
9	Solar/Wind	Cultural surveys	Project developers shall conduct a records search (Class I inventory) of published and unpublished literature for past cultural resource finds in the area of potential effects, including ancillary facilities such as access roads and utility lines; coordinate with researchers working locally in the area, and, depending on the extent of existing information, develop a survey design in coordination with the designated lead agency and SHPO, and complete a cultural resources inventory. The inventory shall be conducted according to the standards set forth in Secretary of Interior's Standards and Guidelines for Archaeology and Historic Preservation (48 FR 44716), BLM Handbook H-8110: Guidelines for Identifying Cultural Resources (BLM 2002), and revised BLM Manual 8110 (BLM 2004). All inventory data shall be provided to the designated lead agency and the AZSITE database in digitized format that meets applicable accuracy standards, including shape files for surveyed areas.	S
10	Solar/Wind	Cultural surveys	A phased sampling strategy, beginning with a Class II inventory to assess various alternative development areas, is recommended prior to the selection of individual project locations. Class II inventory shall meet the standards set forth in the Secretary of Interior's Standards and Guidelines for Archaeology and Historic Preservation (48 FR 44716), BLM Handbook H-8110: Guidelines for Identifying Cultural Resources (BLM 2002), and revised BLM Manual 8110 (BLM 2004a).	S
11	Solar/Wind	Cultural surveys	Following field surveys ensure the survey report documents previously unrecorded and newly discovered resources information. Provide information necessary for evaluating each newly discovered resource's eligibility for the NRHP. Ensure the cultural resources specialist completes a technical report detailing the records search results, each survey's methods and results, including identified resources evaluations, and recommendations for resource evaluations based on the NRHP eligibility criteria. The reports should meet the lead agency's or agencies' published standards.	S
12	Solar/Wind	Cultural surveys	Retain the services of a geoarchaeologist, when appropriate, to investigate and complete a geomorphology technical report. Include the following elements: <ul style="list-style-type: none"> • Reconstruct the historical geomorphology of the project's Area of Potential Effects (APE); • Map and date the sediments of the landforms in that area; 	S

Table B-1 (continued)
Design Features

No.	Technology	Topic	Description of Measure	Phase
13	Solar/Wind	Cultural surveys	<ul style="list-style-type: none"> • Assess whether buried archaeological deposits may be present and subject to project impacts. <p>Retain a qualified cultural resources specialist to write and carry out a monitoring and mitigation plan or agreement, when applicable, and to be available if cultural resources are encountered during construction. Avoidance of known cultural resources is generally the preferred resolution option; include in the plan measures to protect avoided resources during construction and to prevent looting/vandalism and erosion. If project impacts to known NRHP-eligible cultural resources are unavoidable, data recovery may be approved as a mitigation measure; include a data recovery strategy in the plan. The project developer may also be asked by the appropriate lead agency to include additional measures for addressing the discovery of previously unknown cultural resources during construction. Consider the following measures, at a minimum:</p> <ul style="list-style-type: none"> • Hire a qualified archaeological monitor to oversee project excavations and to monitor resources that will be protected from disturbance by construction-related activities. • Develop and use a cultural resources construction personnel training program to promote cultural resources identification and lawful and appropriate response to discoveries. • Notify involved agencies of unexpected cultural or historical resources discoveries during construction. The project developer may be asked or ordered to cease construction in the vicinity of the discovery to allow evaluation by an agency archaeologist and formulation of appropriate mitigation measures. • If human remains are discovered, cease construction and consult with the lead agencies. It is advisable to prepare a Plan of Action to address anticipated or unanticipated discoveries of materials protected under NAGPRA, even if such discoveries appear to be unlikely on the basis of the survey results. • Where project construction would directly and adversely affect NRHP eligible properties, scientific data recovery may be selected as an appropriate mitigation measure. Data recovery procedures shall be conducted in accordance with an agency-approved Data Recovery Plan including a detailed research design and methodology. • Have the cultural resources specialist prepare a report documenting archaeological monitoring and data recovery activities. 	C, O, D

Table B-1 (continued)
Design Features

No.	Technology	Topic	Description of Measure	Phase
14	Solar/Wind	Treatment plans	Provide input to lead agency-prepared mitigation plans, agreement documents and related historic properties treatment plans. Treatment plans will guide: <ul style="list-style-type: none"> • Completion of a 100 percent archaeological surface survey (if not completed earlier in the permitting/pre-construction phase). • Outstanding geoarchaeological investigations. • Evaluation of newly identified cultural resources for NRHP eligibility. • Assessment of project impacts to NRHP-eligible cultural resources. • Implementation of site avoidance, monitoring, data recovery, reduction of visual impacts, or other measures developed to mitigate adverse impacts. 	S
15	Solar/Wind	Monitoring	In cases where there is a probability of encountering cultural resources during construction that could not be fully detected during Class III inventory, cultural field monitors (appropriate for the resource anticipated) shall be employed to monitor ground disturbing activities. Development of a monitoring plan is recommended.	C, O, D
16	Solar/Wind	Education	The use of management practices, such as training/education programs for workers and the public, shall be implemented to reduce occurrences of human-related disturbances to nearby cultural sites. The specifics of these management practices shall be established in project-specific consultations between the applicant and the BLM as well as with the SHPO and Tribes, as appropriate.	S, C, O, D
17	Solar/Wind	Construction	The unexpected discovery of cultural resources during construction shall be brought to the attention of the responsible authorized officer immediately. Work shall be halted in the vicinity of the find. The area of the find shall be protected to ensure that resources are not removed, handled, altered, or damaged while they are being evaluated and appropriate mitigation measures are being developed.	C, O, D
Designated Areas with Wilderness Characteristics				
18	Solar/Wind	Viewsheds	Renewable energy facilities shall be located and designed to minimize impacts on the viewshed of specially designated visually sensitive areas, including areas managed by other federal, state, and local agencies.	S
19	Solar/Wind	Unique/ important areas	Locating renewable energy facilities in areas of unique or important cultural, recreation, wildlife, or visual resources shall be avoided, even if they do not possess a special area designation.	S

Table B-1 (continued)
Design Features

No.	Technology	Topic	Description of Measure	Phase
Ecological				
20	Solar/Wind	Surveys	All pre-disturbance surveys shall be conducted by qualified biologists following accepted protocols established by the USACE, BLM, USFWS, or other federal or state regulatory agencies, as determined appropriate by the designated lead agency, to identify and delineate the boundaries of important, sensitive, or unique habitats in the project vicinity including waters of the United States, wetlands, springs, seeps, ephemeral streams, intermittent streams, 100-year floodplains, ponds and other aquatic habitats, riparian habitat, remnant vegetation associations, rare or unique natural communities, and habitats supporting special status species populations. Applicants shall conduct surveys for Federal and/or State-protected species and other species of concern (including priority wildlife and special status plant and animal species) within the project area and design the project to avoid, minimize, or mitigate impacts to these resources.	S
21	Solar/Wind	Training	<p>Develop a project-specific worker environmental awareness program (WEAP) that meets the approval of the permitting agencies and would be carried out during all phases of the project (site mobilization, ground disturbance, grading, construction, operation, closure/decommissioning, or project abandonment, and restoration/reclamation activities). Identify in the WEAP biological resources and BMPs for minimizing impacts to resources. Provide interpretation for non-English speaking workers, and provide the same instruction for new workers prior to their working onsite. Keep in project field construction office files the names of onsite personnel (for example, surveyors, construction engineers, employees, contractors, contractor's employees, subcontractors) who have participated in the education program. At a minimum, include the following in the program:</p> <ul style="list-style-type: none"> • Photos and habitat descriptions for special status species that may occur on the project site and information on their distribution, general behavior, and ecology. • Species sensitivity to human activities. • Legal protections afforded the species. • Project BMPs for protecting species. • State and federal law violation penalties. • Worker responsibilities for trash disposal and safe/ humane treatment of wildlife and special status species found on the project site, associated reporting requirements, and specific required measures to prevent taking of threatened or endangered species. • Handout materials summarizing the contractual obligations and protective requirements specified in project permits and approvals. • Project site speed limit requirements and penalties. 	C, O, D

Table B-1 (continued)
Design Features

No.	Technology	Topic	Description of Measure	Phase
22	Solar/Wind	Training	All personnel shall be instructed on the identification and protection of ecological resources (especially for special status species), including knowledge of mitigation measures required by federal, state, and local agencies. Workers must be aware that only qualified biologists are permitted to handle listed species according to specialized protocols approved by the USFWS. Workers shall not collect native plants and shall avoid contact with or any form of harassment of wildlife, including taking photographs or feeding. In addition, workers shall be prohibited from bringing firearms and pets to project sites. Observations of potential wildlife impacts, including wildlife mortality, shall be reported to the BLM authorized officer immediately.	C, O, D
23	Solar/Wind	Construction	If needed, temporary access roads shall be developed primarily through the removal of woody vegetation, although temporary timber mats should be used in areas of wet soils. Wide-tracked or balloon-tired equipment, timber corduroy, or timber mat work areas shall be used on wet soils, where wetland or stream crossings are unavoidable and when crossing on frozen ground is not possible in winter. Areas rutted by equipment shall be immediately regraded and revegetated. Tower installation shall be conducted by airlift helicopter, where necessary, to avoid extensive crossing of wetlands or highly sensitive areas (such as those identified as rare natural habitats).	C, O, D
24	Solar/Wind	Blasting	Explosives shall be used only within specified times and at specified distances from sensitive wildlife or surface waters, as established by the designated lead agency, or other federal and state agencies. The occurrence of flyrock from blasting shall be limited by using blasting mats.	C, D
25	Solar/Wind	Fugitive dust	Plants, wildlife, and their habitats shall be protected from fugitive dust through measures included in the facility's Dust Abatement Plan.	C, O, D
26	Solar/Wind	Traffic	Any vehicle-wildlife collisions or carrion shall be immediately reported to security or the on-site biological monitor. Observations of potential wildlife problems, including wildlife mortality, shall be immediately reported to the BLM or other appropriate agency authorized officer. Procedures for removal of wildlife carcasses on-site and along access roads shall be addressed in the Animal, Pest, and Vegetation Control Plan, to avoid vehicle-related mortality of carrion-eaters.	C, O, D
27	Solar/Wind	Traffic	New roads shall be designed and constructed to the appropriate BLM road design standards, such as those described in BLM Manual 9113 (BLM 1985), and be no larger than necessary to accommodate their intended functions (e.g., traffic volume and weight of vehicles). Roads internal to solar facility sites shall be designed to minimize ground disturbance.	S
28	Solar/Wind	Lighting	Install and maintain shielded facility lighting to prevent upward and side casting of light towards wildlife habitat and propose use of motion sensors. Lighting shall be designed to provide the minimum illumination needed to achieve safety and security objectives. All unnecessary lighting shall be turned off at night to limit attracting migratory birds or special status species. Towers that require lighting for aviation safety shall comply with the USFWS communications tower	S, C, O, D

Table B-1 (continued)
Design Features

No.	Technology	Topic	Description of Measure	Phase
			guidance. Unless otherwise required by the Federal Aviation Administration (FAA), only white (preferable) or red strobe lights shall be used at night, and these shall be the minimum number and minimum intensity allowable by the FAA. The strobes should be on for a brief a period as possible and the time between strobe or flashes should be the longest possible. Synchronize strobes so that a strobe effect is achieved and towers are not constantly illuminated. The use of solid red or pulsating red warning lights at night shall be avoided. Current research indicates that solid or pulsating (beacon) red lights attract night-migrating birds at a much higher rate than white strobe lights. Red strobe lights have not yet been studied.	
29	Solar/Wind	Lighting	Towers that require lighting for aviation safety shall comply with USFWS communications tower guidance. Unless otherwise required by the FAA, only white (preferable) or red strobe lights shall be used at night, and these shall be the minimum number, minimum intensity, and minimum number of flashes per minute (longest duration between flashes) allowable by the FAA. The use of solid red or pulsating red warning lights at night shall be avoided. Current research indicates that solid or pulsating (beacon) red lights attract night-migrating birds at a much higher rate than white strobe lights. Red strobe lights have not yet been studied.	S, C
30	Solar/Wind	Lighting	Keep lighting at operation and maintenance facilities and substations located within 0.5 mile of the turbines to the minimum required for meeting FAA guidelines, and safety and security needs.	S, C
31	Solar/Wind	Road construction	If the need for using surfacing, road sealant, soil bonding, and stabilizing agents on non-paved surfaces is determined use agents that have been shown to be non-toxic to wildlife and plants.	C, O, D
32	Solar/Wind	Cattle guards	If cattle guards are identified for the design for new roads, they shall be wildlife friendly. To the extent practicable, improvements shall be made to existing ways and trails that require cattle to pass through existing fences, fence-line gates, new gates, and standard wire gates alongside them.	S
33	Solar/Wind	Trenches	Because open trenches could impede the seasonal movements of large game animals and alter their distribution, they shall be backfilled as quickly as is possible. Open trenches could also entrap smaller animals; therefore, escape ramps shall be installed at regular intervals along open-trench segments at distances identified in the applicable land use plan or best available information and science. Additionally, an appropriate number of qualified biological monitors (as determined by the federal authorizing agency and the USFWS) shall be on-site to monitor, capture, and relocate animals that become entrapped in trenches and are unable to escape on their own.	C, O, D
34	Solar/Wind	Fences	Fences shall be built (as practicable) to exclude livestock and wildlife from all project facilities, including all water sites.	C, O

Table B-1 (continued)
Design Features

No.	Technology	Topic	Description of Measure	Phase
35	Solar/Wind	Evaporation ponds	If the use of open evaporation ponds is permitted for the project. Ponds will be designed with deterrents for wildlife usage, especially waterfowl.	S
36	Solar/Wind	Aquatic habitat	Projects shall avoid surface water or groundwater withdrawals that affect sensitive habitats (e.g., aquatic, wetland, and riparian habitats) and any habitats occupied by special status species. Applicants shall demonstrate, through hydrologic modeling, that the withdrawals required for their project are not going to affect groundwater discharges that support special status species or their habitats.	S
37	Solar/Wind	Aquatic habitat	If transmission lines are located near aquatic habitats or riparian areas (e.g. minimum buffers identified in applicable land use plan or best available science and information), vegetation maintenance shall be limited and performed mechanically rather than with herbicides. Cutting in wetlands or stream and wetland buffers shall be conducted by hand or feller-bunchers. Tree cutting in stream buffers shall only target trees able to grow into a transmission line conductor clearance zone within 3 to 4 years. Cutting in such areas for construction or vegetation management shall be minimized, and the disturbance of soil and remaining vegetation shall be minimized.	S, C
38	Solar/Wind	Fish passage	Any necessary stream crossings shall be designed to provide in-stream conditions that allow for and maintain uninterrupted movement and safe passage of fish during all project periods.	S
39	Solar/Wind	Aquatic species	Appropriate fish screens shall be installed on cooling water intakes to limit the potential for impingement impacts on organisms in surface water sources used for cooling water. Intake designs shall minimize the potential for entrainment of aquatic organisms from surface waters into cooling water systems.	C
40	Solar/Wind	Habitat	Meteorological towers, soil borings, wells, and travel routes shall be located to avoid important, sensitive, or unique habitats including but not limited to wetlands, springs, seeps, ephemeral streams, intermittent streams, 100-year floodplains, ponds and other aquatic habitats, riparian habitat, remnant vegetation associations, rare natural communities, and habitats supporting special status species populations, as identified in applicable land use plans or best available information and science.	S, C
41	Solar/Wind	Habitat	Projects shall not be sited in designated critical habitat, ACECs, or other specially designated areas that are considered necessary for special status species and habitat conservation.	S
42	Solar/Wind	Habitat	A habitat restoration plan shall be developed to avoid, minimize, or mitigate negative impacts on vulnerable wildlife while maintaining or enhancing habitat values for other species. The plan shall identify reclamation, soil stabilization, and erosion reduction measures that shall be implemented to ensure that all temporary use areas are restored. The plan shall require that restoration occur	S

Table B-1 (continued)
Design Features

No.	Technology	Topic	Description of Measure	Phase
			<p>as soon as possible after completion of activities, provided such revegetation will not compromise the function of any buried utilities, to reduce the amount of habitat converted at any one time and to speed up the recovery to natural habitats. Species salvaged during construction could be transplanted into these areas at a density similar to pre-construction conditions. Revegetation shall focus on the establishment of native plant communities similar to those present in the vicinity of the project site. Species used shall consist of native species dominant within the plant communities existing in adjacent areas having similar soil conditions. Certified weed-free seed mixes of native shrubs, grasses, and forbs of local origin shall be used. In areas where suitable native species are unavailable, other plant species approved by BLM could be used. The restoration plan shall include adaptive management and a monitoring plan. The monitoring plan will establish success thresholds.</p>	
43	Solar/Wind	Wildlife	<p>Meteorological towers and solar sensors shall be located to avoid sensitive habitats or areas where wildlife are known to be sensitive to human activities (e.g., sage grouse; refer to applicable land use plan or best available information and science to determine avoidance distances). Installation of these components shall be scheduled to avoid disruption of wildlife reproductive activities, migratory behaviors, or other important behaviors. Guy wires on meteorological towers shall be avoided whenever possible. If guy wires are necessary, permanent markers (bird flight diverters) shall be attached to the guy wires to increase their visibility. The area disturbed by installation of meteorological towers (i.e., footprint) shall be kept to a minimum.</p>	S, C
44	Solar/Wind	Wildlife timing	<p>Activities shall be timed to avoid, minimize, or mitigate impacts on wildlife. For example, crucial winter ranges for elk, deer, pronghorn, and other species shall be avoided especially during their periods of use. If activities are planned during bird breeding seasons, a nesting bird survey shall be conducted first. If active nests were detected, the nest area shall be flagged, and no activity shall take place near the nest (at a distance determined in consultation with the USFWS) until nesting was completed (i.e., nestlings have fledged or the nest has failed) or until appropriate agencies agree that construction can proceed with the incorporation of agreed-upon monitoring measures. The timing of activities shall be coordinated with the state wildlife agencies.</p>	S, C, O, D
45	Solar/Wind	Birds/bats	<p>Operators shall evaluate avian and bat use of the project area and design the project to minimize or mitigate the potential for bird and bat strikes (e.g., development shall not occur in riparian habitats and wetlands). Avian and bat use surveys consistent with current methodologies and standards shall be conducted; the amount and extent of ecological baseline data required shall be determined on a project basis. Develop a bat and avian protection plan to protect bats and migratory birds, while improving conservation, safety, and reliability for utility customers.</p>	S

Table B-1 (continued)
Design Features

No.	Technology	Topic	Description of Measure	Phase
46	Wind	Birds/bats	Locate turbines to avoid separating birds and bats from their seasonal migration corridors, daily roosting, feeding, or nesting sites if documented that the turbines' presence poses a risk to species.	S
47	Solar/Wind	Raptors	Removal of raptor nests shall take place only if the birds are not actively using the nest, particularly during the nesting and brood-rearing period. Nests shall be relocated to nesting platforms, when possible; otherwise, they must be destroyed when removed. An annual report on all nests moved or destroyed will be provided to the appropriate federal and/or state agencies. Coordination with the USFWS will occur in the event that a raptor nest is located on a transmission line support structure.	C, O, D
48	Solar/Wind	Ravens	Raven nests shall be removed from transmission towers to reduce predation pressure on sensitive species such as the desert tortoise.	C, O, D
49	Solar/Wind	Birds/ raptors	Any power line-associated mortality of bird species (e.g., raptors) shall be monitored and reported to the BLM and the USFWS, and measures shall be taken to prevent future mortality.	C, O, D
50	Solar/Wind	Birds	If a proposed project has the potential to impact golden eagles or their habitat, an Avian Protection Plan (APP) would be required as a condition of the BLM right-of-way grant. The APP would be developed by the applicant, in coordination with the FWS and the BLM, to evaluate options to avoid and minimize the project impacts. The APP must address siting, operations, and monitoring, and if necessary, would incorporate eagle conservation measures to reduce project impacts.	S
51	Solar/Wind	Birds	Facilities shall be designed to discourage their use as perching or nesting substrates by birds. For example, power lines and poles shall be configured to minimize raptor electrocutions and discourage raptor and raven nesting and perching. Transmission lines and electrical components shall be installed and maintained in accordance with the APLIC Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006 (Avian Power Line Interaction Committee 2006) to reduce the likelihood of electrocutions of raptors and other large birds.	S
52	Solar/Wind	Birds	Use flashing or strobe lights on turbines, meteorological towers, and/or heliostat towers to minimize avian collision risk.	S, C, O
53	Solar/Wind	Birds	Guy wires on permanent meteorological towers shall be avoided, however, may be necessary on temporary meteorological towers installed during site monitoring and testing. If guy wires are necessary, the meteorological towers shall be periodically inspected to determine whether permanent markers (bird flight diverters) attached to the guy wires are necessary to increase visibility.	S, C

Table B-1 (continued)
Design Features

No.	Technology	Topic	Description of Measure	Phase
54	Wind	Bats	Operators shall determine the presence of bat colonies and avoid placing turbines near known bat hibernation, breeding, and maternity/nursery colonies; in known migration corridors; or in known flight paths between colonies and feeding areas.	S
55	Solar/Wind	Eagles	At the project level, recommendations contained in the Interim Golden Eagle Technical Guidance: Inventory and Monitoring Protocol; and Other Recommendations in Support of Golden Eagle Management and Permit Issuance (Pagel et al. 2010) shall be considered in project planning, as appropriate. Additionally, the Bald and Golden Eagle Protection Act–Golden Eagle National Environmental Policy Act and Avian Protection Plan Guidance for Renewable Energy (Instruction Memorandum No. 2010-156) will need to be adhered to (BLM 2010b) until programmatic permits from the USFWS are available. This memorandum requires that consideration of golden eagles and their habitat be incorporated into site-specific NEPA analysis for all renewable energy projects and determine whether the project has the potential to affect golden eagles or their habitat. It must be determined whether breeding territories/nests, feeding areas, roosts, or other important golden eagle use areas are located within the analysis area. The analysis shall be made in coordination with the USFWS and AZGFD. If the proposed project has the potential to affect golden eagles or their habitat, an analysis shall be completed that includes: (1) direct and indirect effects analysis; (2) cumulative effects analysis; (3) BMPs; (3) avian protection plans; (4) interagency coordination; and (5) record of decision, decision record, and notice to proceed.	S
56	Solar/Wind	Eagles	Avoid, to the extent needed to comply with state and federal requirements, siting project facilities and infrastructure in a location or manner that would cause bald and golden eagle mortality, injury, and/or disturbance; i.e. locate facilities outside of eagle breeding home ranges as well as important breeding, wintering, and dispersal foraging areas, migration stopovers and corridors, and areas used by eagles for thermal or orographic lift.	S
57	Solar/Wind	Eagles	Where applicable, incorporate actions to avoid eagle disturbance (refer to the FWS National Bald Eagle Management Guidelines (U.S. Fish and Wildlife Service 2007).	S
58	Solar/Wind	Raptors	Operators shall determine the presence of active raptor nests (i.e., raptor nests used during the breeding season) and design the project to provide for spatial buffers and timing restrictions for surface disturbing activities. Operators shall coordinate with AZGFD to help determine the appropriate survey methods. Measures to reduce raptor and/or raptor prey species use at a project site (e.g., minimize road cuts, maintain either no vegetation or plant species that are unattractive to raptors around the turbines) shall also be identified.	S
59	Solar	Special status species	The capability of local surface water or groundwater supplies to provide adequate water for operation of proposed solar facilities shall be considered early during project siting and design.	S

Table B-1 (continued)
Design Features

No.	Technology	Topic	Description of Measure	Phase
			Technologies that would result in large withdrawals that would affect water bodies that support ESA-listed species shall not be considered.	
60	Solar/Wind	Special status species	Pipelines that transport hazardous liquids (e.g., oils) that will pass through aquatic or other habitats containing sensitive species shall be designed with block or check valves on both sides of the waterway or habitat to minimize the amount of product that could be released due to leaks. Such pipelines shall be constructed of double-walled pipe at river crossings.	S
61	Solar/Wind	Desert tortoise	Ensure the biologist inspects construction pipes, culverts, or similar structures: (a) with a diameter greater than 3 inches, (b) stored for one or more nights, (c) less than 8 inches aboveground, and (d) within desert tortoise habitat (such as outside the permanently fenced area), before the materials are moved, buried, or capped. As an alternative, cap such materials before storing outside the fenced area or placing on pipe racks. Avoid inspection or capping if the materials are stored within the permanently fenced area after completing desert tortoise clearance surveys.	C, D
62	Solar/Wind	Special status species	If it is determined through coordination with the appropriate federal and state agencies (e.g., BLM, USFWS, and state resource management agencies) that it is necessary to translocate plant and wildlife species from project areas, developers shall ensure that qualified biologists conduct pre- and post-translocation surveys for target species (especially if the target species are special status species) and release individuals to protected off-site locations as approved by the federal and state agencies. The biologists shall coordinate with appropriate agencies the safe handling and transport of encountered special status species.	S, C, O, D
63	Solar/Wind	Special status species	If any federally listed threatened and endangered species are found, the USFWS shall be consulted as required by Section 7 of the ESA, and an appropriate course of action shall be determined to avoid or mitigate impacts. After found, the species will be avoided and the BLM approving officer shall be contacted immediately. If a biological monitor is present on site, they shall record the sighting, follow approved protection measures, and make the appropriate contacts.	C, O, D
64	Solar/Wind	Vegetation	A Water Resources Monitoring and Mitigation Plan shall be developed for each project. Changes in surface water or groundwater quality (e.g., chemical contamination, increased salinity, increased temperature, decreased dissolved oxygen, and increased sediment loads) or flow that result in alteration of terrestrial plant communities or communities in wetlands, springs, seeps, intermittent streams, perennial streams, and riparian areas (including alterations of cover and community structure, species composition, and diversity) off the project site shall be avoided to the extent practicable. A monitoring plan shall be developed that determines the effects of groundwater withdrawals on plant communities. See measures applicable to protecting water quality.	S

Table B-1 (continued)
Design Features

No.	Technology	Topic	Description of Measure	Phase
65	Solar/Wind	Cactus	As directed by the local BLM field office, Joshua trees (<i>Yucca brevifolia</i>), other Yucca species, and most agave and cactus species, shall be salvaged prior to land clearing, and transplanted, held for use in revegetating temporarily disturbed areas, or otherwise protected as prescribed by state or local BLM requirements.	C, O, D
66	Solar/Wind	Noxious weeds	An Integrated Vegetation Management Plan shall be developed that is consistent with applicable regulations and agency policies for the control of noxious weeds and invasive plant species. The plan shall address monitoring; ROW vegetation management; the use of certified weed-free seed and mulching; the cleaning of vehicles to avoid the introduction of invasive weeds; and the education of personnel on weed identification, the manner in which weeds spread, and the methods for treating infestations. The plan shall investigate possibilities of revegetating parts of the renewable energy project area. Where revegetation is accomplished, fire breaks shall be required such that vegetated areas would not result in increased fire hazard. For transmission line ROWs, the plan shall be consistent with the existing vegetation management plan for that ROW. Principles of integrated pest management, including biological controls, shall be used to prevent the spread of invasive species. The plan shall include periodic monitoring, reporting, and immediate eradication of noxious weed or invasive species occurring within all managed areas. A controlled inspection and cleaning area shall be established to visually inspect construction equipment arriving at the project area and to remove and collect seeds that may be adhering to tires and other equipment surfaces. To prevent the spread of invasive species, project developers shall work with the local BLM field office to determine whether a pre-activity survey is warranted, and if so, conduct the survey. If invasive plant species are present, project developers shall work with the local BLM field office to develop a control strategy. The plan shall include a post-construction monitoring element that incorporates adaptive management protocols.	S
67	Solar/Wind	Hazardous materials	Design features for hazardous materials and waste management regarding refueling, equipment maintenance, and spill prevention and response shall be applied to reduce the potential for impacts on ecological resources.	C, O, D
68	Solar/Wind	Hazardous materials	A Spill Prevention and Emergency Response Plan shall be developed that considers sensitive ecological resources. Spills of any toxic substances shall be promptly addressed and cleaned up before they can enter aquatic or other sensitive habitats due to runoff or leaching.	S
69	Solar/Wind	Pesticide use	If pesticides are used on the site, an integrated pest management plan shall be developed to ensure that applications will be conducted within the framework of BLM and DOI policies and entail only the use of EPA-registered pesticides. Pesticide use shall be limited to nonpersistent, immobile pesticides and shall only be applied in accordance with label and application permit directions and stipulations for terrestrial and aquatic applications. Any applications of herbicides	S, C, O, D

Table B-1 (continued)
Design Features

No.	Technology	Topic	Description of Measure	Phase
			will be subject to BLM herbicide treatment standard operating procedures. Only herbicides on the list of approved herbicide formulations (updated annually) will be used on public lands.	
70	Solar/Wind	Pests	Prepare a facility vector (such as mosquitoes or rodents) control plan, as appropriate, that meets the permitting agency approval and would be implemented during all phases of the project.	S
71	Solar/Wind	Fire	A Fire Management and Protection Plan shall be developed to implement measures to minimize the potential for a human-caused fire to affect ecological resources and respond to natural fire situations.	S
72	Solar/Wind	Waste	A Trash Abatement Plan shall be developed that focuses on containing trash and food in self-closing, sealable containers with lids that latch and empty them daily to reduce their attractiveness to opportunistic species, such as common ravens, coyotes, and feral dogs that could serve as predators on native wildlife and special status animals. Remove trash containers associated with construction from the project site when construction is complete.	S
73	Solar/Wind	Reclamation	A Decommissioning and Site Reclamation Plan specific to the project shall be developed and implemented. Baseline data shall be collected in each project area as a benchmark for measuring the success of reclamation efforts. The plan shall contain an adaptive management component that allows for the incorporation of lessons learned from monitoring data. The plan shall require that land surfaces be returned to pre-development contours to the greatest extent feasible immediately following decommissioning. The plan shall focus on the establishment of native plant communities similar to those present in the vicinity of the project site. The plan shall be designed to expedite the re-establishment of vegetation and require restoration to be completed as soon as practicable. To ensure rapid and successful re-establishment efforts, the plan shall specify site-specific measurable success criteria, including target dates, which shall be developed in coordination with the BLM and which shall be required to be met by the operator. Vegetation re-establishment efforts shall continue until all success criteria have been met. Bonding to cover the full cost of vegetation re-establishment shall be required. Species used for vegetation re-establishment shall consist of native species dominant within the plant communities existing in adjacent areas having similar soil conditions. The plan shall require the use of weed-free seed mixes of native shrubs, grasses, and forbs of local sources where available. When available, seed of known origin as labeled by state seed certification programs shall be used. Local native genotypes shall be used. If cultivars of native species are used, certified seed (i.e., blue tag) shall be used. "Source identified" seed (i.e., yellow tag) shall be used when native seed is collected from wildland sites. The cover, species composition, and diversity of the re-established plant community shall be similar to those in the vicinity of the site. In areas where suitable native species are unavailable, other plant species approved by the BLM could be used. If non-natives	S, D

Table B-1 (continued)
Design Features

No.	Technology	Topic	Description of Measure	Phase
			are necessary they shall be non-invasive, non-competitive, and ideally are short-lived, have low reproductive capabilities, or be self-pollinating to prevent gene flow into the native community. Non-natives used shall not exchange genetic material with common native plant species. The plan shall also include site-specific, measurable success criteria that must be met. The plan shall be developed in coordination with appropriate federal and state agencies.	
74	Solar/Wind	Reclamation	Post-decommissioning protocols shall include monitoring for native vegetation recovery; invasive species colonization and spread; wildlife use; and special status species use. Monitoring data shall be used to determine the success of reclamation activities and the need for changes in ongoing management or for additional reclamation measures. Ongoing visual inspections for a minimum of 5 years following decommissioning activities shall be required to ensure adequate restoration and minimal environmental degradation. This period shall be extended until satisfactory results are obtained.	D
75	Solar/Wind	Mitigation/ monitoring	<p>Prepare a project specific mitigation and monitoring plan in cooperation with and that meets the approval of permitting agencies and AZGFD where applicable. Carry out the plan during all phases of the project to avoid, minimize, or mitigate adverse direct, indirect, and cumulative impacts, including habitat, special status plant, and wildlife species losses. Address at a minimum:</p> <ul style="list-style-type: none"> • Biological resource mitigation, monitoring, and compliance measures required by federal, state, and local applicable permitting agencies. • Documentation (based on surveys) of sensitive plant and wildlife expected to be affected by all phases of the project (project construction, operation, abandonment, and decommissioning). Agencies may request additional surveying, based on the documentation or past experience working with the resources. Include measures to avoid or minimize impacts to species and habitat. • A detailed description of measures, including revegetation, soil stabilization, and erosion reduction measures, to minimize or mitigate permanent and temporary disturbances on vegetation, wildlife, and special status plants and animals from construction activities. The plan shall require that restoration occur as soon as possible after completion of activities to reduce the amount of habitat converted at any one time and to hasten the recovery to natural habitats. 	S

Table B-1 (continued)
Design Features

No.	Technology	Topic	Description of Measure	Phase
			<ul style="list-style-type: none"> • Mitigation and monitoring unavoidable impacts on waters of the US, including wetlands. • Demonstration of compliance of the project with the regulatory requirements of the Bald and Golden Eagle Protection Act. The plan shall be developed in coordination with the USFWS. • Measures to protect birds (including migratory species protected under the Migratory Bird Treaty Act) developed in coordination with the appropriate federal and state agencies (e.g. BLM, USFWS, and state resource management agencies). • Measures to mitigate and monitor impacts on special status species developed in coordination with the appropriate federal and state agencies (e.g. BLM, USFWS, and state resource management agencies). • Monitoring the potential for increase in predation of special status species (especially desert tortoise) from ravens and other species that are attracted to developed areas and opportunistically use tall structures to spot vulnerable prey. • Clearing and translocation of special status species, including the steps to implement the translocation as well as the follow-up monitoring of populations in the receptor locations, as determined in coordination with the appropriate federal and state agencies. The need for a Special Status Species Clearance and Translocation Plan shall be determined on a project-specific basis. • All locations on a map, at an approved scale, of sensitive plant and wildlife areas subject to disturbance and areas requiring temporary protection and avoidance during construction. • Aerial photographs or images, at an approved scale, of areas to be disturbed during project construction activities. • Duration for each type of monitoring and a description of monitoring methodologies and frequency. • Performance standards, thresholds, monitoring, and criteria to be used to 	

Table B-1 (continued)
Design Features

No.	Technology	Topic	Description of Measure	Phase
			<p>determine if/when proposed mitigation is or is not successful.</p> <ul style="list-style-type: none"> • All standards and remedial measures to be implemented if performance standards and criteria are not met. • Adaptive management strategies. • A closure/decommissioning or abandonment plan, including a description of funding mechanism(s). 	
76	Solar/Wind	Monitoring	<p>Designate a qualified biologist (approved by the BLM) responsible for overseeing compliance with biological resources BMPs and project-specific mitigation measures during mobilization, ground disturbance, grading, construction, operation, and closure/decommissioning, or project abandonment, particularly in areas containing or known to have contained sensitive biological resources, such as special status species and unique plant assemblages. Additional qualified biological monitors may be required on-site during all project phases as determined by the authorizing federal agency. It is suggested that the qualified biologist be responsible for actions including, but not limited to, the following:</p> <ul style="list-style-type: none"> • Clearly marking sensitive biological resource areas and inspecting the areas at appropriate intervals for meeting regulatory terms and conditions. • Inspecting, daily, active construction areas where wildlife may have become trapped (for example, trenches, bores, and other excavation sites that constitute wildlife pitfalls outside the permanently fenced area) before beginning construction. At the end of the day, conducting wildlife inspections of installed structures that would entrap or not allow escape during periods of construction inactivity. Periodically inspecting areas with high vehicle activity (such as parking lots) for wildlife in harm's way. • Overseeing cactus, agave, and yucca salvage operations. • Immediately recording and reporting hazardous spills immediately as directed in the project hazardous materials management plan. • Coordinating directly and regularly with permitting agency representatives regarding biological resources issues, including biological resource BMP implementation. f) Maintaining written records regarding implementation of biological resource BMPs and providing a summary of these records periodically in a report to the appropriate agencies. g) Notifying the project owner and appropriate agencies of non-compliance with biological resources BMPs. 	C, O, D

Geologic Hazards

Table B-1 (continued)
Design Features

No.	Technology	Topic	Description of Measure	Phase
77	Solar/Wind	Geotechnical specifications	Build project structures in accordance with the design basis recommendations specified in the project specific geotechnical investigation report.	S, C
Hazardous Materials				
78	Solar/Wind	Phase I surveys	For projects proposed on previously disturbed or developed lands, conduct a Phase I site assessment (ASTM E1527 or other equivalent assessment method deemed acceptable by the appropriate regulatory oversight agency) for the project site and linear appurtenances. If Phase I identifies environmental conditions, concerns, or data gaps requiring additional site assessment to adequately characterize the site, conduct additional site assessment work (such as Phase 2) with appropriate regulatory agency oversight. Provide the Phase I, and if conducted, the Phase 2 site assessment with applications to appropriate lead agencies.	S
79	Solar/Wind	Hazardous materials/ waste plan	A Hazardous Materials and Waste Management Plan shall address the selection, transport, storage, and use of all hazardous materials needed for construction, operation, and decommissioning of the facility for local emergency response and public safety authorities and for the regulating agency, and shall address the characterization, on-site storage, recycling, and disposal of all resulting wastes. The plan shall, at a minimum, include the following: facility identification; comprehensive hazardous materials inventory; Material Safety Data Sheets (MSDS) for each type of hazardous material; emergency contacts and mutual aid agreements, if any; site map showing all hazardous materials and waste storage and use locations; copies of spill and emergency response plans (see below), and hazardous materials-related elements of a decommissioning/closure plan.	S, C, O, D
80	Solar/Wind	Hazardous materials/ waste plan	A Construction and Operation Waste Management Plan shall identify the waste streams that are expected to be generated at the site and addresses hazardous waste determination procedures, waste storage locations, waste-specific management and disposal requirements, inspection procedures, and waste minimization procedures. The plan shall address all solid and liquid wastes that may be generated at the site in compliance with the CWA requirements to obtain the project's NPDES permit.	S, C, O, D
81	Solar/Wind	Hazardous materials	All hazardous materials and vehicle/equipment fuels shall be transported, stored, managed, and disposed in accordance with accepted BMPs and in compliance with all applicable regulations and the requirements of approved plans, including, where applicable, a Stormwater Management Plan, a Spill Prevention and Emergency Response Plan, and a Hazardous Materials and Waste Management Plan.	C, O, D
82	Solar/Wind	Hazardous materials	Systems containing hazardous materials shall be designed and operated in a manner that limits the potential for hazardous materials release, constructed of compatible materials, and in good condition (as verified by periodic inspections), including provision of secondary containment	S, C, O, D

Table B-1 (continued)
Design Features

No.	Technology	Topic	Description of Measure	Phase
			features (to the extent practical); installation of sensors or other devices to monitor system integrity; installation of strategically placed valves to isolate damaged portions and limit the amount of hazardous materials in jeopardy of release; and robust inspection and repair procedures.	
83	Solar/Wind	Hazardous materials	All site characterization, construction, operation, and decommissioning activities shall be conducted in compliance with applicable federal and state laws and regulations, including the Toxic Substances Control Act of 1976, as amended (15 USC 2601, et seq.). In addition, any release of toxic substances (leaks, spills, and the like) in excess of the reportable quantity established by 40 CFR Part 117 shall be reported as required by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, Section 102b. A copy of any report required or requested by any federal agency or state government as a result of a reportable release or spill of any toxic substances shall be furnished to the authorized officer concurrent with the filing of the reports to the involved federal agency or state government. In addition, the United States shall be indemnified against any liability arising from the release of any hazardous substance or hazardous waste on the facility or associated with facility activities.	S, C, O, D
84	Solar/Wind	Hazardous materials storage	Secondary containment shall be provided for all onsite hazardous materials and waste storage, including fuel. In particular, fuel storage (for construction vehicles and equipment) shall be a temporary activity occurring only for as long as is needed to support construction activities.	C, O, D
85	Solar/Wind	Herbicide/pesticide use	When an herbicide/pesticide is used to control vegetation, the climate, soil type, slope, and vegetation type shall be considered in determining the risk of herbicide/pesticide contamination (BLM 2006a). Additionally, an Animal, Pest, and Vegetation Control Plan shall be developed to ensure that applications are conducted within the framework of BLM and U.S. Department of the Interior (DOI) policies and standard operating procedures and entail only the use of EPA-registered pesticides/herbicides that also comply with state and local regulations.	C, O, D
86	Solar/Wind	Herbicide/pesticide use	Use appropriate herbicide-free/pesticide-free buffer zones for herbicides not labeled for aquatic use, based on permitting agency or BLM/U.S. Forest Service risk assessment guidance. The federal guidance suggests minimum widths of 100 feet for aerial applications, 25 feet for applications dispersed by vehicle and 10 feet for hand spray applications.	C, O, D
87	Solar/Wind	Fire	A Fire Management and Protection Plan shall be developed to implement measures to minimize the potential for fires associated with substances used and stored at the site. The flammability of the specific HTF used at the facility shall be considered.	S, C, O, D
88	Solar/Wind	Spills	A comprehensive Spill Prevention and Emergency Response Plan shall be developed for the facility that meets the following criteria: is written, periodically updated, and made available to the entire workforce; contains procedures for timely notification of appropriate authorities,	S, C, O, D

Table B-1 (continued)
Design Features

No.	Technology	Topic	Description of Measure	Phase
			including the designated BLM land manager; provides spill/emergency contingency planning for each type of hazardous material present, including abatement or stabilizing of release, recovery of spilled product, and remediation of impacted environmental media; is supported by the strategic deployment of appropriate spill response materials and equipment, including PPE for individuals with spill or emergency response assignments; provides for prompt response to spills and timely delivery of recovered spill materials and contaminated environmental media to appropriately permitted off-site treatment or disposal facilities; formally assigns spill and emergency response duties to specified individuals; provides and documents appropriate training to individuals with spill or emergency response assignments; provides for the prompt response to spills and timely delivery of recovered spill materials and contaminated environmental media to appropriately permitted off-site treatment or disposal facilities; provides general awareness training to remaining facility personnel; and provides for written documentation of each event, including root cause analysis, corrective actions taken, and a characterization of the resulting environmental or health and safety impacts.	
89	Solar/Wind	Ordnances	Project developers shall survey project sites for unexploded ordnance, especially if projects are within 20 mi (32 km) of a current U.S. Department of Defense (DOD) installation or formally used defense site.	S, C
90	Solar/Wind	Accidents	In the event of an accidental release of hazardous materials to the environment, the operator shall document the event, including a root cause analysis, appropriate corrective actions taken, and a characterization of the resulting environmental or health and safety impacts. Documentation of the event shall be provided to the BLM authorized officer and other Federal and State agencies, as required.	C, O, D
91	Solar/Wind	Contaminated soils	If any newly found potentially contaminated soils are discovered, contractors would stop work immediately in that area and notify the project proponent, BLM, and Arizona Department Environmental Quality of the discovery and coordinate for any excavation and disposal of the soil.	C, O, D
Health and Safety				
92	Solar/Wind	Health and safety	A health and safety program shall be developed to protect workers during site characterization, construction, operation, and decommissioning of a renewable energy project. The program shall identify all applicable federal and state occupational safety standards and establish safe work practices addressing all hazards, including requirements for developing the following plans: general injury prevention; PPE requirements and training; respiratory protection; hearing conservation; electrical safety; hazardous materials safety and communication; housekeeping and material handling; confined space entry; hand and portable power tool use; gas-filled equipment	S

Table B-1 (continued)
Design Features

No.	Technology	Topic	Description of Measure	Phase
			use; and rescue response and emergency medical support, including on-site first-aid capability.	
93	Solar/Wind	Health	If operation of the solar and/or wind facility and associated transmission lines and substations is expected to cause potential adverse impacts on nearby residences and occupied buildings from noise, sun reflection, flicker, or EMF, recommendations for addressing these concerns shall be incorporated into the project design (e.g., establishing a sufficient setback from transmission lines).	O
94	Solar/Wind	Hazardous materials	In the event of an accidental release of hazardous substances to the environment, project developers shall document the event, including a root cause analysis, appropriate corrective actions taken, and a characterization of the resulting environmental or health and safety impacts. Documentation of the event shall be provided to the permitting agencies and other federal and state agencies within 30 days, as required.	C, O, D
95	Solar/Wind	Safety	In addition, the health and safety program shall address OSHA standard practices for the safe use of explosives and blasting agents (e.g., if used to construct foundations for power tower facilities); measures for reducing occupational EMF exposures; the establishment of fire safety evacuation procedures; and required safety performance standards (e.g., electrical system standards and lighting protection standards). The program shall include training requirements for applicable tasks for workers and establish procedures for providing required training to all workers. Documentation of training and a mechanism for reporting serious accidents to appropriate agencies shall be established.	S, C, O, D
96	Solar/Wind	Electrical	Electrical systems shall be designed to meet all applicable safety standards (e.g., National Electrical Code [NEC]) and comply with the interconnection requirements of the transmission system operator.	S
97	Solar/Wind	EMI	Design the project to reduce electromagnetic interference (EMI) (for example, impacts to radar, microwave, television, and radio transmissions) and comply with Federal Communications Commission (FCC) regulations. Conduct signal strength studies when proposed locations have the potential to affect FCC licensed transmissions. Reduce to nil potential or real interference with public safety communication systems (for example, radio traffic related to emergency activities) or the amateur radio bands.	S
98	Wind	EMI	In the event an installed wind energy development project results in electromagnetic interference (EMI), the operator shall work with the owner of the impacted communications system to resolve the problem. Additional warning information may also need to be conveyed to aircraft with onboard radar systems so that echoes from wind turbines can be quickly recognized.	O
99	Solar/Wind	Explosives	For the mitigation of explosive hazards, workers shall be required to comply with the OSHA	C, O, D

Table B-1 (continued)
Design Features

No.	Technology	Topic	Description of Measure	Phase
			standard (29 CFR 1910.109) for the safe use of explosives and blasting agents.	
100	Solar/Wind	Traffic	A Traffic Management Plan shall be prepared for the site access roads to control hazards that could result from increased truck traffic (most likely during construction or decommissioning), to ensure that traffic flow would not be adversely affected and that specific issues of concern (e.g., the locations of school bus routes and stops) are identified and addressed. This plan shall incorporate measures such as informational signs, flaggers when equipment may result in blocked throughways, and traffic cones to identify any necessary changes in temporary lane configuration. The plan shall be developed in coordination with local planning authorities.	S, C, O, D
101	Wind	Meteorological towers	Meteorological towers installed for site monitoring and testing shall be inspected periodically (at least every 6 months) for structural integrity.	S
102	Solar/Wind	Aviation	The project shall be planned to comply with FAA regulations, including lighting requirements, and to avoid potential safety issues associated with proximity to airports, military bases or training areas, or landing strips.	S
103	Solar	Glare	For parabolic trough facilities, an evaluation of the potential exposure of the public to glare from parabolic trough mirrors shall be conducted. If there is a potential for exposure at levels that could cause retinal damage, measures to eliminate the exposure shall be implemented (e.g., slatted fencing to shield views from outside the facility).	S
104	Solar	Glare	A Heliostat Positioning Plan shall be prepared for power tower projects to avoid exposures to reflected sunlight that could cause retinal damage, temporary blindness, or distraction to operators of aircraft or motorized vehicles on roads in the vicinity of facilities.	S
105	Solar	Glare	Parabolic trough and power tower facilities shall develop a Glare Monitoring Plan to log, investigate, and respond to complaints about glare, either from heliostats or from the tower receivers.	S, O
106	Solar	Glare	For power tower facilities, the hazards associated with the tower and the glare from the heliostat mirrors shall be evaluated through coordination with local airports and evaluation of flight paths.	S, O
107	Solar	SF6	Because of the high global warming potential of SF6, the use of alternative dielectric fluids shall be considered. Alternatively, regular leak detection inspections shall be required to minimize the occurrence and impacts of SF6 leaks from facility piping.	S
108	Solar/Wind	Fire	Operators shall develop a Fire Management and Protection Plan to implement measures to minimize the potential for a human-caused fire and to respond to human-caused or natural-caused fires. Carry out the plan during all phases of project development. Train site workers to respond, as appropriate, to fires. Maintain a 30-foot firebreak within the fenced area containing	S

Table B-1 (continued)
Design Features

No.	Technology	Topic	Description of Measure	Phase
			project facilities.	
109	Solar/Wind	Security	Project developers shall work with appropriate agencies (e.g., DOE and TSA) to address critical infrastructure and key resource vulnerabilities at renewable energy facilities, to minimize and plan for potential risks from natural events, sabotage, and terrorism.	S, O
110	Solar/Wind	Ordnance	Survey project sites for unexploded ordnance, especially if projects are within 20 miles of a current DOD installation or formerly used defense site.	S
Lands and Realty				
111	Solar/Wind	PLSS	Protection and preservation of evidence of the Public Land Survey System (PLSS) and related federal property boundaries is required of project developers. Prior to commencing any ground-disturbing activity, evidence of the PLSS and related property boundaries will be marked for protection. Coordination with BLM Cadastral Survey staff should occur for assistance with providing data, searching for and evaluating evidence, and locating and protecting monuments of the PLSS and related property boundaries from destruction. In some cases, resurveys, re-monumentation, and/or referencing of PLSS corners may be required prior to commencement of any surface disturbance.	S
112	Solar/Wind	Interconnections	In applications to appropriate lead agencies, provide a copy of the electric transmission interconnection study from the appropriate control agency. Include in the interconnection study an identification of the transmission impacts beyond the first point of interconnection and acceptable measures to mitigate/alleviate impacts to the transmission network system. When more than one alternative mitigation measure is identified, indicate in the applications the measure selected by the project developer. Provide for each selected mitigation measure, an environmental analysis sufficient to meet the CEQA requirements for indirect project impacts.	S
113	Wind	Decommissioning	Inoperative turbines shall be repaired, replaced, or removed in a timely manner. Requirements to do so shall be incorporated into the due diligence provisions of the rights-of-way authorization. Operators will be required to demonstrate due diligence in the repair, replacement, or removal of turbines; failure to do so may result in termination of the right-of-way authorization.	D
114	Solar/Wind	Decommissioning	Prior to the termination of the right-of-way authorization, a decommissioning plan shall be developed and approved by the BLM. The decommissioning plan shall include a site reclamation plan and monitoring program.	D
115	Solar/Wind	Decommissioning	All turbines, solar panels, and/or ancillary structures shall be removed from the site.	D
Native American Concerns				
116	Solar/Wind	Burial sites	Tribal burial sites shall be avoided. If avoidance is not possible, consultation with the lineal descendants or Tribal affiliates of the deceased shall be undertaken before removing a known burial. Remains and	S

Table B-1 (continued)
Design Features

No.	Technology	Topic	Description of Measure	Phase
			objects shall be protected and their treatment and disposition determined according to NAGPRA statutory procedures and regulations. A contingency plan for encountering unanticipated burials and funerary goods during construction, maintenance, or operation of a renewable energy facility shall be developed as part of a formalized agreement to address management and mitigation options for significant cultural resources (see Cultural Resources) in consultation with the appropriate Tribal governments and cultural authorities well in advance of any ground disturbances.	
117	Solar/Wind	Water resources	Springs and other water sources that are, or may be, sacred or culturally important shall be avoided whenever possible. If construction, maintenance, or operation activities must occur in proximity to springs or other water sources, appropriate measures, such as the use of geotextiles or silt fencing, shall be taken to prevent silt from degrading water sources. The effectiveness of these mitigating barriers shall be monitored. Measures for preventing water depletion impacts on spring flows shall also be employed. Particular mitigations shall be determined in consultation with the appropriate Native American Tribe(s).	S, C, O, D
118	Solar/Wind	Vegetation	Culturally important plant species shall be avoided when possible. When it is not possible to avoid these plant resources, consultations shall be undertaken with the affected Tribe(s). If the species is available elsewhere on agency-managed lands, guaranteeing access may suffice. For rare or less common species, establishing (transplanting) an equal amount of the plant resource elsewhere on agency-managed land accessible to the affected Tribe may be acceptable.	S, C, O, D
119	Solar/Wind	Wildlife	Culturally important wildlife species and their habitats shall be avoided. When it is not possible to avoid these habitats, renewable energy facilities shall be designed to minimize impacts on game trails, migration routes, and nesting and breeding areas of Tribally important species. Mitigation and monitoring procedures shall be developed in consultation with the affected Tribe(s).	S, C, O, D
120	Solar/Wind	Archaeology	Archaeological sites created by ancestral Native American populations shall be avoided whenever possible. However, when archaeological excavations are necessary, affiliated Tribe(s) shall be consulted in developing research designs and data recovery plans. Possible mitigations include scientific excavation; monitoring or participation in excavations by Tribal representatives; or approved curation of collections in tribal facilities that meet government standards to ensure appropriate preservation and management.	S, C, O, D
121	Solar/Wind	Art	Rock art (panels of petroglyphs and/or pictographs) shall be avoided whenever possible. These panels may be just one component of a larger cultural landscape, in which avoidance of all impacts may not be possible. Mitigation plans for eliminating or reducing (minimizing) potential impacts on rock art shall be formulated in consultation with the appropriate Tribal cultural authorities.	S, C, O, D

Table B-1 (continued)
Design Features

No.	Technology	Topic	Description of Measure	Phase
Noise - Vibration				
122	Solar/Wind	Noise baseline	Project developers shall take measurements to assess the existing background ambient sound levels both within and outside the project site and compare those with the anticipated noise levels associated with the proposed facility. The ambient measurement protocols of all affected land management agencies shall be considered and utilized. Nearby residences and likely sensitive human and wildlife receptor locations shall be identified at this time. Site facilities to avoid locations in close proximity to sensitive noise receptors (for example, residences, hospitals, and schools).	S
123	Wind	Equipment	Adhere to applicable wind turbine national or international acoustic design standards (for example, International Energy Agency, International Electrotechnical Commission, and the American National Standards Institute).	S
124	Solar/Wind	Timing	If residences or sensitive receptors are nearby, noisy construction and decommissioning activities shall be limited to the least noise-sensitive times of day (daytime between 7 a.m. and 7 p.m.) and weekdays. Quieter activities, such as instrumentation or interior installation, could be conducted at any time.	C, O, D
125	Solar/Wind	Monitoring/ mitigation	Prepare a noise monitoring and mitigation plan. Design the project to: minimize noise impacts to sensitive noise receptors, limit increases to less than a five to 10 dBA increase above ambient levels, and not exceed local noise standards. Address project generated noise impacts as much as possible. Consider acquiring lands to serve as buffers around the proposed facilities.	S
Paleontology				
126	Solar/Wind	Surveys	Project developers shall determine whether paleontological resources exist in a project area on the basis of the following: the sedimentary context of the area and its potential to contain paleontological resources (PFYC [potential fossil yield classification] Class, if it is available); a records search of published and unpublished literature for past paleontological finds in the area; coordination with paleontological researchers working locally in potentially affected geographic areas and geologic strata; and/or depending on the extent of existing information, the completion of a paleontological survey.	S
127	Solar/Wind	Mitigation	The Paleontological Resources Management Plan shall include a mitigation plan; mitigation may include avoidance, removal of fossils (data recovery), stabilization, monitoring, protective barriers and signs, or other physical or administrative protection measures. The Paleontological Resources Management Plan also shall identify measures to prevent potential looting, vandalism, or erosion impacts and address the education of workers and the public to make them aware of the consequences of unauthorized collection of fossils on public land.	S
128	Solar/Wind	Monitoring	If an area has a high potential but no fossils are observed during survey, monitoring by a qualified	C, O, D

Table B-1 (continued)
Design Features

No.	Technology	Topic	Description of Measure	Phase
			paleontologist may be required by the designated lead agency during all excavation and earthmoving activities in the sensitive area. Development of a monitoring plan is recommended.	
129	Solar/Wind	Monitoring	If fossils are discovered during construction, the designated lead agency shall be notified immediately. Work shall be halted at the fossil site and continued elsewhere until a qualified paleontologist can visit the site and make site-specific recommendations for collection or other resource protection. The area of the discovery shall be protected to ensure that the fossils are not removed, handled, altered, or damaged.	C, O, D
Soils				
130	Solar/Wind	Geotechnical	Ground-disturbing geotechnical studies (e.g., geotechnical drilling) shall adhere to the permitting requirements specified by the BLM in 43 CFR 2920.	S, C
131	Solar/Wind	Construction	Construction grading shall be conducted in compliance with good industry practice (e.g., the American Society for Testing and Materials [ASTM] International standard methods) and other requirements (e.g., BLM and/or local grading and construction permits), as they apply.	C, O, D
132	Solar/Wind	Disturbance area	Existing roads, disturbed areas, and borrow pits shall be used. If new roads are necessary, they shall be designed and constructed to the appropriate road design standards, such as those described in BLM Manual 9113. The specifications and codes developed by the U.S. Department of Transportation (DOT) are also to be taken into account.	S, C, O, D
133	Solar/Wind	Drainages	Land disturbance (including crossings) in natural drainage systems and groundwater recharge zones, specifically ephemeral washes and dry lake beds, are to be avoided. Any structures crossing drainages must be located and constructed so that they do not decrease bank and channel stability or increase water volume or velocity. Developers shall obtain all applicable federal and state permits.	C, O, D
134	Solar/Wind	Drainages	Solar and/or wind facilities or components (e.g., heliostats, panels, dishes, troughs, turbines, etc.) shall not be placed in natural drainage ways.	S, C, O, D
135	Solar/Wind	Drainages	Adequate space (i.e., setbacks) between renewable energy facilities and natural washes is to be maintained to preserve their hydrological function and provide a buffer for flood control.	S, C, O, D
136	Solar/Wind	Roads	New roads shall be designed to follow natural land contours and avoid or minimize hill cuts in the project area and avoid existing desert washes. Siting of new roads and walking trails (if any) is to be consistent with the designation criteria specified by the BLM in 43 CFR 8342.1.	S
137	Solar/Wind	Roads	Roads shall be designed to avoid erosion and changes in surface water runoff based on local meteorological conditions, soil moisture, and erosion potential.	S
138	Solar/Wind	Roads	Temporary roads shall be designed with eventual reclamation in mind.	S

Table B-1 (continued)
Design Features

No.	Technology	Topic	Description of Measure	Phase
139	Solar/Wind	Erosion control	Erosion controls that comply with county, State, and Federal standards shall be applied. Practices such as jute netting, silt fences, and check dams shall be applied near disturbed areas. Erosion control structures (e.g., rock lining or apron) shall be added at culvert outlets to reduce flow velocity and minimize the potential for scouring.	C, O, D
Transportation				
140	Solar/Wind	Easements/encroachments	Easements could be required for public roadway corridors through a site to maintain proper traffic flows and retain more direct routing for the local population.	S
141	Solar/Wind	Easements/encroachments	Obtain encroachment permits from appropriate agencies.	C, O, D
142	Solar/Wind	Transportation plans	An access road siting and management plan shall be prepared incorporating existing BLM standards regarding road design, construction, and maintenance such as those described in the BLM 9113 Manual and the Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development (revised 2007).	S
143	Solar/Wind	Transportation plans	A transportation plan shall be developed, particularly for the transport of turbine components, main assembly cranes, and other large pieces of equipment. The plan shall consider specific object sizes, weights, origin, destination, and unique handling requirements and shall evaluate alternative transportation approaches. In addition, the process to be used to comply with unique state requirements and to obtain all necessary permits shall be clearly identified.	S
144	Solar/Wind	Transportation plans	A traffic management plan shall be prepared for the site access roads to ensure that no hazards would result from increased truck traffic and that traffic flow would not be adversely impacted. This plan shall incorporate measures such as informational signs, flaggers when equipment may result in blocked throughways, and traffic cones to identify any necessary changes in temporary lane configuration.	S
145	Solar/Wind	Design	Existing roads shall be used, but only if in safe and environmentally sound locations. If new roads are necessary, they shall be designed and constructed to the appropriate BLM road design standards and be no higher than necessary to accommodate their intended functions (e.g., traffic volume and weight of vehicles). Excessive grades on roads, road embankments, ditches, and drainages shall be avoided, especially in areas with erodible soils. Special construction techniques shall be used, where applicable. Abandoned roads and roads that are no longer needed shall be recontoured and revegetated.	S, C, O, D
Visual Resources				
146	Solar/Wind	VRM	Project developers shall consult with the BLM early in project planning to help determine the proposed project's conformance to the applicable RMP's VRM Class designation. VRM	S

Table B-1 (continued)
Design Features

No.	Technology	Topic	Description of Measure	Phase
			considerations shall take place early in the project planning phase in accordance with BLM VRM manual and handbooks. Operators shall utilize digital terrain mapping tools at a landscape/viewshed scale for site planning and design, visual impact analysis, and visual impact mitigation planning and design. Visual mitigation planning and design shall be performed through field assessments, applied GPS technology, photo documentation, use of computer-aided design and development software, and visual simulations to reflect a full range of visual resource best management practices. The digital terrain mapping tools shall be at a resolution and contour interval suitable for site design and accurate placement of proposed developments into the digital viewshed. Visual simulations shall be prepared and evaluated in accordance with BLM Handbook H-8432-1, or other agency requirements, to create spatially accurate depictions of the appearance of proposed facilities. Simulations shall depict proposed project facilities from Key Observation Points and other visual resource sensitive locations.	
147	Solar/Wind	VRM	The BLM VRM class values, including Scenic Quality, Sensitivity, and Distance Zones, shall be factored into the project planning, design, and decision making, and demonstrate how the visual values influence project design and document how impacts on these values are minimized through consideration for proposed project location and its relationship to the surrounding viewshed.	S
148	Solar/Wind	VRM	Facilities proposed within the foreground/midground distance zone (0 to 5 mi [0 to 8 km]) of National Scenic Highways and All-American Roads shall include measures to minimize the profile of all structures related to the facility so that the viewshed from the scenic highway meets VRM objectives. The project developer shall evaluate the potential visual impacts on National Scenic Highways and All-American Roads associated with the proposed project and identify appropriate mitigation measures for inclusion as stipulations in the Plan of Development.	S
149	Solar/Wind	Design	The public shall be involved and informed about the visual site design elements of the proposed renewable energy facilities. Possible approaches include conducting public forums for disseminating information, offering organized tours of operating wind developments, and using computer and visualization simulations in public presentations.	S
150	Solar/Wind	Design	A qualified, licensed, and experienced professional landscape architect shall be a part of the planning teams evaluating visual resource issues.	S
151	Solar/Wind	Design	BLM field office and locally based public shall be consulted to provide input on identifying important visual resources in the project area and on the siting and design process.	S
152	Solar/Wind	Design	Project developers shall also consult with the respective land management agencies assigned administrative responsibility Special designations, such as WA, NSHT, WSR, NPs, and NWRs	S

Table B-1 (continued)
Design Features

No.	Technology	Topic	Description of Measure	Phase
			located within the project's viewshed.	
153	Solar/Wind	Design	Project developers shall obtain engineering-design-quality topographical data and use digital terrain mapping tools at a landscape-viewshed scale for project location selection, site planning and design, visual impact analysis, and visual impact mitigation planning and design.	S
154	Solar/Wind	Design	Visual mitigation planning and design shall be performed through field assessments, applied global positioning system (GPS) technology, photo documentation, use of computer-aided design and development software, 3-D GIS modeling software and imaging software to depict visual simulations to reflect a full range of visual resource mitigation measures.	S
155	Solar/Wind	Design	Project developers shall exhaust opportunities of projects to be sited outside the viewsheds of KOPs, or if facilities must be sited within view of KOPs then they shall be sited as far away as possible, since visual impacts generally diminish as viewing distance increases.	S
156	Solar/Wind	Design	Structures and roads shall be designed and located to minimize and balance cuts and fills. Retaining walls, binwalls, half bridges, and tunnels shall be used to reduce cut and fill.	S
157	Solar/Wind	Surface disturbance	Natural or previously excavated bedrock landforms shall be sculpted and shaped when excavation of these landforms is required. Percent backslope, benches, and vertical variations shall be integrated into a final landform that repeats the natural shapes, forms, textures, and lines of the surrounding landscape. The earthen landform shall be integrated and transitioned into the excavated bedrock landform. Sculpted rock face angles, bench formations, and backslope need to adhere to the natural bedding planes of the natural bedrock geology. Half-case drill traces from presplit blasting shall not remain evident in the final rock face. The color contrast from the excavated rock faces shall be removed by color treating with a rock stain. Native vegetation (where feasible, or a mix of native and non-native species if necessary to ensure successful revegetation) shall be reestablished with the benches and cavities created within the created bedrock formation.	C, O, D
158	Solar/Wind	Surface disturbance	The project developer shall maintain revegetated surfaces until a self-sustaining stand of vegetation is reestablished and visually adapted to the undisturbed surrounding vegetation. No new disturbance shall be created during operations without completion of a VRM analysis and approval by the authorized officer.	C, O, D
159	Solar/Wind	Special areas	Specific to NHTs, but possibly pertaining to other special designations, NPs and NWRs: <ul style="list-style-type: none"> For applications that include remnants of a National Historic Trail, are located within the viewshed of a National Historic Trail's designated centerline, or include or are within the viewshed of a trail eligible for listing in the NRHP by virtue of its integrity of setting and feeling, the applicant shall evaluate the 	S, C, O, D

Table B-1 (continued)
Design Features

No.	Technology	Topic	Description of Measure	Phase
			<p>potential visual impacts on the trail, minimize, avoid, or mitigate adverse effects, and identify appropriate mitigation measures as stipulations in the Plan of Development (see also Cultural Resources).</p> <ul style="list-style-type: none"> Because the landscape setting observed from national historic sites, national trails, and Tribal cultural resources may be a part of the historic context contributing to the historic significance of the site or trail, project siting project siting will strive to avoid locating facilities that would alter the visual setting such that they would reduce the historic significance or function. 	
160	Solar/Wind	Lighting	<p>A Lighting Plan shall be prepared that documents how lighting will be designed and installed to minimize night-sky impacts during facility construction and operations phases. Lighting for facilities shall not exceed the minimum number of lights and brightness required for safety and security and shall not cause excessive reflected glare. Full cut-off luminaires shall be utilized to minimize uplighting. Lights shall be directed downward or toward the area to be illuminated. Light fixtures shall not spill light beyond the project boundary. Lights in high-illumination areas not occupied on a continuous basis shall have switches, timer switches, or motion detectors so that the lights operate only when the area is occupied. Where feasible, vehicle-mounted lights shall be used for night maintenance activities. Wherever feasible, consistent with safety and security, lighting shall be kept off when not in use. The Lighting Plan shall include a process for promptly addressing and mitigating complaints about potential lighting impacts.</p>	S, C, O
161	Solar/Wind	Color	<p>Multiple color camouflage technology applications shall be considered for projects within sensitive viewsheds and with visibility distance between 0.25 and 2 mi (0.40 and 3.20 km). BLM guidance on the use of color to mitigate visual impacts shall be consulted.</p>	C, O
162	Solar	Glare	<p>Solar facilities shall be sited and designed properly to eliminate glinting and glare effects on roadway users, nearby residences, commercial areas or other highly sensitive viewing locations, or reduce it to the lowest achievable levels. A study to assess accurately and to quantify potential glinting and glare effects and to determine potential health, safety, and visual impacts associated with glinting and glare effects shall be conducted by qualified individuals using appropriate and commonly accepted software and procedures. The study results must be made available to the BLM in advance of project approval. If the project design is changed during the siting and design process such that substantial changes to glinting and glare effects may occur, glinting and glare effects shall be recalculated, and the study results made available to the BLM.</p>	S
163	Solar	Glare	<p>Mirrors/heliostats shall be deployed and operated to avoid high-intensity light (glare) being reflected toward off-site ground receptors. Where off-site glare is unavoidable, fencing with</p>	S, C, O

Table B-1 (continued)
Design Features

No.	Technology	Topic	Description of Measure	Phase
			privacy slats or similar screening materials shall be employed.	
164	Solar/Wind	Glare	Commercial symbols or signs and associated lighting on buildings or other structures shall be prohibited.	S, C, O
165	Solar/Wind	Transmission	Electricity transmission-distribution projects shall utilize non-specular conductors and non-reflective coatings on insulators.	S, O
166	Solar/Wind	Reclamation	A Decommissioning and Site Reclamation Plan shall be developed, approved by the BLM, and implemented. The plan shall require that all aboveground and near-ground structures be removed. Some structures shall be removed only to a level below the ground surface that will allow reclamation/restoration. Topsoil from all decommissioning activities shall be salvaged and reapplied during final reclamation. The plan shall include provisions for monitoring and determining compliance with the project's visual mitigation and reclamation objectives.	D
Water Resources				
167	Solar	Water supply	Project developers shall plan to implement water conservation measures relating to solar energy technology water needs in order to reduce project water requirements. Developers would minimize the consumptive use of fresh water for power plant cooling by, for example, using dry cooling, using recycled or impaired water, or selecting solar energy technologies that do not require cooling water.	S, O
168	Solar/Wind	Water supply	Project developers shall quantify water source, timing, and use requirements for project construction, operation, and decommissioning.	S, C, O, D
169	Solar/Wind	Water supply	Project developers shall coordinate with appropriate water rights agencies for securing water rights. Project developers shall choose appropriate water sources with respect to available water rights and management practices, as well as consideration of maintaining aquatic, riparian, and other water-dependent sources.	S
170	Solar/Wind	Groundwater	Project developers who plan to use groundwater shall develop and implement a groundwater Water Resources Monitoring and Mitigation Plan, which includes monitoring the effects of groundwater withdrawal for project uses, vegetation restoration and dust control uses during decommissioning and aquifer recovery after project decommissioning. Monitoring frequency shall be decided on a site-specific basis and in coordination with federal, state, and local agencies managing groundwater resources of the region.	S, C, O, D
171	Solar/Wind	Groundwater	If groundwater use is proposed, project developers shall ensure that a comprehensive analysis of the groundwater basin is provided and that the following potential significant impacts are evaluated: <ul style="list-style-type: none"> • Creation or exacerbation of overdraft conditions and their potential to cause 	S

Table B-1 (continued)
Design Features

No.	Technology	Topic	Description of Measure	Phase
			<p>subsidence and loss of aquifer storage capacity;</p> <ul style="list-style-type: none"> • Use that cause injury to other water rights claims in the basin; • Estimates of the total cone of depression considering cumulative drawdown from all potential pumping in the basin, including the project, for the life of the project through the decommissioning phase; • Changes in water quality that affect other beneficial use; and • Effects on groundwater dependent ecosystems such as springs, seeps, and wetlands that provide water for plants and animals. 	
172	Solar/Wind	Groundwater	<p>Groundwater wells constructed during any stage of the project would conform to state and local standards and records shall include:</p> <ul style="list-style-type: none"> • Legal description (township, range, section, and quarter section);Project map with proposed and existing well locations; • Well design characteristics: casing diameter, screened interval(s), well depth, and static water level; • Results of groundwater pumping tests or other tests done in the well; • Anticipated pumping capacity and peak pumping rates; • Identification of the groundwater aquifer and its hydrogeologic characteristics; • Estimation of the potential cone of depression that might be produced by the proposed pumping throughout the lifetime of a project by using an analytical or numerical model; and • Estimate of the total cone of depression considering cumulative drawdown from all potential pumping in the basin, including the project, for the life of the project through the decommissioning phase (also using an analytical or numerical model). 	S
173	Solar/Wind	Surface water	<p>Project developers who plan to use surface water sources shall develop a Water Resources Monitoring and Mitigation Plan that includes monitoring changes in flows, volumes, and water quality during construction and operations, as well as their recovery during decommissioning. Monitoring frequency shall be decided on a site-specific basis and in coordination with federal, state, and local agencies managing surface water resources of the region.</p>	S
174	Solar/Wind	Surface water	<p>Project developers shall plan to avoid impacts on existing surface water features, including streams, lakes, wetlands, floodplains, intermittent streams, playas, and</p>	S, C, O, D

Table B-1 (continued)
Design Features

No.	Technology	Topic	Description of Measure	Phase
			ephemeral washes/drainages (any unavoidable impacts would be minimized), in the development and in nearby regions according to: <ul style="list-style-type: none"> • All sections of the Clean Water Act 33 USC §1251 et seq. (1972), Safe Drinking Water Act 42 USC §300f et seq. (1974), and Arizona Executive Order No. 91-6 Protection of Riparian Areas (Feb. 14, 1991); • Executive Order No. 11988 Floodplain Management (May 24, 1977) and Executive Order No. 11990 Protection of Wetlands (May 24, 1977); • EPA stormwater management guidelines (EPA 2009a) and applicable state and local stormwater management guidelines; • Wild and Scenic Rivers System (Public Law 90-542; 16 U.S.C. 1271 et seq.). 	
175	Solar/Wind	Water quality	Potable water supplies shall meet all required federal, state, and local water quality standards (e.g. Sections 303 and 304 of the CWA). Developers shall identify wastewater treatment measures and new or expanded facilities, if any, to be included as part of the facility's NPDES permit.	C, O, D
176	Solar/Wind	Water quality	No project and/or project related activities shall degrade, negatively effect, and/or contribute to impairment of existing surface water quality conditions for waterbodies that are Federally designated on the CWA section 303(d) list of impaired surface waters and existing water quality shall be maintained and protected in a surface water that is classified as an Outstanding Arizona Water (OAW) under Arizona Administrative Code R18-11-112 or designated Arizona's Outstanding Natural Resource Waters.	C, O, D
177	Solar/Wind	Water quality	When an herbicide/pesticide is used to control vegetation, the climate, soil type, slope, and vegetation type shall be considered in determining the risk of herbicide/pesticide contamination (BLM 2006a). Additionally, an Animal, Pest, and Vegetation Control Plan shall be developed to ensure that applications are conducted within the framework of BLM and U.S. Department of the Interior (DOI) policies and standard operating procedures and entail only the use of EPA-registered pesticides/herbicides that also comply with state and local regulations.	C, O, D
178	Solar/Wind	Flooding	Projects developers shall maintain the pre-development flood hydrograph for all storms up to and including the 100-yr rainfall event. All stormwater retention and/or infiltration and treatment systems shall also be designed for all storms up to and including the 100-yr storm event. As part of a Spill Prevention and Emergency Response Plan, measures to prevent potential groundwater and surface water contamination shall be identified.	S, C, O, D
179	Solar/Wind	Hydrology	Developers shall be required to conduct a detailed hydrologic study demonstrating a clear understanding of the local surface water and groundwater hydrology. At a minimum this	S

Table B-1 (continued)
Design Features

No.	Technology	Topic	Description of Measure	Phase
			<p>hydrologic study shall include:</p> <ul style="list-style-type: none"> • Quantification of physical characteristics describing surface water features, such as streamflow rates, stream cross-sections, channel routings, seasonal flow rates (intermittent streams), peak flow rates (ephemeral washes/drainages), sediment characteristics and transport rates, lake depths, and surface areas of lakes, wetlands, and floodplains; • Hydrologic analysis and modeling to define the 100-yr, 24-hour rainfall event for the project area and calculation of projected runoff from this storm at site; • Hydrologic analysis and modeling to identify 100-yr floodplain boundaries of any surface water feature on the site; • Quantification of physical characteristics describing the groundwater aquifer, such as physical dimensions of the aquifer, sediment characteristics, confined/unconfined conditions, hydraulic conductivity and transmissivity distribution of the aquifer, groundwater surface elevations, and groundwater flow processes (direction, recharge/discharge, current basin extractions, and surface water-groundwater connectivity); • Quantification of regional climate including seasonal and long-term information on temperatures, precipitation, evaporation, and evapotranspiration; and • Quantification of the sustainable yield of surface waters and groundwater available to the project. Project developers shall evaluate the water sources in terms of existing water rights and management plans for adequacy to serve project demands while maintaining aquatic, riparian, and other water-dependent resources. 	
180	Solar/Wind	Wastewater	Developers shall coordinate with state/local regulatory agencies regarding the issuance of permits or “will-serve” agreements for development and use of water, and/or the operation of on-site wastewater treatment systems.	S, O
181	Solar/Wind	Wastewater	Comply with local requirements for permanent, domestic water use and wastewater treatment. The treatment of sanitary and industrial wastewater either on-site or off-site would comply with federal, state, and local regulations. Any discharges to surface waters would need NPDES permitting. Any storage or treatment of wastewater on-site shall have proper lining of holding ponds and tanks to prevent leaks.	C, O, D
182	Solar/Wind	Stormwater	The facility shall obtain and comply with a construction stormwater permit through the EPA or state-run NPDES program (whichever applies within the state). Additionally, the EPA requires	S, C, O, D

Table B-1 (continued)
Design Features

No.	Technology	Topic	Description of Measure	Phase
			any development larger than 20 acres (0/08 km ²) begun after August 2011 to comply with a requirement to monitor construction discharges for turbidity concentrations (EPA 2009c).	
183	Solar/Wind	Mitigation	The Project Proponent will compensate for the loss of ephemeral drainage habitat through in-kind habitat restoration of a portion of the main drainage at a minimum ratio of 2:1. Restoration components may include removal of accumulated sediment, bank stabilization, planting of vegetation, sediment control measures, establishing protective habitat buffers, placing a conservation easement over the restored drainage and buffer, and funding an endowment that will provide for long-term management.	C
184	Solar/Wind	Mitigation	<p>A Drainage, Erosion, and Sedimentation Control Plan shall be developed that ensures protection of water quality and soil resources, demonstrates no increase in off-site flooding potential, and includes provisions for stormwater and sediment retention on the project site. The plan would identify site surface water runoff patterns and develop mitigation measures that prevent excessive and unnatural soil deposition and erosion throughout and downslope of the project site and project-related construction areas. The plan would achieve the following:</p> <ul style="list-style-type: none"> • Runoff from parking lots, roofs, or other impervious surfaces would be directed to the immediate landscape or to retention basins prior to being released downgradient of the site. • Any landscaping used for stormwater treatment shall not be an invasive species and preferably a native species and would require little or no irrigation and would be recessed to create retention basins/areas used to capture runoff. • The amount of area covered by impervious surfaces would be reduced through the use of permeable pavement or other pervious surfaces. • Natural drainages and a pre-project hydrograph would be maintained for the area. Siting in identified 100-yr floodplains shall not be allowed within the development. 	S, C, D
Wild Horses and Burros				
185	Solar/Wind	Mitigation	Activities of project developers shall be coordinated with the designated lead agency to ensure that impacts on wild horses and burros and their management areas are minimized. Issues that would need to be addressed could include the installation of fencing and access control, provision for movement corridors, delineation of open range, traffic management (e.g., vehicle speeds), compensatory habitat restoration, and access to or development of water sources.	S, C, O, D

Table B-I (continued)
Design Features

No.	Technology	Topic	Description of Measure	Phase
Wildfire				
186	Solar/Wind	Noxious weeds	A vegetation plan designed to prevent the establishment of non-native, invasive species on the solar energy facility and along transmission line ROWs and roads shall be developed and implemented to minimize the potential for increasing wildland fire frequency.	S, C, O, D
187	Solar/Wind	Firebreak	The ROW for the renewable energy facilities shall be sized to ensure there is a large enough firebreak inside the ROW so there would be no threat to facilities either from wildland fire approaching from outside the ROW or from fire moving from inside to outside of the ROW. This distance should be determined through coordination with fire management staff and should be undertaken specifically to remove the need for protective responses, both active and passive (e.g., vegetation manipulation), by the designated lead agency, state, and local fire organizations.	S

**Table B-2
Required Plans**

Construction, Operation, and Maintenance Plan	Applicants are required to prepare a COM Plan that incorporates the stipulations and conditions of each agency. The COM Plan will provide information on the project's design, construction, operation and maintenance, and environmental mitigation measures that will be used and implemented by construction contractors and personnel.
Access Road Siting and Management Plan	An access road siting and management plan shall be prepared incorporating existing BLM standards regarding road design, construction, and maintenance such as those described in the BLM 9113 Manual and the Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development (revised 2007).
Compensatory Wetland Mitigation & Monitoring Plan	Compensatory Wetland Mitigation and Monitoring Plan (CWMMP) describes the mitigation of potential impacts to wetlands that would result from a proposed project. The proposed mitigation measures set forth in this Plan are intended to compensate for project impacts. The proposed compensatory mitigation measures described in this Plan address the direct, indirect, and cumulative impacts associated with a proposed project. The overall objective of the CWMMP is to ensure that there will be no net loss of wetland function or area.
Decommissioning & Site Reclamation Plan (Solar & IM 2009-043)	<p>Prior to the termination of the right-of-way authorization, a decommissioning plan shall be developed and approved by the BLM. The decommissioning plan shall include a site reclamation plan and monitoring program.</p> <p>A Decommissioning and Site Reclamation Plan specific to the project shall be developed and implemented. Baseline data shall be collected in each project area as a benchmark for measuring the success of reclamation efforts. The plan shall contain an adaptive management component that allows for the incorporation of lessons learned from monitoring data. The plan shall require that land surfaces be returned to pre-development contours to the greatest extent feasible immediately following decommissioning. The plan shall focus on the establishment of native plant communities similar to those present in the vicinity of the project site. The plan shall be designed to expedite the re-establishment of vegetation and require restoration to be completed as soon as practicable. To ensure rapid and successful re-establishment efforts, the plan shall specify site-specific measurable success criteria, including target dates, which shall be developed in coordination with the BLM and which shall be required to be met by the operator. Vegetation re-establishment efforts shall continue until all success criteria have been met. Bonding to cover the full cost of vegetation re-establishment shall be required. Species used for vegetation re-establishment shall consist of native species dominant within the plant communities existing in adjacent areas having similar soil conditions. The plan shall require the use of weed-free seed mixes of native shrubs, grasses, and forbs of local sources where available. When available, seed of known origin as labeled by state seed certification programs shall be used. Local native genotypes shall be used. If cultivars of native species are used, certified seed (i.e., blue tag) shall be used. "Source identified" seed (i.e., yellow tag) shall be used when native seed is collected from wildland sites. The cover, species composition, and diversity of the re-established plant community shall be similar to those in the vicinity of the site. In areas where suitable native species are unavailable, other plant species approved by the BLM could be used. If non-natives are necessary they shall be non-invasive, non-competitive, and ideally are short-lived, have low reproductive capabilities, or be self-pollinating to prevent gene flow into the native community. Non-natives used shall not exchange genetic material with common native plant species. The plan shall also include site-specific, measurable success criteria that must be met. The plan shall be developed in coordination with appropriate federal and state agencies.</p>

Table B-2 (continued)
Required Plans

	<p>The plan shall require that all above ground and near-ground structures be removed. Some structures shall be removed only to a level below the ground surface that will allow reclamation/restoration. Topsoil from all decommissioning activities shall be salvaged and reapplied during final reclamation. The plan shall include provisions for monitoring and determining compliance with the project's visual mitigation and reclamation objectives.</p> <p>Reclamation of the construction site shall begin immediately after construction to reduce the likelihood of visual contrasts associated with erosion and invasive weed infestation and to reduce the visibility of affected areas as quickly as possible.</p>
Drainage, Erosion & Sedimentation Control Plan	<p>A Drainage, Erosion, and Sedimentation Control Plan shall be developed that ensures protection of water quality and soil resources, demonstrates no increase in off-site flooding potential, and includes provisions for stormwater and sediment retention on the project site. The plan would identify site surface water runoff patterns and develop mitigation measures that prevent excessive and unnatural soil deposition and erosion throughout and downslope of the project site and project-related construction areas. The plan would achieve the following:</p> <ul style="list-style-type: none"> • Runoff from parking lots, roofs, or other impervious surfaces would be directed to the immediate landscape or to retention basins prior to being released downgradient of the site • Any landscaping used for stormwater treatment would require little or no irrigation and would be recessed to create retention basins/areas used to capture runoff • The amount of area covered by impervious surfaces would be reduced through the use of permeable pavement or other pervious surfaces • Natural drainages and a pre-project hydrograph would be maintained for the area
Dust Abatement Plan	<p>Plants, wildlife, and their habitats shall be protected from fugitive dust through measures included in the facility's Dust Abatement Plan.</p>
Ecological Resources Mitigation & Monitoring Plan	<p>A vegetation plan designed to prevent the establishment of non-native, invasive species on the solar energy facility and along transmission line ROWs and roads shall be developed and implemented to minimize the potential for increasing wildland fire frequency</p> <p>An Ecological Resources Mitigation and Monitoring Plan shall be developed to avoid, minimize, or mitigate adverse impacts on important ecological resources. The plan shall include but not necessarily be limited to the following elements:</p> <ul style="list-style-type: none"> • Revegetation, soil stabilization, and erosion reduction measures that shall be implemented to ensure that all temporary use areas are restored. The plan shall require that restoration occur as soon as possible after completion of activities to reduce the amount of habitat converted at any one time and to speed up the recovery to natural habitats. • Mitigation and monitoring unavoidable impacts on waters of the United States, including wetlands. • Compensatory mitigation and monitoring for significant direct, indirect, and cumulative impacts on and loss of habitat for special status plant and animal species. • Demonstration of compliance of the project with the regulatory requirements of the Bald and Golden Eagle Protection Act. The plan shall be developed in coordination with the USFWS. • Measures to protect birds (including migratory species protected under the

Table B-2 (continued)
Required Plans

	<p>Migratory Bird Treaty Act) developed in coordination with the appropriate federal and state agencies (e.g., BLM, USFWS, and state resource management agencies).</p> <ul style="list-style-type: none"> • Measures to mitigate and monitor impacts on special status species developed in coordination with the appropriate federal and state agencies (e.g., BLM, USFWS, and state resource management agencies) • Monitoring the potential for increase in predation of special status species (especially desert tortoise) from ravens and other species that are attracted to developed areas and opportunistically use tall structures to spot vulnerable prey. • Clearing and translocation of special status species, including the steps to implement the translocation as well as the follow-up monitoring of populations in the receptor locations, as determined in coordination with the appropriate federal and state agencies. The need for a Special Status Species Clearance and Translocation Plan shall be determined on a project-specific basis • Prepare a project specific ecological mitigation and monitoring plan in cooperation with and that meets the approval of permitting agencies. Carry out the plan during all phases of the project and, in general, identify appropriate mitigation levels to compensate for significant direct, indirect, and cumulative impacts, including habitat, special status plant, and wildlife species losses. Address at a minimum: <ul style="list-style-type: none"> ○ Biological resource mitigation, monitoring, and compliance measures required by federal, state, and local applicable permitting agencies. ○ Documentation (based on surveys) of sensitive plant and wildlife expected to be affected by all phases of the project (project construction, operation, abandonment, and decommissioning). Agencies may request additional surveying, based on the documentation or past experience working with the resources. Include measures to avoid or minimize impacts to species and habitat. ○ A detailed description of measures to minimize or mitigate permanent and temporary disturbances from construction activities. ○ All locations on a map, at an approved scale, of sensitive plant and wildlife areas subject to disturbance and areas requiring temporary protection and avoidance during construction. ○ Aerial photographs or images, at an approved scale, of areas to be disturbed during project construction activities. ○ Duration for each type of monitoring and a description of monitoring methodologies and frequency. ○ Performance standards and criteria to be used to determine if/when proposed mitigation is or is not successful. ○ All standards and remedial measures to be implemented if performance standards and criteria are not met. ○ A closure/decommissioning or abandonment plan, including a description of funding mechanism(s).
<p>Fire Management & Protection Plan</p>	<p>A Fire Management and Protection Plan shall be developed to implement measures to minimize the potential for a human-caused fire to affect ecological resources and respond to natural fire situations.</p> <p>A Fire Management and Protection Plan shall be developed to implement measures to minimize the potential for fires associated with substances used and stored at the site. The flammability of the specific HTF used at the facility shall be considered.</p> <p>Operators shall develop a Fire Management and Protection Plan to implement</p>

Table B-2 (continued)
Required Plans

	<p>measures to minimize the potential for a human-caused fire and to respond to human-caused or natural-caused fires. Carry out the plan during all phases of project development. Train site workers to respond, as appropriate, to fires. Maintain a 30-foot firebreak within the fenced area containing project facilities.</p>
<p>Glint & Glare Assessment, Mitigation & Monitoring Plan</p>	<p>A study to assess accurately and to quantify potential glinting and glare effects and to determine potential health, safety, and visual impacts associated with glinting and glare effects shall be conducted by qualified individuals using appropriate and commonly accepted software and procedures. The study results must be made available to the BLM in advance of project approval. If the project design is changed during the siting and design process such that substantial changes to glinting and glare effects may occur, glinting and glare effects shall be recalculated, and the study results made available to the BLM.</p> <p>Parabolic trough and power tower facilities shall develop a Glare Monitoring Plan to log, investigate, and respond to complaints about glare, either from heliostats or from the tower receivers.</p>
<p>Habitat Restoration & Management Plan (Solar & IM 2009-043)</p>	<p>A habitat restoration plan shall be developed to avoid, minimize, or mitigate negative impacts on vulnerable wildlife while maintaining or enhancing habitat values for other species. The plan shall identify reclamation, soil stabilization, and erosion reduction measures that shall be implemented to ensure that all temporary use areas are restored. The plan shall require that restoration occur as soon as possible after completion of activities to reduce the amount of habitat converted at any one time and to speed up the recovery to natural habitats.</p>
<p>Heliostat Positioning Plan</p>	<p>A Heliostat Positioning Plan shall be prepared for power tower projects to avoid exposures to reflected sunlight that could cause retinal damage, temporary blindness, or distraction to operators of aircraft or motorized vehicles on roads in the vicinity of facilities. The plan should also avoid use of “standby points” (i.e., focal points away from the receiver vessel when all mirrors are not needed and some are in standby mode), but rather keep reflected beams dispersed to avoid impacts to birds through incineration.</p>
<p>Historic Properties Treatment Plan</p>	<p>Retain a qualified cultural resources specialist to write and carry out a monitoring and mitigation plan or agreement, when applicable, and to be available if cultural resources are encountered during construction. Avoidance of known cultural resources is generally the preferred resolution option; include in the plan measures to protect avoided resources during construction and to prevent looting/vandalism and erosion. If project impacts to known NRHP-eligible cultural resources are unavoidable, data recovery may be requested; include a data recovery strategy in the plan. The project developer may also be asked by the appropriate lead agency to include additional measures for addressing the discovery of previously unknown cultural resources during construction. Consider the following measures, at a minimum:</p> <ul style="list-style-type: none"> • Hire a qualified archaeological monitor to oversee project excavations. • Develop and use a cultural resources construction personnel training program to promote cultural resources identification and lawful and appropriate response to discoveries. • Notify involved agencies of unexpected cultural or historical resources discoveries during construction. The project developer may be asked or ordered to cease construction in the vicinity of the discovery to allow evaluation and formulation of appropriate mitigation measures. • If human remains are discovered, cease construction and consult with the lead agencies. The agencies will likely follow particular state and federal laws that

Table B-2 (continued)
Required Plans

	<p>address the treatment of human remains.</p> <ul style="list-style-type: none"> • Where unavoidable impacts from project construction are expected, recover data from newly discovered NRHP-eligible cultural resources. • Have the cultural resources specialist prepare a report documenting archaeological monitoring and data recovery activities. <p>Project proponents should expect to provide input to lead agency-prepared mitigation plans, agreement documents and related historic properties treatment plans. Treatment plans will guide:</p> <ul style="list-style-type: none"> • Completion of a 100 percent archaeological surface survey (if not completed earlier in the permitting/pre-construction phase). • Outstanding geoarchaeological investigations. • Evaluation of newly identified cultural resources for NRHP eligibility. • Assessment of project impacts to NRHP-eligible cultural resources. • Development of measures to address the effects of the project on such eligible resources to avoid or reduce impacts as much as possible. <p>IM 2009-043 - Cultural Resources Management Plan</p> <p>If cultural resources are present at the site, or if areas with a high potential to contain cultural material have been identified, a cultural resources management plan (CRMP) shall be developed. This plan shall address mitigation activities to be taken for cultural resources found at the site. Avoidance of the area is always the preferred mitigation option. Other mitigation options include archaeological survey and excavation, and monitoring. If an area exhibits a high potential, but no artifacts were observed during an archaeological survey, monitoring by a qualified archaeologist may be required during all excavation and earthmoving in the high-potential area. A report shall be prepared documenting these activities. The CRMP also shall (1) establish a monitoring program, (2) identify measures to prevent potential looting/vandalism or erosion impacts, and (3) address the education of workers and the public to make them aware of the consequences of unauthorized collection of artifacts and destruction of property on public lands.</p>
<p>Integrated Vegetation Management Plan</p>	<p>An Integrated Vegetation Management Plan shall be developed that is consistent with applicable regulations and agency policies for the control of noxious weeds and invasive plant species. The plan shall address monitoring; ROW vegetation management; the use of certified weed-free seed and mulching; the cleaning of vehicles to avoid the introduction of invasive weeds; and the education of personnel on weed identification, the manner in which weeds spread, and the methods for treating infestations. For transmission line ROWs, the plan shall be consistent with the existing vegetation management plan for that ROW. Principles of integrated pest management, including biological controls, shall be used to prevent the spread of invasive species. The plan shall include periodic monitoring, reporting, and immediate eradication of noxious weed or invasive species occurring within all managed areas. A controlled inspection and cleaning area shall be established to visually inspect construction equipment arriving at the project area and to remove and collect seeds that may be adhering to tires and other equipment surfaces. To prevent the spread of invasive species, project developers shall work with the local BLM field office to determine whether a pre-activity survey is warranted, and if so, conduct the survey. If invasive plant species are present, project developers shall work with the local BLM field office to develop a control strategy. The plan shall include a post-construction monitoring element that incorporates adaptive management protocols.</p>

Table B-2 (continued)
Required Plans

Lighting Plan	A Lighting Plan shall be prepared that documents how lighting will be designed and installed to minimize night-sky impacts during facility construction and operations phases. Lighting for facilities shall not exceed the minimum number of lights and brightness required for safety and security and shall not cause excessive reflected glare. Full cut-off luminaires shall be utilized to minimize uplighting. Lights shall be directed downward or toward the area to be illuminated. Light fixtures shall not spill light beyond the project boundary. Lights in high-illumination areas not occupied on a continuous basis shall have switches, timer switches, or motion detectors so that the lights operate only when the area is occupied. Where feasible, vehicle-mounted lights shall be used for night maintenance activities. Wherever feasible, consistent with safety and security, lighting shall be kept off when not in use. The Lighting Plan shall include a process for promptly addressing and mitigating complaints about potential lighting impacts.
Noxious Weeds & Invasive Species Plan (IM 2009-043 & SPEIS)	Operators shall develop a plan for control of noxious weeds and invasive species, which could occur as a result of new surface disturbance activities at the site. The plan shall address monitoring, education of personnel on weed identification, the manner in which weeds spread, and methods for treating infestations. The use of certified weed-free mulch and certified weed-free seed shall be required. If trucks and construction equipment are arriving from locations with known invasive vegetation problems, a controlled inspection and cleaning area shall be established to visually inspect construction equipment arriving at the project area and to remove and collect seeds that may be adhering to tires and other equipment surfaces.
Nuisance Animal & Pest Control Plan (IM 2009-043 - Integrated Pest Management Plan)	An Animal, Pest, and Vegetation Control Plan shall be developed to ensure that applications are conducted within the framework of BLM and U.S. Department of the Interior (DOI) policies and standard operating procedures and entail only the use of EPA-registered pesticides/herbicides that also comply with state and local regulations. Any vehicle-wildlife collisions shall be immediately reported to security. Observations of potential wildlife problems, including wildlife mortality, shall be immediately reported to the BLM or other appropriate agency authorized officer. Procedures for removal of wildlife carcasses on-site and along access roads shall be addressed in the Animal, Pest, and Vegetation Control Plan, to avoid vehicle-related mortality of carrion-eaters. If pesticides/herbicides are to be used on the site, an Animal, Pest, and Vegetation Control Plan shall be developed to ensure that applications will be conducted within the framework of designated lead agencies and will entail the use of only EPA-registered pesticides/herbicides that are nonpersistent and immobile and approved by the designated lead agency.
Paleontological Resource Management Plan (Solar & IM 2009-043)	If paleontological resources are present at the site or if areas with a high potential to contain paleontological material have been identified, a Paleontological Resources Management Plan shall be developed. This shall include a mitigation plan; mitigation may include avoidance, removal of fossils (data recovery), stabilization, monitoring, protective barriers and signs, or other physical or administrative protection measures. The Paleontological Resources Management Plan also shall identify measures to prevent potential looting, vandalism, or erosion impacts and address the education of workers and the public to make them aware of the consequences of unauthorized collection of fossils on public land.
Spill Prevention & Emergency Response Plan (Solar & IM 2009-043)	As part of a Spill Prevention and Emergency Response Plan, measures to prevent potential groundwater and surface water contamination shall be identified. As part of a Spill Prevention and Emergency Response Plan identify sources, locations, and quantities of potential chemical releases (through spills, leaks, or fires) and to

Table B-2 (continued)
Required Plans

	<p>define response measures and notification requirements shall be developed and followed to reduce potential for soil contamination. The plan shall also identify individuals and their responsibilities for implementing the plan.</p> <p>Shall be developed that considers sensitive ecological resources. Spills of any toxic substances shall be promptly addressed and cleaned up before they can enter aquatic or other sensitive habitats due to runoff or leaching.</p> <p>A comprehensive Spill Prevention and Emergency Response Plan shall be developed for the facility that meets the following criteria: is written, periodically updated, and made available to the entire workforce; contains procedures for timely notification of appropriate authorities, including the designated BLM land manager; provides spill/emergency contingency planning for each type of hazardous material present, including abatement or stabilizing of release, recovery of spilled product, and remediation of impacted environmental media; is supported by the strategic deployment of appropriate spill response materials and equipment, including PPE for individuals with spill or emergency response assignments; provides for prompt response to spills and timely delivery of recovered spill materials and contaminated environmental media to appropriately permitted off-site treatment or disposal facilities; formally assigns spill and emergency response duties to specified individuals; provides and documents appropriate training to individuals with spill or emergency response assignments; provides for the prompt response to spills and timely delivery of recovered spill materials and contaminated environmental media to appropriately permitted off-site treatment or disposal facilities; provides general awareness training to remaining facility personnel; and provides for written documentation of each event, including root cause analysis, corrective actions taken, and a characterization of the resulting environmental or health and safety impacts.</p>
<p>Stormwater Management Plan (Solar & IM 2009-043)</p>	<p>A Stormwater Management Plan shall be developed for the site to ensure compliance with applicable regulations and prevent off-site migration of contaminated stormwater, changes in pre-project storm hydrographs, or increased soil erosion.</p> <ul style="list-style-type: none"> • Siting in identified 100-yr floodplains shall not be allowed within the development. • Projects developers shall maintain the pre-development flood hydrograph for all storms up to and including the 100-yr rainfall event. All stormwater retention and/or infiltration and treatment systems shall also be designed for all storms up to and including the 100-yr storm event.
<p>Traffic Management Plan (Solar & IM 2009-043)</p>	<p>A traffic management plan shall be prepared for the site access roads to ensure that no hazards would result from increased truck traffic and that traffic flow would not be adversely impacted. This plan shall incorporate measures such as informational signs, flaggers when equipment may result in blocked throughways, and traffic cones to identify any necessary changes in temporary lane configuration.</p> <p>A Traffic Management Plan shall be prepared for the site access roads to control hazards that could result from increased truck traffic (most likely during construction or decommissioning), to ensure that traffic flow would not be adversely affected and that specific issues of concern (e.g., the locations of school bus routes and stops) are identified and addressed. This plan shall incorporate measures such as informational signs, flaggers when equipment may result in blocked throughways, and traffic cones to identify any necessary changes in temporary lane configuration. The plan shall be developed in coordination with local planning authorities.</p> <p>Transportation Plan (IM 2009-043)</p> <p>A transportation plan shall be developed, particularly for the transport of turbine components, main assembly cranes, and other large pieces of equipment. The plan shall consider specific object sizes, weights, origin, destination, and unique handling</p>

Table B-2 (continued)
Required Plans

	<p>requirements and shall evaluate alternative transportation approaches. In addition, the process to be used to comply with unique state requirements and to obtain all necessary permits shall be clearly identified.</p> <p>Operators shall consult with local planning authorities regarding increased traffic during the construction phase, including an assessment of the number of vehicles per day, their size, and type. Specific issues of concern (e.g., location of school bus routes and stops) shall be identified and addressed in the traffic management plan.</p>
Trash Abatement Plan	<p>A Trash Abatement Plan shall be developed that focuses on containing trash and food in closed containers and removing them periodically to reduce their attractiveness to opportunistic species, such as common ravens, coyotes, and feral dogs that could serve as predators on native wildlife and special status animals.</p>
Water Resources Monitoring & Mitigation Plan	<p>Project developers who plan to use groundwater shall develop and implement a groundwater Water Resources Monitoring and Mitigation Plan, which includes</p> <ul style="list-style-type: none"> • Monitoring the effects of groundwater withdrawal for project uses, vegetation restoration and dust control uses during decommissioning, and aquifer recovery after project decommissioning. • Monitoring changes in flows, volumes, and water quality during construction and operations, as well as their recovery during decommissioning. • Monitoring frequency shall be decided on a site-specific basis and in coordination with federal, state, and local agencies managing surface water resources of the region. • Groundwater- and/or surface water-monitoring activities shall be as outlined in the established groundwater monitoring plan for the site. <p>A Water Resources Monitoring and Mitigation Plan shall be developed for each project. Changes in surface water or groundwater quality (e.g., chemical contamination, increased salinity, increased temperature, decreased dissolved oxygen, and increased sediment loads) or flow that result in alteration of terrestrial plant communities or communities in wetlands, springs, seeps, intermittent streams, perennial streams, and riparian areas (including alterations of cover and community structure, species composition, and diversity) off the project site shall be avoided to the extent practicable. A monitoring plan shall be developed that determines the effects of groundwater withdrawals on plant communities. See measures applicable to protecting water quality.</p>
Wind Erosion Management Plan	<p>A wind erosion management plan should be prepared for projects located in a documented high wind area. The plan shall ensure protection of water quality, air quality and soil resources on the project site. The plan would develop mitigation measures that prevent excessive and unnatural soil deposition and erosion.</p>
Worker Environmental Awareness Program	<p>Develop a project-specific worker environmental awareness program (WEAP) that meets the approval of the issuing BLM office and would be carried out during all phases of the project (site mobilization, ground disturbance, grading, construction, operation, closure/decommissioning, or project abandonment, and restoration/reclamation activities). Identify in the WEAP biological resources and BMPs for minimizing impacts to resources. Provide interpretation for non-English speaking workers, and provide the same instruction for new workers prior to their working onsite. Keep in project field construction office files the names of onsite personnel (for example, surveyors, construction engineers, employees, contractors, contractor's employees, subcontractors) who have participated in the education program. At a minimum, include the following in the program:</p> <ul style="list-style-type: none"> • Photos and habitat descriptions for special status species that may occur on the

Table B-2 (continued)
Required Plans

	<p>project site and information on their distribution, general behavior, and ecology.</p> <ul style="list-style-type: none"> • Species sensitivity to human activities. • Legal protections afforded the species. • Project BMPs for protecting species. • State and federal law violation penalties. • Worker responsibilities for trash disposal and safe/ humane treatment of special status species found on the project site, associated reporting requirements, and specific required measures to prevent taking of threatened or endangered species. • Handout materials summarizing the contractual obligations and protective requirements specified in project permits and approvals. • Project site speed limit requirements and penalties.
Health and Safety Program	<p>A health and safety program shall be developed to protect workers during site characterization, construction, operation, and decommissioning of a renewable energy project. The program shall identify all applicable federal and state occupational safety standards and establish safe work practices addressing all hazards, including requirements for developing the following plans: general injury prevention; PPE requirements and training; respiratory protection; hearing conservation; electrical safety; hazardous materials safety and communication; housekeeping and material handling; confined space entry; hand and portable power tool use; gas-filled equipment use; and rescue response and emergency medical support, including on-site first-aid capability.</p> <p>In addition, the health and safety program shall address OSHA standard practices for the safe use of explosives and blasting agents (e.g., if used to construct foundations for power tower facilities); measures for reducing occupational EMF exposures; the establishment of fire safety evacuation procedures; and required safety performance standards (e.g., electrical system standards and lighting protection standards). The program shall include training requirements for applicable tasks for workers and establish procedures for providing required training to all workers. Documentation of training and a mechanism for reporting serious accidents to appropriate agencies shall be established.</p>
Noise Monitoring & Mitigation Plan	<p>Prepare a noise monitoring and mitigation plan. Design the project to: minimize noise impacts to sensitive noise receptors, limit increases to less than a five to 10 dBA increase above ambient levels, and not exceed local noise standards. Address project generated noise impacts as much as possible. Consider acquiring lands to serve as buffers around the proposed facilities.</p>
Bat & Avian Protection Plan	<p>Protect bats and migratory birds while improving conservation, safety, and reliability for utility customers. Projects will be analyzed on a case-by-case basis to determine whether development of an avian protection plan (APP) and/or avian bat protection plan (ABPP) is necessary.</p>
Facility Vector (such as mosquitoes or rodents) Control Plan	<p>A FVCP that meets the permitting agency approval and would be implemented during all phases of the project.</p>
Hazardous Materials and Waste Management Plan	<p>Shall address the selection, transport, storage, and use of all hazardous materials needed for construction, operation, and decommissioning of the facility for local emergency response and public safety authorities and for the regulating agency, and shall address the characterization, on-site storage, recycling, and disposal of all resulting wastes. The plan shall, at a minimum, include the following: facility identification; comprehensive hazardous materials inventory; Material Safety Data</p>

Table B-2 (continued)
Required Plans

	<p>Sheets (MSDS) for each type of hazardous material; emergency contacts and mutual aid agreements, if any; site map showing all hazardous materials and waste storage and use locations; copies of spill and emergency response plans and hazardous materials-related elements of a decommissioning/closure plan.</p>
<p>Construction and Operation Waste Management Plan</p>	<p>Shall identify the waste streams that are expected to be generated at the site and addresses hazardous waste determination procedures, waste storage locations, waste-specific management and disposal requirements, inspection procedures, and waste minimization procedures. The plan shall address all solid and liquid wastes that may be generated at the site in compliance with the CWA requirements to obtain the project's NPDES permit.</p>

**Table B-3
Required Studies**

Transmission interconnection study	In applications to appropriate lead agencies, provide a copy of the electric transmission interconnection study from the appropriate control agency. Include in the interconnection study an identification of the transmission impacts beyond the first point of interconnection and acceptable measures to mitigate/alleviate impacts to the transmission network system. When more than one alternative mitigation measure is identified, indicate in the applications the measure selected by the project developer. Provide for each selected mitigation measure, an environmental analysis sufficient to meet the CEQA requirements for indirect project impacts.
Preliminary hydrologic study	Project developers shall conduct a preliminary hydrologic study demonstrating a clear understanding of the local surface water and groundwater hydrology. At a minimum this hydrologic study shall include: <ul style="list-style-type: none"> • The relationship of the project site hydrologic basin to the basins in the region • Identification of all surface water bodies (including rivers, streams, ephemeral washes/drainages, lakes, wetlands, playas and floodplains) • Identification of all applicable groundwater aquifers • Preliminary estimates of physical characteristics of surface water features, groundwater aquifers, and the regional climate (seasonal and long term).
Detailed hydrologic study	Developers shall be required to conduct a detailed hydrologic study demonstrating a clear understanding of the local surface water and groundwater hydrology. At a minimum this hydrologic study shall include: <ul style="list-style-type: none"> • Quantification of physical characteristics describing surface water features, such as streamflow rates, stream cross-sections, channel routings, seasonal flow rates (intermittent streams), peak flow rates (ephemeral washes/drainages), sediment characteristics and transport rates, lake depths, and surface areas of lakes, wetlands, and floodplains • Hydrologic analysis and modeling to define the 100-yr, 24-hour rainfall event for the project area and calculation of projected runoff from this storm at site; • Hydrologic analysis and modeling to identify 100-yr floodplain boundaries of any surface water feature on the site; • Quantification of physical characteristics describing the groundwater aquifer, such as physical dimensions of the aquifer, sediment characteristics, confined/unconfined conditions, hydraulic conductivity and transmissivity distribution of the aquifer, groundwater surface elevations, and groundwater flow processes (direction, recharge/discharge, current basin extractions, and surface water-groundwater connectivity); • Quantification of regional climate including seasonal and long-term information on temperatures, precipitation, evaporation, and evapotranspiration; and • Quantification of the sustainable yield of surface waters and groundwater available to the project. Project developers shall evaluate the water sources in terms of existing water rights and management plans for adequacy to serve project demands while maintaining aquatic, riparian, and other water-dependent resources.
Comprehensive groundwater basin analysis	If groundwater use is proposed, project developers shall ensure that a comprehensive analysis of the groundwater basin is provided and that the following potential significant impacts are evaluated: <ul style="list-style-type: none"> • Creation or exacerbation of overdraft conditions and their potential to cause subsidence and loss of aquifer storage capacity

Table B-3 (continued)
Required Studies

	<ul style="list-style-type: none"> • Use that cause injury to other water rights claims in the basin • Estimates of the total cone of depression considering cumulative drawdown from all potential pumping in the basin, including the project, for the life of the project through the decommissioning phase. • Changes in water quality that affect other beneficial use; and • Effects on groundwater dependent ecosystems such as springs, seeps, and wetlands that provide water for plants and animals.
Geomorphology Technical Report	<p>Retain the services of a geoarchaeologist, when appropriate, to investigate and complete a geomorphology technical report. Include the following elements:</p> <ul style="list-style-type: none"> • Reconstruct the historical geomorphology of the project's Area of Potential Effects (APE); • Map and date the sediments of the landforms in that area; • Assess whether buried archaeological deposits may be present and subject to project impacts.
Safety Assessment	<p>A safety assessment shall be conducted to describe potential safety issues and the means that would be taken to mitigate them, including issues such as site access; construction; safe work practices; glare exposure from mirrors, heliostats, and/or power towers; security; heavy equipment transportation; traffic management; emergency procedures; and fire control.</p>
Health Risk Assessment	<p>A health risk assessment shall evaluate potential cancer and noncancer risks to workers and the general public from exposure to facility emission sources during construction and operations. If potential risks are found to exceed applicable threshold levels, measures shall be taken to decrease emissions from the source.</p>

Table B-4
Best Management Practices

No.	Technology	Topic	Description of Measure	Phase
Air Quality				
1	Solar/Wind	Emissions	On-site vehicle use shall be reduced to the extent feasible.	C, O, D
2	Solar/Wind	Emissions	Idling of diesel equipment shall be limited to no more than 10 minutes unless idling must be maintained for proper operation (e.g., drilling, hoisting, and trenching).	C, O, D
3	Solar/Wind	Emissions	Consider using electric vehicles, biodiesel, or alternative fuels during construction and operation phases to reduce the project's criteria and GHG pollutant emissions.	C, O, D
4	Solar/Wind	Fugitive dust	Workers shall be trained to comply with the speed limit, use good engineering practices, minimize drop height of materials, and minimize disturbed areas.	C, O, D
5	Solar/Wind	Fugitive dust	Construction shall be staged to limit the exposed area at any time, whenever practical.	C, O, D
6	Solar/Wind	Fugitive dust	Access to the construction site and staging areas shall be limited to authorized vehicles only through the designated treated roads.	C, O, D
7	Solar/Wind	Fugitive dust	Access roads, on-site roads, and parking lots shall be surfaced with aggregate with hardness sufficient to prevent vehicles from crushing the aggregate and thus causing dust or compacted soil conditions. Paving could also be used on access roads and parking lots. Alternatively, chemical dust suppressants or durable polymeric soil stabilizers shall be used on these locations.	C, O, D
8	Solar/Wind	Fugitive dust	All unpaved roads, disturbed areas (e.g., areas of scraping, excavation, backfilling, grading, and compacting), and loose materials generated during project activities shall be watered as frequently as necessary to minimize fugitive dust generation. In water-deprived locations, water spraying shall be limited to active disturbance areas only and non-water-based dust control measures shall be implemented in areas with intermittent or non-heavy use, such as stockpiles or access roads.	C, O, D
9	Solar/Wind	Fugitive dust	Speed limits (e.g., 10 mph [16 km/h]) within the construction site shall be posted with visible signs and enforced to minimize airborne fugitive dust.	C, D
10	Solar/Wind	Fugitive dust	All vehicles transporting loose materials traveling on public roads shall be covered, and loads shall be sufficiently wet and kept below the freeboard of the truck.	C, O, D
11	Solar/Wind	Fugitive dust	Tires of all construction-related vehicles shall be inspected and cleaned as necessary to be free of dirt prior to entering paved public roadways.	C, D
12	Solar/Wind	Fugitive dust	Visible trackout or runoff dirt on public roadways from the construction site shall be cleaned (e.g., through street vacuum sweeping).	C, D

Table B-4 (continued)
Best Management Practices

No.	Technology	Topic	Description of Measure	Phase
13	Solar/Wind	Fugitive dust	Topsoil from all excavations and construction activities shall be salvaged and reapplied during reclamation or, where feasible, used for interim reclamation by being reapplied to construction areas not needed for facility operation as soon as activities in that area have ceased.	C, O, D
14	Solar/Wind	Fugitive dust	Use wind erosion control techniques (such as windbreaks, water, chemical dust suppressants, and/or vegetation) where soils are disturbed in construction, access and maintenance routes, and materials stock pile areas. Keep related windbreaks in place until the soil is stabilized or permanently covered with vegetation. Wind fences shall be installed around disturbed areas that could affect the area beyond the site boundaries (e.g., nearby residences).	C, O, D
15	Solar/Wind	Fugitive dust	All soil disturbance activities shall be minimized and travel on unpaved roads shall be conducted during periods of low winds and stable conditions typical of early morning hours from late fall to early spring, to the extent practicable, which could significantly lower potential impacts on ambient air quality.	C, O, D
16	Solar/Wind	Fugitive dust	Any stockpiles created shall be kept on-site, with an upslope barrier in place to divert runoff. Stockpiles shall be sprayed with water, covered with tarpaulins, and/or treated with appropriate dust suppressants, especially in preparation for high wind or storm conditions. Compatible native vegetative plantings may also be used to limit dust generation for stockpiles that will be inactive for a relatively long period. Chemical dust suppressants that emit VOCs shall be avoided within or near O ₃ nonattainment areas.	C
17	Solar/Wind	Fugitive dust	Potential environmental impacts from the use of dust palliatives shall be minimized by taking all necessary measures to keep the chemicals out of sensitive soil and streams. In addition, the application of dust palliatives shall comply with federal, state, and local laws and regulations. Dust palliatives must meet the requirements of the applicable transmission system operator (e.g., Western Area Power Administration construction standards prohibit use of oil as a dust suppressant [Western 2008]).	C, O, D
Ecological				
18	Solar/Wind	Staging areas	As practical, staging and parking areas shall be located within the site of the utility-scale renewable energy facility to minimize habitat disturbance in areas adjacent to the site.	C, O, D
19	Solar/Wind	Construction activities	Before beginning construction, delineate the boundaries of areas to be disturbed using temporary construction fencing and/or flagging, and confine disturbances, project vehicles, and equipment to the delineated project areas.	C, D
20	Solar/Wind	Construction	To the extent practicable, work personnel shall stay within the ROW and/or easements.	C, O, D

Table B-4 (continued)
Best Management Practices

No.	Technology	Topic	Description of Measure	Phase
21	Solar/Wind	Fugitive dust	If the application of water is needed to abate dust in construction areas and on dirt roads, use the least amount needed to meet safety and air quality standards and prevent the formation of puddles, which could attract wildlife to construction sites.	C, D
22	Solar/Wind	Traffic	Existing access roads, utility corridors, and other infrastructure shall be used to the maximum extent feasible.	C, O, D
23	Solar/Wind	Traffic	Plant species that would attract wildlife shall not be planted along high speed or high-traffic roads. If applicable, an avian and bat protection plan will be developed.	C, O, D
24	Solar/Wind	Traffic	Road closures shall be considered during crucial periods (e.g., extreme winter conditions, calving/fawning seasons). Personnel shall be advised to minimize stopping and exiting their vehicles in the winter ranges of large game while there is snow on the ground.	C, O, D
25	Solar/Wind	Helicopter use	The minimization of habitat disturbance shall be considered through utilizing helicopters for construction to minimize the need for access roads, and by locating transmission facilities in previously disturbed areas. Existing utility corridors and other support structures shall be utilized to the maximum extent feasible.	C, O, D
26	Solar/Wind	Noise	Noise reduction devices (e.g., mufflers) shall be employed to minimize the impacts on wildlife and special status species populations. Explosives shall be used only within specified times and at specified distances from sensitive wildlife or surface waters as established by the designated lead agency or other federal and state agencies. Operators shall ensure that all equipment is adequately muffled and maintained in order to minimize disturbance to wildlife	C, O, D
27	Solar/Wind	Noise	Minimize construction and operation related noise levels to minimize impacts to wildlife.	C, O, D
28	Solar/Wind	Power lines	Place low and medium voltage connecting power lines underground whenever possible. In certain circumstances, burial of the lines may be prohibitively expensive (for example in shallow bedrock areas) or may cause unacceptable impacts to wetland habitats and dependent species. Overhead lines may be acceptable: <ul style="list-style-type: none"> • if sited away from high bird crossing locations, such as between roosting and feeding areas or between lakes, rivers, and nesting areas; and/or • when the structures parallel tree lines or are otherwise screened so that collision risk is reduced. 	S, C
29	Solar/Wind	Aquatic habitat	The placement of transmission towers within aquatic and wetland habitats shall be avoided whenever feasible. If towers must be placed within these habitats, they shall not impede flows or fish passage.	S, C, O

Table B-4 (continued)
Best Management Practices

No.	Technology	Topic	Description of Measure	Phase
30	Solar/Wind	Aquatic habitat	Low-water crossings (fords) shall be used only as a last resort and then during the driest time of the year. Rocked approaches to fords shall be used. The pre-existing stream channel, including bed and banks, shall be restored after the need for a low-water ford has passed.	C, O, D
31	Solar/Wind	Habitat	To reduce the extent of habitat disturbance during construction and operation, existing access roads, utility corridors, and other infrastructure shall be used to the maximum extent feasible and foot and vehicle traffic through undisturbed areas shall be minimized.	C, O, D
32	Solar/Wind	Habitat	Areas left in a natural condition during construction (e.g., wildlife crossings) shall be maintained in as natural a condition as possible within safety and operational constraints.	C, O, D
33	Solar/Wind	Habitat	Projects shall be planned to avoid, minimize, or mitigate impacts on aquatic habitats, wetland habitats, waters of the United States, other special aquatic sties, unique biological communities, crucial wildlife habitats, breeding areas, and special status species locations and habitats, including designated critical habitat. Project planning shall be coordinated with the appropriate federal and state resource management agencies.	S
34	Solar/Wind	Habitat	Habitat loss, habitat fragmentation, and resulting edge habitat due to project development shall be minimized to the extent practicable. Habitat fragmentation could be reduced by consolidating facilities (e.g., access roads and utilities could share common ROWs, where feasible), reducing the number of access roads to the minimum amount required, minimizing the number of stream crossings within a particular stream or watershed, and, locating facilities in areas where habitat disturbance has already occurred. Individual project facilities shall be located and designed to minimize disruption of animal movement patterns and connectivity of habitats.	S
35	Solar/Wind	Habitat	The number of areas where wildlife could hide or be trapped (e.g., open sheds, pits, uncovered basins, and laydown areas) shall be minimized. All pits shall contain wildlife escape ramps. For example, an uncovered pipe that has been placed in a trench shall be capped at the end of each workday to prevent animals from entering the pipe. If a special status species is discovered inside a component, that component must not be moved or, if necessary, moved only to remove the animal from the path of activity, until the animal has escaped.	C, O, D
36	Wind	Birds	Locating renewable energy power facilities near open water or other areas known to attract a large number of birds shall be avoided.	S
37	Solar/Wind	Birds/bats	Tall structures shall be located to avoid known flight paths of birds and bats.	S
38	Solar/Wind	Birds/ raptors	Project proponents should establish buffer zones and protection, mitigation, and monitoring plans for active nests detected during surveys.	S, C
39	Solar/Wind	Birds	Although it is unclear whether tubular or lattice towers pose less risk, it is recommended that tubular towers or best available technology be used to reduce bird perching opportunities on turbines.	S, C, O

Table B-4 (continued)
Best Management Practices

No.	Technology	Topic	Description of Measure	Phase
40	Wind	Raptors	Turbines shall be configured to avoid landscape features known to attract raptors if site studies show that placing turbines there would pose a significant risk to raptors.	S
41	Solar/Wind	Special status species	In consultation with permitting agencies, avoid special status species or unique plant assemblages when installing and maintaining transmission line towers/poles, access roads, pulling sites, and storage and parking areas adjacent to linear facilities.	S, C, O
42	Solar/Wind	Special status species	During all project phases, buffer zones shall be established around sensitive habitats, and project facilities and activities shall be excluded or modified within those areas, to the extent practicable.	C, O, D
43	Solar/Wind	Special status species	Project activities shall not be located in or near occupied habitats of special status animal species. Buffer zones shall be established around these areas (e.g., identified in the land use plan or substantiated by best available information or science), to prevent any destructive impacts associated with project activities.	S
44	Solar/Wind	Special status habitat	Prior to any ground-disturbing activity, seasonally appropriate walkthroughs shall be conducted by a qualified biologist or team of biologists to ensure that important or sensitive species or habitats are not present in or near project areas. Attendees at the walkthrough shall include appropriate federal agency representatives, state natural resource agencies, and construction contractors, as appropriate. Habitats or locations to be avoided (with appropriately sized buffers) shall be clearly marked.	C, O, D
45	Solar/Wind	Vegetation	Project-specific vegetation management plans shall investigate possibilities of revegetating parts of the renewable energy project area. Where revegetation is accomplished, fire breaks are required, such that vegetated areas would not result in increased fire hazard.	S, C, D
46	Solar/Wind	Wetlands	Where a pipeline trench may drain a wetland, trench breakers shall be constructed and/or the trench bottom shall be sealed to maintain the original wetland hydrology.	C, O, D
47	Solar/Wind	Noxious weeds	The establishment and spread of invasive species and noxious weeds within the ROW and in associated areas of ground surface disturbance or vegetation cutting shall be prevented. The area shall be monitored regularly and invasive species should be eradicated immediately.	C, O, D
48	Solar/Wind	Herbicide use	Herbicide use shall be limited to nonpersistent, immobile substances. Only herbicides with low toxicity to wildlife and nontarget native plant species shall be used, as determined in consultation with the USFWS. The typical herbicide application rate shall be used rather than the maximum application rate, where effective. All herbicides shall be applied in a manner consistent with their label requirements and in accordance with guidance provided in the Final PEIS on vegetation treatments using herbicides (BLM 2007). No herbicides shall be used near or in surface water, streams (including ephemeral, intermittent, or perennial), riparian areas, or wetlands. Setback distances shall be determined through coordination with federal and state resource management	C, O, D

Table B-4 (continued)
Best Management Practices

No.	Technology	Topic	Description of Measure	Phase
			agencies. Before herbicide treatments are begun, the designated lead agency or an authorized contractor shall conduct nest searches in and around treatment areas to minimize impacts on migratory birds.	
49	Solar/Wind	Waste	Construction debris, especially treated wood, shall not be stored or disposed of in areas where it could come in contact with aquatic habitats.	C, O, D
50	Solar/Wind	Reclamation	Access roads shall be reclaimed when they are no longer needed. However, seasonal restrictions (e.g., nest and brood rearing) shall be considered, as appropriate (e.g., identified in the land use plan or substantiated by best available information or science).	C, O, D
51	Solar/Wind	Reclamation	All holes and ruts created by removal of structures and access roads shall be filled or graded.	D
52	Solar/Wind	Reclamation	While structures are being dismantled, care shall be taken to avoid leaving debris on the ground in areas in which wildlife regularly move.	D
53	Solar/Wind	Reclamation	The facility fence shall remain in place for several years to help reclamation (e.g., would preclude large mammals and vehicles from disturbing revegetation efforts).	D
54	Solar/Wind	Reclamation	For a repowering or retrofit project, remove and stabilize roads and facilities that are no longer needed; re-seed with native plants appropriate for the soil conditions and adjacent habitat. Derive plants from local seed sources where feasible. The term "local" in this context means seed sources with a genetic makeup that do not vary substantially from seeds or plants found at the disturbed location.	C
55	Solar/Wind	Biological monitor	Vehicles and site workers shall avoid entering aquatic habitats such as streams and springs during site characterization activities until surveys by qualified biologists have evaluated the potential for unique flora and fauna to be present.	C, O, D
Hazardous Materials				
56	Solar/Wind	Training	Ensure that on-site workers are fully trained to properly handle and are informed about each of the hazardous materials to be used on-site.	C, O, D
57	Solar/Wind	Hazardous materials	Pollution prevention opportunities shall be identified and implemented, including material substitution of less hazardous alternatives, recycling, and waste minimization.	C, O, D
58	Solar/Wind	Hazardous materials	Written procedures for the storage, use, and transportation of each type of hazardous material present shall be provided, including all vehicle and equipment fuels.	S, C, O, D
59	Solar/Wind	Hazardous materials	Authorized users for each type of hazardous material shall be identified.	C, O, D

Table B-4 (continued)
Best Management Practices

No.	Technology	Topic	Description of Measure	Phase
60	Solar/Wind	Hazardous materials	Hazardous materials and waste storage areas or facilities shall be formally designated and access restricted to authorized personnel. Construction debris, especially treated wood, shall not be disposed of or stored in areas where it could come in contact with aquatic habitats.	S, C, O, D
61	Solar/Wind	Hazardous materials	Hazardous materials and waste storage areas must be consistent with accepted industry practices as well as applicable federal, state, and local regulations and that include, at a minimum, containers constructed of compatible materials, properly labeled, and in good condition; secondary containment features for liquid hazardous materials and wastes; physical separation of incompatible chemicals; and fire-fighting capabilities when warranted.	C, O, D
62	Solar/Wind	Hazardous materials	Procedures shall be established for fuel storage and dispensing, including shutting off vehicle (equipment) engines; using only authorized hoses, pumps, and other equipment in good working order; maintaining appropriate fire and spill response materials at equipment-fueling stations; providing emergency shutoffs for fuel pumps; ensuring that fueling stations are paved; ensuring that both aboveground fuel tanks and fueling areas have adequate secondary containment; prohibiting smoking, welding, or open flames in fuel storage and dispensing areas; equipping the area with fire suppression devices, as appropriate; conducting routine inspections of fuel storage and dispensing areas; requiring prompt recovery and remediation of all spills, and providing for the prompt removal of all fuel and fuel tanks used to support construction vehicles and equipment at the completion of facility construction and decommissioning phases.	S, C, O, D
63	Solar/Wind	Hazardous materials	Good waste management practices shall be adopted for handling, storing, and disposing of wastes generated by a construction project to prevent the release of waste materials into stormwater discharges; waste management includes the following: spill prevention and control, construction debris and litter management, concrete waste management, and liquid waste management.	C, O, D
64	Solar/Wind	Hazardous materials storage	To the greatest extent practical and considering the remoteness of a given facility, "just-in-time" ordering procedures shall be employed that are designed to limit the amounts of hazardous materials present on the site to quantities minimally necessary to support continued operations; excess hazardous materials shall receive prompt disposition.	C, O, D
65	Solar/Wind	Herbicide/pesticide use	Avoid rinsing herbicide/pesticide spray tanks in or near water bodies.	C, O, D
66	Solar/Wind	Spills	Berms and other controls shall be used at facilities to prevent off-site migration of any leaked or spilled HTF, TES fluids, or any other chemicals stored or used at the site.	C, O, D
67	Solar/Wind	Spills	Remediate hazardous product leaks and chemical releases that constitute a Recognized Environmental Condition before completing decommissioning.	D

Table B-4 (continued)
Best Management Practices

No.	Technology	Topic	Description of Measure	Phase
68	Solar/Wind	Transporting hazardous materials	Dedicated areas with secondary containment shall be established for off-loading hazardous materials transport vehicles.	C, O, D
69	Solar/Wind	Refueling	Refueling areas shall be located away from surface water locations and drainages and on paved surfaces; features shall be added to direct spilled materials to sumps or safe storage areas where they can be subsequently recovered.	S, C, O, D
70	Solar/Wind	Vehicles	All vehicles and equipment shall be in proper working condition to ensure that there is no potential for leaks of motor oil, antifreeze, hydraulic fluid, grease, or other hazardous materials.	C, O, D
71	Solar/Wind	Inspections	Written procedures shall be established for inspecting hazardous materials and waste storage areas and for plant systems containing hazardous materials; identified deficiencies and their resolution shall be documented.	S, C, O, D
72	Solar/Wind	Waste removal	Schedules shall be established for the regular removal of wastes (including sanitary wastewater generated in temporary, portable sanitary facilities) for delivery by licensed haulers to appropriate off-site treatment or disposal facilities.	C, O, D
73	Solar/Wind	Decommissioning	During facility decommissioning, the following shall occur: emergency response capabilities shall be maintained throughout the decommissioning period as long as hazardous materials and wastes remain on-site, and emergency response planning shall be extended to any temporary material and equipment storage areas that may have been established; temporary waste storage areas shall be properly designated, designed, and equipped; hazardous materials removed from systems shall be properly containerized and characterized, and recycling options shall be identified and pursued; off-site transportation of recovered hazardous materials and wastes resulting from decommissioning activities shall be conducted by authorized carriers; all hazardous materials and waste shall be removed from on-site storage and management areas (including surface impoundments), and the areas shall be surveyed for contamination and remediated as necessary.	D
Health and Safety				
74	Solar/Wind	Health	A health risk assessment shall evaluate potential cancer and noncancer risks to workers from exposure to facility emission sources during construction and operations. If potential risks are found to exceed applicable threshold levels, measures shall be taken to decrease emissions from the source.	S, C, O, D
75	Solar/Wind	Safety	A safety assessment shall be conducted to describe potential safety issues and the means that would be taken to mitigate them, including issues such as site access; construction; safe work practices; glare exposure from mirrors, heliostats, and/or power towers; security; heavy equipment transportation; traffic management; emergency procedures; and fire control.	S, C, O, D

Table B-4 (continued)
Best Management Practices

No.	Technology	Topic	Description of Measure	Phase
76	Solar/Wind	EMF	Measures shall be considered to reduce occupational EMF exposures, such as backing electrical generators with iron to block EMF, shutting down generators when working in the vicinity, and otherwise limiting exposure time and proximity while generators are running.	S
77	Solar/Wind	Traffic	Operators shall consult with local planning authorities regarding increased traffic during the construction phase, including an assessment of the number of vehicles per day, their size, and type. Specific issues of concern (e.g., location of school bus routes and stops) shall be identified and addressed in the traffic management plan.	O
78	Solar/Wind	Firearms	Prohibit workers or visitors, with the exception of law enforcement personnel, from bringing firearms or weapons to the project site.	C, O, D
79	Solar/Wind	Wastewater	Any wastewater generated in association with temporary, portable sanitary facilities shall be periodically removed by a licensed hauler and introduced into an existing municipal sewage treatment facility. Portable sanitary facilities provided for construction crews shall be adequate to support expected on-site personnel.	C, O, D
Lands and Realty				
80	Solar/Wind	Land use	To plan for efficient use of the land, necessary infrastructure requirements shall be consolidated wherever possible, and current transmission and market access shall be evaluated carefully.	S
81	Solar/Wind	Overhead lines	All electrical collector lines shall be buried in a manner that minimizes additional surface disturbance (e.g., along roads or other paths of surface disturbance). Overhead lines may be used in cases where burial of lines would result in further habitat disturbance.	S
82	Solar/Wind	Monitoring	Site monitoring protocols defined in the POD shall be implemented. These will incorporate monitoring program observations and additional mitigation measures into standard operating procedures and BMPs to minimize future environmental impacts.	S, C
83	Solar/Wind	Monitoring	All control and mitigation measures established for the project in the POD and the resource-specific management plans that are part of the POD shall be maintained and implemented throughout the construction phase, as appropriate.	S, C
84	Solar/Wind	Monitoring	Results of monitoring program efforts shall be provided to the BLM authorized officer.	C, D
85	Solar/Wind	Decommissioning	All management plans, BMPs, and stipulations developed for the construction phase shall be applied to similar activities during the decommissioning phase.	D
Livestock Grazing				
86	Solar/Wind	Roads	Access roads shall be constructed, improved, and maintained to minimize impact on grazing operations. Road design would include appropriate fencing, cattle guards, and signs.	C, O

Table B-4 (continued)
Best Management Practices

No.	Technology	Topic	Description of Measure	Phase
Minerals				
87	Solar/Wind	Mining	Transmission lines shall be located to avoid conflicts with mining activities in areas with active mineral development.	S
Native American Concerns				
88	Solar/Wind	Training	Prior to construction, consideration shall be given to training contractor personnel whose activities or responsibilities could affect resources of significance to Native Americans during construction. When there is a reasonable expectation of encountering unidentified cultural resources during construction, monitoring of construction shall be considered to minimize impacts on resources of significance to Tribes to the extent possible.	S, C, O, D
89	Solar/Wind	Visual	Visual intrusion on sacred areas and places of traditional importance shall be avoided to the extent practical through the selection of renewable energy facility location and technology. When avoidance is not possible, timely and meaningful consultation with the affected Tribe(s) shall be conducted to formulate a mutually acceptable plan to minimize or mitigate the adverse effect.	S
90	Solar/Wind	Noise	Standard noise mitigation measures shall be employed when near sacred sites to minimize the impacts of noise on culturally significant areas.	C, O, D
91	Solar/Wind	Health and safety	Health and safety mitigation measures for the general public shall be employed when renewable energy facilities are located near to Native American traditional use areas in order to minimize potential health and safety impacts to Native Americans.	C, O, D
92	Solar/Wind	Mitigation	All mitigation measures listed in cultural resources would also apply to historic properties of concern to Native Americans.	S, C, O, D
Noise - Vibration				
93	Solar/Wind	Construction	Siting of stationary construction equipment (e.g., compressors and generators) shall be far from nearby residences and other sensitive receptors.	C, O, D
94	Solar/Wind	Equipment	If noise from a transformer becomes an issue, a new transformer with reduced flux density, which generates noise levels as much as 10 to 20 dB lower than National Electrical Manufacturers Association (NEMA) standard values, could be installed. Alternatively, barrier walls, partial enclosures, or full enclosures could be adopted to shield or contain the transformer noise, depending on the degree of noise control needed.	O
95	Solar/Wind	Equipment	Permanent sound-generating facilities (e.g., compressors, pumps) shall be sited away from residences and other sensitive receptors. In areas of known conflicts, consideration shall be given to the installation of acoustic screening.	O

Table B-4 (continued)
Best Management Practices

No.	Technology	Topic	Description of Measure	Phase
96	Solar/Wind	Equipment	Where feasible, low-noise systems (e.g., for ventilation systems, pumps, generators, compressors, and fans) shall be incorporated and equipment selected that has no prominent discrete tones.	C, O, D
97	Solar/Wind	Equipment	All equipment shall be maintained in good working order in accordance with manufacturers' specifications. For example, suitable mufflers and/or air-inlet silencers shall be installed on all internal combustion engines (ICEs) and certain compressor components.	C, O, D
98	Solar/Wind	Equipment	All equipment shall have sound-control devices no less effective than those provided on the original equipment. All construction equipment used shall be adequately muffled and maintained. Properly maintain mufflers, brakes, and loose items on construction and operation related vehicles to minimize noise and ensure safe operations. Operate trucks as quietly as possible, while considering local conditions. Advise about downshifting and vehicle operations in residential communities to keep truck noise to a minimum.	C, O, D
99	Solar/Wind	Equipment	Install mufflers on diesel and gas-driven engine air coolers and exhaust stacks. Equip emergency pressure relief valves and steam blow-down lines with silencers to limit noise levels.	C, O, D
100	Solar/Wind	Equipment	If residences or sensitive receptors are nearby, noisy equipment, such as turbines and motors, shall be placed in enclosures.	O
101	Solar	Equipment	If a wet-cooling tower is to be used, the louvered side shall be sited to face away from sensitive human receptors. The cooling tower shall be located such that nearby equipment can act as a barrier and serve as additional noise reduction. Quieter fans shall be selected in the facility design, and fans shall be operated at a lower speed, particularly if operating at night. If a high degree of reduction is required, silencers shall be used on the fan stacks.	S, O
102	Wind	Equipment	Use variable speed turbines or pitched blades to lower rotational speed.	S, O
103	Solar/Wind	Helicopter	Helicopter flights at low altitude (under 1,500 ft. [457 m]) near noise-sensitive receptors shall be minimized except at locations where only helicopter activities can perform the task.	C, O, D
104	Solar/Wind	Vehicles	Construction and decommissioning activities and construction traffic shall be scheduled to minimize disruption to nearby residents and existing operations surrounding the project areas.	C, O, D
105	Solar/Wind	Vehicles	All vehicles traveling within and around the project area shall be operated in accordance with posted speed limits to reduce vehicular noise levels.	C, O, D
106	Solar/Wind	Safety	Warning signs shall be posted in high-noise areas, and a hearing protection program shall be implemented for work areas with noise in excess of 85 dBA.	C, O, D

Table B-4 (continued)
Best Management Practices

No.	Technology	Topic	Description of Measure	Phase
107	Solar/Wind	Timing	Whenever feasible, different noisy activities shall be scheduled to occur at the same time, since additional sources of noise generally do not increase noise levels at the site boundary by much. That is, less-frequent but noisy activities would generally be less annoying than lower level noise occurring more frequently.	C, O, D
108	Solar/Wind	Monitoring/mitigation	Project developers shall realize that complaints about noise may still occur, even when the noise levels from the facility do not exceed regulatory levels. Accordingly, a noise complaint process and hotline for the surrounding communities shall be implemented, including documentation, investigation, evaluation, and resolution of all legitimate project-related noise complaints.	C, O, D
109	Solar/Wind	Monitoring/mitigation	Noise reduction measures that shall be considered include siting noise sources to take advantage of topography and distance, and constructing engineered sound barriers and/or berms or sound-insulated buildings, if needed, to reduce potential noise impacts at the locations of nearby sensitive human receptors. As an alternative, the solar facility generating higher operational noises (e.g., a solar dish engine facility) could take advantage of higher background noises; for example, it could be sited within an existing noisy area, such as close to a well-traveled highway, where the ambient sounds partially mask the noise from the facility.	S, C, O, D
110	Solar/Wind	Monitoring/mitigation	Noise control measures (e.g., erection of temporary wooden noise barriers) shall be implemented if noisy activities would be expected near sensitive receptors.	C, O, D
111	Solar/Wind	Monitoring/mitigation	If noisy activities, such as blasting or pile driving, are required during the construction or decommissioning period, nearby residents shall be notified in advance.	C, O, D
112	Solar/Wind	Monitoring/mitigation	Employ engineering controls, including sound-insulated equipment and control rooms, to reduce the average noise level to appropriate levels in normal work areas.	C, O, D
Recreation				
113	Solar/Wind	Siting	Renewable energy facilities shall not be placed in areas of unique or important recreation resources.	S
114	Solar/Wind	Access	Replacement of access lost for OHV use shall be considered as part of the analysis of project-specific impacts.	S
Soils				
115	Solar/Wind	Construction	Construction shall be conducted in stages to limit the areas of exposed soil at any given time. For example, only land that will be actively under construction in the near term (e.g., within the next 6 to 12 months) should be cleared of vegetation.	C, O, D
116	Solar/Wind	Construction	Ground-disturbing activities shall be minimized, especially during the rainy season.	C, O, D
117	Solar/Wind	Construction	Construction on wet soils shall be avoided.	C, O, D

Table B-4 (continued)
Best Management Practices

No.	Technology	Topic	Description of Measure	Phase
118	Solar/Wind	Construction	Foundations and trenches shall be backfilled with originally excavated material as much as possible. Excess excavation materials shall be disposed of only in approved areas or, if suitable, stockpiled for use in reclamation activities.	C, O, D
119	Solar/Wind	Construction	Water or other stabilizing agents shall be used to wet roads in active construction areas and laydown areas to minimize the windblown erosion of soil.	C, O, D
120	Solar/Wind	Clearing	The clearing and disturbing of sensitive areas (e.g., steep slopes and natural drainages) and other areas shall be avoided outside the construction zone.	C, O, D
121	Solar/Wind	Disturbance area	The area disturbed by operation of a renewable energy project shall be minimized (e.g., by using existing roads).	C, O, D
122	Solar/Wind	Disturbance area	The footprint of disturbed areas, including the number and size/length of roads, fences, borrow areas, and laydown and staging areas, shall be minimized.	S, C, O, D
123	Solar/Wind	Disturbance area	Electrical lines from solar collectors and/or wind turbines shall be buried along existing features (e.g., roads or other paths of disturbance) to minimize the overall area of surface disturbance whenever possible.	C, O, D
124	Solar/Wind	Disturbance area	Temporary stabilization of disturbed areas that are not actively under construction shall occur.	C, O, D
125	Solar/Wind	Disturbance area	Permanent stabilization of disturbed areas shall occur during final grading and landscaping of the site.	C, O, D
126	Solar/Wind	Slopes/ grades	Excessive grades shall be avoided on roads, road embankments, ditches, and drainages, especially in areas with erodible soils.	S, C, O, D
127	Solar/Wind	Slopes/ grades	Areas with unstable slopes shall be avoided, and local factors that can cause slope instability (e.g., groundwater conditions, precipitation, earthquake activity, slope angles, and the dip angles of geologic strata) shall be identified.	S, C, O, D
128	Solar/Wind	Slopes/ grades	The creation of excessive slopes shall be avoided during site preparation and construction. Special construction techniques are to be used, where applicable, in areas of steep slopes, erodible soil, and drainage ways.	C, O, D
129	Solar/Wind	Drainages	Drainage crossings shall be stabilized as quickly as possible, and channel erosion shall be prevented from runoff caused by the project.	C, O, D
130	Solar/Wind	Stockpiles	Originally excavated materials shall be stockpiled and used for backfill.	C, O, D
131	Solar/Wind	Fill	Topsoil from all excavation and construction activities shall be salvaged so it can be reapplied to the disturbed area once construction is completed.	C, O, D

Table B-4 (continued)
Best Management Practices

No.	Technology	Topic	Description of Measure	Phase
132	Solar/Wind	Fill	Borrow materials shall be obtained only from authorized and permitted sites; existing sites shall be used in preference to new sites.	C, O, D
133	Solar/Wind	Roads	Abandoned roads and roads no longer needed shall be recontoured and revegetated.	C, O, D
134	Solar/Wind	Erosion control	Potential soil erosion shall be controlled at culvert outlets with appropriate structures.	C, O, D
135	Solar/Wind	Erosion control	Catch basins, roadway ditches, and culverts shall be cleaned and maintained regularly.	C, O, D
136	Solar/Wind	Erosion control	Runoff from slope tops shall be controlled and directed to settling or rapid infiltration basins, and disturbed slopes shall be stabilized as quickly as possible.	C, O, D
137	Solar/Wind	Erosion control	Sediment-laden waters from disturbed, active areas within the project site shall be retained through the use of barriers and sedimentation devices (e.g., berms, straw bales, sandbags, jute netting, or silt fences).	C, O, D
138	Solar/Wind	Erosion control	Barriers and sedimentation devices shall be placed around drainages and wetlands to prevent contamination by sediment-laden water.	C, O, D
139	Solar/Wind	Erosion control	Sediment from barriers and sedimentation devices shall be removed to restore sediment control capacity	C, O, D
140	Solar/Wind	Erosion control	Routine site inspections shall be conducted to assess the effectiveness and maintenance requirements for erosion and sediment control systems.	C, O, D
141	Solar/Wind	Operation	All appropriate mitigation measures developed for the construction phase shall be applied to similar activities during the operations phase.	O
142	Solar/Wind	Revegetation	Project areas are to be replanted with vegetation at spaced intervals to the extent possible to break up areas of exposed soil and reduce soil loss by wind erosion.	C, O, D
143	Solar/Wind	Revegetation	Native plant communities in disturbed areas shall be restored by natural revegetation or by seeding and transplanting (using weed-free native grasses, forbs, and shrubs), based on BLM recommendations, as early as possible once construction is completed.	C, O, D
144	Solar/Wind	Reclamation	The original grade and drainage pattern shall be re-established.	C, O, D
145	Solar/Wind	Reclamation	All areas of disturbed soil shall be reclaimed using weed-free native grasses, forbs, and shrubs. Reclamation activities shall be undertaken as early as possible on disturbed areas.	C, O, D
146	Solar/Wind	Reclamation	All mitigation measures developed for the construction phase shall be applied to similar activities during the decommissioning/reclamation phase.	D
Transportation				
147	Solar/Wind	Transportation plans	The project shall be planned to utilize existing roads and utility corridors to the maximum extent feasible and to minimize the number and length/size of new roads, lay-down areas, and borrow areas.	S

Table B-4 (continued)
Best Management Practices

No.	Technology	Topic	Description of Measure	Phase
148	Solar/Wind	Design	Access roads and on-site roads shall be surfaced with aggregate materials, wherever appropriate.	S, C, O, D
149	Solar/Wind	Design	Access roads shall be located to follow natural contours and minimize side hill cuts.	S, C, O, D
150	Solar/Wind	Design	Roads shall be located away from drainage bottoms and avoid wetlands, if practicable.	S, C, O, D
151	Solar/Wind	Design	Roads shall be designed so that changes to surface water runoff are avoided and erosion is not initiated.	S, C, O, D
152	Solar/Wind	Design	Access roads shall be located to minimize stream crossings. All structures crossing streams shall be located and constructed so that they do not decrease channel stability or increase water velocity. Operators shall obtain all applicable Federal and State permits.	S, C, O, D
153	Solar/Wind	Construction traffic	To mitigate impacts related to the daily commutes of construction workers, the operator may be required to implement local road improvements, provide multiple site access locations and routes, stagger work schedules, and implement a ride-sharing or shuttle program.	C, D
154	Solar/Wind	Oversize vehicles	Obtain vehicle oversize and overweight permits, as appropriate.	C, O, D
155	Solar/Wind	Traffic	Traffic shall be restricted to the roads developed for the project. Use of other unimproved roads shall be restricted to emergency situations.	C, O, D
156	Solar/Wind	Traffic	Signs shall be placed along construction roads to identify speed limits, travel restrictions, and other standard traffic control information. To minimize impacts on local commuters, consideration shall be given to limiting construction vehicles traveling on public roadways during the morning and late afternoon commute time. Consideration shall also be given to opportunities for busing of construction workers to the job site to reduce traffic volumes.	C, O, D
157	Solar/Wind	Operation	To reduce hazards for incoming and outgoing traffic, as well as to expedite traffic flow, the operator may be required to implement traffic control measures, such as intersection realignment coupled with speed limit reduction; the installation of traffic lights and/or other signage; and the addition of acceleration, deceleration, and turn lanes on routes with site entrances.	O
158	Solar/Wind	Monitoring	Ongoing ground transportation planning shall be conducted to evaluate road use, minimize traffic volume, and ensure that roads are maintained adequately to minimize associated impacts.	O
Visual Resources				
159	Solar/Wind	Design	Visual information shall be included as a part of the critical due diligence information when determining and selecting development sites and ROW boundaries.	S

Table B-4 (continued)
Best Management Practices

No.	Technology	Topic	Description of Measure	Phase
160	Solar/Wind	Design	Consider proposed facility and transmission line visual impacts from relevant viewing angles when selecting building sites and locations. Consider visual impacts from frequent water vapor plumes if cooling towers are proposed.	S
161	Solar/Wind	Design	ROW location, size, and boundary determinations shall consider terrain characteristics and opportunities for full or partial project concealment.	S
162	Solar/Wind	Design	Other site design elements shall be integrated with the surrounding landscape. Elements to address include minimizing the profile of the ancillary structures, burial of cables, prohibition of commercial symbols, and lighting. Regarding lighting, efforts shall be made to minimize the need for and amount of lighting on ancillary structures.	S
163	Solar/Wind	Design	Siting shall take advantage of both topography and vegetation as screening devices to restrict views of projects from visually sensitive areas.	S
164	Solar/Wind	Design	Locating facilities near visually prominent landscape features (e.g., knobs and waterfalls) that naturally draw observers' attention shall be avoided.	S
165	Solar/Wind	Design	Use commercially available modeling software to identify a "zone" of flicker. Appropriately site and orient wind turbines to minimize shadow flicker occurrences on nearby residences.	S
166	Wind	Design	Maintain uniform size and design of turbines (for example, direction of rotation, type of turbine and tower, and height).	S
167	Solar/Wind	Design	Structures and roads shall be designed and located to minimize and balance cuts and fills. Retaining walls, binwalls, half bridges, and tunnels shall be used to reduce cut and fill.	S
168	Solar/Wind	Design	Low-profile structures shall be chosen whenever possible to reduce their visibility.	S
169	Solar/Wind	Design	Openings in vegetation for facilities, structures, roads, and the like shall mimic the size, shape, and characteristics of naturally occurring openings to the extent possible.	S, C
170	Solar/Wind	Design	Materials and surface treatments shall repeat and/or blend with the existing form, line, color, and texture of the landscape.	S, C
171	Solar/Wind	Design	Review pre-development visual conditions, inventoried visual quality and integrity shall be reviewed and the visual elements of form, line, color and texture restored to pre-development visual compatibility or to that of the surrounding landscape setting conditions, whichever achieves the greater visual quality and ecologically sound outcome.	S
172	Solar/Wind	Design	Horizontal and vertical pipeline bending shall be used in place of cut-and-fill activities where feasible.	S, C

Table B-4 (continued)
Best Management Practices

No.	Technology	Topic	Description of Measure	Phase
173	Solar/Wind	Construction	All stakes and flagging will be removed from the construction area and disposed of in an approved facility.	C, O, D
174	Solar/Wind	Surface disturbance	Existing rocks, vegetation, and drainage patterns shall be preserved to the maximum extent possible.	C, O, D
175	Solar/Wind	Surface disturbance	Brush-beating or mowing, or using protective surface matting rather than vegetation removal shall be done where feasible.	C, O, D
176	Solar/Wind	Surface disturbance	Slash from vegetation removal shall be mulched and spread to cover fresh soil disturbances as part of the revegetation plan. Slash piles shall not be left in sensitive viewing areas.	C, O, D
177	Solar/Wind	Surface disturbance	Project developers shall reduce visual impacts during construction by clearly delineating construction boundaries and minimizing areas of surface disturbance; preserving vegetation to the greatest extent possible; utilizing undulating surface disturbance edges; stripping, salvaging, and replacing topsoil; contoured grading; controlling erosion; using dust suppression techniques; and restoring exposed soils to their original contour and vegetation.	C, O, D
178	Solar/Wind	Surface disturbance	Visual impacts are lessened when vegetation and ground disturbances are minimized, siting shall take advantage of existing clearings to reduce vegetation clearing and ground disturbance. Linear development (transmission lines, pipelines, roads, etc.) shall follow the edges of clearings (where they would be less conspicuous) rather than passing through the center of clearings.	S, C, O, D
179	Solar/Wind	Surface disturbance	Road-cut slopes shall be rounded, and the cut-and-fill pitch shall be varied to reduce contrasts in form and line; the slope shall be varied to preserve specimen trees and nonhazardous rock outcroppings.	C, O, D
180	Solar/Wind	Surface disturbance	Topsoil from cut-and-fill activities shall be segregated and spread on freshly disturbed areas to reduce color contrast and aid rapid revegetation. Topsoil piles shall not be left in sensitive viewing areas.	C, O, D
181	Solar/Wind	Surface disturbance	Disposal of excess fill material downslope shall be avoided in order to avoid creating color contrast with existing vegetation and soils.	C, O, D
182	Solar/Wind	Surface disturbance	Excess cut-and-fill materials shall be hauled in or out to minimize ground disturbance and impacts from fill piles.	C, O, D
183	Solar/Wind	Surface disturbance	Soil disturbance shall be minimized in areas with highly contrasting subsoil color.	C, O, D

Table B-4 (continued)
Best Management Practices

No.	Technology	Topic	Description of Measure	Phase
184	Solar/Wind	Surface treatments	Soil borrow areas, cut-and-fill slopes, berms, water bars, and other disturbed areas shall be contoured to approximate naturally occurring slopes, thereby avoiding form and line contrasts with the existing landscape. Contouring to a rough texture would trap seed and discourage off-road travel, thereby reducing associated visual impacts.	C, O, D
185	Solar/Wind	Surface treatments	Gravel and other surface treatments shall be removed or buried.	C, O, D
186	Solar/Wind	Facilities	Minimize the number of structures. Combine and carry out activities in one structure, or co-locate structures to share pads, fences, access roads, lighting, and other facilities.	S, O
187	Wind	Facilities	Turbine arrays and turbine design shall be integrated with the surrounding landscape. Design elements to be addressed include visual uniformity, use of tubular towers, proportion and color of turbines, nonreflective paints, and prohibition of commercial messages on turbines.	S
188	Solar/Wind	Skylining	Visual “skylining” shall be avoided when structures, transmission lines, and other structures are placed on ridgelines, summits, or other locations where they would be silhouetted against the sky from important viewing locations. Skylining draws visual attention to the project elements and can greatly increase visual contrast. Siting shall take advantage of opportunities to use topography as a backdrop for views of facilities and structures to avoid skylining. Evaluate alternatives and select the least visually intrusive option when linear facilities (e.g. transmission lines) cross over ridgelines.	S
189	Solar/Wind	Lighting	<p>Minimize the need for and amount of lighting on ancillary structures. Design and commit to install permanent exterior lighting such that:</p> <ul style="list-style-type: none"> • light fixtures do not cause spill light beyond the project site; b) lighting fixtures are fully shielded, do not cause reflected glare, and use low temperature bulbs; • direct lighting does not illuminate the nighttime sky; • illumination of the project and its immediate vicinity is minimized by including use of motion detectors or other lighting controls to turn lights off except when needed for security and safety; • lighting complies with local policies and ordinances; and • use lighting that meets International Dark Sky Association standards, when feasible. 	S, C, O, D
190	Solar/Wind	Color	Paint the turbines with a non-reflective coating and a uniform color while observing air navigational marking regulations and addressing biological resource concerns.	S, C, O

Table B-4 (continued)
Best Management Practices

No.	Technology	Topic	Description of Measure	Phase
191	Solar/Wind	Color	Appropriately colored materials shall be selected for structures, or appropriate stains/coatings shall be applied to blend with the project's backdrop.	S
192	Solar/Wind	Color	Materials, coatings, or paints having little or no reflectivity shall be used whenever possible.	S, O
193	Solar/Wind	Color	Grouped structures shall all be painted the same color to reduce visual complexity and color contrast.	C, O
194	Solar/Wind	Color	Aboveground pipelines shall be painted or coated to match their surroundings.	C, O
195	Solar/Wind	Color	Culvert ends shall be painted or coated to reduce color contrasts with existing landscape.	C, O, D
196	Solar/Wind	Color	No paint or permanent discoloring agents will be applied to rocks or vegetation to indicate surveyor construction activity limits.	C, O, D
197	Solar/Wind	Color	Reduce graveled surfaces visual color contrast with approved color treatment practices.	S, C, O, D
198	Solar/Wind	Glare	Minimize the use of signs and project construction signs; necessary signs shall be made of nonglare materials and utilize unobtrusive colors; reverse sides of signs and mounts shall be painted or coated using the most suitable color selected from the BLM Standard Environmental Color Chart to reduce color contrasts with the existing landscape; however, placement and design of any signs required by safety regulations must conform to these regulations.	S, C, O
199	Solar/Wind	Transmission	Monopoles may reduce visual impacts more effectively than lattice towers in foreground and middleground views within built or partially built environments, while lattice towers tend to be more appropriate for less developed rural landscapes where the latticework would be more transparent against background textures and colors.	S, O
200	Solar/Wind	Transmission	All electrical collector lines shall be buried where possible. All electrical collector lines shall be buried in a manner that minimizes additional surface disturbance (e.g., along roads or other paths of surface disturbance).	S, C
201	Solar/Wind	Transmission	Communication and other local utility cables shall be buried where feasible.	C, O
202	Solar/Wind	Helicopter use	In visually sensitive areas, air transport capability shall be used to mobilize equipment and materials for clearing, grading, and erecting transmission towers, thereby preserving the natural landscape conditions between tower locations, and reducing the need for permanent and/or temporary access roads.	C, O, D
203	Solar/Wind	Waste removal	Establish a regular litter pick-up procedure within and around the perimeter of the project site.	C, O, D
204	Solar/Wind	Waste removal	"Good housekeeping" procedures shall be developed to ensure that the site is kept clean of debris, garbage, fugitive trash or waste, and graffiti; to prohibit scrap heaps and dumps; and to minimize storage yards. Mitigation measures regarding waste management (Section 5.20.3) shall be applied.	C, O, D

Table B-4 (continued)
Best Management Practices

No.	Technology	Topic	Description of Measure	Phase
205	Solar/Wind	Maintenance	Maintenance activities shall include dust abatement (in arid environments) and noxious weed control.	O
206	Solar/Wind	Maintenance	Road maintenance activities shall avoid blading existing forbs and grasses in ditches and adjacent to roads.	O
207	Solar/Wind	Revegetation	Cut slopes shall be randomly scarified and roughened to reduce texture contrasts with existing landscapes and aid in revegetation.	C, O, D
208	Solar/Wind	Revegetation	A combination of seeding, planting of nursery stock, transplanting of local vegetation within the proposed disturbance areas, and staging of construction enabling direct transplanting shall be considered. Where feasible, native vegetation shall be used for revegetating, establishing a composition consistent with the form, line, color, and texture of the surrounding undisturbed landscape.	C, O, D
209	Solar/Wind	Revegetation	Edges of revegetated areas shall be feathered to reduce form and line contrasts with the existing landscapes.	C, O, D
210	Solar/Wind	Revegetation	Stockpiled topsoil shall be reapplied to disturbed areas and the areas revegetated by using a mix of native species selected for visual compatibility with existing vegetation, where feasible, or a mix of native and non-native species if necessary to ensure successful revegetation.	C, O, D
211	Solar/Wind	Mitigation	The full range of visual best management practices shall be considered, and plans shall incorporate all pertinent BMPs. Visual resource monitoring and compliance strategies shall be included as a part of the project mitigation plans to cover the construction, operation and decommissioning phases.	C, O, D
212	Solar/Wind	Mitigation	Visual impact mitigation objectives and activities shall be discussed with equipment operators before construction activities begin.	C, O, D
213	Solar/Wind	Screening	Where screening topography and vegetation are absent, natural-looking earthwork landforms and vegetative or architectural screening shall be used to minimize visual impacts. Vegetative screening can be particularly effective along roadways.	S, O
214	Solar/Wind	Reclamation	All areas of disturbed soil shall be reclaimed by using weed-free native grasses, forbs, and shrubs representative of the surrounding and intact native vegetation composition and/or use non-native species, if necessary to ensure successful revegetation.	C, O, D
215	Solar/Wind	Reclamation	Rocks, brush, and forest debris shall be restored whenever possible to approximate pre-existing visual conditions.	C, O, D
216	Solar/Wind	Reclamation	Interim restoration shall be undertaken during the operating life of the project as soon as possible after disturbances.	C, O, D

Table B-4 (continued)
Best Management Practices

No.	Technology	Topic	Description of Measure	Phase
Water Resources				
217	Solar	Water supply	Use the minimum volume of water necessary for mirror washing. Collecting and recycling the wash water is encouraged.	O
218	Solar/Wind	Water supply	Water use shall be minimized by implementing conservation practices, such as treating spent wash water and storing it for reuse.	C, O, D
219	Solar/Wind	Ground water	The creation of hydrologic conduits between two aquifers shall be avoided during foundation excavation and other activities.	C, O, D
220	Solar/Wind	Water quality	If drilling activities are required as part of site characterization, any drilling fluids or cuttings shall be maintained so that cuttings, fluids, or runoff from storage areas will not come in contact with aquatic habitats. Temporary impoundments for storing drilling fluids and cuttings shall be lined to minimize infiltration of runoff into groundwater or surface water.	C, O, D
221	Solar/Wind	Water quality	Washing equipment or vehicles in streams and wetlands shall be avoided.	C, O, D
222	Solar/Wind	Water quality	Project developers shall avoid or minimize and mitigate the degradation of water quality (e.g., chemical contamination, increased salinity, increased temperature, decreased dissolved oxygen, and increased sediment loads) that could result from construction activities. Water quality in areas adjacent to or downstream of development areas shall be monitored during the life of the project to ensure that water quality is protected.	C, O, D
223	Solar/Wind	Stormwater	Construction activities shall avoid land disturbance in ephemeral washes and dry lakebeds; any unavoidable disturbance would be minimized. Stormwater facilities would be designed to route flow around the facility and maintain pre-project hydrographs.	C, O, D
224	Solar/Wind	Stormwater	When stream or wash crossings are constructed, culverts or water conveyances for temporary and permanent roads shall be designed to comply with county standards or to accommodate the runoff of a 100-year storm, whichever is larger.	C, O, D
225	Solar/Wind	Stormwater	Geotextile mats shall be used to stabilize disturbed channels and stream banks (CASQA 2003). Earth dikes, swales, and lined ditches shall be used to divert work-site runoff that would otherwise enter a disturbed stream (CASQA 2003).	C, O, D
226	Solar/Wind	Stormwater	Special construction techniques shall be used, where applicable, in areas of erodible soil, alluvial fans, and stream channel/wash crossings.	C, O, D
227	Solar/Wind	Reclamation	All management plans, mitigation measures, and stipulations developed for the construction phase shall be applied to similar activities during the decommissioning/reclamation phase.	D

Table B-4 (continued)
Best Management Practices

No.	Technology	Topic	Description of Measure	Phase
Wild Horses and Burros				
228	Solar/Wind	Design	Access roads shall be appropriately constructed, improved, and maintained and should employ appropriate signs to minimize potential horse and burro collisions. Fences should be built (as practicable) to exclude wild horses and burros from all project facilities, including all water sites built for the development of facilities and roadways.	S, C, O, D
Wildfire				
229	Solar/Wind	Safety	The effectiveness of developing and adhering to a hazardous materials and waste management plan and a fire safety plan, requiring a facility design to include isolation valves to limit HTF releases (where applicable), and providing worker training shall be considered in reducing fire risks.	S