# United States Department of the Interior

FISH AND WILDLIFE SERVICE
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In Reply Refer To:
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MEMORANDUM

To: Field Manager, Palm Springs-South Coast Field Office, Bureau of Land Management Palm Springs, California

From: Field Supervisor, Carlsbad Fish and Wildlife Office, Carlsbad, California

Subject: Biological Opinion on the Desert Sunlight Solar Farm Project, Riverside County, California [CACA 48649]

This memorandum transmits the U.S. Fish and Wildlife Service's (Service) biological opinion on the Bureau of Land Management's (BLM) proposed issuance of a right-of-way (ROW) grant that would authorize the construction, operation, and maintenance of the proposed Desert Sunlight Solar Farm project (project or Solar Farm); the BLM also proposes to issue a ROW grant for the construction, operation, and maintenance of the Southern California Edison (SCE) Red Bluff Substation and associated component. Both project components are located in Riverside County, California. This biological opinion analyzes the effects of the project on the threatened desert tortoise (*Gopherus agassizii*) and its designated critical habitat in accordance with section 7 of the Endangered Species Act of 1973 (Act), as amended (16 U.S.C. 1531 *et seq.*). Your request for formal consultation, dated October 15, 2010, was received on October 20, 2010. Additional documents and revisions to the biological assessment were submitted on December 23, 2010.

This biological opinion is primarily based on information provided in the following documents and communications: 1) BLM's *Draft Environmental Impact Statement and California Desert Conservation Area Plan Amendment for the Proposed Desert Sunlight Solar Farm Project* (DEIS; BLM 2010); 2) *Biological Assessment for the Desert Sunlight Solar Farm Project* (Ironwood Consulting 2010a); 3) *Biological Resources Technical Report for the Desert Sunlight Solar Farm Project* (Ironwood Consulting 2010b); 4) draft revised *Desert Tortoise Translocation Plan for the Desert Sunlight Solar Farm Project* (Ironwood Consulting and Woodard 2010); 5) draft revised *Common Raven Management Plan for the Desert Sunlight Solar Farm Project* (Ironwood Consulting 2010c); 6) draft *Habitat Compensation Plan for the Desert Sunlight Solar Farm Project* (First Solar 2011); 7) draft *Integrated Weed Management Plan for the Desert Sunlight Solar Farm Project* (Ironwood Consulting 2010d); 8) BLM's *Desert Sunlight Solar Farm Project California Desert Conservation Area Plan Amendment and Final Environmental Impact Statement* (FEIS; BLM 2011); 9) consolidated list of conservation

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measures provided by the BLM; 10) supplemental materials provided during the consultation process; 11) electronic transmissions from BLM, First Solar, Ironwood Consulting, and SCE; and 12) pertinent literature contained in our files. The project file for this consultation is located at the Carlsbad Fish and Wildlife Office (CFWO).

## CONSULTATION HISTORY

Desert Sunlight Holdings, LLC (Sunlight), a wholly-owned subsidiary of First Solar Development, Inc. initiated early coordination on this project in 2007; their consultant on the project, Ironwood Consulting, contacted the California Department of Fish and Game (CDFG) and Service to discuss wildlife survey protocols for the proposed project. Between 2007 and 2010, the consultant performed various biological surveys within the proposed project boundaries. During this time, the Service coordinated with the BLM, CDFG, and Sunlight and SCE (applicants) on the development of the measures contained in the biological assessment and BLM's DEIS to avoid, minimize, and offset impacts to the desert tortoise. Between April and December 2010, when consultation was initiated, regularly scheduled conference calls between the applicants, Service, BLM, and CDFG were held to discuss issues related to potential impacts to desert tortoises and measures to avoid, minimize, and offset those impacts, translocation, schedules for consultation and project construction, and other topics, including changes to the proposed action. We also conducted several visits to the project site with these agencies and Ironwood Consulting. Prior to the release of the FEIS, the BLM and California Public Utilities Commission (CPUC) worked together to develop additional protective measures for various resources, including the desert tortoise, to be implemented as part of the proposed action.

In preparing this biological opinion, we provided a draft biological opinion to the BLM for review and comment on June 17, 2011. BLM provided a copy of the draft to the CDFG and applicants, and provided us with the combined comments from those entities that BLM wished to be considered in our preparation of the final biological opinion. We have incorporated all comments received from the BLM, CDFG, and applicants into this biological opinion, as appropriate.

# BIOLOGICAL OPINION

## DESCRIPTION OF THE PROPOSED ACTION

The following description of the proposed action is a summary of the biological assessment (Ironwood Consulting 2010a), DEIS (BLM 2010), FEIS (BLM 2011), other supporting documents listed above (see pp. 1 and 2), subsequent language clarification via email, and further modifications based on comments received from the BLM on the draft biological opinion.

## Introduction

The proposed action is the BLM's issuance of two ROW grants that would authorize construction, operation, maintenance, and decommissioning of a commercial solar power generating facility and substation on approximately 7,600 hectares (ha) [19,000 acres (ac)] and 69.6 ha (172 ac) of BLM-managed lands, respectively. The proposed project is located in Riverside County approximately 9.7 kilometers (km) [6 miles (mi)] north of the rural community of Desert Center and approximately 10.3 km (6.5 mi) north of the Interstate 10 (I-10) corridor. The BLM's authorization of the ROW grants for the proposed project would require a resource management land use plan amendment to the California Desert Conservation Area (CDCA) plan, as amended (BLM 1999). Appendix 1 contains all of the figures referenced herein and the tables not included in the body of this biological opinion.

Project components generally include phased construction, operation, and maintenance of the Solar Farm site and the associated generation-tie transmission line (gen-tie) and construction, operation, and maintenance of the SCE Red Bluff Substation and related components (Figure 2 in Ironwood Consulting 2010a). The Service analyzes two gen-tie alignments (A-1 and A-2) in this biological opinion to allow for approval and construction of either alignment. The final alignment will be dependent upon the ability of the applicants to obtain necessary permissions to access private lands through which gen-tie A-2 would pass. Sunlight will construct, own, operate, and maintain the Solar Farm and gen-tie line, while SCE will construct, own, operate, and maintain the Red Bluff Substation and its associated elements. As a result, both Sunlight and SCE are considered the applicants under this biological opinion.

The proposed project will permanently disturb up to 1,690 ha (4,176 ac) (Table 1), all of which is desert tortoise habitat on lands administered by the BLM, with the exception of approximately 1.8 km (1.1 mi) along Kaiser Road held by Metropolitan Water District (MWD) of Southern California 1 km (0.6 mi) and Riverside County 0.8 km (0.5 mi); this assumes that the gen-tie alignment would follow Kaiser Road (gen-tie A-1). Gen-tie alignment A-2 reduces project impacts by approximately 2.4 ha (6 ac); this alignment passes through abandoned agricultural fields on private lands. Any non-emergency expansion of construction, operation, or maintenance activities into locations outside of the areas considered in this biological opinion will require BLM approval and desert tortoise clearance surveys, and may require reinitiation of consultation with the Service.

## Construction: Sunlight and SCE

Construction of the proposed Solar Farm and gen-tie is expected to be completed in phases over a period of at least 26 months. Construction of the proposed Red Bluff Substation is expected to take approximately 24 months. The Red Bluff Substation would be constructed on a schedule that allows interconnection and partial energization of the Solar Farm before overall project construction is complete.

**Table 1. Disturbance acreage for the Desert Sunlight Solar Farm and SCE project components**

| Area | Gen-tie A-1 | Gen-tie A-2 |
|---|---|---|
| **Sunlight Components** | **1,620.4 ha (4,004 ac)** | **1,618 ha (3,998 ac)** |
| Solar Farm site | 1,583.1 ha (3,912 ac) | 1,583.1 ha (3,912 ac) |
| Total Gen-tie line | 37.2 ha (92 ac)* | 34.8 ha (86 ac)* |
| Transmission erection and structure areas | 17 ha (42 ac) | 14.2 ha (35 ac) |
| Access roads | 9 ha (22 ac) | 6.3 ha (15.5 ac) |
| Splicing areas | 2.4 ha (6 ac) | 2 ha (5 ac) |
| Stringing areas | 12.5 ha (31 ac) | 15.4 ha (38 ac) |
| Guard structure areas | 0.8 ha (2 ac) | 0.8 ha (2 ac) |
| **SCE Components** | **69.6 ha (172 ac)** | **Same as gen-tie A-1** |
| Red Bluff Substation and staging areas | 30.8 ha (76 ac) | |
| Drainage/side slopes | 5.7 ha (14 ac) | |
| Access road | 12.6 ha (31 ac) | |
| Transmission loop-in | 13.4 ha (33 ac) | |
| Distribution line | 3.2 ha (8 ac) | |
| Telecommunications site | 0.4 ha (<1 ac) | |
| Laydown yard (temporary use area) | 3.6 ha (9 ac) | |
| **Total Project** | **1,690 ha (4,176 ac)** | **1,687.5 ha (4,170 ac)** |

*The sum total does not account for 11 ac of overlap of features for gen-tie A-1 and 9.5 ac of overlap for gen-tie A-2.

### *Solar Farm and Support Facilities: Sunlight*

The proposed project includes phased construction of a 550-megawatt (MW) commercial solar photovoltaic (PV) power-generating facility using First Solar's technology for thin film cadmium telluride PV modules. The proposed Solar Farm site would include operations, monitoring and maintenance facilities, enclosed water tank, security kiosk, visitor center, parking areas, and equipment/materials laydown areas. In addition, an onsite substation would step up the voltage of the Solar Farm-generated electricity to 220 kilovolts (kV) to match the voltage of the gen-tie that would interconnect the solar farm output with the Red Bluff Substation.

Construction and compensation of the proposed Solar Farm would be implemented in phases (Table 2, Biological Phasing Plan Figure). Prior to any activities for any given phase, desert tortoise clearance surveys would be conducted in accordance with the Service's most recent *Desert Tortoise Field Manual* (Service 2009a).

Phase I is divided into IA and IB because of the higher likelihood of encountering desert tortoises in the Phase IB area. Phase IA is primarily the "move-on" portion of the construction sequence and consists of establishing the primary staging area for the project. Activities associated with this phase would begin in August of 2011, outside of the active season of the

**Table 2. Impacts associated with phased construction of the proposed Solar Farm**

| Solar Farm Phase | Area |
|---|---|
| **Phase I** | 434.2 ha (1,073 ac) |
| IA | 121.4 ha (300 ac) |
| IB | 312.8 ha (773 ac) |
| **Phase II** | 972.1 ha (2,402 ac) |
| **Phase III** | 176.9 ha (437 ac) |
| **Total Solar Farm** | **1,583.1 ha (3,912 ac)** |

desert tortoise. Portions of the perimeter security fence, temporary fence, and desert tortoise exclusion fence would be constructed and parking and lay-down areas would be prepared. Administrative trailers would be moved on to the first staging area; measures required by the Storm Water Pollution Prevention Plan (SWPPP) would be installed; the access road to the Phase IA area would be constructed; and installation of the water supply well and pond for construction would also occur at this time. Subsequent to establishment of the necessary construction support facilities (approximately August to September 2011) construction of the first solar arrays would begin within the Phase IA area. Construction within the Phase IB area would begin in fall 2011, during the active season of the desert tortoise. The primary construction activities would include, but not be limited to, site preparation, construction of the onsite substation, and installation of solar arrays.

Phase II activities are expected to begin in September 2011 or spring 2012. This phase consists of site preparation and installation of solar arrays. Perimeter security fencing and desert tortoise exclusion fencing would be constructed prior to any ground-disturbing activities within the Phase II area. Temporary desert tortoise exclusion fencing may be installed within the perimeter security fence to delineate interior divisions of the project site to allow for greater efficiency in conducting desert tortoise clearance surveys, which would be completed during the active season for the species. Construction of the gen-tie would also begin during Phase II.

Phase III is anticipated to begin in 2012. Activities would be similar to those described for Phase II. All clearance surveys would be completed during the desert tortoise active season.

The proposed Solar Farm would consist of arrays of PV modules. Each array would occupy approximately 3.2 ha (8 ac) and consist of PV modules, a power conversion station (PCS), and a transformer. Vertical steel posts would support arrays. Wire harnesses and combiner boxes that would collect power from several rows of modules and feed the PCS via direct current cables placed in underground covered trenches would electrically connect the PV modules. High-capacity 34.5 kV collection system lines would connect the power output from the PV combining switchgear to the onsite substation via overhead lines supported by wooden poles approximately 15.8 meters (m) [52 feet (ft)] above finished grade. The approximately 350 poles necessary for the proposed Solar Farm would be located within the perimeter security fence site.

Sunlight intends to implement a site preparation approach for the proposed Solar Farm site that involves the use of techniques that reduce the required volume of earth movement. The process utilizes a "disc and roll" technique that uses farm tractors to till the soil over much of the Solar Farm site and then roll it for compaction followed by "micrograding" or "isolated cut and fill and roll" of other areas of the site to trim off high spots and use the material to fill in low spots. These techniques would reduce the area of the Solar Farm site over which conventional mass cut and fill grading would occur. However, this change does not affect the total overall acreage impacts for the project. A 1.8-m (6-ft) chain link fence topped with barbed wire would enclose the entire Solar Farm site, including support facilities. Desert tortoise exclusion fencing would also be installed along the outside of the entire perimeter fence. Controlled access gates would be installed at roads entering and exiting the Solar Farm site. The site would be designed, operated, and maintained so that channelization of surface water flow would not undermine the integrity of the perimeter fence or the desert tortoise exclusion fencing.

The PV technology being used requires no water for electricity generation or module cleaning. Water necessary for construction, operation, and maintenance of the proposed Solar Farm would be obtained from wells constructed within the project boundary. Alternatively, Sunlight may explore acquiring water from existing wells. The existing well locations are within previously disturbed areas along an existing road within the Solar Farm project area.

The construction water storage and supply system would include conveying water from the wells to stand tanks, bladders, or temporary water supply ponds that would be used to reduce fugitive dust emissions during high wind events. The stand tanks or bladders may be located at the well sites. The temporary water supply ponds would reduce the amount of vehicle travel around the site by water trucks (and associated exhaust and dust), reduce the rate of groundwater extraction during construction, and improve capability to respond quickly and effectively to dust emissions caused by high wind events. Seven temporary 0.4-ha (1-ac) water supply ponds within the Solar Farm site are proposed; no more than two or three ponds would be in operation at any one time. The ponds would be connected to the groundwater wells via 15.2-centimeter (cm) [6-inch (in)] high-density polyethylene pipes that run along access roads or within the Solar Farm site perimeter from the wells to the ponds.

The temporary water supply ponds may attract ravens and other avian species protected under the Migratory Bird Treaty Act (MBTA). In consideration of these potential risks, Sunlight would implement avian deterrence measures, including lining the ponds, maintaining 0.6 m (2 ft) of freeboard in the ponds, designing the ponds with interior side slopes of 33 percent, and covering the ponds with netting, as necessary. These measures are expected to reduce access of perching birds and/or shorebirds to the water and minimize the attraction of the ponds to waterfowl (see "Conservation Measures" section and Ironwood Consulting 2010e).
Upon completion of construction, one of the groundwater wells used during construction would be closed and the other would remain in use during operations. Water from the well would be used for domestic purposes only, for the operations and maintenance (O&M) facility and the visitor center, and would be stored in an enclosed aboveground 18,930 liters (5,000 gallons) potable water storage tank. A septic system and leach field would serve the sanitary wastewater

treatment needs and would be sited south of the O&M facility and visitor center. Water use is estimated at 0.024 ha-m (0.2 ac-ft) per year.

Retention basins are necessary during construction and operations to minimize surface water erosion and sedimentation. The retention basins would be located within the perimeter security fence of the proposed Solar Farm site along the upstream western boundary and on the downstream southeastern boundary of the site. The basins would be designed to minimize concentration and channelization of flows within the project site and to prevent downstream erosion and channelization. The basins would be designed so that retained water would either infiltrate or evaporate and not be allowed to pond thereby minimizing the potential for raven or other avian species to be attracted to these areas.

Construction and O&M activities would be limited to daylight hours to the extent possible. However, if needed for worker safety, lighting during construction would be limited to specific work areas, focused downward, and shielded and directed toward the interior of the site to minimize light exposure to areas outside the construction area. During operations, lighting would be limited to shielded, area-specific lighting for security purposes for the O&M facility and the onsite substation. Power for construction activities would be provided by connection to the existing distribution line located adjacent to the Solar Farm perimeter security fence along Kaiser Road. No area outside of the fence line would be disturbed. Additionally, an onsite portable generator may be required.

Access to the proposed Solar Farm site would be via the existing paved Kaiser Road that adjoins I-10 at Desert Center. The Solar Farm perimeter security fence would be located approximately 39.6 m (130 ft) east of Kaiser Road; a limited area of impact would occur outside of the fence associated with access roads.

Preconstruction work would consist of staking and flagging the following: 1) ROW and construction area boundaries; 2) construction laydown, parking, and work areas; 3) final grade, 4) access and roads; and 5) foundation structures for facilities. Staking and flagging would be maintained until final site cleanup.

The entire site would be graded or disc and rolled to provide a level surface for installation of the solar PV arrays. Five temporary construction staging areas would be utilized in phases throughout the 26-month construction period. Each staging area would be approximately 3.3 ha (8.1 ac), totaling 13.1 ha (32.4 ac). The staging areas within the Solar Farm site would include material laydown and storage areas and an equipment assembly area. The staging areas would be unpaved and not graveled, but be treated with dust palliative and water periodically to control dust. The staging areas within the Solar Farm site would be replaced with PV arrays once the areas are no longer needed for staging.

The proposed Solar Farm site would be fenced with security and desert tortoise exclusion fencing, and clearance surveys and desert tortoise translocation would be completed in accordance with the Service's *Desert Tortoise Field Manual* (Service 2009a) and the approved *Desert Tortoise Translocation Plan for the Desert Sunlight Solar Farm Project* (Ironwood

Consulting and Woodard 2010), respectively. Temporary desert tortoise exclusion fencing would be installed around portions of the nonlinear features that do not correspond to permanent security fencing and may be installed around linear features where a monitor would not be present in the immediate vicinity of construction activities. Desert tortoise exclusion fencing would be constructed in accordance with specifications contained in the Service's *Desert Tortoise Field Manual* (Service 2009a). Desert tortoise clearance surveys associated with construction of the Solar Farm site would only be conducted during the desert tortoise's most active season (April to May; September to October). Surveys outside of these periods require approval by the CFWO; clearance surveys associated with Phase IA would occur outside of the active season of the desert tortoise.

***Gen-tie Transmission Line: Sunlight***

The proposed Solar Farm site would interconnect with the regional transmission system via a new 220-kV single-circuit gen-tie along one of two alignments. Gen-tie A-1 would exit the southwestern portion of the project site and follow Kaiser Road. The gen-tie would be constructed within a 48.8-m (160-ft) wide transmission ROW for an approximate distance of 19.3 km (12 mi) to SCE's Red Bluff Substation. The gen-tie would be constructed with approximately 73, 48.8-m (135-ft) tall steel vertical configuration monopoles spaced approximately 274.3 to 304.8 m (900 to 1,100 ft) apart. Access and construction of the gen-tie line would include disturbance of areas for access roads (overland travel), transmission structure erection areas and footprints, splicing, stringing, and guard structures[1]. The expected disturbance of the gen-tie is 37.2 ha (92 ac) and is comprised of the erection areas and footprints of the transmission line structures [17 ha (42 ac)], access roads [9 ha (22 ac)], splicing areas [2.4 ha (6 ac)], guard structure areas [0.8 ha (2 ac)], and stringing areas [12.5 ha (31 ac)].

The gen-tie A-1 alignment crosses portions of the designated Chuckwalla Critical Habitat Unit (CHU) and BLM's Chuckwalla Desert Wildlife Management Area (DWMA)/Area of Critical Environmental Concern (ACEC), which are special management areas for desert tortoise. This alignment would affect 13.76 ha (34 ac) of the Chuckwalla CHU and 14.97 ha (37 ac) of the Chuckwalla DWMA; the CHU and DWMA are analogous on 2.8 ha (7 ac) of the alignment. Impacts from and materials used for the gen-tie A-2 alignment would be similar to those described for gen-tie A-1, with the exception of the following: the length of gen-tie A-2 would be approximately 16.9 km (10 mi) from the proposed Solar Farm to SCE's Red Bluff Substation. This alignment would be constructed with approximately 59 steel monopoles. The expected disturbance from the gen-tie A-2 alternative is 34.8 ha (86 ac) and is comprised of the erection

[1] The following assumptions were used to calculate disturbance for the gen-tie line (Ironwood Consulting 2010a). Access roads (overland travel areas) are assumed to be 4.3-m (14-ft) wide. Approach areas to the access roads would be 4.3 m (14 ft) wide by 7.6 m (25 ft) long with 6.1-m (20-ft) radii on each side. Tangent structures were assumed to have a 1.8-m (6-ft) diameter permanent foundation footprint with a foundation up to 2.1 m (7 ft) in diameter. Angle and dead-end structures were assumed to have a 3.6-m (12-ft) diameter permanent footprint. A structure erection area of 48.8 m by 48.8 m (160 ft by 160 ft) was assumed to surround each proposed transmission structure. The splicing area would typically be 30.5 m by 137.2 m (100 ft by 450 ft). A 137.2-m (450-ft) radius area and a 22.9-m by 61-m (75-ft by 200-ft) area were assumed for each stringing areas. Guard structures would require the use of a 15.2-m by 30.5-m (50-ft by 100-ft) area.

areas and footprints of the transmission line structures [14.2 ha (35ac)], access roads [6.3 ha (15.5 ac)], splicing areas [2 ha (5 ac)], guard structure areas [0.8 ha (2 ac)], and stringing areas [15.4 ha (38 ac)]. The gen-tie A-2 alignment would affect a small portion of the Chuckwalla CHU [5.7 ha (14 ac)]/ DWMA [4.5 ha (11 ac)] near the I-10; the CHU and DWMA are analogous on 2.8 ha (7 ac) of the alignment.

***Red Bluff Substation and Support Facilities: SCE***

The Red Bluff Substation would be a 1,120 mega-volt ampere (MVA), 500/220-kV substation measuring approximately 30.8 ha (76 ac) within the Chuckwalla CHU and DWMA. It would loop the 500-kV transmission line system into the substation and provide connection for the Desert Sunlight 220-kV gen-tie line for the project [13.4 ha (33 ac)]. The entire substation site would be graded and leveled and be surrounded by a 2.4-m (8-ft) high concrete wall with two 7.3-m (24-ft) wide rolling gates installed at access points. A temporary l3.6-ha (9-ac) laydown yard would provide space for materials during construction of the substation. An additional 5.7 ha (14 ac) would be needed for drainage improvements and 12.6 ha (31 ac) for improvements of the access road off Corn Springs Road. The project includes an upgrade of an electric distribution line for substation light and power 3.2 ha (8 ac) and a telecommunications facility associated with the substation, bringing the total disturbance area to 69.6 ha (172 ac).

The new 500-kV loop-in line segment would be constructed using eight transmission poles; of these, six would be lattice steel towers (LST). The new single-circuit transmission structures would require a 180-m (590-ft) wide area between the SCE existing DPV1 BLM ROW and the new Red Bluff Substation site. Other transmission structures would be within SCE's existing BLM ROW. Three dead-end structures and one suspension structure would be required for each line segment (a total of eight structures for both lines), to reach the edge of the Red Bluff Substation site. The entire loop-in line segment including structures and access roads would occupy approximately 13.5 ha (33 ac). Although some modification to the existing 220-kV structures would likely be required with the new 550-kV loop-in line segments crossing over Florida Power and Light's Buck-Julian Hinds 220-kV transmission line, any tower modification would most likely be encompassed within the 13.5 ha (33-ac) loop-in line disturbance area.

***Gen-Tie Line Connection: SCE***

The proposed Red Bluff Substation design includes bringing the final span from the project 220-kV gen-tie line into the switchrack, just west of the substation. A single lattice steel tower (LST) or tubular steel pole (TSP) structure just west (or north) of the substation site is needed for the connection of the proposed gen-tie to a 220-kV position inside the Red Bluff Substation. The last gen-tie structure constructed for the proposed project would be located just off the Red Bluff Substation property within other areas already disturbed for the proposed action and would be a dead end structure; SCE would work with Sunlight to integrate final design. If the LST design is used, the impact would be 0.09 ha (0.22 ac); if the TSP design is used, the impact would be 0.04 ha (0.1 ac). SCE would construct, own, operate, and maintain the final span of the circuit from the substation dead end structure to the tower connection at the last project structure.

***Distribution Line for Substation Light and Power: SCE***

An upgrade of the existing, SCE-owned, Desert Center 12-kV circuit from single phase to three-phase construction would be required to provide light and power for the Red Bluff Substation. This line is located on BLM-managed land. The rebuild would require replacement of 100 wooden poles approximately 8.8 to 11.9-m (29 to 39-ft) tall. In addition, the power route would be extended from these poles approximately 304.8 m (1,000 ft) underground (south) towards the substation. Total impacts for this portion of the project include 3.2 ha (8 ac).

Lighting at the proposed Red Bluff Substation would consist of high-pressure sodium, low intensity lights located in the switchyards, around the transformer banks, and in areas of the yard where operating and maintenance activities may take place during evening hours for emergency/scheduled work. Maintenance lights would be controlled by a manual switch and would normally be in the "off" position. The lights would be directed downward, and shielded to reduce glare outside the facility.

***Drainage Facilities: SCE***

Surface stormwater runoff would need to be redirected around the Red Bluff Substation. Alterations to existing natural drainage channels within the substation footprint would be considerable and require extensive rerouting of three deep channels. The drainage systems may include structures, channels (e.g., earthen, concrete, rip-rap), pipes, and ponds. The system would be designed to convey runoff away from the substation site and into approved facilities. The erosion protection measures at all potential discharge locations would be designed, at a minimum, to meet the best management practices as outlined by the California State Water Resources Control Board. Drainage improvements and related grading needed would require approximately 5.7 ha (14 ac) outside of the block wall.

Drainage facilities around the Telecom site include construction of a 2.4-m (8-ft) high berm on three sides to prevent the site from flooding. The berm is included in the less than 0.4-ha (1-ac) disturbance area.

***Access Road: SCE***

Access would be provided from the Corn Springs exit off I-10 via Chuckwalla Valley Road, heading east along the paved southern frontage of the freeway. From this point the access would head south along a 91.4-m (300-ft) long section of Corn Springs Road, then would turn west through roadway improvements to approximately 7.3 km (4.5 mi) of the existing dirt pipeline patrol road to the substation site. Approximately 13.4 ha (33 ac) would be adversely affected with these road improvements.

***Telecommunications Facilities: SCE***

A telecommunication system would also be required to provide: 1) monitoring and remote operation capabilities of the electrical equipment at Red Bluff Substation, and 2) for transmission line protection. This system includes electrical equipment that would be installed onsite at the Solar Farm, along the gen-tie, at the Red Bluff Substation, and at the existing Chuckwalla Mountain Communications Site. The new Desert Center Communications Site (Telecom site) would be located on the north side of Airport Access Road approximately 182.9 m (600 ft) east of State Route (SR) 177 (Rice Road), and west of the former Desert Center Airport. Construction of a 6.1-m (20-ft) wide by 9.1-m (30-ft) long road would be required to access the Telecom site from SR 177. The disturbance footprint of the Telecom site, including access road and other features described below would be less than 0.4 ha (1 ac).

Permanent impacts associated with the Desert Center Telecom site, includes a 2.4-m (8-ft) high by 3-m (10-ft) wide berm around three sides of the facility and an access road, which consists of an area approximately 45.7 m by 21.3 m (150 ft by 70 ft). Enclosed within the disturbed area would be a fenced area of 30.5 m by 15.2 m (100 ft by 50 ft). Within the fenced area, there would be a 3.7 m by 11 m (12 ft by 36 ft) communication room and the 56.4 m (185-ft) tall microwave tower and two 3- m (10-ft) diameter microwave antennas. Power would be provided from a tap into the nearest 12-kV line and would require the installation of about seven wooden poles to span about 228.6 m (750 ft).

The Chuckwalla Mountain Communications Site is located on BLM-managed lands within the Chuckwalla CHU and DWMA approximately (5 mi) southwest of Desert Center. The site supports an extensive communication complex atop a peak in the Chuckwalla Mountains that has been operating under a BLM lease for many years. Access to the site would be via the existing unpaved Red Cloud Road (Michael Brandman Associates 2009). No new disturbance is associated with this project component (L. Robb, SCE, personal communication 2011).

**Operations and Maintenance: Sunlight**

Activities associated with O&M would occur within the proposed Solar Farm site during the life of the ROW grant. While electrical power would be generated only during daylight hours, 10 to 15 full time employees would staff the facility 24 hours a day, 7 days a week. Within the Solar Farm perimeter security fence, routine O&M activities are expected to be limited to maintenance and repair of the perimeter fence, access gates, all-weather roads, solar arrays/module components, support facilities, vehicle and equipment movement, and vegetation removal.

The proposed onsite substation would be unmanned and the electrical equipment within the substation would be monitored and controlled remotely by a power management system from the Solar Farm site control room or a centrally located operation control center. Personnel would generally visit for electrical switching and routine maintenance two to three times per week. Outside of the fenced Solar Farm site, O&M activities would be conducted within the access

road/utility corridor, gen-tie transmission line ROW, rerouted drainage channels, and outer side of the perimeter security fence.

Routine O&M activities associated with the gen-tie line would involve periodic inspection via helicopter or truck. Maintenance of the transmission lines would be performed on an as-needed basis throughout the year and periodic cleaning of line conductors and replacement and/or repair of equipment damaged by wind, dust, or accident, road grading and drainage structure repairs to maintain a drivable surface along the access roads.

**Decommissioning of Solar Farm: Sunlight**

The ROW grant for the proposed Solar Farm is 30 years, but the operational life of the facility may be longer or shorter depending on economic or other circumstances. If the facility were to become economically non-viable before 30 years of operation, permanent closure could occur sooner. If permanent closure is imminent, BLM would require a Decommissioning Plan be developed and implemented. The procedures provided in any Decommissioning Plan would be developed to ensure compliance with applicable laws and regulations and to ensure protection of public health and safety and the environment. The Decommissioning Plan would be submitted to the BLM for review and approval prior to a closure of the project site. When the BLM begins to consider decommissioning, it would contact the Service to determine if additional consultation, pursuant to section 7(a)(2) of the Act, would be appropriate. Consequently, we do not analyze the potential effects of decommissioning on the desert tortoise in this biological opinion.

**Operations and Maintenance of Red Bluff Substation: SCE**

Once constructed, the Red Bluff Substation would be unmanned, and electrical equipment within the substation would be remotely monitored. SCE personnel would visit the substation three to four times a month for routine maintenance purposes. Routine maintenance would include equipment testing, monitoring, and repair.

The SCE transmission lines would be maintained in a manner consistent with CPUC General Order No. 165. SCE maintains an inspection frequency of the energized overhead facilities a minimum of once per year via ground and/or aerial observation. Maintenance would include activities such as repairing conductors, replacing insulators, and access road maintenance as needed to correct wash out from storm flows.

**Conservation Measures: Sunlight and SCE**

The proposed action includes conservation, minimization, and compensation measures that would be implemented by the applicants to avoid, minimize, and offset potential adverse effects to the desert tortoise. The Service, BLM, CDFG, and applicants worked closely on developing these measures. The FEIS refers to some specific measures as Applicant Measures (AM) and Mitigation Measures (MM); AMs are defined as those proposed by Sunlight and/or SCE as part of the proposed action and those measures required by law, regulation, or policy and, MMs are

additional measures required by BLM, CDFG, and CPUC to further reduce impacts (BLM 2011). The CPUC would only be involved with the review and approval of measures associated with the Red Bluff Substation. The measures pertinent to the analysis under this biological opinion include the following (not presented in this order):

AM-BIO-1: Habitat Compensation Plan
AM-BIO-2: Integrated Weed Management Plan
AM-BIO-4: Worker Environmental Awareness Program
AM-WIL-1: Desert Tortoise Translocation Plan
AM-WIL-2: Raven Management Plan
MM-BIO-1: Construction Monitoring
MM-BIO-2: Offsite Compensation
MM-WIL-7: Alternative to Long-distance Desert Tortoise Translocation (addresses AM-WIL-1)
MM-WIL-8: Plans required under AM-WIL-1, 2, and 3 shall be submitted for review and approved by the Service, BLM, CDFG, and CPUC, as appropriate.

A complete list and descriptions of these measures are provided in the FEIS (Executive Summary and Chapter 4 in BLM 2011) and, where applicable, as appendices to the biological assessment (Ironwood Consulting 2010a-e) and are hereby incorporated by reference. In some cases, we have modified the language to improve clarity, but we have not changed the intent of the measures that the applicants and BLM have proposed. The conservation measures are part of the proposed action evaluated below in our effects analysis; as such, without prior agreement by the Service, any significant deviation from these measures during project implementation would constitute grounds for reinitiation of formal consultation.

**1. Construction Monitoring (MM-BIO-1)**

A BLM-approved biologist shall conduct construction monitoring during all ground-disturbing activities to ensure containment within the staked and flagged construction areas at all times. The construction monitor shall also be present during all ground-disturbing activities to either actively or passively relocate special status wildlife species, other than desert tortoises, nesting bird species, and burrowing owl, located within the construction zones to a suitable location outside of the project areas. The construction monitor also shall inspect fencing and netting at all construction ponds to ensure that the ponds are not accessible to potential avian or canid desert tortoise predators or to wildlife that could drown or become entrapped within the exclosures. Netting and fencing must prevent the ponds from becoming water subsidies to predators or from becoming hazards to native wildlife.

The construction monitor shall have the authority to stop work and report directly to the applicants' Construction and Operation Managers or Environmental Compliance Manager (ECM) to ensure compliance with the conservation measures put forth in this biological opinion. If the construction monitor is not the same as the Desert Tortoise Authorized Biologist, the two (or more) shall coordinate to meet the reporting requirements outlined

below. The BLM and applicants shall be responsible for ensuring that construction monitoring is conducted during all construction activities.

***Desert Tortoise Authorized Biologist Selection and Qualifications***

The applicants shall assign at least one Authorized Biologist to the project. The applicants shall submit the resume of the proposed Authorized Biologist(s), with at least three references and contact information, to the Service, BLM, and CDFG. The Authorized Biologist must meet the following minimum qualifications:

a. Bachelor's degree in biological sciences, zoology, botany, ecology, or a closely related field;

b. Three years of experience in field biology or current certification of a nationally recognized biological society, such as the Ecological Society of America or The Wildlife Society;

c. Have at least one year of field experience with biological resources found in or near the project area;

d. Meet or exceed the current Authorized Biologist qualifications set forth by the Service at www.fws.gov/ventura/speciesinfo/protocols_guidelines, and demonstrate familiarity with protocols and guidelines for the desert tortoise, and be approved by the Service, BLM, and CDFG;

e. Possess a California ESA Memorandum of Understanding pursuant to Section 2081(a) for desert tortoise; or

f. In lieu of the above requirements, the resume shall demonstrate to the satisfaction of the BLM, in coordination with the Service and CDFG, that the proposed Authorized Biologist or alternate has the appropriate training and background to effectively implement the conservation measures.

No fewer than 45 days prior to the start of site mobilization or construction-related ground disturbance, the applicants shall submit the names of the Authorized Biologist(s) along with a completed Desert Tortoise Authorized Biologist Request Form to the Service, BLM, and CDFG for review and final approval.

If an Authorized Biologist needs to be replaced, the specified information of the proposed replacement must be submitted to the BLM at least 10 working days prior to the termination or release of the preceding Authorized Biologist. In an emergency, the applicants shall immediately notify the BLM to discuss the qualifications and approval of a short-term replacement while a permanent Authorized Biologist is proposed to and approved by the Service and BLM.

***Desert Tortoise Authorized Biologist Duties***

The applicants shall ensure that the Authorized Biologist performs the activities described below during any site mobilization activities and construction-related ground disturbance (e.g., grading, boring, or trenching). No ground disturbance shall commence until an approved Authorized Biologist is available to be on site. The Authorized Biologist may be assisted by an approved Biological Monitor(s) but remains the contact for the applicants and the BLM. The Authorized Biologist duties shall include the following:

a. Advise the applicants' Construction and Operation Managers on the implementation of the conservation measures set forth in this biological opinion;

b. Be available to supervise, conduct, and coordinate mitigation, monitoring, and other biological resources compliance efforts, particularly in areas requiring avoidance or containing sensitive biological resources, such as desert tortoises and special-status species or their habitat;

c. Clearly mark sensitive biological resource areas and verify personally or use Biological Monitors to check for compliance with all impact avoidance and minimization measures (see below), including checking all exclusion zones to ensure that signs, stakes, and fencing are intact and that project-related activities are restricted in these protective zones;

d. Inspect active construction areas where animals may have become trapped prior to construction commencing each day. At the end of the day, inspect for the installation of structures that prevent entrapment or allow escape during periods of construction inactivity. Periodically inspect areas with high vehicle activity (e.g., parking lots) for animals in harm's way;

e. Remain on site daily in areas located outside of permanent desert tortoise exclusion fencing while vegetation salvage, grubbing, grading and other ground-disturbance construction activities are taking place to ensure conservation measures are properly implemented;

f. Notify the applicants and the BLM of any non-compliance with any of the conservation measures set forth in this biological opinion;

g. Respond directly to inquiries from the Service, BLM, and CDFG regarding biological resource issues;

h. Train the Biological Monitors as appropriate, and ensure their familiarity with the Worker Environmental Awareness Program (WEAP; AM-BIO-4) training program, and Service guidance regarding desert tortoise surveys, handling procedures, and translocation; and

i. Maintain the ability to be in regular, direct communication with representatives of the Service, BLM, and CDFG, including notifying these agencies of dead or injured listed species and reporting special-status species observations to the California Natural Diversity Data Base.

***Desert Tortoise Biological Monitor Selection and Qualifications***

The Authorized Biologist shall submit the resume(s), at least three references, and contact information of the proposed Biological Monitor(s) to the BLM. The resume shall exhibit, to the satisfaction of the BLM, the appropriate education and experience to accomplish the assigned biological resource tasks. Biological Monitor(s) shall be trained by the Authorized Biologist to ensure familiarity with the WEAP training program, and Service guidance regarding desert tortoise surveys, handling procedures, and translocation.

The applicants shall submit the specified information to the BLM for approval at least 30 days prior to the start of any site mobilization and construction-related ground disturbance (e.g., grading, boring, or trenching). The Authorized Biologist shall submit a written statement to the BLM confirming that individual Biological Monitor(s) have had appropriate training and the dates when training was completed. If additional Biological Monitors are necessary during construction, the specified information shall be submitted to the BLM for approval at least 10 days prior to their first day of monitoring activities.

***Desert Tortoise Biological Monitor Duties***

The Biological Monitors shall assist the Authorized Biologist in conducting surveys and in monitoring of site mobilization activities, construction-related ground disturbance (e.g., grading, boring or trenching). The Authorized Biologist shall remain the primary contact for the applicants and the BLM.

***Desert Tortoise Authorized Biologist and Biological Monitor Authority***

The applicants' Construction and Operation Managers shall act on the advice of the Authorized Biologist and Biological Monitor(s) to ensure conformance with the conservation measures set forth in this biological opinion. The Authorized Biologist shall have the authority to immediately stop any activity that is not in compliance with these conditions and/or order any reasonable measure to avoid take of an individual of a listed species. If required by the Authorized Biologist and Biological Monitor(s), the applicants' Construction and Operation Managers or ECM shall halt all site mobilization, construction-related ground disturbance, and O&M activities in areas specified by the Authorized Biologist. The Authorized Biologist shall:

a. Require a halt to all activities in any area where there would be an unauthorized adverse impact to biological resources if the activities continued;

b. Inform the applicants and the Construction and Operation Managers when to resume activities; and

c. Notify the BLM and if there is a halt of any activities and advise them of any corrective actions that have been taken or would be instituted to rectify the situation. If the work stoppage relates to desert tortoises or any other Federal or State-listed species, the Service and CDFG shall also be notified.

If the Authorized Biologist is unavailable for direct consultation, the Biological Monitor(s) shall act on behalf of the Authorized Biologist.
The applicants shall ensure that the Authorized Biologist or Biological Monitor(s) notifies the BLM immediately (and no later than the morning following the incident, or Monday morning in the case of a weekend) of any non-compliance or a halt of any site mobilization, construction-related ground disturbance, or O&M activities. If the non-compliance or halt to construction or O&M relates to desert tortoises or any other Federal or State listed species, the applicants shall notify the CFWO and the Regional Office of CDFG in Ontario, California, at the same time. The applicants shall notify the BLM of the circumstances and actions being taken to resolve the non-compliance. The BLM, in coordination with the Service and CDFG, would review any corrective action taken by the applicants to determine success or failure, or if additional time is required to evaluate the circumstances. The BLM would notify the applicants of its determination within 5 working days of receipt of notice that corrective actions have been taken.

***Applicants' Authorized Environmental Compliance Manager(s)***

In coordination with the BLM, the applicants shall designate, jointly or independently, a project ECM(s). The ECM and Authorized Biologist would work closely together to ensure compliance with the various conditions and requirements of project permits and approvals set forth in the biological opinion, supporting plans appended to the biological assessment, and the FEIS. The ECM will be responsible for the all project reporting required by the Service, BLM, and CDFG.

**2. Worker Environmental Awareness Program (WEAP; AM-BIO-4)**

The applicants shall develop and implement a project-specific WEAP and secure approval of the program from the BLM, in consultation with the Service and CDFG. The WEAP shall be administered to all onsite personnel including surveyors, construction engineers, employees, contractors, contractor's employees, supervisors, inspectors, subcontractors, and delivery personnel. The WEAP shall be implemented during site mobilization, construction, O&M, and decommissioning. The WEAP shall:

a. Be developed by or in consultation with the Authorized Biologist and consist of an onsite or training center presentation in which supporting written material and

electronic media, including photographs of protected species, is made available to all participants;

b. Place special emphasis on desert tortoise, including information on physical characteristics, distribution, behavior, ecology, sensitivity to human activities, legal protection, penalties for violations, reporting requirements, and conservation measures required for the project;

c. Discuss the locations and types of sensitive biological resources on the project sites and adjacent areas, and explain the reasons for protecting these resources; provide information to participants that no wildlife shall be harmed;

d. Describe the temporary and permanent habitat protection measures to be implemented at the project site;

e. Include a discussion of fire prevention measures to be implemented by workers during project activities; require workers to dispose of cigarettes and cigars in appropriately receptacles;

f. Identify whom to contact for further comments and questions about the material discussed in the program; and

g. Include a training acknowledgment form to be signed by each worker indicating that they received training and shall abide by the guidelines.

At least 30 days prior to construction-related ground disturbance, the applicants shall provide the Service, BLM, and CDFG a draft program for review and approval. A copy of the final WEAP and all supporting written materials and electronic media prepared or reviewed by the Authorized Biologist and a resume of the person(s) administering the program shall also be submitted to the BLM. The WEAP may be administered by a competent individual(s) acceptable to the Authorized Biologist.

The applicants shall provide in the Monthly Compliance Report the number of persons who have completed the training in the prior month and a running total of all persons who have completed the training to date. At least 10 days prior to construction-related ground disturbance activities the applicants shall submit two copies of the final WEAP.

Training acknowledgement forms signed during construction shall be kept on file by the applicants for at least 6 months after the start of commercial operation. Throughout the life of the project, the WEAP shall be repeated annually for permanent employees, and shall be routinely administered within a week of arrival to any new construction personnel, foremen, contractors, subcontractors, and other personnel potentially working within the project area. Upon completion of the orientation, employees shall sign a form confirming that they attended the program and understood all protection measures. These forms shall be

maintained by the applicants and shall be made available to the Service, BLM, and CDFG and upon request. Workers shall receive and be required to visibly display a hardhat sticker or certificate that they have completed the training. During project operation, signed statements for operational personnel shall be kept on file for 6 months following the termination of an individual's employment.

**3. Avoidance and Minimization Measures**

The applicants shall undertake the following measures to manage the project site and related facilities in a manner to avoid or minimize impacts to biological resources:

a. Limit Disturbance Areas. The boundaries of all areas to be disturbed (including staging areas, access roads, and sites for temporary placement of spoils) shall be delineated with stakes and flagging prior to construction activities in coordination with the Authorized Biologist. Spoils and topsoil shall be stockpiled, and disposal, parking, and staging areas shall be located in disturbed areas lacking native vegetation that do not support special-status species habitat or individuals. All disturbances, project vehicles, and equipment shall be confined to flagged areas.

b. Minimize Road Impacts. New and existing roads that are planned for construction, widening, or other improvements shall not extend beyond flagged areas as described above. All vehicles passing or turning around would do so within the planned impact area or in previously disturbed areas. Where new access is required outside of existing roads or the construction zone, the route shall be clearly marked (i.e., flagged and/or staked) prior to the onset of construction.

c. Minimize Traffic Impacts. Vehicular traffic during project construction and O&M-related activities shall be confined to existing routes of travel to and from the project sites, and cross country vehicle and equipment use outside authorized work areas shall be prohibited. The speed limit shall not exceed 40 kilometers per hour (kph) (25 miles per hour (mph)) within the project areas, on maintenance roads for linear facilities, or on access roads to the project sites. Speed limit signs shall be posted on new access roads to the sites.

d. Monitor During Construction. In areas that have not been fenced with desert tortoise exclusion fencing but have been cleared, the Authorized Biologist shall be present at the construction site during all project activities that have potential to disturb soil, vegetation, and wildlife. The Authorized Biologist or Biological Monitor(s) shall walk immediately ahead of equipment during ground-disturbing activities. If desert tortoises are located during construction monitoring, applicable procedures outlined in the Service-approved *Desert Tortoise Translocation Plan for the Desert Sunlight Solar Farm Project* (Ironwood Consulting and Woodard 2010) and the Service's *Desert Tortoise Field Manual* (Service 2009a) shall be implemented.

e. Minimize Impacts of Transmission/Pipeline Alignments, Roads, and Staging Areas. Staging areas for construction on the project sites shall be within the area that has been fenced with desert tortoise exclusion fencing and cleared. All project components, including pulling sites, storage and parking areas, shall be designed, installed, and maintained with the goal of minimizing impacts to native plant communities and sensitive biological resources.

f. Avoid Use of Toxic Substances. Soil bonding and weighting agents used on unpaved surfaces shall be non-toxic to desert tortoises, other wildlife, and plants.

g. Minimize Lighting Impacts. Facility lighting shall be designed, installed, and maintained to prevent side casting of light towards adjacent habitats.

h. Minimize Noise Impacts. A continuous low-pressure technique shall be used for steam blows, to the extent possible, to reduce noise levels in desert tortoise habitats proximate to the project areas.

i. Avoid Vehicle Impacts to Desert Tortoises. Parking and staging areas shall be enclosed by desert tortoise exclusion fencing to the extent feasible. No vehicles or construction equipment parked outside the fenced area shall be moved prior to an inspection of the ground beneath the vehicle for the presence of desert tortoises. If a desert tortoise is observed in these areas or under a vehicle, it shall be left to move on its own. If it does not move within 15 minutes, an Authorized Biologist or Biological Monitor under the Authorized Biologist's direct supervision may move it out of harm's way as described in the most recent version of the Service's *Desert Tortoise Field Manual* (Service 2009).

j. Avoid Wildlife Pitfalls. To avoid trapping desert tortoise and other wildlife in trenches, pipes or culverts, the following measures shall be implemented:

   i. Backfill Trenches. At the end of each work day, the Authorized Biologist shall ensure that all potential wildlife pitfalls (e.g., trenches, bores, and other excavations) outside the area fenced with desert tortoise exclusion fencing have been backfilled. If backfilling is not feasible, all potential pitfalls shall be sloped at a 3:1 ratio at the ends to provide wildlife escape ramps, or covered completely to prevent wildlife access, or fully enclosed with desert tortoise exclusion fencing. The Authorized Biologist or a Biological Monitor shall inspect all potential pitfalls outside the areas permanently fenced with desert tortoise exclusion fencing shall be inspected periodically throughout the day, at the end of each workday, and at the beginning of each day. Should a tortoise or other wildlife become trapped, the Authorized Biologist or Biological Monitor shall move it out of harm's way as described in the most recent version of the Service's *Desert Tortoise Field Manual* (Service 2009). Any other wildlife encountered during the course of construction shall be allowed to leave the construction area unharmed.

ii. Avoid Entrapment of Desert Tortoises. Any construction pipe, culvert, or similar structure with a diameter greater than 7.6 cm (3 in), stored less than 20.3 cm (8 in) aboveground and within desert tortoise habitat outside the permanently fenced area for one or more nights, shall be inspected for desert tortoises before the material is moved, buried, or capped. As an alternative, all such structures may be capped before being stored outside the fenced area, or placed on elevated pipe racks. These materials would not need to be inspected or capped if they are stored within the permanently fenced area after the clearance surveys have been completed.

k. Minimize Standing Water. Water applied to dirt roads and construction areas (i.e., trenches or spoil piles) for dust abatement shall be the minimal amount needed to meet safety and air quality standards in an effort to prevent the formation of puddles, which could attract desert tortoises, common ravens, and other wildlife to construction sites. A Biological Monitor shall patrol these areas to ensure water does not accumulate and shall take appropriate action to reduce water application where necessary.

l. Dispose of Road-killed Animals. Road-killed animals or other carcasses detected by personnel on roads associated with the project areas shall be reported immediately to an Authorized Biologist, Biological Monitor(s) or the project ECM who shall promptly remove the road-kill for disposal (i.e., removal to a landfill or disposal at the project facility). If a desert tortoise or another special status species is killed, the Biological Monitor shall contact the Service, BLM, and CDFG within one working day of detection for guidance on disposal or storage of the carcass; all other road-kill shall be disposed of promptly. The Biological Monitor shall provide the special-status species record as described below for Desert Tortoise Compliance Verification.

m. Minimize Spills of Hazardous Materials. All vehicles and equipment shall be maintained in proper working condition to minimize the potential for fugitive emissions of motor oil, antifreeze, hydraulic fluid, grease, or other hazardous materials. The Authorized Biologist shall be informed of any hazardous spills immediately as directed in the project Hazardous Materials Plan. Hazardous spills shall be immediately cleaned up and any contaminated soil properly disposed of at a licensed facility. Servicing of construction equipment shall take place only at an authorized area. Service and maintenance vehicles shall carry necessary supplies to address leaks or spills.

n. Worker Guidelines. During construction, all trash and food-related waste shall be placed in self-closing containers and removed daily from the site. Workers shall not feed wildlife or bring pets to the project sites. Except for law enforcement personnel, no workers or visitors to the site shall bring firearms or weapons. Vehicular traffic shall be confined to existing routes of travel to and from the project sites, and cross-

country vehicle and equipment use outside authorized work areas shall be prohibited. The speed limit when traveling on dirt access routes within desert tortoise habitat shall not exceed 40 kph (25 mph).

o. Implement Erosion Control Measures. Standard erosion control measures shall be implemented for all phases of construction and operation where sediment run-off from exposed slopes threatens to enter waters of the State. Sediment and other flow-restricting materials shall be moved to a location where they shall not be washed back into the stream. All disturbed soils and roads within the project site shall be stabilized to reduce erosion potential, both during and following construction. Areas of disturbed soils (i.e., access and staging areas) that slope toward drainages shall be stabilized to reduce erosion potential.

p. Monitor Ground Disturbing Activities Prior to Pre-Construction Site Mobilization. If pre-construction site mobilization requires ground-disturbing activities such as for geotechnical borings or hazardous waste evaluations, an Authorized Biologist or Biological Monitor shall be present to monitor any actions that could disturb soil, vegetation, or wildlife.

q. Revegetation of Temporarily Disturbed Areas. The applicants shall prepare and implement a Revegetation Plan to restore all areas subject to temporary disturbance to pre-project grade and conditions. Temporarily disturbed areas within the project areas include, but are not limited to: all proposed locations for and adjacent to linear facilities, temporary access roads, berms, areas surrounding the drainage diffusers, temporary construction laydown areas, and construction equipment staging areas. The Revegetation Plan shall include a description of topsoil salvage and seeding techniques, a monitoring and reporting plan, and contingency measures should the following performance standards not be met by the end of monitoring year 2:

i. At least 80 percent of the species observed within the temporarily disturbed areas shall be native species that naturally occur in desert scrub habitats; and

ii. Relative cover and density of plant species within the temporarily disturbed areas shall equal at least 60 percent.

No less than 30 days prior to ground-disturbing activities, the applicants shall submit the final Revegetation Plan that has been reviewed and approved by the BLM; any modifications to the Revegetation Plan shall be approved by the BLM prior to implementation.

Within 30 days after completion of project construction, the applicants shall provide to the BLM for review and approval, a written report identifying which items of the Revegetation Plan have been completed, a summary of all modifications to MM made during construction, and which items are still outstanding. The Authorized Biologist shall document the implementation of the revegetation measures in the Monthly Compliance Reports.

As part of the Annual Compliance Report, following construction and until completion of the revegetation monitoring specified in the Revegetation Plan, the Authorized Biologist shall provide a report to BLM that includes: a summary of revegetation activities for the year; a discussion of whether revegetation performance standards for the year were met; and recommendations for revegetation remedial action, if warranted, planned for the upcoming year.

Within 30 days after completion of project construction, the applicants shall provide to the BLM, for review and approval, a written construction termination report identifying how measures have been completed. As part of the Annual Compliance Report each year following construction, the Authorized Biologist shall provide a report to the BLM that describes compliance with avoidance and minimization measures to be implemented during construction, operation, and maintenance (e.g., a summary of the incidence of road-killed animals during the year, implementation of measures to avoid toxic spills, erosion and sedimentation, efforts to enforce worker guidelines).

**4. Desert Tortoise Translocation Plan (AM-WIL-1)**

A draft *Desert Tortoise Translocation Plan for the Desert Sunlight Solar Farm Project* (Ironwood Consulting and Woodard 2010) has been prepared by the applicants to ensure that all activities will be overseen by Service-, BLM-, and CDFG-approved Authorized Biologist(s) and Biological Monitor(s) and that any desert tortoises located within the construction zone will be translocated to the approved recipient site(s) outside of the project disturbance areas. The final plan will be reviewed and approved by the Service, BLM, CDFG, and CPUC, as appropriate, prior to implementation. All methods for clearance surveys, fence specification and installation, desert tortoise handling, artificial burrow construction, egg handling, and other procedures shall be in accordance with those described in the Service's most recent guidance documents available at: http://www.fws.gov/ventura/speciesinfo/protocols_guidelines. The applicants shall also implement all terms and conditions set forth in this biological opinion.

***Desert Tortoise Clearance Surveys and Fencing***

Prior to clearance surveys and the onset of any vegetation clearing or grubbing on the project sites, the applicants shall install desert tortoise exclusion fencing around the Solar Farm site by phase and the entire Red Bluff Substation site; perimeter security fencing shall be installed during construction. Because the Solar Farm component will be constructed in phases, the perimeter of Phase IA will be fenced first and temporary desert tortoise exclusion fencing will be installed to divide or subdivide the each of the phases (see Biological Phasing Plan Figure). All fence alignments shall be flagged and surveyed within 24 hours prior to the initiation of fence construction.

Clearance surveys of the linear project components (e.g., perimeter security fence and desert tortoise exclusion fence, gen-tie alignments, access roads) may be conducted during any season and shall be conducted by the Authorized Biologist(s) and Biological Monitor(s) in accordance with the qualifications and duties outlined above. Clearance surveys for fences and other linear features shall provide 100 percent coverage of all areas to be disturbed and an additional transect along both sides of the fence alignment. Prior to the clearance surveys, the applicants shall provide a figure clearly depicting the final limits of construction disturbance for the proposed fence installation. The fence line survey area shall be 13.7 m (45 ft) wide on either side of centerline along the alignment. Disturbance associated with fence construction shall not exceed 9.1 m (30 ft) on either side of the centerline. Where construction disturbance for fence installation can be limited to 4.6 m (15 ft) on either side of centerline, the survey area may be reduced accordingly. Transects width shall be no greater than 4.6 m (15 ft).

Desert tortoises located during clearance surveys of linear facilities outside of the Solar Farm or Red Bluff Substation project sites (i.e., along the gen-tie or access roads) shall be moved out of harm's way to within 500 m (1,640 ft) of the disturbance area. Any desert tortoises located during clearance surveys of linear facilities conducted during the inactive season (i.e., along perimeter and/or desert tortoise exclusion fence) will be moved out of harm's way to within 500 m (1,640 ft) inside of the fence and be translocated during the active season (see below). If the individual is inaccessible because of its location underground, the burrow would be fenced with temporary exclusion fencing at a distance of 100 m (328 ft) from the burrow to provide sufficient space for the individual until the following active season. The burrow and area within the fence will be monitored periodically to ensure the individual is not confined should it become active. As previously stated, clearance surveys and handling of individuals will be conducted and desert tortoise exclusion fencing will be constructed in accordance with the most recent version of the Service's *Desert Tortoise Field Manual* (Service 2009a).

a. Fence Material and Installation. All desert tortoise exclusion fence shall be constructed in accordance with the most recent version of the Service's *Desert Tortoise Field Manual* (Chapter 8 in Service 2009a).

b. Security Gates. Security gates shall be designed with minimal ground clearance to deter ingress by desert tortoises. If the gates are electronic, the gates shall be activated to open and close immediately after the vehicle(s) or personnel have entered or exited to prevent the gates from being kept open for long periods of time.

c. Fence Inspections. Following installation of the desert tortoise exclusion fencing for both the permanent site fencing and temporary fencing in the utility corridors, the fencing shall be checked and repaired, as necessary, on a daily basis to ensure its integrity. If desert tortoises were moved out of harm's way during fence construction, permanent and temporary fencing shall be inspected at least two times a day for the first 7 days to ensure a recently moved tortoise has not been trapped

within or is pacing the fence. Thereafter, permanent fencing shall be inspected monthly and during and within 24 hours following all major rainfall events. A major rainfall event is defined as one for which flow is detectable within the fenced drainage. Any damage to the fencing shall be temporarily repaired immediately to keep desert tortoises out of the project area, and permanently repaired within 48 hours of observing damage. Inspections of permanent security fencing shall occur for the life of the project.

Temporary fencing shall be inspected weekly and, where drainages intersect the fencing, during and within 24 hours following major rainfall events. All temporary fencing shall be repaired immediately upon discovery and, if the fence may have permitted desert tortoises to enter the site while damaged, the Authorized Biologist shall survey the area for any individuals.

***Desert Tortoise Clearance Surveys within the Project Sites***

Clearance surveys of the project sites shall be conducted in accordance with the most recent version of the Service's *Desert Tortoise Field Manual* (Chapter 6 in Service 2009a) and shall consist of two surveys covering 100 percent the project area by walking transects no more than 4.6 m (15 ft) apart. If a desert tortoise is located on the second survey, a third survey shall be conducted. Each separate survey shall be walked in a different direction to allow opposing angles of observation. Clearance surveys of the areas within Phase IB, II, and III of the proposed Solar Farm and Red Bluff Substation sites may only be conducted during the active season (i.e., approximately April 1 through May 31 or September 1 through October 31) unless an alternate schedule is approved by the Service, BLM, and CDFG. All desert tortoises located within the project areas shall be translocated in accordance with the final translocation plan.

a. Burrow Searches, Excavation, and Desert Tortoise Handling. During clearance surveys all desert tortoise burrows, and burrows constructed by other species that might be used by desert tortoises, shall be examined by the Authorized Biologist and Biological Monitor(s) to assess occupancy of each burrow by desert tortoises. All potential desert tortoise burrows located during clearance surveys during the active season shall be excavated carefully by hand; if desert tortoise occupancy is confirmed, excavation of the burrow and handling of individuals shall be conducted in accordance with the most recent version of the Service's *Desert Tortoise Field Manual* (Service 2009). To prevent reentry by a desert tortoise or other wildlife, all burrows shall be collapsed once absence has been verified. Desert tortoises removed from burrows and from elsewhere on the project sites shall be translocated as described in the final translocation plan.

   If surveys are conducted during the inactive season and the desert tortoise is inaccessible, the burrow shall be fenced with temporary exclusion fencing at a distance of 100 m (328 ft) from the burrow to provide sufficient space for the

individual until the following active season. The burrow and area within the fence shall be monitored periodically to ensure the individual is improperly confined should it become active.

If construction is scheduled to commence during the inactive season for desert tortoise (i.e., approximately June 1 to August 31 and November 1 to March 31), prior to construction activities, the Solar Farm site and Red Bluff Substation site shall be fenced into subsections with temporary desert tortoise exclusion fencing. Clearance surveys shall then be performed within each of the subsections. If a desert tortoise or active burrow is located within a subsection, a transmitter will be affixed (if the individuals is accessible), but construction will not begin until the following active season, when translocation may occur.

Clearance surveys will be conducted first for the move-on area near the southwestern boundary of the Solar Farm site, which will also entail siting of an access point and staging area from Kaiser Road. Remaining areas of Phase IA and all areas of phases IB, II, and III may subsequently be subdivided into smaller units using temporary fencing for efficiency in conducting clearance surveys. Once an area has been fenced, either with permanent security fence and desert tortoise exclusion fence or temporary fence, the interior area must be cleared of desert tortoises in accordance with Service guidance.

If a desert tortoise is found above ground during the inactive season, and if time and temperature constraints allow, the individual will be fitted with a transmitter and/or tested for disease. The desert tortoise will be left where it was found so that it can more easily be re-located in the following active season.

If construction is scheduled to commence during the active season for desert tortoise, prior to construction activities, the Solar Farm site and Red Bluff Substation site will be fenced into subsections with temporary desert tortoise exclusion fencing. Clearance surveys will then be performed as each subsection is fenced. During the active season, health assessments will be performed and biological samples will be obtained for each individual desert tortoise found to determine if its disposition (i.e., either individuals will be fitted with a transmitter and translocated to the recipient site or sent to the Desert Tortoise Conservation Center).

For each phase, desert tortoises will be monitored *in-situ* or quarantine pens will be used to hold individuals located above ground during clearance surveys, individuals that may emerge from hibernation during the winter, and individuals for which disease screening results are pending. The applicants will construct the quarantine pens and follow husbandry procedures in accordance with the most recent Service guidance (Service 2010). The pens will be 20 m by 20 m (65.6 ft by 65.6 ft) and a veterinarian-approved husbandry plan will direct care of desert tortoises while in quarantine. Desert tortoises in quarantine pens will be monitored in accordance with Service guidance, care will be administered following specific procedures, and the quarantine period will not exceed 18 months. Desert tortoises monitored in-situ will be confined to large areas within their existing home ranges and will be monitored according to Service guidance until translocation occurs.

***Monitoring Following Clearance Surveys***

Following the desert tortoise clearance and translocation of desert tortoises from the project sites and utility corridors, workers and heavy equipment shall be allowed to enter the construction zones to perform clearing, grubbing, leveling, and trenching activities. An Authorized Biologist or Biological Monitor(s) shall be on site during all construction activities to move desert tortoises missed during the clearance survey. Should a desert tortoise be discovered, it shall be translocated as described in the final translocation plan. All translocated desert tortoises will be monitored at least once within 24 hours of their release, and a minimum of twice weekly for the first two weeks after translocation. Then, all translocated desert tortoises will be monitored for a period of 5 years, at a minimum of once a week between March 15 and May 31, twice a month from June 1 to November 15, and once a month between November 15 and March 15. If five or more individuals are translocated from the proposed project sites, then during the 5-year monitoring period, an equal number of resident desert tortoises at the control site will be monitored along with the translocated and resident desert tortoises at the recipient site.

Health assessments will be conducted for all translocated individuals annually prior to overwintering (i.e., between October 15 and November 15) and subsequent to overwintering (i.e., between March 1 and April 1). A health assessment will also be completed for each translocated individual at the end of the 5-year monitoring period. Any health problems or mortalities observed will be reported to the Service, BLM, and CDFG verbally within 48 hours or via email within 5 business days. Fresh carcasses will undergo a necropsy as directed by the Service and CDFG and animals showing clinical signs of disease will be transported to the Desert Tortoise Conservation Center.

Vegetation transects will also be established at the recipient sites and will be surveyed annually between March 15 and April 30 to measure potential changes in habitat characteristics.

***Reporting***

Within 30 days after completion of desert tortoise clearance surveys the Authorized Biologist shall submit a report to the Service, BLM, and CDFG describing implementation of each of the conservation measures pertaining to desert tortoises. The report shall also include the information described below and any other information needed to demonstrate compliance with the conservation measures set forth in this biological opinion.

At a minimum, the Authorized Biologist shall record the following information for any desert tortoises handled: 1) locations (narrative and maps) and dates of observation; 2) general condition and health, including injuries, state of healing and whether desert tortoise voided their bladders; 3) location moved from and location moved to (using GPS technology); 4) gender, carapace length, and diagnostic markings (i.e., identification numbers or marked

lateral scutes); 5) ambient temperature when handled and released; and 6) digital photograph of each handled desert tortoise. Desert tortoises moved from within project areas shall be marked and monitored in accordance with the final translocation plan.

During translocation, all data described above recorded on standardized data sheets and/or digital data recorders. The lead Authorized Biologist for the translocation effort will submit briefings via email to the Service, BLM, CDFG, and the applicants prior to the 5th day of the month summarizing the translocation activities performed the previous month. Annual project reports will also be submitted to the Service, BLM, and CDFG.

During the 5-year monitoring period, all translocation activities will be recorded on standardized data sheets and/or digital data recorders. The lead Authorized Biologist will submit quarterly status reports via email to the Service, BLM, and CDFG. An annual report will also be submitted to BLM on or before January 15 so that the February 1 deadline for annual reports to the Service can be met. A final report will be submitted to BLM following the fifth year of monitoring, summarizing the overall effectiveness of the monitoring program.

**5. Desert Tortoise Compliance Verification**

The applicants shall provide the Service, BLM, and CDFG staff with reasonable access to the project sites and compensation lands under the control of the applicants and shall otherwise fully cooperate with the BLM's efforts to verify the applicants' compliance with, or the effectiveness of, the conservation measures set forth in this biological opinion and the FEIS for the project (BLM 2011). The applicants shall hold the Authorized Biologist and the BLM harmless for any costs the applicants incur in complying with the conservation measures, including stop work orders issued by the BLM or the Authorized Biologist.

a. Authorized Biologist. The Authorized Biologist, together with approved Biological Monitors(s), shall conduct the following in addition to duties described under conservation measure number 1:

i. Notification. Notify the BLM and at least 14 calendar days before initiating construction-related ground-disturbance activities; immediately notify the BLM in writing if the applicants are not in compliance with any conditions of certification, including but not limited to any actual or anticipated failure to implement MM within the time periods specified in the conditions of certification.

ii. Monthly Compliance Inspections and Reporting. Beginning with the first month after construction is initiated and continuing every month until construction is complete, monthly compliance inspections shall be conducted by the Authorized Biologist, who shall maintain written records of tasks and compliance activities, including those conducted by any project Biological Monitors. Summaries of these records shall be submitted to the BLM in Monthly Compliance Reports.

During project O&M, the Authorized Biologist shall submit summaries of compliance activities in an Annual Compliance Report unless their duties cease, as approved by the BLM. Annual Compliance Reports shall be submitted to the Service, BLM, and CDFG.

b. Notification of Injured or Dead Listed Species. If an injured or dead desert tortoise or any other listed species is detected within or near the project disturbance areas, the Service, BLM, and CDFG shall be notified immediately by phone. Notification shall occur no later than noon on the business day following the event if it occurs outside normal business hours so that the agencies can determine if further actions are required to protect listed species.

Follow-up written notification via FAX or email shall be submitted to these agencies within two calendar days of the incident and shall include the written report from the Authorized Biologist describing all reported incidents of death or injury a listed species, identifying who was notified, an explanation of when the incidents occurred, and a map depicting both the limits of construction and location of the incident to the agencies.

i. Injured Desert Tortoise. If a desert tortoise is injured as a result of project-related activities during construction, the Authorized Biologist or approved Biological Monitor(s) shall immediately take it to a CDFG-approved wildlife rehabilitation and/or veterinarian clinic. Any veterinarian bills for such injured animals shall be paid by the applicants. Following phone notification as required above, the Service, BLM, and CDFG shall determine the final disposition of the injured animal, if it recovers. Written notification shall include, at a minimum, the date, time, location, circumstances of the incident, and the name of the facility where the animal was taken.

ii. Desert Tortoise Fatality. If a desert tortoise is killed by project-related activities during construction or O&M, a written report with the same information as an injury report shall be submitted to the Service, BLM, and CDFG. These desert tortoises shall be salvaged according to guidelines described in *Salvaging Injured, Recently Dead, Ill, and Dying Wild, Free-Roaming Desert Tortoise* (Berry 2001). The applicants shall pay to have the desert tortoises transported and necropsied. The report shall include the date and time of the finding or incident.

c. Stop Work Order. The BLM may issue the applicants a written stop work order to suspend any activity related to the construction or O&M of the project to prevent or remedy a violation of one or more permit conditions including, but not limited to, failure to comply with reporting, monitoring, or habitat acquisition obligations, or to prevent the illegal take of an endangered, threatened, or candidate species. The applicants shall comply with the stop work order immediately upon receipt thereof.

d. Final Listed Species Mitigation Report. No later than 45 days after initiation of project operation, the Authorized Biologist shall provide the BLM a Final Listed Species Mitigation Report that includes, at a minimum: 1) a copy of the table with notes showing when each of the conservation measures was implemented; 2) all available information about the amount and extent of project-related incidental take of listed species; 3) information about other project impacts on the listed species; 4) construction dates; 5) an assessment of the effectiveness of conservation measures in minimizing and compensating for project impacts; 6) recommendations on how conservation measures might be changed to more effectively minimize and mitigate the impacts of future projects on the listed species; and 7) any other pertinent information associated with the project.

**6. Common Raven Management Plan (AM-WIL-2)**

A *Common Raven Management Plan for the Desert Sunlight Solar Farm Project* (Ironwood Consulting 2010c) has been prepared by the applicants to minimize the potential for the project to attract common ravens to the project sites. The final plan will be reviewed and approved by the Service, BLM, CDFG, and CPUC, as appropriate.

The plan provides the details on the management actions that will be implemented during preconstruction, construction, O&M and decommissioning of the project. Some of the specific measures to reduce the potential for the project to introduce food subsidies and open water sources for ravens include:

a. All project facilities, including the gen-tie, will be designed to discourage roosting and nesting by ravens and other avian species through the use deterrents, which may include bird spikes and auditory and visual deterrents;

b. Nesting will be actively discouraged on all project facilities. Inactive nests will be dismantled and passive deterrents will be installed. For active nests, the Biological Monitor will determine the number of fledglings and their status of development. Once the nest is determined to no longer be active, it will be removed and passive deterrents installed. Non-lethal deterrents will be the first course of action. However, ravens may adapt quickly to avoid passive deterrents. If offending ravens are proven to be consistent threat to resident desert tortoises, then lethal removal may be warranted in coordination with the Service, BLM, and CDFG in compliance with the MBTA and California Fish and Game Code;

c. Traffic speeds on all project-related dirt roads will be limited to 40 kph (25 mph) to reduce road-kills. Biological Monitors shall monitor speeds during construction activities;

d. Refuse management will be an integral part of the management plan. A sufficient number of refuse containers will be supplied and all containers will have sealable and

lockable lids to prevent strong winds from blowing garbage around the sites, wildlife from entering refuse containers, and unauthorized people from tampering with refuse. Biological Monitors shall periodically check on refuse containers to ensure they are not overflowing and are being closed properly;

e. All work vehicles will have a sufficient supply of strong garbage bags to aid in collection and disposal of refuse at the end of each day into the large containers discussed above;

f. Waste management contractors will supply an adequate number of portable toilets to promote a hygienic environment;

g. Temporary construction ponds will include raven deterrents in their design to discourage ravens and other wildlife. Ponds will be constructed with at least 2-ft of freeboard, fenced and/or netted, and lined. Water will be transported throughout the site in enclosed pipes laid on the ground surface and water trucks;

h. Other water sources for the project (i.e., wells) will be checked periodically by Biological Monitors to ensure they are not creating open water sources by leaking or overfilling water trucks; and

i. Training to all project personnel will be provided via the WEAP.

Monitoring will be conducted throughout the life of the project as outlined in the plan. In general, all incidental sightings of ravens within the project areas will be logged either by a Biological Monitor (during construction), personnel authorized by the applicants, or project personnel. In addition, for 5 years following construction, nest surveys for this species will be completed at least twice each spring between March 15 and June 1, and further assessments will be performed on the ground underneath raven nests during spring months to evaluate any evidence of any desert tortoise predation.

If monitoring data shows an increase in raven roosting or nesting behavior within the project areas, the applicants shall coordinate with the Service, BLM, and CDFG to determine the appropriate measures to further discourage raven activity, including one or more of the following:

j. Bird spikes installed on top of potential perches designed to prevent birds from gaining a foothold on the perch because of their porcupine design;

k. Repellant coils installed on top of potential perches to deter birds from gaining footholds because of their destabilizing coil design;

l. Bird control wire designed so that a line or grid of variable height posts is interconnected by a wire. This creates a confusing landing area in the same spirit as trip wires used for unsuspecting people;

m. Bird netting; and/or

n. Electric shock deterrents with low voltage pulses.

On or before January 15 of each calendar year of monitoring, an annual report will be submitted to BLM that summarizes all monitoring activities. The report shall contain sufficient information for the BLM to provide necessary reporting to the Service and CDFG, which shall be due on or before February 1 of each year.

The applicants shall contribute to the Service's Regional Raven Management Program by making a one-time payment of $105 per acre of project disturbance to the Renewable Energy Action Team (REAT) account established with the National Fish and Wildlife Foundation (NFWF) (contact the CFWO for details). Contributions are as follows:

| Sunlight Components | Gen-Tie A-1 | Raven Fee | Gen-Tie A-2 | Raven Fee |
|---|---|---|---|---|
| Solar Farm | 3,912 | $410,760 | 3,912 | $410,760 |
| Gen-tie disturbance acreage | 92 | $9,660 | 86 | $9,030 |
| Total disturbance acreage | 4,004 | $420,420 | 3,998 | $419,790 |

| SCE Components | Gen-Tie A-1 or A-2 | Raven Fee |
|---|---|---|
| Red Bluff Substation (and related elements) disturbance acreage | 172 | $18,060 |

## 7. Integrated Weed Management Plan (AM-BIO-2)

An *Integrated Weed Management Plan for the Desert Sunlight Solar Farm Project* (IWMP) (Ironwood Consulting 2010d) has been prepared pursuant to BLM's *Vegetation Treatments Using Herbicides on BLM Lands in 17 Western States* (BLM 2007) and the *National Invasive Species Management Plan* (The National Invasive Species Council 2008) by the applicants to reduce the potential for the introduction of nonnative and invasive species during construction, O&M, and decommissioning of the project. The final plan will be reviewed and approved by the BLM.

The following measures are required in the plan and will be implemented by the applicants to control and monitor nonnative and invasive species:

a. Preventative Measures During Construction

i. Equipment Cleaning. To prevent the spread of weeds into new habitats, and prior to entering the project work areas, construction equipment will be cleaned of dirt and mud that could contain weed seeds, roots, or rhizomes. Equipment will be inspected to ensure they are free of any dirt or mud that could contain weed seeds and the tracks, feet, tires, and undercarriage will be carefully washed, with special attention being paid to axles, frame, cross members, motor mounts, underneath steps, running boards, and front bumper/brush guard assemblies. Other construction vehicles (e.g., pick-up trucks) that will be frequently entering and exiting the site will be inspected and washed on an as-needed basis. All vehicles will be washed offsite when possible. Should offsite washing prove infeasible, an onsite cleaning station will be set up to clean equipment before it enters the work areas. Either high-pressure water or air will be used to clean equipment and the cleaning site will be situated away from any sensitive biological resources. If possible, water used to wash vehicles and equipment will be collected and re-used.

ii. Site Soil Management. Soil management will consist of limiting ground disturbance to the minimum necessary for construction activities and using dust suppressants to minimize the spread of seeds. Disturbed vegetation and topsoil will be re-deposited at or near the area from which they are removed to eliminate the transport of soil-borne noxious weed seeds, roots, or rhizomes. BLM-approved dust suppressants or palliative (e.g., water) will be minimized on the sites as much as possible, but may be used during construction to minimize the spread of airborne seeds, especially during very windy days.

iii. Weed-free Products. Any use of hay or straw bales on the project sites will be limited to certified weed-free material. Other products such as gravel, mulch, and soil may also transport weeds and these products, too, will be certified weed-free. If needed, mulch will be made from the local, onsite native vegetation cleared from the project areas. Soil will not be imported onto the project sites from offsite sources.

iv. Personnel Training. Weed management will be part of mandatory site training for all construction personnel and will be included in the WEAP. Training will include weed identification and information on the threat of invasive species infestations, including impacts to local agriculture, vegetation communities, wildlife, and altering fire regimes. Training will stress the importance of preventing the spread of weeds.

b. Contaminant and Control Measures

When monitoring (see below) indicates that invasive species are spreading, mechanical and chemical methods will be employed. The applicants will use mechanical weed removal methods as the preferred method, but herbicides may be

used when conditions (i.e., wind or proximity of native vegetation) are such that the effect on native species is expected to be minimal. During suppression or eradication activities, care will be taken to have the least effect on native plant species and adjacent habitats. Herbicides used will be limited to those approved by the BLM. Herbicides will be applied before the invasive species flower and set seed
When monitoring (see below) indicates that invasive species are spreading, mechanical and chemical methods will be employed. The applicants will use mechanical weed removal methods as the preferred method, but herbicides may be used when conditions (i.e., wind or proximity of native vegetation) are such that the effect on native species is expected to be minimal. During suppression or eradication activities, care will be taken to have the least effect on native plant species and adjacent habitats. Herbicides used will be limited to those approved by the BLM. Herbicides will be applied before the invasive species flower and set seed.

If monitoring indicates the spread of athel, a woody invasive species, then athel will be controlled by cutting the trees and applying BLM-approved Garlon™ Ultra Herbicide to the stump immediately after cutting. All cut material generated during athel clearance will be removed from the site by truck. This material will be covered with a tarp or other material that will keep athel cuttings or seed from being spread by truck movement.

As noted above, the applicants and their contractors will implement weed control pursuant to BLM's *Vegetation Treatments Using Herbicides on BLM Lands in 17 Western States* (BLM 2007) and the *National Invasive Species Management Plan* (The National Invasive Species Council 2008). Personnel responsible for weed control will be trained in the proper and safe use of all equipment and chemicals used for this purpose.

c. Monitoring

Baseline weed conditions will be assessed during the preconstruction phase of the project, during preconstruction surveys, and staking and flagging of construction areas. A stratified random sampling technique will be used to identify and count the extent of weeds on the project sites.

Monitoring will take place each year during construction, and annually for 3 years following the completion of construction. The purpose of annual monitoring will be to determine if weed populations identified during baseline surveys have increased in density or are spreading as a result of the project. Control methods will be implemented when measurable weed increases, as well as visually verified increases, are detected during monitoring. Such increases will include small patches of unusually high-density weeds (i.e., concentrations in washes) that have established as a result of project activities.

During construction, daily monitoring records will be kept by Biological Monitors that will include information relevant to invasive weeds. During O&M-related activities, the applicants or authorized designee will be required to continually update the invasive species list and conduct monitoring and management appropriate to any new species in coordination with the BLM.
After the 3 years of O&M monitoring is complete, general management and monitoring of the project areas will be conducted by authorized site personnel each year during both the germinating and early growing season (November through April) to eliminate new weed individuals prior to seed set. Throughout construction and long-term monitoring, personnel will be trained to identify nonnative and native species and work with a trained vegetation monitor to determine where control or eradication is necessary.

d. Reporting

Results of monitoring and management efforts will be included in annual reports and a final monitoring report completed at the end of 3 years of post-construction monitoring. Copies of these reports will be kept on file at the project sites. Copies of each annual report as well as the final monitoring report will be sent to the BLM for review and approval. BLM will use the results of these reports to determine if any additional monitoring or control measures are necessary.

e. Success Criteria

Weed control will be ongoing on the project sites for the life of the project, but plan success will be determined by BLM after the 3 years of O&M through the reporting and review process. Success criteria will be defined as having no more than ten percent increase in a weed species or in overall weed cover in any part of the project.

**8. Alternate to Long-distance (i.e., greater than 500 m) Desert Tortoise Translocation (MM-WIL-7)**

The draft *Desert Tortoise Translocation Plan for the Desert Sunlight Solar Farm Project* (Ironwood Consulting and Woodard 2010) shall be updated to identify and describe, as an alternative to translocation, a strategy to remove desert tortoises on the project sites from the wild and place them permanently in facilities approved by the Service and CDFG, to be fully funded by the applicants. All suitable care or holding facilities for desert tortoises shall be listed and described in the draft plan, and capacity of each facility to accommodate desert tortoises from the project site shall be provided. The updated draft plan and shall be submitted to the Service, BLM, CDFG, and CPUC, as appropriate, for review and approval. Upon approval of a final translocation plan and issuance of Federal and State approvals, the applicant shall either translocate desert tortoises into the wild or shall permanently place them in approved facilities, consistent with the final plan.

**9. Habitat Compensation Plan (AM-BIO-1) and Offsite Compensation (MM-BIO-2)**

A *Habitat Compensation Plan for the Desert Sunlight Solar Farm Project* (First Solar 2011) has been prepared by the applicants to compensate for the loss of desert tortoise habitat and population connectivity, creosote bush scrub, desert dry wash woodland, and other jurisdictional resources. The plan shall be revised to reflect acreages and habitat types as described herein, and will be reviewed and approved by the Service, BLM, CDFG, and CPUC, as appropriate. All of the details regarding the methods for assessing required offsets and the terms of funding, acquisition, and management are contained the *Habitat Compensation Plan for the Desert Sunlight Solar Farm Project* (First Solar 2011), FEIS for the project (BLM 2011), and the criteria stipulated below.

As required by the Northern and Eastern Colorado Desert Coordinated Management Plan (BLM 2002) and consistent with past practice, the mitigation ratio for impacts to the Chuckwalla DWMA is 5:1, impacts to desert tortoise habitat outside of the DWMA is 1:1, and impacts to desert dry wash woodland is 3:1. Additionally, the applicants have agreed to mitigate impacts to moderate density desert tortoise habitat outside the CHU and DWMA but within various project areas at a 2:1 ratio, and for low density tortoise habitat at a 1:1 ratio pursuant to CDFG fully-mitigated standards. Compensation will be accomplished by acquisition of mitigation land or conservation easements or by providing funding for specific land acquisition, endowment, restoration, and management actions under one of several programs including the recently approved mitigation program created by Senate Bill 34 (SB 34). The applicants shall acquire and protect, in perpetuity, compensation habitat to mitigate impacts to biological resources listed below.

The total project disturbance for the Sunlight and SCE components is up to 1,690 ha (4,176 ac) (depending upon which gen-tie is selected). Total habitat compensation lands shall be no fewer than 2,757.1 ha (6,813 ac) for impacts to desert tortoise habitats. Compensation will be completed as construction is implemented in phases.

**Impacts associated with phased construction of the proposed project**

| Component | Area |
|---|---|
| Solar Farm Phase I | 434.2 ha (1,073 ac) |
| IA | 121.4 ha (300 ac) |
| IB | 312.8 ha (773 ac) |
| Solar Farm Phase II | 972.1 ha (2,402 ac) |
| Solar Farm Phase III | 176.9 ha (437 ac) |
| Total Solar Farm | 1,583.2 ha (3,912 ac) |
| Gen-tie A-1 | 37.2 ha (92 ac) |
| Gen-tie A-2 | 34.8 ha (86 ac) |
| SCE Components | 69.6 ha (172 ac) |
| Total Project w/ Gen-tie A-1 | 1,690 ha (4,176 ac) |
| Total Project w/ Gen-tie A-2 | 1,687.5 ha (4,170 ac) |

Final compensation requirements shall be adjusted to account for any deviations in project disturbance, according to final design, and as-built project footprint. Sunlight shall be responsible for all compensation for habitat disturbance at the Solar Farm site, gen-tie line, and associated access roads; SCE shall be responsible for all compensation for habitat disturbance at the Red Bluff Substation site, telecommunications sites, and associated access roads as articulated in the compensation plan.
Habitat compensation will be implemented as follows:

a. "Nested" Compensation. If all or any portion of the acquired compensation lands meets the habitat occupancy or suitability requirement for more than one of the resources listed in the compensation plan, that portion of the acquired lands may also be used to fulfill the obligation to offset impacts to those resources through land acquisition. For example, the entirety of the Red Bluff Substation and associated components are within the Chuckwalla CHU and DWMA, where impacts to the Chuckwalla CHU and DWMA would require mitigation at a 5:1 ratio. Though portions of the site support desert dry wash woodland that would require compensation at a 3:1 ratio, all impacts within the Chuckwalla CHU and DWMA will be offset at the 5:1 ratio. However, compensation lands for desert dry wash woodland at the 3:1 ratio may be nested within the overall 5:1 compensation area (see Table 2 in First Solar 2011 for more details).

b. Compensation Land Selection Criteria. As described in the DEIS (BLM 2010) and FEIS (BLM 2011) for the proposed project, criteria for the acquisition, initial protection and habitat improvement, and long-term maintenance and management of compensation lands for impacts to biological resources shall include all of the following:

   i. Must be within the same recovery unit where the impacts occur (i.e., the Eastern Colorado Desert Tortoise Recovery Unit for the Sunlight/SCE project).

   ii. Must be within the same CHU where the impacts occur (i.e., the Chuckwalla CHU for the Sunlight/SCE project).

   iii. Must contribute to wildlife movement and desert tortoise population connectivity of value equal to that on the project sites and build linkages between desert tortoise CHUs, known populations of desert tortoise, and other lands allocated for conservation. The primary focus area for acquiring parcels to maintain/improve connectivity will be along the I-10 corridor between Desert Center and Cactus City, with a priority on parcels that connect conserved lands on either side of the I-10 through large culverts or bridges. For Sunlight, no less than 1,618 ha (3,998 ac) (Solar Farm and gen-tie A-2) will be acquired along the I-10 corridor. For SCE, no less than 348 ha (860 ac) will be acquired along the I-10 corridor (see Desert Tortoise Connectivity Acquisition Area Figure). The remainder of compensation acreage may be located outside the I-10 corridor, such as parcels acquired by the CDFG under Senate Bill 34 (SB 34).

iv. Must adjoin (i.e., be contiguous with) larger blocks of lands that are either already protected or planned for protection, or which could feasibly be protected long-term by a public resource agency or a non-governmental organization dedicated to habitat preservation.

v. Must be contiguous with suitable habitat for the species/natural community at issue.

vi. Must be of equal or higher quality and function as the habitats impacted by the project.

vii. Must be prioritized by degree of threat from incompatible land uses.

viii. Must provide habitat acreage with capacity to regenerate naturally when disturbances are removed.

ix. Must not have a history of intensive recreational use or other disturbance that might cause future erosional damage or other habitat damage, and make habitat recovery and restoration, and overall management difficult or infeasible.

x. Must not be characterized by high densities of invasive species, either on or immediately adjacent to the parcels under consideration that might jeopardize habitat recovery and restoration.

xi. Must not contain hazardous wastes that cannot be removed to the extent that the site could not provide suitable habitat.

xii. Must not convey lands with severed water and mineral rights included as part of the acquisition, unless the BLM and CPUC, as appropriate, in consultation with the Service and CDFG, agree in writing to the acceptability of land without these rights.

c. Review and Approval of Compensation Lands Prior to Acquisition. The applicants shall submit a formal acquisition proposal to the Service, BLM, CDFG, and CPUC, as appropriate, describing the parcel(s) proposed for purchase, with documentation of the selection criteria listed above. The Service, BLM, CDFG, and CPUC, as appropriate, will reach mutual agreement on the parcels selected for acquisition to ensure the respective agency responsibilities and biological objectives for offsetting impacts are achieved.

d. Management Plan. The applicants or approved third party shall prepare a management plan for the compensation lands in consultation with the entity that will be managing the lands. The goal of the management plan shall be to support and enhance the long-term viability of the biological resources. The Management Plan shall be submitted for review and approval to the BLM and CPUC, as appropriate, in consultation with the Service and CDFG.

e. Compensation Lands Acquisition Requirements. These requirements facilitate the implementation of those criteria outlined in BLM's Northern and Eastern Desert Coordination Management (NECO) Plan, the DEIS (BLM 2010) and FEIS (BLM 2011) for the proposed project, as well those strategies outlined in the desert tortoise recovery plan (Service 1994a) and the draft revised recovery plan (Service 2008). The applicants shall comply with the following requirements relating to acquisition of the compensation lands after the Service, BLM, CDFG, and CPUC, as appropriate, have approved the proposed compensation lands. Elements and associated costs include compilation of a Preliminary Report, Title/Conveyance, and Initial Protection and Habitat Improvement Property Analysis Record, and Long-term Maintenance and Management Funding, including accrual of interest, withdrawal of principal, and pooling of funds. In addition, the applicants shall be responsible for other expenses associated with the items listed above, such as all other costs related to acquisition of compensation lands and conservation easements, including but not limited to, the title and document review costs incurred from other state agency reviews, overhead related to providing compensation lands to CDFG or an approved third party, escrow fees or costs, environmental contaminants clearance, and other site cleanup measures.

To further the acquisition strategy, the applicants shall acquire no less than 71 percent of the total compensation requirement [i.e., 1,618 ha (3,998 ac) attributed to the Solar Farm and gen-tie A-2 and 348 ha (860 ac) attributed to the Red Bluff Substation], on a willing-seller basis, within the I-10 corridor connectivity acquisition area prior to initiation of ground-disturbance associated with Phase III to ensure there is no temporal discrepancy between the time impacts occur and compensation lands are secured (see Desert Tortoise Connectivity Acquisition Area Figure). Acquisition shall occur in accordance with the requirements described above and with the concurrence of the Service and BLM.

i. Mitigation Security. No fewer than 30 days prior to ground disturbance, the applicants shall provide financial assurances in the form of an irrevocable letter of credit, a pledged savings account, or another form of security ("Security") approved by the BLM and CPUC, as appropriate. Security assurances shall guarantee that an adequate level of funding is available to implement any of the measures required by this condition that are not completed prior to the start of ground-disturbing activities. The actual costs to comply with this condition will vary depending on the actual costs of acquiring compensation habitat, the costs of initially improving the habitat, and the actual costs of long-term management.

f. Compensatory mitigation for both the Sunlight and SCE project components will be accomplished either by:

i. Providing funds to implement those measures into the REAT account established with the NFWF.

The responsibility for acquisition of compensation lands may be delegated to a third party other than NFWF, such as a non-governmental organization supportive of desert habitat conservation, by written agreement of the Service, BLM, CDFG, and CPUC, as appropriate. Such delegation shall be subject to approval by the BLM and CPUC, as appropriate, in consultation with the Service and CDFG, prior to land acquisition, enhancement or management activities. Agreements to delegate land acquisition to an approved third party, or to manage compensation lands, shall be executed and implemented within 18 months of issuance of the BLM ROD and CPUC decision document.

If funds are provided to NFWF, the compensation funds will 1) be provided no later than 30 days prior to ground disturbance; 2) lands will be acquired no later than 18 months after ground-disturbing activity; and 3) lands will be conserved in perpetuity by a legal mechanism agreed to by the agencies. Sunlight and SCE independently will establish a management fund for the agency that owns and manages the acquired lands. The management fund will consist of an interest-bearing account (as described in the REAT/NFWF MOA), with the amount of capital commensurate to generate sufficient interest to fund all monitoring, management, and protection of the acquired lands, including reasonable administrative overhead, biological monitoring, improvements to carrying capacity, law enforcement measures, and other actions designed to protect or improve the habitat values of the acquired lands. A Property Analysis Record, as or comparable method, will be conducted by Sunlight and SCE independently and reviewed by the Service, BLM, CDFG, and CPUC, as appropriate, to determine the management needs and costs described above, which then will be used to calculate the amount of capital needed for the management fund. This management fund will be held and managed by NFWF or another entity approved by the Service, BLM, CDFG, and CPUC, as appropriate.

ii. The applicant may choose to compensate and mitigate for impacts to state-listed endangered species pursuant to section 2081 of the California Endangered Species Act using one or both of the “in-lieu fee” or “advance mitigation” mechanisms set forth in SB 34. Compensation lands acquired through SB 34 may in whole or in part satisfy the compensation habitat requirements set forth in this mitigation measure, only to the extent that they do in fact provide habitat values and mitigation for significant impacts to the species and biological resources identified above, and are consistent with the selection criteria described above.

iii. If conservation lands are acquired directly by Sunlight and SCE independently they must meet the CDFG’s fully mitigated standard. Lands purchased will be transferred in fee title to CDFG, a CDFG approved non-profit organization qualified pursuant to California Government Code section 65965, or other government entity with either a conservation easement, deed restriction, or other protective measures (as approved by BLM and CDFG) over those lands. If lands are transferred to CDFG, Sunlight will reimburse CDFG for reasonable expenses

incurred during title and documentation review, expenses incurred from other state agency reviews, and overhead related to transfer of the lands. CDFG estimates that this project will create an additional cost to CDFG of no more than $3,000 for every fee title deed or easement processed. If lands are transferred via donation to BLM, similar transfer fees may be incurred.

g. Sunlight and SCE independently may proceed with ground-disturbing activities before completing all of the required mitigation (including acquisition of lands), monitoring, and reporting activities by ensuring funding to complete those activities. Sunlight and SCE independently will provide to CDFG, within 30 days of the project commencing ground-disturbing activities, an irrevocable letter of credit or another form of security (security) approved by CDFG's Office of the General Counsel. The security will allow CDFG to draw on the principal sum if CDFG, at its sole discretion, determines that Sunlight and SCE independently have failed to comply with the conditions set forth herein.

   Based on the mitigation ratios established as part of the proposed action, the security required for Sunlight will be in the amount of $17,859,000 based on the following acreage-based estimated costs of implementing the mitigation, monitoring and reporting requirements: land acquisition costs for impacts to habitat, calculated at $1,300.00/ac for 5,953 ac is $7,738,900; costs of enhancing mitigation lands, calculated at $250.00/ac is $1,488,250; long-term maintenance and management, calculated at $1,450.00/ac is $8,631,850.

   Sunlight has indicated that they will construct the property in three phases and will post security prior to ground construction for each phase. Security for Phase 1 and gen-tie A-1 will be in the amount of $6,120,000 for 2,040 ac total; with 1,644 ac for the Solar Farm and 396 ac for the gen-tie] of mitigation, Phase II will be in the amount of $9,057,000 for 3,019 ac of mitigation, and Phase III will be in the amount of $2,682,000 for 874 ac of mitigation. Even if the security is provided, Sunlight must complete the required acquisition, protection and transfer of all lands and record the required conservation easements, deed restriction, or other protection measures no later than 18 months after the start of ground-disturbing activities.

   The security for required for SCE will be in the amount of $2,580,000 based on the following estimated costs of implementing the mitigation, monitoring and reporting requirements: land acquisition costs for impacts to habitat, calculated at $1,300.00/ac for 860 ac is $1,118,000; costs of enhancing mitigation lands, calculated at $250.00/ac is $215,000; and long-term maintenance and management, calculated at $1,450.00/ac is $1,247,000.

As an additional conservation measure, if Phase III of the proposed project is constructed, the applicants will fund the implementation the following two plans to be prepared by the U.S. Geological Survey (USGS) in close coordination with the Service, BLM, and CDFG; the final

plans will be reviewed and approved by those agencies. The duration of the monitoring program would extend for the life of the project and term of the ROW grant, anticipated to be 30 years.

A. Desert Tortoise Habitat Linkage Management and Monitoring Plan

To maintain desert tortoise habitat and population connectivity across and adjacent to the proposed project ROW between the Chuckwalla CHU and DWMA, Joshua Tree National Park, Pinto Mountain CHU, and the Chemehuevi CHU and DWMA, the applicants will fund a desert tortoise habitat linkage management plan that will be developed and implemented by USGS in close coordination with the Service, BLM, and CDFG. Because of the existing land ownership in this area, the BLM will play a more significant role in the planning and implementation of this plan. Within at least 6 months of issuance of a Notice to Proceed for Phase III, the draft plan would be completed and submitted for agency approval. The plan would contain the following components: 1) a map of the linkage area that would be managed for the primary benefit of the desert tortoise; the area generally would encompass all BLM-managed lands within and adjacent to the proposed ROW south of Joshua Tree National Park to Kaiser Road, and south to I-10 between Kaiser Road and Joshua Tree National Park; 2) an inventory of potential obstructions to connectivity and sources of mortality within the mapped area; 3) a list of specific actions under the jurisdiction of BLM that may be needed to remove or mitigate impediments to desert tortoise occupancy and movement, and minimize the risk of fatalities (i.e., construction of fences and culverts along Kaiser Road), the locations of which would be stipulated by the agencies; and 4) schedule for implementing and reporting remedial action to remove or minimize obstructions to movement, occupancy, and sources of mortality to maintain functionality of the remedial actions. Should any measures be proposed in the future that have not been analyzed under the current DEIS/FEIS for the proposed Desert Sunlight Solar Farm Project, a supplemental site-specific environmental analysis may be required.

B. Desert Tortoise Population Connectivity Effectiveness-Monitoring Plan

To monitor the effectiveness of the habitat linkage in providing population connectivity through and adjacent to the proposed project ROW between the Chuckwalla CHU and DWMA and Joshua Tree National Park, the applicants will fund a desert tortoise population connectivity effectiveness-monitoring plan that will be developed and implemented by USGS in close coordination with the Service, BLM, and CDFG over a 30-year period. The draft plan would be submitted to the agencies for review and approval at least 6 months prior to issuance of a Notice to Proceed for Phase III. Information is needed to address two specific, inter-related questions:

1. Does the remaining habitat provide a sufficient linkage for desert tortoise gene flow north and south of the project?

2. Does the remaining habitat provide sufficient space to support self-sustaining resident populations of desert tortoises?

3. What proximate factors affect tortoise use of or survival within the putative linkage area?

To address these questions, the plan would contain the following components: 1) delineation of a study area generally between the southern boundary of Joshua Tree National Park and Victory Pass along Eagle Mountain Road and within the habitat linkage management area delineated above; 2) a determination of a statistical sample-size to address specific questions listed above; 3) an approach to collect tissue for genetic analysis from the population, sample sizes permitting, to determine baseline genetic structure across the study area and to evaluate gene flow and differentiation across the geographic extent of the study area over the life of the project; 4) detailed protocols to acquire data on cause-specific mortality and fate of individuals and spatial habitat use within the putative population linkage in the study area, such as home range dimensions (which may be dynamic from year to year), nearest neighbor distances, and other movement patterns; and 5) a reporting schedule for documenting progress and accomplishments on the components above. The plan should describe the use of tracking devices (i.e., radio or satellite telemetry and/or other data loggers), including periodic capture to attach new batteries for the life of the project, necessary to address the questions above.

Results would be used to identify barriers to movement, land management issues, and opportunities to maintain a viable population and genetic connectivity linkage through an adaptive management program in conjunction with the plan outlined above. At the end of the term of the ROW grant, if the results of the effectiveness monitoring efforts do not demonstrate that population connectivity in this region is ecologically functional, the BLM will consider these results during its review of any renewal request for the Solar Farm prior to issuing a decision on the extension of the ROW grant. If the BLM determines that renewal of the ROW grant may conflict with maintenance of habitat linkage functions, decommissioning and habitat restoration would commence to reestablish population connectivity. As previously discussed, a decommissioning plan would be submitted to the BLM for review and approval prior to a closure of the project site. When the BLM begins to consider decommissioning, it would contact the Service to determine if additional consultation, pursuant to section 7(a)(2) of the Act, would be appropriate.

Should other projects be approved in the vicinity of this linkage, all support costs associated with the Desert Tortoise Habitat Linkage Management and Monitoring Plan and the Desert Tortoise Population Connectivity Effectiveness Monitoring Plan would be prorated to obtain contributions from other potential applicants based on total acres of direct and indirect impacts to habitat linkages regardless of land ownership. Other potential funding sources also may be added in the future, such as monies dedicated to improved management of desert tortoise habitat that become available from NFWF accounts, or other private and public sector funds appropriated for desert tortoise management purposes. The scope of work for the effectiveness monitoring component will be coordinated with other ongoing efforts designed to ascertain the viability of other constricted habitat and population linkages within the range of the species.
All conservation measures relative to the desert tortoise will adhere to the Service's most recent guidance applicable at the time of project construction. The conservation measures, as described herein, reflect the *Desert Tortoise Field Manual* (Service 2009a), *Translocation of Desert Tortoises (Mojave Population) from Project Sites: Plan Development Guidance* (Service

2010a), and *Preparing for any action that may occur within the range of the Mojave desert tortoise: 2010 field season* (Service 2010b).

**Action Area**

The implementing regulations to section 7(a)(2) of the Act describe the action area to be all areas affected directly or indirectly by the Federal action and not merely the immediate area affected by the proposed project (50 CFR § 402.02). The action area is the area of potential direct or indirect effects of the proposed action and any interrelated or interdependent human activities; the direct and indirect effects of these activities include associated physical, chemical, and/or biological effects of considerable likelihood (Service and NMFS 1998). Indirect effects are those that are caused by the proposed action and are later in time but are still reasonably certain to occur (Service and NMFS 1986). Analyses of the environmental baseline, effects of the action on the species and designated critical habitat, cumulative effects, and the impacts of the incidental taking, are based upon the action area as determined by the Service (Service and NMFS 1998).

The action area for the proposed project includes the areas of desert tortoise habitat that would be impacted by activities associated with construction and O&M of the Solar Farm and Red Bluff Substation and their associated components, including the Desert Center and Chuckwalla Mountain telecommunications facilities [up to 1,690 ha (4,176 ac)], and desert tortoise translocation (Action Area Figure). For the purposes of this biological opinion, the project site is defined as the area inside and outside of the permanent fence that would be disturbed due to construction and O&M activities on the project components, perimeter security fence, rerouted drainage channels outside of the Red Bluff Substation, and linear facilities (e.g., access roads, utility corridors, and gen-tie line). Along the linear facilities outside of the Solar Farm and Red Bluff Substation sites, the action area also includes a distance of up to 500 m (1,640 ft) on each side of centerline where any desert tortoises would be moved out of harm's way to avoid injury from construction or O&M-related activities. The total action area analyzed from this biological opinion equals approximately 37,176 ha (91,864 ac; Action Area Figure).

The action area also includes the proposed desert tortoise recipient (translocation) and control sites that are analyzed in the translocation plan, and all contiguous desert tortoise habitat within 6.5 km (4.0 mi) of the release point of each desert tortoise translocated at the DuPont Recipient Site. By including habitats within 6.5 km (4.0 mi) of the release points, we are addressing the areas where desert tortoises may move following translocation[2]. The preferred translocation site for the proposed Solar Farm component is the Chuckwalla Recipient Site, located on 1,747 ha (4,317 ac) within the Chuckwalla CHU and DWMA west of Kaiser Road and north of I-10. Because of adjacent land management constraints, the 6.5 km (4 mi) potential desert tortoise dispersal area has been truncated; the total that would be included as part of the action area for this recipient site would be 6,631.2 ha (16,386 ac). The alternative translocation site for the proposed Solar Farm component is the DuPont Recipient Site, located within the Chuckwalla CHU and DWMA south of I-10 and DuPont Road and east of the Chuckwalla Mountains; this

[2] See "Effects of the Action" section for a discussion on post-translocation dispersal.

site shares its northeastern boundary with designated wilderness. Including the potential desert tortoise dispersal area, the total that would be included as part of the action area for this recipient site would be 13,272.9 ha (32,798 ac).
Red Bluff Recipient Site would be used for translocation of desert tortoises from the substation site. This recipient site is located approximately 0.6 km (0.4 mi) south of the substation on 119.4 ha (295 ac) of contiguous public lands within the Chuckwalla CHU and DWMA. Including the potential desert tortoise dispersal area, the total that would be included as part of the action area for this recipient site would be 4,066.2 ha (10,048 ac).

Two control sites associated with the Solar Farm component are proposed and would be used if five or more individuals would be translocated from the proposed project site. The Sunlight Control Site is preferred, located immediately northwest of the Solar Farm site and totals 1,613.1 ha (3,986 ac). The Red Cloud Control Site is the alternative location and totals 2,528.5 ha (6,248 ac) within the action area. No control sites are required for any other project components.

Finally, the action area encompasses lands that would be acquired to offset the loss of desert tortoise habitat resulting from phased construction and O&M of the proposed project. The acquisition, management, and monitoring of these conservation areas are expected to have beneficial effects to desert tortoises; however, the locations of these lands are currently unknown. Acquisition priorities would be along the I-10 corridor between Cactus City and Desert Center, where existing crossings could be utilized to access contiguous desert tortoise habitats through the Upper Chuckwalla Valley into Joshua Tree National Park (see Desert Tortoise Linkage Acquisition Area Figure). Up to 2,757.1 ha (6,813 ac) of suitable desert tortoise habitat would be acquired; impacts to designated critical habitat would be offset within the Chuckwalla CHU (see "Conservation Measures" section, First Solar 2011, and BLM 2011).

## ANALYTICAL FRAMEWORK FOR THE JEOPARDY DETERMINATION

Section 7(a)(2) of the Endangered Species Act requires that Federal agencies ensure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of listed species. "Jeopardize the continued existence of" means to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species (50 CFR §402.02).

The jeopardy analysis in this biological opinion relies on four components:

1. The status of the species, which describes the range-wide condition of the desert tortoise, the factors responsible for that condition, and its survival and recovery needs;

2. The environmental baseline, which analyzes the condition of the desert tortoise in the action area, the factors responsible for that condition, and the relationship of the action area to the survival and recovery of the desert tortoise;

3. The effects of the action, which determine the direct and indirect impacts of the proposed Federal action and the effects of any interrelated or interdependent activities on the desert tortoise and designated critical habitat; and

4. The cumulative effects, which evaluates the effects of future, non-Federal activities in the action area on the desert tortoise.

In accordance with policy and regulation, the jeopardy determination is made by evaluating the effects of the proposed Federal action in the context of the range-wide status of the desert tortoise, taking into account any cumulative effects in the action area, to determine if implementation of the proposed action is likely to cause an appreciable reduction in the likelihood of both the survival and recovery of the desert tortoise in the wild. For the purposes of making the jeopardy determination, the analysis in this biological opinion places an emphasis on consideration of the range-wide survival and recovery needs of the desert tortoise and the role of the action area in the survival and recovery of the desert tortoise as the context for evaluating the significance of the effects of the proposed Federal action, together with cumulative effects.

Section 7(a)(2) of the Act also requires that Federal agencies ensure that any action they authorize, fund, or carry out does not result in the destruction or adverse modification of designated critical habitat. Our analysis of effects to desert tortoise designated critical habitat follows Service-issued guidance, *Application of the "Destruction of Adverse Modification" Standard under section 7(a)(2) of the Endangered Species Act"* (Service 2004). The guidance addressed the Ninth Circuit Court of Appeals ruling in *Gifford Pinchot Task Force v U.S. Fish and Wildlife Service, No. 03-35279* (August 6, 2004). The guidance states that an evaluation of effects to designated critical habitat should consider the concepts embodied in section 3 (definitions of "critical habitat" and "conservation"), section 4 (the procedures for delineating and adjusting areas included in a designation), and section 7 [the substantive standard in paragraph (a)(2) and the procedures in paragraph (b)] of the Act. The guidance also focuses on the function and conservation role of both the affected critical habitat unit as well as the entire designation. This biological opinion is not based on the regulatory definition of destruction or adverse modification of critical habitat at 50 CFR § 402.02.

## STATUS OF THE SPECIES AND CRITICAL HABITAT RANGE-WIDE

The following section summarizes information about the desert tortoise relative to the legal/listing status, recovery planning, habitat characteristics, distribution and population trends, current threats, and status of critical habitat as discussed in the Service's biological opinion on the CDCA Plan Amendment for the Coachella Valley (Service 2010c). Please refer to that document as well as the Desert Tortoise (Mojave Population) Recovery Plan (Service 1994a), the draft revised recovery plan (Service 2008) and references therein, and the 5-year review for the species (Service 2010d) for additional detailed information about these topics and the species' description, ecology, life history, and habitat affinities.

**Legal/Listing Status:** On August 20, 1980, the Service published a final rule listing the Beaver Dam Slope population of the desert tortoise in Utah as threatened and designated 6,734 ha (16,640 ac) of BLM-administered land as critical habitat (Service 1980). Major threats to the species identified in the rule included habitat destruction through development, overgrazing, and geothermal development, collection for pets, malicious killing, road kills, and competition with grazing or feral animals. In 1984, Defenders of Wildlife, Natural Resources Defense Council, and Environmental Defense Fund petitioned the Service to list the species as endangered. The following year, we determined that listing the desert tortoise as Endangered was warranted, but higher priorities precluded any action.

In 1989, more information regarding threats to desert tortoises became available prompting the Service to publish an emergency rule listing the Mojave population (all desert tortoises north and west of the Colorado River) as endangered (Service 1989). On April 2, 1990, the Service determined the Mojave population of the desert tortoise to be threatened (Service 1990). Reasons for the determination included significant population declines, loss of habitat from construction projects such as roads, housing and energy developments, and conversion of native habitat to agriculture. Livestock grazing and off-highway vehicle (OHV) use were identified as factors causing degradation of additional habitat. Also cited as threatening the desert tortoise's continuing existence were: illegal collection by humans for pets or consumption; upper respiratory tract disease; predation on juvenile desert tortoises by common ravens, coyotes, and kit foxes; fire; and collisions with vehicles on paved and unpaved roads.

The species was listed as threatened under the California Endangered Species Act in 1989 and is considered a species at risk under California's Wildlife Action Plan (Bunn *et al.* 2006). CDFG manages over 19,670 ha (48,000 ac) of land for the conservation of the desert tortoise, and additional lands acquired as mitigation for projects that result in impacts to the species.

On February 8, 1994, the Service designated approximately 2.6 million ha (6.4 million ac) of critical habitat for the Mojave population of the desert tortoise in portions of California, Nevada, Arizona, and Utah (Service 1994b), which became effective on March 10, 1994.

**Recovery Plan for the Desert Tortoise:** The first recovery plan for the desert tortoise was published in 1994 together with a companion document identifying 14 proposed DWMAs (Service 1994a) within six recovery units. The recovery plan serves as the basis and key strategy for recovery and delisting of the species. Within each DWMA, the recovery plan recommends implementation of reserve-level protection of desert tortoise populations and habitat, while maintaining and protecting other sensitive species and ecosystem functions. The recovery plan also recommends that DWMAs be designed to follow the accepted concepts of reserve design and be managed to restrict human activities that negatively affect desert tortoises (Service 1994a). The delisting criteria established by the recovery plan are:

1. The population within a recovery unit must exhibit a statistically significant upward trend or remain stationary for at least 25 years;

2. Enough habitat must be protected within a recovery unit or the habitat and desert tortoises must be managed intensively enough to ensure long-term viability;

3. Populations of desert tortoises within each recovery unit must be managed so discrete population growth rates (lambdas or $\lambda$) are maintained at or above 1.0;

4. Regulatory mechanisms or land management commitments that provide for long-term protection of desert tortoises and their habitat must be implemented; and

5. The population of the recovery unit is unlikely to need protection under the Endangered Species Act in the foreseeable future.

The recovery plan based its descriptions of the six recovery units on differences in genetics, morphology, behavior, ecology, and habitat use over the range of the Mojave population of the desert tortoise. The recovery plan contains generalized descriptions of the variations in habitat parameters of the recovery units and the behavior and ecology of the desert tortoises that reside in these areas (pages 20 to 22 in Service 1994a). The recovery plan also describes the characteristics of desert tortoises and variances in their habitat, foods, burrow sites, and phenotypes across the range of the listed taxon (pages 24 to 26 in Service 1994a). Consequently, to capture the full range of phenotypes, use of habitat, and range of behavior of the desert tortoise as a species, conservation of the species across its entire range is essential.
The Service released a draft revised recovery plan for public review in 2008 (Service 2008); the final revised plan is expected to be released later this year. The draft revised recovery plan refines the recovery and delisting criteria and includes a discussion of reducing the number of recovery units from six to five. Since 1994, research pertaining to ecological and genetic variation has provided important insights into patterns of distribution within the Mojave desert tortoise population. This information was used to define the recovery unit boundaries in a manner that balances distinctiveness and variability within the population. Maintaining local adaptation as well as genetic diversity over time is important for recovery; thus, applying these concepts at the appropriate recovery unit level will facilitate prioritization of recovery and management activities within the various geographic units. Based on this information, the Eastern Colorado and the Northern Colorado recovery units, and a portion of the Eastern Mojave Recovery Unit in Piute and Fenner valleys, were combined to form the Colorado Desert Recovery Unit in the draft revised recovery plan (Service 2008).

For this biological opinion, however, we use the 1994 recovery unit boundaries for three reasons: 1) the Service has not formally adopted the revised recovery plan and revised recovery unit boundaries; 2) existing data sets were generally collected specific to the units as delineated in the 1994 recovery plan; and 3) the information relative to the environmental baseline and conservation targets for the Eastern Colorado Recovery Unit can be applied to the analysis of the action area. It is important to note that despite the recognition of subunits within the larger population, contiguous habitats within which gradients of ecological and genetic differentiation exist provide linkages within and between these subunits. Maintaining these linkages is essential for recovery of the species.

**Habitat Characteristics and Life History:** The desert tortoise is a large, herbivorous reptile that reaches 20 to 38 centimeters (cm) [8 to 15 inches (in)] in carapace (upper shell) length and 10 to 15 cm (4 to 6 in) in shell height. Hatchlings emerge from eggs at about 5 cm (2 in) in length. Adults have a domed carapace and relatively flat, unhinged plastrons (lower shell). Their shells are greenish-tan to dark brown in color with tan scute (horny plate on the shell) centers. Adult desert tortoises weigh 3.6 to 6.8 kilograms (8 to 15 pounds). The forelimbs have heavy, claw-like scales and are flattened for digging. Hind limbs are more elephantine (Ernst *et al.* 1994).

Desert tortoises occupy a variety of habitats from flats and slopes dominated by creosote bush scrub at lower elevations to rocky slopes in blackbrush scrub and juniper woodland ecotones at higher elevations. Desert tortoises occur from below sea level to an elevation of 2,225 m (7,300 ft). Throughout most of the southern California deserts, desert tortoises occur most commonly on gently sloping terrain with sandy-gravel soils that support sparse cover of low-growing shrubs, which allows establishment of herbaceous plants. Soils must be friable enough for digging of burrows, but firm enough so that burrows do not collapse. Typical habitat for desert tortoises has been characterized as creosote bush scrub where precipitation ranges from 5 to 20 cm (2 to 8 in), the diversity of perennial plants is relatively high, and production of ephemerals is high.

Desert tortoises are well adapted to living in a highly variable and often harsh desert environment. They spend much of their lives in burrows, even during their seasons of activity. In late winter or early spring, they emerge from overwintering burrows and typically remain active through fall. Activity does decrease in summer, but individuals often emerge after summer rain storms to drink (Henen *et al.* 1998). Mating occurs during both spring and fall (Black 1976, Rostal *et al.* 1994). During activity periods, desert tortoises eat a wide variety of herbaceous vegetation, particularly grasses and the flowers of annual plants (Berry 1974, Luckenbach 1982, Esque 1994). During periods of inactivity, they reduce their metabolism and water loss and consume very little food. Adult desert tortoises lose water at such a slow rate that they can survive for more than a year without access to free water of any kind and can apparently tolerate large imbalances in their water and energy budgets (Nagy and Medica 1986; Peterson 1996a, b; Henen *et al.* 1998).

In drought years, the availability of surface water following rains may be crucial for desert tortoise survival (Nagy and Medica 1986). During these unfavorable periods, desert tortoises decrease surface activity and remain mostly inactive or dormant underground (Duda *et al.* 1999), which reduces water loss and minimizes energy expenditures (Nagy and Medica 1986). Duda *et al.* (1999) showed that home range size, number of different burrows used, average distances traveled per day, and levels of surface activity were significantly reduced during drought years.

The size of desert tortoise home ranges varies with respect to location and year (Berry 1986) and serves as an indicator of resource availability and opportunity for reproduction and social interactions (O'Connor *et al.* 1994). Females have long-term home ranges that may be as little or less than half that of the average male, which can range to 80 or more ha (200 ac) (Burge

1977, Berry 1986, Duda *et al*. 1999, Harless *et al*. 2009). Core areas used within desert tortoises' larger home ranges depend on the number of burrows used within those areas (Harless *et al*. 2009). Over its lifetime, each desert tortoise may use more than 3.9 $km^2$ (1.5 $mi^2$) of habitat and may make periodic forays of more than 11 km (7 mi) at a time (Berry 1986).

Desert tortoises are long-lived and grow slowly, requiring 13 to 20 years to reach sexual maturity, and have low reproductive rates during a long period of reproductive potential (Turner *et al.* 1984; Bury 1987; Germano 1994). Growth rates are greater in wet years with higher annual plant production [e.g., desert tortoises grew an average of 1.2 cm (0.5 in) in an El Niño year compared to 0.2 cm (0.07 in) in a drought year in Rock Valley, Nevada; Medica *et al*. 1975)]. The number of eggs as well as the number of clutches that a female desert tortoise can produce in a season is dependent on a variety of factors including environment, habitat, availability of forage and drinking water, and physiological condition (Turner *et al.* 1986, 1987; Henen 1997; McLuckie and Fridell 2002). The success rate of clutches has proven difficult to measure, but predation, while highly variable (Bjurlin and Bissonette 2004), appears to play an important role in clutch failure (Germano 1994).

**Distribution and Population Trends:** The Mojave population of the desert tortoise includes those animals living north and west of the Colorado River in the Mojave Desert of California, Nevada, Arizona, and southwestern Utah, and in the Sonoran (Colorado) Desert in California. Before entering into a discussion of the status and trends of the desert tortoise, a brief discussion about the methods of estimating the numbers of desert tortoises is warranted. Three primary methods have been widely used over time: permanent study plots, triangular transects, and line distance sampling.

Generally, permanent study plots are defined areas that are surveyed during the spring at roughly 4-year intervals to determine the number of desert tortoises present. Desert tortoises found on these plots were registered; that is, they were marked so individuals could be identified during subsequent surveys. Between 1971 and 1980, 27 plots were established in California; 15 of the plots were used by BLM to monitor desert tortoises on a long-term basis (Berry 1999). Range-wide, 49 plots have been used at one time or another to monitor desert tortoises over time (Tracy *et al.* 2004).

Triangular transects is a method used to detect desert tortoise sign (e.g., scat, burrows, tracks, carcasses). The number of sign is then correlated with standard reference sites, such as permanent study plots, to calculate density estimates.

Finally, line distance sampling involves walking transects while trying to detect live desert tortoises. Based on the distance of the desert tortoise from the centerline of the transect, the length of the transect, and a calculation of what percentage of the animals in the area were likely to have been above ground and visible to surveyors during the time the transect was walked, an estimation of the density can be made. This density only represents an estimation of the number of desert tortoises that are greater than 180 millimeters (mm; 7.1 in) in size. Desert tortoises that are larger than this are typically classified as subadult or adult desert tortoises.

Each of these methods has various strengths and weaknesses. In general, permanent study plots have been used to estimate the status of desert tortoises across large areas over time. While a substantial body of data has been collected from these plots, plot placement is generally regarded as a factor limiting demographic and trend conclusions only to those specific areas (Tracy *et al.* 2004). Triangular transects have been used to assess the density of desert tortoises within discrete sites at a point in time; this method was commonly used to estimate the number of desert tortoises that may be affected by a specific proposed action. Line distance sampling is currently being used as the primary method in a long-term monitoring strategy to detect population trends. This program was established in 2001, but detecting population trends is expected to be a gradual process and surveys conducted over short periods of time (e.g., 2001 to 2007) would only reveal catastrophic declines or significant changes (Service 2008).

The report prepared by the Desert Tortoise Recovery Plan Assessment Committee (Tracy *et al.* 2004) concluded that estimating accurate long-term trends of desert tortoise populations, habitat, and/or threats across the range was not feasible based on the combined suite of existing data and analyses. Instead, these data provide general insight into the range-wide status of the species and show appreciable declines at the local level in many areas (Luke *et al.* 1991, Berry 2003, Tracy *et al.* 2004). Some of the constraints that make estimating population densities extremely difficult include the cryptic nature of the species (i.e., individuals spend much of their lives underground or concealed under shrubs), inactivity in years of low rainfall, and low abundance across a broad distribution within several different habitat types. Other factors, such as the inability to sample on private lands and rugged terrain, further complicate sampling efforts. Consequently, because of these constraints and the various methods used to estimate abundance over the years, we cannot provide concise estimations of the density of desert tortoises in each recovery unit or DWMA that have been made in a consistent manner (Service 2008).

Given the difficulty in determining the density of desert tortoises over large areas, differences in density estimates in the recovery plan and those derived from subsequent sampling efforts may not accurately reflect on-the-ground conditions. Regardless, the absence of live desert tortoises and presence of carcasses over large areas of some DWMAs provide at least some evidence that desert tortoise populations seem to be in a downward trend in some regions.

**Status and Trends of Desert Tortoise Populations within the Eastern Colorado Recovery Unit:** The following provides general information on the status and trends of the desert tortoise within the Eastern Colorado Recovery Unit where the proposed project is located (Service 1994a). We have not included detailed information on the status of the desert tortoise in the other recovery units throughout the range of the species in this biological opinion. However, this omission does not compromise our ability to make the required determination regarding whether a proposed action is likely to jeopardize the continued existence of a species at the level of the listed taxon. Because the range of the listed taxon is divided into recovery units, our analysis begins at the recovery unit level. If the effects of the proposed action have the potential to compromise the ability of the species to survive and recover within the recovery unit, the next level of analysis considers how the compromised recovery unit would affect the listed taxon throughout its range (Service 2005). Our analysis can therefore be comprehensively conducted

in a manner through this iterative process. Because the Eastern Colorado Recovery Unit comprises one of six recovery units for the desert tortoise pursuant to the current recovery plan (Service 1994a), our level of analysis in this biological opinion will begin at this level.

The Eastern Colorado Recovery Unit, the southernmost unit of the Mojave population, is bounded roughly by SR 62 to the north, bisects Joshua Tree National Park to the west, lies east of the Salton Sea, and the Arizona border forms the eastern boundary. The Chuckwalla CHU and DWMA, and a portion of the Joshua Tree DWMA, Pinto Mountains CHU, Chocolate Mountains Aerial Gunnery Range, and several wilderness areas occur in this recovery unit.

According to the 1994 Recovery Plan (Service 1994a) and the draft revised plan (Service 2008), desert tortoises are generally found in the valleys, on bajadas, desert pavements, rocky slopes, and in the broad, well-developed washes in the Colorado Desert portion of the range. Vegetation is characterized by relatively species-rich succulent scrub, creosote bush scrub, and desert dry wash woodland. Because this region receives about one-third of its annual rainfall in summer and supports, tortoises feed on two distinct annual floras (i.e., summer and winter annuals). Desert tortoises den singly in burrows under shrubs, in intershrub spaces, and washes. Farther north, tortoises are more likely to burrow in caliche caves and washes. The climate is somewhat warmer than in other recovery units, with few freezing days per year. Desert tortoises within this recovery unit near Goffs produce relatively smaller eggs, produce more eggs overall, lay their second clutches earlier, and are smaller overall than desert tortoises in the Desert Tortoise Research Natural Area in the Western Mojave Recovery Unit (Wallis *et al.* 1999). They also produce more eggs than similarly sized females at the Nevada Test Site in the Eastern Mojave Recovery Unit (Mueller *et al.* 1998).

The 1994 Recovery Plan estimated desert tortoise densities in this recovery unit at 2 to 67 tortoises/km$^2$ (5 to 175/mi$^2$), with a relative high degree of threats facing the species in this area. Two permanent study plots are located within the Chuckwalla DWMA. At the Chuckwalla Bench plot, Berry (1996) calculated densities of 222, 152, 64, 62, and 70 tortoises/km$^2$ (578, 396, 167, 160, and 182/mi$^2$) in 1979, 1982, 1988, 1990, and 1992, respectively. At the Chuckwalla Valley plot, Berry (1996) calculated densities of 63, 70, and 28 tortoises/km$^2$ (163, 181, and 73/mi$^2$) in 1980, 1987, and 1991, respectively. Tracy *et al*. (2004) concluded that these data show a statistically significant decline in the number of adult desert tortoises over time and that the decline on the Chuckwalla Bench plot seemed to be responsible for the overall decline within the recovery unit. However, these conclusions are based solely on two plots, which is a weakness of using these data to discern long-term trends for the recovery units.

As stated above, a long-term monitoring program for the desert tortoise was implemented in 2001 (1999 in the Upper Virgin River Recovery Unit; McLuckie *et al.* 2002). This program was the first comprehensive effort undertaken to estimate densities across the range of the listed population (Service 2006, 2009b) and continues today. Data for the Eastern Colorado Recovery Unit are provided in Table 3.

**Table 3. Summary of density estimates for the Eastern Colorado Recovery Unit since adoption of line-distance sampling method (see Service 2006, 2009b for additional details on this and other recovery units).**

| Recovery Unit | Year | No. of Transects | Length (km) | Adult Tortoises* | Density ($km^2$) | Coefficient of Variation (%) | 95% Confidence Interval | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | Low | High |
| Eastern Colorado | 2001 | 205 | 328.0 | 54 | 10.1 | 18.3 | 7.0 | 14.4 |
| | 2002 | 104 | 416.7 | 42 | 7.7 | 28.8 | 4.4 | 13.4 |
| | 2003 | 108 | 431.7 | 32 | 4.0 | 22.7 | 2.6 | 6.3 |
| | 2004 | 132 | 1414.0 | 102 | 6.4 | 28.9 | 3.7 | 11.2 |
| | 2005 | 91 | 1094.3 | 74 | 7.9 | 26.7 | 4.7 | 13.2 |
| | 2007 | 100 | 1151.7 | 59 | 5.0 | 22.6 | 3.2 | 7.7 |

*"Adult tortoises" is the number of subadults and adults (midline carapace length ≥180mm).

Density estimates of adult desert tortoises varied among recovery units and years. Over the first 6 years of range-wide monitoring (2001-2005, 2007), considerable decreases in density were reported in 2003 in the Eastern Colorado and Western Mojave recovery units (Service 2006). However, the variability between annual estimates among all years (Table 3) is consistent with variability due to sampling between years; only after several years of consistent patterns will the range-wide approach distinguish population trends from the variability due to sampling. Beyond noting that no range-wide population losses or gains were detected, inferences as to the long-term trends based on these data would be premature for any of the recovery units (Service 2008).

**Current Threats:** The majority of threats to desert tortoises and their habitats remain similar to those cited in the original listing rules and are generally associated with human land uses. Some of these threats include urbanization, unauthorized OHV activity, authorized vehicular activity, illegal collecting, mortality on paved roads, vandalism, livestock grazing, feral burros, drought, nonnative plants and changes to natural fire regimes, and environmental contaminants. Upper respiratory tract disease and possibly other diseases were also identified as significant threats and continue to be of concern.

Drought has been implicated as a factor in reduced survival rates on desert tortoises in local areas (Longshore *et al.* 2003). In this 9-year study, researchers compared two "closely situated, but physiographically different, sites" in the Lake Mead National Recreation Area, Nevada. After a period during which survival rates were stable, the survival rate decreased on one of the sites that experienced drought conditions in 3 out of 4 years. The authors postulate that if such local incidents occur on a regular basis, "source-sink population dynamics may be an important factor" in determining the density of desert tortoise populations.

We have excerpted the following paragraphs from the draft revised recovery plan as a general discussion of some of the threats desert tortoises face with regard to the anthropogenic factors that affect their ability to meet their nutritional needs. Additional detail on these topics and all references can be found in the draft revised recovery plan (Service 2008):

"Surface disturbance from OHV activity can cause erosion and large amounts of dust to be discharged into the air. Recent studies on surface dust impacts on gas exchanges in Mojave Desert shrubs showed that plants encrusted by dust have reduced photosynthesis and decreased water-use efficiency, which may decrease primary production during seasons when photosynthesis occurs (Sharifi *et al.* 1997). Sharifi *et al.* (1997) also showed reduction in maximum leaf conductance, transpiration, and water-use efficiency due to dust. Leaf and stem temperatures were also shown to be higher in plants with leaf-surface dust. These effects may also impact desert annuals, an important food source for (desert) tortoises.

OHV activity can also disturb fragile cyanobacterial-lichen soil crusts, a dominant source of nitrogen in desert ecosystems (Belnap 1996). Belnap (1996) showed that anthropogenic surface disturbances may have serious implications for nitrogen budgets in cold desert ecosystems, and this may also hold true for the hot deserts that (desert) tortoises occupy. Soil crusts also appear to be an important source of water for plants, as crusts were shown to have 53 percent greater volumetric water content than bare soils during the late fall when winter annuals are becoming established (DeFalco *et al.* 2001). DeFalco *et al.* (2001) found that nonnative plant species comprised greater shoot biomass on crusted soils than native species, which demonstrates their ability to exploit available nutrient and water resources. Once the soil crusts are disturbed, nonnative plants may colonize, become established, and out-compete native perennial and annual plant species (DeFalco *et al.* 2001, D'Antonio and Vitousek 1992). Invasion of nonnative plants can affect the quality and quantity of plant foods available to desert tortoises. Increased presence of invasive plants can also contribute to increased fire frequency.

Proliferation of invasive plants is increasing in the Mojave and Sonoran deserts and is recognized as a significant threat to desert tortoise habitat. Many species of nonnative plants from Europe and Asia have become common to abundant in some areas, particularly where disturbance has occurred and is ongoing. As nonnative plant species become established, native perennial and annual plant species may decrease, diminish, or die out (D'Antonio and Vitousek 1992). Land managers and field scientists have identified over 116 species of nonnative plants in the Mojave and Colorado deserts (Brooks and Esque 2002).

Increased levels of atmospheric pollution and nitrogen deposition related to increased human presence and combustion of fossil fuels can cause increased levels of soil nitrogen, which in turn may result in significant changes in plant communities (Aber *et al.* 1989). Many of the nonnative annual plant taxa in the Mojave region evolved in more fertile Mediterranean regions and benefit from increased levels of soil nitrogen, which gives them a competitive edge over native annuals. Studies at three sites within the central, southern, and western Mojave Desert indicated that increased levels of soil nitrogen can increase the dominance of nonnative annual plants and promote the invasion of new species in desert regions. Furthermore, increased dominance by nonnative annuals may decrease the diversity of native annual plants, and increased biomass of nonnative annual grasses may increase fire frequency (Brooks 2003).

Nutritional intake affects growth rates in juvenile desert tortoises (Medica *et al.* 1975) and female reproductive output (Turner *et al.* 1986, 1987; Henen 1992). Invasion of nonnative plants can affect the quality and quantity of plant foods available to desert tortoises, and thereby affect nutritional intake. Desert tortoises are generally quite selective in their choices of foods (Burge 1977, Nagy and Medica 1986, Turner *et al.* 1987, Avery 1992, Henen 1992, Jennings 1992, 1993, Esque 1992, 1994), and in some areas the preferences are clearly for native plants over the weedy nonnatives.

As native plants are displaced by nonnative invasive species in some areas of the Mojave Desert, nonnative plants can be a necessary food source for some desert tortoises. However, nonnative plants may not be as nutritious as native plants. Recent studies have shown that calcium and phosphorus availability are higher in forbs than in grasses and that desert tortoises lose phosphorus when feeding on grasses but gain phosphorus when eating forbs (Hazard *et al.* 2002). Nagy *et al.* (1998), in a comparative study on the nutritional qualities of native vs. nonnative grasses and forbs commonly consumed by desert tortoises (*Achnatherum hymenoides* [Indian ricegrass] vs. *Schismus barbatus*; *Malacothrix* spp. [desert dandelion] vs. *Erodium cicutarium*), found that the nutritional value of the two grasses was similar, but both grasses had much lower nutritional value than the forbs. This suggests that the proliferation of nonnative grasses such as *Schismus* to the exclusion of native forbs and other plants (D'Antonio and Vitousek 1992) places desert tortoises at a nutritional disadvantage. Furthermore, if desert tortoises consume just enough food to satisfy their energy needs (as commonly noted in other vertebrate groups), then the native forbs provide significantly more nitrogen and water than the nonnative forbs (Nagy *et al.* 1998).

Changes in the abundance and distribution of native plants also may affect desert tortoises in more subtle ways. In the Mojave Desert, many food plants are high in potassium (Minnich 1979), which is difficult for desert tortoises to excrete due to the lack of salt glands that are found in other reptilian herbivores such as chuckwallas (*Sauromalus obesus*) and desert iguanas (*Dipsosaurus dorsalis*) (Minnich 1970, Nagy 1972). Reptiles are also unable to produce osmotically concentrated urine, which further complicates the ability for desert tortoises to expel excess potassium (Oftedal and Allen 1996). Oftedal (2002) suggested that desert tortoises may be vulnerable to upper respiratory tract disease or other diseases due to their need to obtain sufficient water and nitrogen from food plants to counteract the negative effects of dietary potassium. Only high quality food plants (as expressed by the Potassium Excretion Potential, or PEP, index) allow substantial storage of protein (nitrogen) that is used for growth and reproduction, or to sustain the animals during drought. Nonnative, annual grasses have lower PEP indices than most native forbs (Oftedal 2002; Oftedal *et al.* 2002). Foraging studies have demonstrated that juvenile Mojave tortoises are highly selective while foraging, selecting both the plant species and plant parts that are have the highest PEP value. Impacts to vegetation (such as livestock grazing, invasion of nonnative plants, and soil disturbance) that reduce the abundance and distribution of high PEP plants may result in additional challenges for foraging desert tortoises (Oftedal *et al.* 2002)."

In addition, predation by common ravens and coyotes is considered a threat that may be increasing in severity due to the expansion of human activities into more remote locations throughout the desert or prey shifting because of prolonged drought and a lack of prey species (e.g., lagomorphs). Common raven populations in some areas of the adjacent Mojave Desert have increased 1,500 percent from 1968 to 1988 in response to expanding human use of the desert (Boarman 2002). Since ravens were scarce in the desert prior to 1940, the existing level of raven predation on juvenile desert tortoises is considered an unnatural occurrence (BLM 1990). In addition to ravens, domestic and feral dogs have emerged as significant predators of desert tortoises that occur in areas adjacent to residential development.

***Renewable Energy Projects in the California Desert District***

In an effort to meet the California Renewable Portfolio Standards (33 percent renewable energy by 2020) and national energy priorities, a large number of renewable energy projects have been proposed on BLM-managed land, State-owned land, and private land in California and throughout the West. As of January 2010, there were 244 proposed renewable energy projects in California in various stages of the environmental review process or under construction. As of December 2009, 49 of these projects, representing approximately 10,500 MW, intended to request American Recovery and Reinvestment Act (ARRA) funds from the Federal government. Solar, wind, and geothermal developers have requested ROW grants on approximately 404,685.64 ha (1 million ac) of BLM lands within the California deserts. State and private lands have also been targeted for renewable solar and wind projects (BLM 2011).

Figure 3.18-2 and tables 3.18-2 and 3.18-3 in the FEIS (BLM 2011; see Appendix 1) illustrate the proposed energy projects (e.g., solar, wind) on BLM-managed land, along the I-10 corridor in eastern Riverside County, along with several commercial and residential developments proposed in and around the Blythe. The Palm Springs-South Coast Field Office of the BLM is processing 17 solar projects on 50,015.91 ha (123,592 ac) for 11,873 MW and 4 wind projects on 2,367.82 ha (5,851 ac) (BLM 2011). Because of intense competition for utility Power Purchase Agreements and Federal funding incentives, not all of the projects identified in FEIS will be completed. Of these projects along the I-10 corridor, several have been approved, are under construction, or will begin construction this year. These include the Devers-Palo Verde 2 (DPV2) Transmission Line Project, Colorado River Substation Expansion [17.8 ha (44 ac)], Desert Southwest Transmission Line, Blythe Energy Project II [12.1 ha (30 ac)], Blythe Solar Power Project [3,804.1 ha (9,400 ac)], Genesis Solar Energy Project [809.4 ha (2,000 ac)], Rice Solar Energy Project [570.6 ha (1,410 ac)], Blythe Airport Solar I Project [259 ha (640 ac)], and the Wiley's Well Communication Tower Project.

In addition, several projects are nearing completion of the environmental review process or have submitted their Plans of Development to the BLM. These include the Eagle Mountain Hydro-pumped Storage Energy Project [616.7 ha (1,524 ac)], Palen Solar Energy Project [2,104.4 ha (5,200 ac)], NextEra McCoy [8,339.8 ha (20,608 ac)], McCoy Soleil Project [792.8 ha (1,959 ac)], Chuckwalla Solar I [1,652.3 ha (4,083 ac)], Desert Quartzite [3,125.8 ha (7,724 ac)], Desert

Harvest Project [427.6 ha (1,057 ac)], Eagle Mountain Landfill Project[3] [1,416.4 ha (3,500 ac)], Paradise Valley "New Town" Development [2,588.8 ha (6,397 ac)], and the Mecca Specific Plan [1,187.4 ha (2,934 ac)].

Collectively, the projects along the I-10 corridor total approximately 20,234.3 ha (50,000 ac), which contribute to the environmental baseline both within and outside of the action area analyzed under this biological opinion. Another planning process that is underway is the Draft Programmatic Solar Energy Development EIS and CDCA Plan Amendment [Solar PEIS; BLM and Department of Energy (DOE) 2010]. This effort proposes over 8.4 million ha (21 million ac) including 24 Solar Energy Zones (SEZ) constituting approximately 274,134.1 ha (677,400 ac) across six western states that would be available for solar energy development on BLM-managed lands (BLM and Department of Energy 2010). The proposed action is located within the Riverside East SEZ [approximately 82,151.2 ha (203,000 ac)], which is one of four SEZs in southern California that total just under 161,874.3 ha (400,000 ac).

As discussed above, the project-by-project and cumulative effects of the renewable energy program within the range of the Mojave population of the desert tortoise have the potential to reduce the amount of available, occupied and/or suitable habitat by hundreds of thousands of acres. The effects from utility-scale projects and impacts to habitat and population (i.e., genetic) connectivity have recently come to the forefront as a significant threat to the desert tortoise. The magnitude and duration of habitat loss that would result from construction and operation of the approved and proposed renewable energy projects along the I-10 corridor have the potential to constrict the remaining habitat linkages and limit gene flow between the Mojave and Colorado deserts (see "Habitat and Population Connectivity" below).

**Habitat and Population Connectivity:** Quantifying the degree to which a landscape promotes or hinders movements among patches of habitat for a given species, hereafter referred to as "habitat connectivity" (Fischer and Lindenmayer 2007), has become increasingly important relative to desert tortoise recovery. As we evaluate utility-scale solar development and other land uses within the range of the species, it is essential that habitat linkages between and among populations are conserved. For gene flow to occur across the range, populations of desert tortoises need to be connected by areas of occupied habitat that support sustainable numbers of reproductive individuals. Recent research provides evidence that genetic differentiation within the Mojave population is consistent with isolation by distance in a continuous-distribution model of gene flow. Populations at the farthest extremes of the distribution are therefore the most differentiated and a gradient of genetic differentiation occurs between those populations, across the range of the species (Britten *et al*. 1997, Edwards *et al.* 2004a, Murphy *et al*. 2007, Hagerty and Tracy 2010). Genetic analyses also suggest that levels of gene flow among subpopulations of desert tortoises were likely high, corresponding to high levels of habitat connectivity (Murphy *et al.* 2007, Hagerty 2008). In essence, the Mojave population historically represents a series of continuous, overlapping home ranges within suitable habitats whose boundaries between divergent units may be validated by ecological or major topographic features, such as steep

[3] The U.S. Court of Appeals for the Ninth Circuit ruled that the land exchange for the project was not properly approved by the administrative agency. Developer is still considering options.

mountainous terrain or, even more significantly, the Colorado River (Germano *et al.* 1994, Service 2008, Nussear *et al*. 2009).

Individual desert tortoises can make long-distance movements through restricted habitats, which may contribute to gene flow (Berry 1986, Edwards *et al*. 2004b), though we do not know the extent to which individuals utilize narrow corridors of relatively intact habitat. The underpinning of the continuous-distribution model of gene flow described above, and the evidence from desert tortoise population genetic studies and distribution, is that individual desert tortoises breed with their neighbors, those desert tortoises breed with other neighbors, and so on. The movements that maintain the genetic diversity across populations occur over generations and not necessarily during the life span of a single desert tortoise. Therefore, for gene flow to happen reliably, populations need to be connected across the range by occupied areas of habitat linkages that support sustainable numbers of desert tortoises.

To define the area required to maintain resident populations within the linkages, we considered desert tortoise home range size and the magnitude of edge effects. The size of desert tortoise home ranges varies with respect to location and year (Berry 1986) and may serve as an indicator of resource availability and opportunity for reproduction and social interactions (O'Connor *et al.* 1994). Females have long-term home ranges that may be as little as or less than half that of the average male, which can range to 80 ha or more (200 ac) (Burge 1977, Berry 1986, Duda *et al.* 1999, Harless *et al*. 2009). Core areas used within the lifetime home range of desert tortoises depend on the number of burrows used within those areas (Harless *et al*. 2009). Over its lifetime, a desert tortoise may use more than 3.9 $km^2$ (1.5 $mi^2$) of habitat and may make periodic forays of more than 11 km (7 mi) at a time (Berry 1986). We therefore assess the viability of the linkages based on the ability of those linkages to maintain the lifetime home range of a desert tortoise or the ability of home ranges of this size to connect to one another absent any barriers. Because we expect lifetime home ranges to expand and contract over time, we can consider whether the linkage could remain viable in a year where decreased resource availability results in a smaller population of individuals that respond by expanding their home ranges.

In assessing lifetime home ranges, the Service (1994a) assumed a circular configuration of this area when using it in the population viability assessment. We based this assumption on the fidelity that desert tortoises exhibit towards an overwintering burrow year after year. Consequently, the overwintering burrow serves as an anchor point from which the lifetime utilization area radiates out. Using a circular lifetime home range of 3.9 $km^2$ (1.5 $mi^2$) for a desert tortoise, we estimate that a linkage would need to be at least 2.3 km (1.4 mi) wide to accommodate the width of a single home range. Although these figures provide a means for characterizing the potential minimum width of a linkage, we do not know the exact area or land configuration required to support a sustainable population of resident desert tortoises within any particular linkage, which would be dependent upon several factors.

Based on the best available information, occupancy likely depends on many site-specific factors, including: 1) desert tortoise densities in the vicinity (i.e., lower density sites require larger areas to reliably support sustainable numbers of desert tortoises); 2) length-to-width ratio of the

linkage (i.e., longer linkages may need to be wider to preserve the dynamic home ranges and interactions required for gene flow); and 3) potential edge effects and integrity of the ecosystem within and adjacent to the linkage. Another consideration is the extent to which slope and ruggedness of the terrain allows desert tortoise occupancy or passage. In addition, maintaining connectivity of desert tortoise habitats and populations should reflect results from the landscape genetic analyses of Hagerty (2008) and Hagerty *et al*. (2010). These analyses showed that desert tortoise gene flow generally occurred historically in a diffuse pattern across the landscape unless otherwise constrained to more narrow, concentrated pathways created by topographic barriers (e.g., around the Spring Mountains in western Nevada). As a result, it is evolutionarily imperative that conservation is focused on maintaining a series of redundant linkages between core populations and critical habitats.

As a cooperating agency for the BLM/DOE's Solar PEIS planning process, the Service performed a landscape-scale modeling exercise to identify habitat linkages between and among CHUs and other conserved lands using data from the USGS desert tortoise habitat model (Nussear *et al*. 2009), desert tortoise landscape genetics analysis (Hagerty 2008, Hagerty and Tracy 2010, Hagerty *et al*. 2010), The Nature Conservancy's Mojave Desert Ecoregional Assessment (Randall *et al*. 2010), and lands designated as Wildlife Habitat Management Areas (WHMAs) that are important for desert tortoise connectivity and wildlife movement under the BLM's NECO Plan; BLM 2002). The intersection of these data sets established an initial range-wide linkage design for desert tortoise connectivity that the Service has recommended be maintained outside of designated desert tortoise conservation areas (e.g., CHUs, DWMAs, wilderness areas, national parks and monuments, and conserved private lands). This linkage design, however, requires refinement on a local and regional scale to account for on-the-ground limitations to desert tortoise occupancy and movement opportunities.

The proposed project site lies within the Upper Chuckwalla Valley and Upper Pinto Wash, which supports an important linkage characterized by diffuse gene flow between the Mojave and Colorado portions of the species' range (Hagerty *et al*. 2010). The western portion of the proposed project site, particularly Phase III, is within an area that has a higher level of predicted occupancy/habitat suitability (Nussear *et al*. 2009) and is known to support resident desert tortoises (see "Environmental Baseline" section below for more detail on the action area).

**Status of Critical Habitat:** The Service designated about 2.6 million ha (6.5 million ac) of critical habitat for the tortoise in portions of California, Nevada, Arizona, and Utah (Service 1994b). The primary constituent elements (PCEs) of desert tortoise critical habitat were identified as sufficient space to support viable populations within each of the six recovery units and to provide for movement, dispersal, and gene flow; sufficient quality and quantity of forage species and the proper soil conditions to provide for the growth of these species; suitable substrates for burrowing, nesting, and overwintering; burrows, caliche caves, and other shelter sites; sufficient vegetation for shelter from temperature extremes and predators; and habitat protected from disturbance and human-caused mortality.

Threats to critical habitat include urban development, military operations, and multiple-uses of public lands such as OHV activities and livestock grazing (Service 1994b). The introduction and spread of invasive nonnative plants, changes to natural fire regimes, and environmental contaminants also threaten critical habitat areas. In addition, threats from long-term climate trends, such as recurrent and prolonged drought, and ecological processes, such as invasive nonnative plant infestations and consequent wildfire risk, are widespread in some areas. These threats have degraded the PCEs of desert tortoise critical habitat over large areas but the extent has not been quantified (Service 2008, Service 2010d). If continued, these threats have the potential to significantly degrade the viability of populations in affected areas, including habitat linkages between core populations.

ENVIRONMENTAL BASELINE

Regulations implementing the Act (50 CFR § 402.02) define the environmental baseline as the past and present impacts of all Federal, State, or private actions and other human activities in the action area. Also included in the environmental baseline are the anticipated impacts of all proposed Federal projects in the action area that have undergone section 7 consultation, and the impacts of State and private actions which are contemporaneous with the consultation in progress.

As discussed in the "Action Area" section above, the action area for this project includes: 1) the Solar Farm site, gen-tie alternatives, and SCE components [1,690 ha (4,176 ac)] and a distance of up to 500 m (1,640 ft) on each side of centerline from linear facilities outside of the Solar Farm and Red Bluff Substation sites where any desert tortoises will be moved out of harm's way; 2) the proposed desert tortoise control and recipient (translocation) sites, and all contiguous tortoise habitat within 6.5 km (4.0 mi) of the release point of translocated tortoises; and 3) lands acquired to offset project impacts. The environmental baseline of each of these components of the action area is described below.

**Past Consultations in the Action Area**

The Service has issued the following biological opinions for actions that have occurred or will occur within the action area for this consultation. In all cases, the Service determined that the proposed action was not likely to jeopardize the continued existence of the desert tortoise.

A biological opinion was issued for the Palen Solar Power Project located immediately north of I-10 in May 2011. The action area for the proposed project intersects the Palen project site in the desert tortoise dispersal area associated with the Red Bluff Recipient Site. The Palen project is one of several utility-scale solar energy development projects proposed on BLM-managed lands along the I-10 corridor. The biological opinion for the Palen project anticipates the permanent loss of 1,698 ha (4,195 ac) of desert tortoise habitat. Take is anticipated, in the form of capture or collection, of up to 97 subadult and adult and 6 juvenile desert tortoises for the purposes of moving individuals out of harm's way, translocation to a recipient site, and disease screening of all translocated, resident, and control animals. Take is anticipated, in the form of mortality or

injury, of up to one desert tortoise per year during construction and one desert tortoise per year for O&M-related activities is anticipated. It should be noted, however, that no live desert tortoises were observed on the Palen project site during pre-project surveys and that these estimates were extrapolated from density data obtained for the recovery unit for the purposes of the analysis.

The Palen project would obstruct desert tortoise linkages under three of the larger bridges along the I-10 corridor within the Desert Tortoise Connectivity WHMA approved under the BLM's NECO Plan (BLM 2002). Though the project narrows the opportunities for desert tortoise connectivity along this highway barrier, the impact would be offset by land acquisitions designed to consolidate BLM management responsibility further west of the proposed project site between Cactus City and Desert Center, where we expect the higher elevation habitats in that area to support higher desert tortoise densities. However, the effectiveness of this compensation measure will depend on 1) additional future acquisitions across the extensive landownership checkerboard north and south of I-10; 2) the capability to remove impediments to desert tortoise occupancy/linkages within this larger area that may require the cooperation of other private/ public sector entities; and 3) the ability to maintain an effective linkage across the ROW of the proposed project and adjoining lands between Pinto Wash and the Eagle Mountains (see discussion in the "Effects of the Action" section).

The portion of the Chuckwalla CHU and DWMA where the Red Bluff Substation components and portions of the gen-tie line are sited contains several proposed, existing, or authorized transmission lines and associated access roads. Existing transmission lines include the DPV1 and Blythe Energy lines. The Service issued biological opinions exempting take of several species, including the desert tortoise, associated with the Blythe Energy line in 2005, the Desert Southwest line in 2006, and the DPV2 line in 2011. The Blythe Energy line was recently completed but construction on the Desert Southwest and DPV2 lines have not yet been initiated.

While issuance of biological opinions for the Blythe, Desert Southwest, and DPV2 transmission line projects allowed for additional take of desert tortoises and degradation of habitat in the project area, these biological opinions included avoidance, minimization, and compensation measures that were intended to ensure the environmental baseline of the species was maintained. However, effectiveness monitoring has not been conducted for any of these projects to determine the extent to which this intent has been realized. Only the DPV2 transmission line includes a monitoring requirement to address subsidies provided by the project for common raven or other avian predators. The numerous electrical towers and lines allowable with this utility corridor afford hunting perches and nesting substrate for several species of avian predators of desert tortoises (primarily raptors and common ravens), which have the potential to reduce desert tortoise population densities within hunting range of these structures. However, the contribution and impact of this mortality mechanism, along with that of highway-related impacts along I-10, to declines in desert tortoise densities or changes in population demographics remain unknown.

The Service issued a programmatic biological opinion evaluating the effects of BLM's CDCA Plan Amendment for the BLM's NECO Plan (BLM 2002) on desert tortoises in 2002 and as

amended in 2005 and 2007. The programmatic biological opinion exempted take for casual uses (e.g., recreation, mining, OHV use), livestock grazing, and burro removal that BLM authorizes through approval of the CDCA Plan. Projects outside of these activity categories require separate consultation. Ongoing land uses covered under these previously issued biological opinions have allowed for additional habitat degradation in the project area, primarily along the proposed gen-tie line, due to factors such as introduction and spread of nonnative plant species and predators associated with disturbed habitats.

The Service issued a biological opinion for effects to desert tortoises from minor construction activities within the BLM's California Desert District in 1997. For the purposes of the biological opinion, minor construction activities constitute land disturbance of less than 0.8 ha (2 ac) per activity, cannot exceed 4.1 ha (10 ac) of impacts to designated critical habitat in any one year, and cannot exceed 16.2 ha (40 ac) within the Eastern Colorado Recovery Unit over the life of the opinion. Once these thresholds have been met, the BLM must reinitiate consultation. A variety of activities were addressed under this biological opinion, including construction of communications facilities, location of temporary helicopter staging sites, construction of guzzlers or spring development for wildlife, or location of apiary sites. Disturbance from these actions and other minor construction activities could require cross-country travel by vehicles, construction of access roads or fencing, and staging areas for construction equipment. The biological opinion exempts take, in the form of direct mortality or injury, of up to 2 desert tortoises per year from construction activities, and take, in the form or harassment, of up to 10 desert tortoises per year for the purposes of moving individuals out of harm's way. Conservation measures are required as part of the proposed action to avoid, minimize, and offset adverse effects to the species.

The Service issued a biological opinion for the Eagle Mountain Landfill Project in 1992; however, litigation relative to an integral land exchange has continued to delay project implementation. The proposed action involves the conversion of an existing, inactive iron ore mine to a Class III, non-hazardous, solid waste landfill. The proposed Eagle Mountain Landfill project is located in the northwestern portion of the action area for the Sunlight and SCE project. The site consists of private [974.9 ha (2,409 ac)] and public [922.7 ha (2,280 ac)] lands north of I-10, adjacent to Joshua Tree National Park. The biological opinion exempted take, in the form of mortality or injury, for one desert pupfish (*Cyprinodon macularia*), a federally endangered species, due to direct and indirect effects of the action and one desert tortoise per year over the life of the project. In addition, take, in the form of harassment, of up to 160 desert tortoises was anticipated for the purposes of moving those individuals out of harm's way during project activities. Estimates of desert tortoise abundance were based on other project-specific surveys conducted in the vicinity of the proposed landfill site and may be high given the previously disturbed nature of the site. Consistent with other projects in the action area, measures to avoid, minimize, and offset adverse effects to the species were included and analyzed as part of the proposed landfill project. These measures included repair and maintenance of culverts under the Eagle Mountain railroad to maintain tortoise connectivity, and placement of ballast to provide escape ramps for tortoises caught between the rails. Neither of these measures have been accomplished to date and, as a result, blocked and hanging culverts and other mortality sinks

along the railroad within the habitat linkage at issue remain an obstacle to desert tortoise occupancy and movement and need to be rectified if habitat potential for natural population density and gene flow are to be realized and maintained.

In sum, the biological opinions listed above have authorized a relatively small amount of take within the large areas that they cover and implementation of conservation measures similar to those included as part of the proposed action analyzed herein minimize the impacts of the take. Because the action areas defined for these projects narrowly intersect that which is analyzed for the proposed project in this biological opinion, only a relatively small portion of the total take associated with these projects would coincide geographically with the proposed project. However, the collective effect of these various project approvals has 1) reduced the number of opportunities for desert tortoises to cross the I-10 corridor and maintain landscape-level population connectivity between the Mojave and Colorado portions of the species' range; and 2) likely reduced desert tortoise population densities in portions of the action area, which reduces the extent of population connectivity to an unknown degree. Consequently, we conclude that the environmental baseline against which the effects of the proposed project are analyzed include habitat areas have been degraded by existing land uses and will experience additional reductions once projects that have been approved are constructed.

**Habitat Characteristics of the Action Area**

The proposed Solar Farm site and portions of the gen-tie alignments are located on lands under a Moderate Multiple-use Class (MUC-M) designation (Appendix A in BLM 2002). Desert tortoise habitat in MUC-M were excluded from designated DWMAs based on the assumption that these areas generally supported low to medium tortoise densities, though survey data were unavailable for most areas. However, since the NECO Plan was approved, considerably more data have been obtained relative to desert tortoise population genetics, importance of habitat and genetic connectivity, species occurrence and densities within the Colorado Desert, and threats to the species throughout its range (Service 2008), including the extent of renewable energy development currently proposed in the plan area.

The Chuckwalla CHU and DWMA, which were designated primarily to facilitate desert tortoise conservation and management, are located immediately west of Kaiser Road; portions of both gen-tie alternatives intersect these lands. The entire SCE portion of the project is located within the Chuckwalla CHU and DWMA and Limited Multiple-Use Class (Appendix A in BLM 2002). This category includes lands within the Chuckwalla Valley south of I-10. The proposed SCE components are discussed in more detail in the "Desert Tortoise Critical Habitat" section below.

Sunlight conducted a series of surveys for special status species and vegetation communities to characterize project-specific conditions on the proposed Solar Farm and SCE components. The following information is summarized from the biological assessment (Ironwood Consulting 2010a), the Biological Resources Technical Report (Ironwood Consulting 2010b), and the DEIS for the project (BLM 2010).

Two vegetation communities are dominant within the action area of the proposed project: Sonoran creosote bush scrub [(Holland 1986); analogous to creosote bush-white bursage shrubland alliance (Sawyer *et al.* 2009)] and desert dry wash woodland [Holland 1986; analogous to blue palo verde-ironwood woodland (Sawyer *et al.* 2009)]. The majority of the action area is characterized by creosote bush scrub, which is comprised of creosote bush (*Larrea tridentata*), burro bush (*Ambrosia dumosa*), boxthorn (*Lycium* sp.), brittlebush (*Encelia farinosa*), indigo bush (*Psorothamnus* spp.), and cheesebush (*Hymenoclea salsola*). This community is relatively more structurally diverse within the stable, older alluvial fan systems located in the northwestern and southwestern portions of the solar farm site than in active alluvial fan systems located in the middle and southern extent of the Solar Farm site (Ironwood Consulting 2010a).

The desert dry wash woodland community consists of drought-deciduous, often leguminous, small-leaved (microphyllous) trees in association with sandy or gravelly washes with braided channels in active alluvial fans. The presence of water, at least seasonally, is vital for this community to persist. Dominant species associated with this community include ironwood (*Olneya tesota*), blue palo verde (*Cercidium floridum*), and smoke tree (*Psorothamnus spinosa*). The BLM and California Resources Agency consider this community type sensitive due its limited distribution, value to wildlife, and susceptibility to disturbance (BLM 2002, CDFG 2010). Dead ironwood trees were observed in the action area where previous disturbances, such as paved or dirt roads, have altered the natural surface flow regime (Ironwood Consulting 2010a).

The major alluvial systems associated with the Upper Chuckwalla Valley, Big Wash, and Dragon Wash support broad floodplains dominated by desert dry wash woodland (primarily *Olneya tesota*), which are crossed by the northern portions of gen-tie A-1. Pinto Wash supports dense, mature desert dry wash woodlands (primarily blue palo verde), which lies immediately adjacent to the Solar Farm's eastern boundary (Ironwood Consulting 2010a).

Soils in the action area primarily consist of older alluvium with moderate to strong desert pavement (i.e., geologic formations on desert bajadas that consist of a mosaic of fine silt, sand, or clay and angular, interlocking pebbles, gravel, and boulders dating to the Pleistocene Epoch) and undifferentiated younger alluvium with interspersed areas of weak desert pavement (Earth Systems Southwest 2010). Older alluvial fan deposits are relatively diverse in soil and vegetation structure and support elevated uplands with 7.6- to 15.2-cm (3- to 6-in) thick desert pavements. Drainages that occur within the older alluvial fans are relatively well-defined with well-formed banks up to several meters deep. Active younger sediments are of Holocene age and consist of fine to coarse sand, inter-bedded with clay, silt and gravel with no evidence of desert pavement. Topography in these areas tends to be uniform, with channel depths generally less than 0.30 m (1 ft).

Creosote bush scrub is the dominant plant community on the Red Bluff Substation site. Active alluvial fans and prominent washes supporting desert dry wash woodland occur in the eastern third of the site; several deeply incised large washes with desert dry wash woodland occur in the

western third of the site. Vegetation communities along the access road alternatives and distribution line are relatively disturbed as a result of historical land disturbance. Existing dirt roads, utility lines, and flood control dykes has substantially impacted the vegetation density and diversity. Ironwood trees within this region displayed signs of poor health where surface flow had been diverted as a result of these disturbances (Ironwood Consulting 2010a).

The proposed Desert Center Telecom Site would be constructed on 0.09 ha (0.22 ac) on BLM-managed lands adjacent to SR 177. Creosote bush scrub is the dominant plant community on this site; fallow agricultural lands occur on the northwest side of SR 177. The Chuckwalla Mountain Telecommunication Site is heavily disturbed and dominated by nonnative plant species, such as Russian thistle (*Salsola kali*). Ongoing activities associated with operations and vehicle use related to existing leases at this site prevent the reestablishment of native vegetation (Michael Brandman Associates 2009).

Project-specific surveys documented a number of nonnative plant species within the action area (Ironwood Consulting 2010d). Sahara mustard (*Brassica tournefortii*) and Mediterranean grass (*Schismus barbatus*) were recorded on all project components and adjacent areas. Red brome (*Bromus madritensis*) and foxtail barley (*Hordeum murinum*) were recorded only on the SCE access road or at the telecommunications site. Other species with variable distributions on project components include Bermuda grass (*Cynodon dactylon*), Cape marigold (*Dimorphoteca sinuata*), prickly lettuce (*Lactuca serriola*), Russian thistle, Mediterranean grass (*S. arabicus*), athel (*Tamarix aphylla*), and six weeks fescue (*Vulpia bromoides*). Because of past and current land uses, these species likely occur throughout the remainder of the action area and the region.

Habitat characteristics of the sites proposed to support the implementation of the desert tortoise translocation plan (i.e., Chuckwalla, DuPont, and Red Bluff Recipient Sites; and Sunlight and Red Cloud Control Sites) are very similar to those described above for the proposed Solar Farm and Red Bluff Substation sites. Excepting the Sunlight Control Site, all sites occur in the Chuckwalla CHU and DWMA and are discussed in more detail in the "Desert Tortoise Critical Habitat" section below. In general, the Chuckwalla and Red Bluff Recipient Sites are characterized by creosote bush scrub and large areas of desert dry wash woodland. Similarly, the DuPont Recipient Site and Red Cloud Control Site are comprised of creosote bush scrub and desert dry wash woodlands, but these sites seem to support more friable soils and higher densities and diversity of plant species. The Sunlight Control Site is located near the northern boundary of the proposed Solar Farm site; the habitats in this area are contiguous with those observed on the project site. Desert pavements and channelized drainages with soft banks occur throughout this control site.

While largely undeveloped, the action area supports various uses (BLM 2010). Development in the surrounding area includes the rural community of Desert Center, Lake Tamarisk, and the inactive Eagle Mountain Mine. Agricultural areas, both active and inactive, are located to the southeast of the Solar Farm site. Several easements and ROWs related to utility corridors, transmission lines, telephone lines, pipelines, railroads, roads, water transmission facilities (i.e., Colorado River Aqueduct and 12 water wells and associated pipelines), and mining claims exist

in the action area and habitat linkage area noted elsewhere herein. The project area overlaps three existing major transmission lines and two designated 3.2-km (2-mi) wide utility corridors. Eagle Mountain Road, Kaiser Road, SR 177, and I-10 are the major paved roads within the action area and several unpaved roads and designated OHV routes occur here as well. Joshua Tree National Park, which is largely designated as wilderness, surrounds the majority of the proposed Solar Farm site to the west, north, and east. At its closest point, the proposed Solar Farm site is approximately 2.3 km (1.4 mi) from the national park boundary. The BLM administers the majority of the lands in the actions area; the proposed Solar Farm and Red Bluff Substation are sited completely on BLM-managed lands, and approximately 1 km (0.6 mi) of gen-tie A-1 and 8.2 km (5.1 mi) of gen-tie A-2 cross private lands or lands managed by MWD.

Overall, occupied and suitable habitats throughout the action area remain relatively intact as evidenced by the presence of desert tortoises observed during project-specific surveys. However, given the anthropogenic features described above, the variable nature of predicted desert tortoise habitats within the action area because of elevation, topographic, and/or land use constraints, and the susceptibility of these lands to invasion by nonnative species after ground disturbance, maintaining the functional linkages between areas of occupied and suitable habitats is paramount to the long-term survival and recovery of the desert tortoise.

**Status of the Species/Critical Habitat in the Action Area**

The action area is in the Eastern Colorado Desert Recovery Unit (Service 1994a) and within the BLM's NECO Plan area (BLM 2002). The action area lies adjacent to two BLM-designated Wildlife Habitat Management Areas (WHMAs): Palen-Ford WHMA and the Desert Tortoise Connectivity WHMA. Management emphasis for the Palen-Ford WHMA is on the management of the dunes and playas within the Palen-Ford dune system, which is adjacent to the southeastern portion of the proposed Solar Farm ROW and Pinto Wash. Management emphasis for the Connectivity WHMA is on providing habitat connectivity for desert tortoises and other wildlife species between conservation areas north and south of I-10 (i.e., Chuckwalla CHU and DWMA, Chuckwalla Mountains Wilderness, and Chemehuevi CHU and DWMA). The Red Bluff Substation is located south of the Desert Tortoise Connectivity WHMA adjacent to I-10. Joshua Tree National Park surrounds three sides of the proposed project ROW and several other conservation units are located within or adjacent to the action area, in addition to the Alligator Rock, Desert Lily Preserve, and Palen Dry Lake ACECs, and the Palen-McCoy Wilderness.

Prior to surveys conducted in support of the proposed action, few surveys had been done in the northern part of the Chuckwalla Valley or outside of the Chuckwalla CHU and DWMA and little biological data were available. Range-wide surveys for desert tortoise provide limited information at the recovery unit level, but no site-specific information was available with the exception of the limited portion of the action area south of I-10.

Between 2008 and 2010, several focused wildlife and botanical surveys were conducted throughout the project study area, which included areas of potential impact associated with the proposed Solar Farm, gen-tie line alternatives, Red Bluff Substation, and all alternatives (Table

4) (Ironwood Consulting 2010b); however, no desert tortoise surveys were conducted for the Chuckwalla Communications Site or access road. The study area encompassed all lands subject to disturbance from the proposed project; desert tortoise surveys were conducted as follows:

**Table 4. Desert tortoise survey acreage[4]**

| **Sunlight Component** | **Desert Tortoise Survey Area** |
|---|---|
| Solar Farm Site | 5,062.62 ha (12,510 ac) |
| Gen-tie[5] A-1 and A-2 | 1,110.86 ha (2,745 ac) |
| **SCE Component** | |
| Red Bluff Substation | 613.91 ha (1,517 ac) |
| Distribution line | 93.08 ha (230 ac) |
| Access roads | 55.85 ha (138 ac) |
| Telecommunications site | 16.59 ha (41 ac) |
| **Total** | **6,952.90 ha (17,181 ac)** |

Focused desert tortoise surveys were conducted in 2008 according to the Service's pre-project survey protocol (Service 1992). In spring 2009, the Service issued revised pre-project survey protocols (Service 2010b); however, the method for 100 percent coverage surveys was essentially unchanged from the 1992 protocol, with the exception of the definition of the "action area", which was incorporated into the survey design for subsequent efforts. The updated protocol categorizes individuals greater than 160 mm (6.3 in) as adult desert tortoises; individuals in smaller size classes are extremely difficult to detect. In addition, pursuant to the 1992 protocol, zone of influence transects were conducted at 100, 300, 600, 1200, and 2400-ft intervals from and parallel to the study area. The applicants conducted surveys of the project components during five survey periods; each component was surveyed once over the 3-year period on March 18 and April 5, 2008; October 1 and 12, 2008; October 26 and 31, 2009; March 15 to April 17, 2010, and July 7 to 12, 2010 (Ironwood Consulting 2010b).

The USGS developed a quantitative habitat model for the range of the Mojave population of desert tortoise, which includes portions of the Colorado Desert in California (Nussear *et al.* 2009). The model provides a measure of the statistical probability of desert tortoise occurrence and a geospatial depiction of known and potential desert tortoise habitat. To date, the USGS model is viewed as the best available data for predicting desert tortoise occurrence on a landscape scale; however, it does not account for site-specific and anthropogenic conditions across the landscape that affect habitat potential at a local scale. In addition, monitoring efforts and collection of presence data have focused mainly within CHUs, DWMAs, and other lands allocated for conservation. Within the project study area, the distribution of desert tortoise sign observed during the focused surveys corresponded to some degree with the USGS model output as noted below (Ironwood Consulting 2010b).

Desert tortoise sign (e.g., live tortoises, burrows, pallets, scat, courtship rings, carcasses) was recorded for the survey areas, but was not uniformly distributed, which is to be expected based

[4] Zone-of-influence transects not included in total.
[5] Includes 121.9 m (400 ft) wide corridor and some overlap between alternatives.

on the patchy distribution of desert tortoises over large areas. Observations and abundance estimates are summarized below for each component (Table 5). Data for the Solar Farm site suggest that, at least in recent history, desert tortoises have occupied the same portions of the site over time; this inference is based on the presence and distribution of tortoise carcasses, which can persist in the environment for a number of years (Service 2010b). The number of active burrows and live tortoises observed during surveys was totaled for each project component and the number of desert tortoises was estimated according to the Service's revised pre-project survey protocol (Ironwood Consulting 2010a, b). However, density and abundance estimates could not be calculated according to the Service's protocol for the linear project components. But because desert tortoises are known to occur in the surrounding area, an attempt was made to estimate the number that may be moved out of harm's way or translocated during the construction of these project components based on incidental observations that do not correspond to the project-specific surveys for the species (K. Simon, Ironwood Consulting, pers. comm. 2010) (Table 5).

**Table 5. Detected desert tortoise sign and estimated number of individuals**

| **Project Component** | **Active** | | | | **Inactive** | | | **Est. No. Live Tortoises** | **95 Percent Confidence Interval Range** |
|---|---|---|---|---|---|---|---|---|---|
| | Tortoises | Active Burrows | Tracks | Scat (recent) | Scat (old) | Carcasses | Older Burrows | | |
| Solar Farm | 4 | 14 | 93 | 17 | 21 | 7 | 26 | 8 | 2-31 |
| Gen-tie A-1[1] | 4 | 4 | 0 | 0 | 0 | 0 | 0 | 16[2] | NA |
| Gen-tie A-2[1] | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 4[2] | NA |
| Substation and other components | 0 | 3 | 2 | 1 | 2 | 4 | 4 | 4 | NA |
| Desert Center Telecom Site | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | NA |
| Chuckwalla Telecom Site and access road | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 29[3] | NA |

[1]Results are for the surveys within the study area, not the disturbance area for each component (see Table 4). Two active burrows were observed within the area of overlap for both gen-tie lines and the substation.
[2]Estimates are based on doubling the number of live tortoises and active burrows observed within the study area of these components. These individuals would be moved out of harm's way during construction and O&M activities.
[3]Estimates are for buffer area around Red Cloud Road based on density data for the Chuckwalla CHU and DWMA. No live desert tortoises are expected to occur at the communications site.

As noted in Table 5, estimates for the gen-tie alternatives were derived by doubling the number of live desert tortoises and active burrows observed within the study area of these components. While this method does not result in statistically meaningful estimates, it provides a basis for our analysis. In addition, as discussed below, the estimate for the access road to the Chuckwalla Mountain Telecom Site, which was derived using the density estimates for the Chuckwalla CHU for an area that included a 500 m (1,640 ft) buffer on either side of centerline of the road, is likely imprecise. Therefore, for these linear project components (i.e., gen-tie line alternatives

and access roads), we cannot accurately estimate the number of desert tortoises that may occur along these features and may need to be moved out of harm's way during project activities.

Desert tortoise sign was more abundant in older, inactive portions of the upper bajada/alluvial fan systems where drainages were well-defined and vegetation was qualitatively more diverse than younger alluvial fan systems. These occupied areas typically supported well-developed desert pavement within the upland mounds between slopes adjacent to ephemeral washes. The abundance of desert tortoise sign was much reduced in lower elevation bajada/alluvial fan systems with active alluvial and sandy deposits on the eastern portions of survey area, which were characteristic of most of the Solar Farm site (Figure 16 in Ironwood Consulting 2010b).

Three concentrations of desert tortoise sign were evident within the project study area for the Solar Farm site (Ironwood Consulting 2010b). The northernmost concentration was located approximately 2.4 km (1.5 mi) northwest of the proposed Solar Farm site. Two live desert tortoises and 18 active burrows with indication of recent use were observed. This area corresponds relatively well with the USGS habitat model as moderate to high predicted habitat and lies just north of Phase III. The second and largest desert tortoise concentration was located immediately north of the MWD transmission line, east of Kaiser Road, and overlaps with the northeastern reaches of Phase III of the proposed Solar Farm site. This concentration consisted of 35 live tortoises and 60 burrows with indication of recent use; signs of mating were also observed in this area. Four live desert tortoises were documented within the project boundary. According to the USGS model, this area is expected to be of moderate to low predicted habitat. While these two concentrations were addressed separately in the biological assessment, desert tortoises in this area likely occur in overlapping home ranges. The third concentration was located immediately east of Kaiser Road, in the southwestern extent of the Solar Farm site. This concentration consisted of two live desert tortoises and six burrows with indication of recent use. This area corresponds to low predicted habitat according to the USGS habitat model and Phase I of the proposed Solar Farm component. One active burrow, three inactive burrows, and a carcass were documented on eastern portion of the Solar Farm site and two inactive burrows were recorded during zone of influence surveys near the Pinto Wash (Ironwood Consulting 2010b). These areas correspond to low predicted habitat according to the USGS habitat model (Figure 16 in Ironwood Consulting 2010b).

Pre-project surveys represent single points in time; desert tortoises that occur on site may have remained undetected, and individuals may have moved onto the site from surrounding areas after surveys were conducted, especially from the higher density habitats north of the project area. As a result, we anticipate that more desert tortoises may occur within the project sites and that the actual number of desert tortoises present is expected to fall within the range calculated based on the 95 percent confidence interval. Therefore, consistent with the most recent pre-project survey protocol (Service 2010b), based on the number of live subadult and adult desert tortoises observed during pre-project surveys (i.e., 4) and the estimated number of desert tortoises anticipated to occur on site (i.e., 8), the range of the 95 percent confidence interval around that estimate is 2 to 31 (Table 5). We acknowledge that the estimate of up to 31 subadult and adult tortoises within the Solar Farm site may be an overestimate; however, we determined that

applying this estimate based on the 95 percent confidence interval would provide a biologically conservative approach using the best available data to establish a baseline for analyzing the potential impacts of the proposed project.

In addition to subadult and adult desert tortoises, the project area is likely to support juvenile desert tortoises [i.e., less than 160 mm (6.3 in)] and eggs. Estimating densities of juvenile desert tortoises is difficult because of low detection probabilities due to their small size and cryptic nature. However, based on a 4-year study of their population ecology, Turner *et al.* (1987) determined that juveniles accounted for 19 to 81 percent of the overall population. Using this range and the estimated maximum of 31 subadult and adult tortoises within the Solar Farm site, we estimate that the project footprint may support 6 to 25 juveniles. We recognize that the survey data used for this estimate come from a limited number of studies and that population levels are constantly changing. We also recognize that since our estimate of the number of subadult and adult tortoises in the project area may be an overestimate (as discussed above), the estimate of the number of juveniles may be an overestimate as well, but provides the best available data to establish a baseline for analysis.

In addition, we expect the project area to support desert tortoise eggs. Estimating the number of tortoise eggs is extremely difficult given that the eggs are buried beneath the soil surface. To estimate the number of eggs that could be present on site, we used the mean clutch size of 5.38 eggs per clutch (Turner *et al.* 1986 in Service 1994a) and a mean number of clutches of 1.6 per female per year (Turner *et al.* 1984). Assuming a 1:1 sex ratio (Turner *et al.* 1984; Turner *et al.* 1987), 15 of the estimated 31 desert tortoises within the Solar Farm site may be reproductive females that together could produce approximately 129 eggs per year. Applying these assumptions [i.e., the sex ratio, mean clutch size, and mean number of clutches per female per year are comparable to those observed by Turner *et al.* (1984)] to estimate the number of eggs on the proposed project site has an unknown but high level of uncertainty. Therefore, while we cannot calculate a precise estimate for the number of eggs that may be impacted by the proposed project, we use this estimate, which constitutes the best available information, for the analysis contained in this biological opinion.

Understanding desert tortoise densities and abundance relative to the proposed project is integral to the effects analysis, and it is equally as important to consider the linkages between desert tortoise populations at the landscape-level and throughout the species' range and the potential impacts to these linkages from the project and other land uses. The USGS model depicts higher predicted desert tortoise habitats in the western portion of the action area, which generally correspond with higher elevations along the upper bajadas. Therefore, these areas become more important for conservation relative to population and genetic connectivity between the Chuckwalla CHU and DWMA, Joshua Tree National Park/Pinto Mountains CHU and DWMA to the north, and the Chemehuevi CHU and DWMA to the northeast (Connectivity Figure 1).

This putative habitat linkage along the western edge of the action area is encumbered by numerous obstacles to potential gene flow, including the Colorado River Aqueduct, the non-operational Kaiser Railroad, Eagle Mountain Road, Kaiser Road, numerous utility lines and

access roads, flood control levees, and mining spoil piles (Connectivity Figure 2). Though the individual and collective effects of these obstacles to desert tortoise occupancy have not been studied, they likely result in unquantified levels of mortality to the resident population, and depress population densities to levels below the natural carrying capacity. However, despite these linkage constraints, moderate to high densities of desert tortoises were observed on and around Phase III of the proposed project (see discussion of survey results above). This suggests that the local population is persisting and some level of occupancy and gene flow continues within the action area.

As discussed above in the "Status of the Species" section, it is essential that habitat linkages between and among desert tortoise populations are conserved, particularly in this portion of the species' range, given that there are limited suitable contiguous habitats and several significant barriers to movement. Based on recent genetics studies (Hagerty *et al*. 2010) and the USGS habitat model (Nussear *et al*. 2009), desert tortoise populations within conservation areas (e.g., DWMAs) in the Mojave and Colorado portions of the range may only be connected by few tenuous linkages supporting suitable habitat. These include a narrow corridor along Cottonwood Wash at the southern entrance to Joshua Tree National Park (with resident desert tortoises occupying areas along narrow sections of the canyon) and through the Pinto Wash between the Eagle and Coxcomb mountains (see "Effects of Impacts to Habitat and Population Connectivity" section below for details on the viability of these linkages).

Farther east, the habitat is generally lower in elevation with hotter, drier climes, and substrates are dominated by less friable soils associated with the Palen-Ford Dry Lake sand transport system that dominates the I-10 corridor east of Desert Center. Patches of habitat in these harsh environments likely support low densities of desert tortoises, and connections between suitable habitats become increasingly rare across the landscape. In these low density areas, home ranges can become distant from one another, and reproduction rates decline as the probability of individuals of reproductive age encountering one another is diminished. This phenomenon, known as the Allee effect (Allee 1931, Stephens *et al*. 1999, Dennis 2002), poses a natural obstruction to gene flow between breeding populations, which appears to be the case across the eastern portion of the proposed project site and beyond the eastern ROW boundary, which is mostly modeled as low predicted habitat by USGS (Nussear *et* al. 2009). In addition, the draft Solar PEIS proposes over 81,000 ha (200,000 ac) along the I-10 corridor surrounding and east of the proposed project as a solar energy zone that would be designated to facilitate utility-scale solar energy development on BLM-managed lands (BLM and DOE 2010). This designation would commit these lands to a single industrial use and conflict with any attempts to maintain desert tortoise connectivity across these hot, dry lowlands.

Despite the patchy distribution of desert tortoise sign within the project study areas and areas of low predicted habitat, any portion of the proposed project ROW may be important for connectivity between and dispersal from surrounding habitats. Desert tortoises are known to use lower-quality intermountain habitat, such as on eastern parts of the proposed Solar Farm site, as dispersal routes, providing passage between high-quality habitat areas in the surrounding areas (Averill-Murray and Averill-Murray 2005). Historically, tortoise populations in the Sonoran

Desert have exchanged individuals at a rate of one migrant per generation (Averill-Murray and Averill-Murray 2005).

**Desert Tortoise Critical Habitat**

***Sunlight Gen-tie***

Gen-tie alternative A-1 and associated access road for the proposed project would affect approximately 10.9 ha (27 ac) of the Chuckwalla CHU and 12.1 ha (30 ac) of the Chuckwalla DWMA immediately adjacent to Kaiser Road. The southern portion of gen-tie alternative A-2 would affect approximately 2.8 ha (7 ac) of the Chuckwalla CHU. Surveys did not document any desert tortoise sign or live animals within the survey area for either gen-tie alternative; however, three live desert tortoises were observed in close proximity to the A-1 alignment, which indicates that individuals would likely have to be moved out of harm's way.

***SCE Components***

The proposed Red Bluff Substation site and associated access roads would be within and affect 70 ha (172 ac) of the Chuckwalla CHU. As noted above, surveys detected desert tortoise sign, but no live desert tortoises within the substation disturbance area. Despite the lack of live desert tortoise observations, a conservative estimate of up to four subadults and adults may be present on site (Table 5) (Ironwood Consulting 2010a). Despite its location within designated critical habitat, because of the disturbed nature of the site, the Chuckwalla Mountain Communication Site is not expected to support any desert tortoises. The proposed Solar Farm site would not directly affect designated critical habitat (Ironwood Consulting 2010a, b).

Because of the existing development and disturbed nature of the Chuckwalla Mountain Communications Site, no desert tortoises are expected to occur within the fenced portion of this facility (Ironwood Consulting 2010b). Estimates related to the access road for the site are based on 2010 line-distance sampling data collected as part of the Service's long-term monitoring program [3.7 tortoises/km$^2$ (9.6 tortoises/mi$^2$)] (Service 2010e) and the area encompassed within 500 m (1,640.4 ft) of the road. Twenty-nine desert tortoises may occur within the 8 km$^2$ (3.1 mi$^2$) study area for the access road; however, not all of these individuals are likely to be affected by project activities. Any animals encountered during construction and O&M activities along the access road would be moved out of harm's way.

The critical habitat that would be affected by the proposed project is relatively undisturbed, but lies between the I-10 and existing transmission lines and access roads. No additional impacts to the Chuckwalla CHU are expected due to construction and O&M of the Chuckwalla Mountain Communications Site. This area of critical habitat would also be affected by anticipated construction of other approved transmission lines and the associated O&M activities along those lines, which are unassociated with the proposed project.

Desert tortoise critical habitat includes the following six PCEs (Service 1994b):

1. Sufficient space to support-viable-populations within each of the six recovery units to provide for movement, dispersal, and gene flow;

2. Sufficient quantity and quality of forage species and the proper soil conditions to provide for the growth of such species;

3. Suitable substrates for burrowing, nesting, and overwintering;

4. Burrows, caliche caves, and other shelter sites;

5. Sufficient vegetation for shelter from temperature extremes and predators; and

6. Habitat protected from disturbance and human-caused mortality.

Based on the Red Bluff Substation site characteristics relative to the six PCEs, we determined that the critical habitat area overlapping the site provides PCE 1 through PCE 5, though areas close to high-traffic roads can have depressed population densities. Despite the relatively small disturbance area [i.e., 30.7 ha (76 ac)] and its proximity to I-10, the critical habitat area overlapping the project site is contiguous with largely undisturbed habitat and supports intact creosote bush scrub with active alluvial fans and prominent washes supporting desert dry wash woodland. These vegetation types provide forage and shelter sites for desert tortoises. The presence of desert tortoise sign, including carcasses observed within and adjacent to the project site, provides further evidence that the area contains the PCEs necessary for foraging and burrowing to support desert tortoise occupancy.

Though I-10 has disrupted the hydrology and associated dry wash woodland components of the lesser washes, the shrub and herbaceous annual vegetative components between the washes apparently remain unaffected by altered hydrology and support comparable community characteristics with areas on either side of I-10. Since desert tortoises forage predominantly on annual plants, the hydrologic effects on the tree canopy do not affect foraging habitat characteristics. Therefore, while the habitat in this area may be considered marginal for some PCEs, the area is occupied (based on the presence of sign) and provides suitable physical and biological characteristics associated with the five PCEs as discussed above. These PCEs operate together in supporting occupancy of suitable habitat by tortoises, and associated dispersal and gene flow, the primary role and function of critical habitat on the proposed project site from a regional perspective.

***Proposed Recipient (Translocation) Sites***

As detailed in the Service's most recent translocation guidance (Service 2010a), recipient sites must be sufficiently large to accommodate and maintain resident (if present) and translocated

desert tortoises; the maximum allowable final density at recipient sites after translocation (includes residents and translocated tortoises) must not exceed 130 percent of the mean density detected in the nearest recovery unit [5.0 tortoises/km$^2$ (13 tortoises/mi$^2$) in the Eastern Colorado Recovery Unit (Service 2009b)]; and the recipient site should exhibit disease prevalence of less than 5 percent with 95 percent confidence. Because of the potential number of desert tortoises that may require translocation and other concerns related to disease and carrying capacity, the Service recommends that at least two recipient sites be identified and analyzed (Service 2010a).

The recipient sites encompass the locations where desert tortoises translocated from the Solar Farm site, the perimeter fence alignment, and Red Bluff Substation would be released (referred to as "release points") and the area to which translocated desert tortoises may disperse after translocation. The recipient sites also represent the areas in which health assessments would be conducted on resident tortoises to ensure that translocated tortoises are not released within 1.5 km (0.9 mi) of a documented seropositive or clinically ill (i.e., diseased) resident tortoise (Service 2010a). For the purposes of this analysis, the proposed recipient sites are equal or greater in size than the project area; the actual size would be depend on the number of tortoises translocated, the locations of the release points, and the presence and location of any diseased resident tortoises.

The need to include a 6.5 km (4 mi) dispersal distance around the recipient sites would not be determined until resident densities are verified and disease screening results are evaluated (see "Effects of the Action" section for a discussion on post-translocation dispersal). However, due to land management constraints within 6.5 km (4 mi) of the Chuckwalla Recipient Site, this site cannot be expanded if density or disease thresholds are reached.

*Chuckwalla Recipient Site*

As described in the draft *Desert Tortoise Translocation Plan for the Desert Sunlight Solar Farm Project* (Ironwood Consulting and Woodard 2010), two translocation sites for the proposed Solar Farm component have been evaluated: the Chuckwalla Recipient Site and DuPont Recipient Site. The preferred translocation site for the proposed Solar Farm component is the Chuckwalla Recipient Site, located on 1,747 ha (4,317 ac) within the Chuckwalla CHU and DWMA west of Kaiser Road and north of I-10. This translocation site is within 2.5 km (1.6 mi) of the Solar Farm site and is divided into northern and southern sections. Use of the Chuckwalla Recipient Site, however, is contingent upon the following conditions being met:

1. Reasonable certainty that the transmission line alignment for the proposed Eagle Mountain Pumped Storage Project would not follow Eagle Mountain Road through the Chuckwalla DWMA, but would instead be co-located with the gen-tie A-1 or A-2 alignment identified for the proposed Sunlight project. This design would avoid impacts from redundant transmission corridors within the Chuckwalla CHU and DWMA.

2. Permanent desert tortoise fencing is constructed along Kaiser Road to I-10 (or to a mutually agreed upon point based on land ownership or habitat suitability). Permanent desert tortoise

fencing is constructed along I-10 approximately 30.4 km (18.9 mi) east and west of the recipient site.

3. Raven and raptor deterrents are built into the project design for the transmission components, and appropriate monitoring and adaptive management are implemented subsequent to project construction for the life of the permit (see Ironwood Consulting 2010c).

The Chuckwalla Recipient Site is bound by Kaiser and Eagle Mountain roads, which would provide paved access for translocation and subsequent monitoring. Neither of these roads is considered significant barriers to movement; however, more significant barriers to movement near the site include I-10, which is approximately 3.2 km (2 mi) to the south of the translocation site, SR 177 to the east of the project site, portions of the MWD aqueduct that are above ground, and steep rocky terrain along the boundaries of Joshua Tree National Park. These features (with the exception of I-10) are not expected to impede the movement of translocated tortoises. The USGS habitat model depicts areas of higher predicted habitat that extend from south of I-10 into Joshua Tree National Park and the Pinto Basin; the Chuckwalla Recipient Site is within this potential habitat linkage and the site supports resident desert tortoises (Ironwood Consulting and Woodard 2010).

No existing designated ROWs, proposed ROWs, and other encumbrances are located within the Chuckwalla Recipient Site. However, a small transmission line parallels Eagle Mountain Road and the MWD emergency spillway for the aqueduct is located to the north of the translocation site (Ironwood Consulting and Woodard 2010).

Pre-project surveys were conducted between September 20, and October 6, 2010 in accordance with the current Service protocols (Service 2010b) to estimate desert tortoise densities within the Chuckwalla Recipient Site. The estimated density within the 1,747 ha (4,317 ac) translocation site is 2.8 tortoises/km$^2$ (7.4 tortoises/mi$^2$) based on 25 live tortoises observed during surveys. Visual assessments were performed on all live desert tortoises for signs of upper respiratory tract disease; no individuals exhibited obvious clinical signs of the disease (Ironwood Consulting and Woodard 2010). Also species known to be predators of desert tortoises (e.g., coyotes, kit foxes, ravens) were documented during pre-project surveys of the site (Ironwood Consulting 2010a).

Using the formula in Service 2010b, we estimate there are 49 subadult and adult desert tortoises within the Chuckwalla Recipient Site. To estimate the number of juveniles and eggs on site, we used the method described above and calculated that there may be between 9 and 40 juveniles and reproductive females may produce approximately 211 eggs per year.

Based on the site characteristics of the Chuckwalla Recipient Site relative to the six PCEs, we determined that the critical habitat area overlapping the site provides, to some extent, for all PCEs. Despite the existing disturbance within this portion of the CHU, the critical habitat area overlapping the recipient site is contiguous with largely undisturbed, occupied desert tortoise habitats. However, the proposed Solar Farm and gen-tie A-1 along with other proposed solar energy projects would eliminate much of the existing habitats to the east of Kaiser Road.

Despite some of the existing and future constraints that may render some PCEs less optimal, the area is occupied (based on the pre-project surveys) and provides suitable physical and biological characteristics associated with the PCEs as discussed above. These PCEs operate together in supporting occupancy of suitable habitat by desert tortoises, and associated dispersal and gene flow, the primary role and function of this portion of critical habitat from a regional perspective.

*DuPont Recipient Site*

The DuPont Recipient Site is the alternative recipient site for desert tortoises that require translocation from the proposed Solar Farm site (Ironwood Consulting and Woodard 2010). This site is located approximately 24 km (15 mi) southeast of the proposed Solar Farm site on 3,019 ha (7,460 ac) of contiguous public lands within the Chuckwalla CHU and DWMA immediately east of the Chuckwalla Wilderness Area. Access to the site to conduct translocation and subsequent monitoring would be via existing unpaved routes that are in moderate to poor condition. Significant barriers to desert tortoise movement include I-10, which is approximately 5.0 km (3.1 mi) to the north and the Chuckwalla Mountains to the west.
No designated ROWs or other encumbrances would conflict with the use of this site for translocation (Ironwood Consulting and Woodard 2010). One 259 ha (640 ac) inholding within the DuPont Recipient Site is owned and managed by the State of California. No individuals would be translocated to this parcel, although it would remain part of the translocation site.

In September 2010, random transects were walked throughout the site to assess general habitat characteristics and habitat suitability for desert tortoises (Ironwood Consulting and Woodard 2010). These surveys covered approximately 32.2 linear km (20 linear mi) and recorded no active sign of desert tortoises, nor any older sign (i.e., unused burrows, old scats, or carcasses). While protocol-level surveys have not yet been conducted, based on the USGS habitat model that identifies this area as moderate to high predicted habitat and the suitable habitat characteristics observed during the initial site assessment, the site is expected to support a resident population of desert tortoises.

If use of the Chuckwalla Recipient Site is determined to be unfeasible, protocol-level surveys would be completed and disease status of the resident population would be determined at the DuPont Recipient Site prior to translocation. However, to estimate desert tortoise abundance at this site for the purposes of this biological opinion, we used the density estimate calculated for the Chuckwalla CHU and DWMA based on 2010 line-distance sampling data collected as part of the Service's long-term monitoring program (Service 2010e). Based on the density estimate of 3.7 tortoises/km$^2$ (9.6 tortoises/mi$^2$), approximately 111 subadult and adult resident desert tortoises may be present at the DuPont Recipient Site. Using the method described above to estimate juveniles and eggs, between 21 and 90 juveniles may be on site while the reproductive females may produce approximately 477 eggs per year. With the potential dispersal area, an additional 29,088.8 ha (71,880 ac) would be included as part of the recipient site. Using the density estimate above, the resident population may be comprised of as many as 1,076 subadult and adult and 204 to 872 juvenile desert tortoises; reproductive females may produce about 4,631 eggs per year.

If neither the Chuckwalla nor the DuPont Recipient Sites may be used for translocation purposes due to density thresholds or disease prevalence that exceeds 5 percent, the applicants would identify another recipient site and contact the Service, BLM, and CDFG for approval prior to its use. If the identification and analysis of an alternative recipient site becomes necessary, the BLM would contact the Service prior to implementation of any translocation activities to determine the need to reinitiate consultation.

Based on the site characteristics DuPont Recipient Site relative to the six PCEs, we determined that the critical habitat area overlapping the site provides for all PCEs. The critical habitat area overlapping the recipient site is contiguous with largely undisturbed habitat and supports intact creosote bush scrub with active alluvial fans and prominent washes supporting desert dry wash woodlands. These vegetation types provide forage and shelter sites for desert tortoises, although none were observed during cursory surveys of the site. Because the USGS habitat model identifies this area as moderate to high predicted desert tortoise habitat (Nussear *et al*. 2009) and the site and surrounding area are relatively undisturbed, this area is expected to provide suitable physical and biological characteristics associated with the PCEs as discussed above. These PCEs operate together in supporting occupancy of suitable habitat by desert tortoises, and associated dispersal and gene flow from a regional perspective.

*Red Bluff Recipient Site*

The Red Bluff Recipient Site would be used for translocation if any desert tortoises are located on the proposed substation site. This recipient site is located approximately 0.6 km (0.4 mi) south of the substation on 119.4 ha (295 ac) of contiguous public lands within the Chuckwalla CHU and DWMA. Access to the site to conduct translocation and subsequent monitoring would be via the primary access route for the substation. Significant barriers to movement include I-10 [1.3 km (0.8 mi)] to the north and the Chuckwalla Mountains to the south. Because of the proximity to I-10, if this site is used for translocation, desert tortoise exclusion fencing would be installed along 18.4 km (11.4 mi) on the south side of the highway (Ironwood Consulting and Woodard 2010).

Several existing telephone, electrical transmission, and high-power gas lines and associated access roads are located adjacent to the Red Bluff Recipient Site. The site would be buffered by 100 m (325 ft) on either side of each existing line or road to minimize any indirect effects to the translocation site from these features. However, the corridor for the approved DPV2 transmission line is immediately adjacent to the northern boundary of the recipient site; therefore, translocation would be focused in the southern portion of this site in an attempt to avoid and minimize conflicts with the future transmission line and increased risk of predation (Ironwood Consulting and Woodard 2010).

Pre-project surveys were conducted for the separate Red Bluff Recipient Site in 2009 and 2010 in accordance with the current Service protocols (Service 2010b). No live desert tortoises or active sign were observed during the surveys; two carcasses were recorded on site (K. Simon, Ironwood Consulting, pers. comm. 2010).

Based on the site characteristics Red Bluff Recipient Site relative to the six PCEs, we determined that the critical habitat area overlapping the site provides, to some extent, PCE 1 through PCE 5, though areas close to high-traffic roads, such as I-10, may support depressed population densities. While barriers to movement do exist around this relatively small site as discussed above, the presence of sign, including a lack of carcasses, provides evidence that the area contains the PCEs necessary for foraging and burrowing to support desert tortoise occupancy.

As with the Red Bluff Substation site, the I-10 and other linear components on the north side of the site have disrupted the hydrology and associated dry wash woodland components in some areas; however, the vegetative components between the washes remain comparable to less disturbed areas on either side of I-10. Therefore, while the habitat may be considered marginal for some PCEs, the area is likely occupied by desert tortoises (based on the presence of sign) and provides suitable physical and biological characteristics associated with the five PCEs as discussed above. These PCEs operate together in supporting occupancy of suitable habitat by desert tortoises, and associated dispersal and gene flow from a regional perspective.

***Proposed Control Sites***

To provide “control” baseline data from which to compare the effectiveness of translocation as a project impact minimization measure, the same number of desert tortoises translocated from the project area would also be monitored at a control site if five or more individuals would be translocated from the proposed project sites. As detailed in the Service’s translocation guidance, control sites should be similar in habitat type/quality and desert tortoise population size/structure as the recipient site and isolated from or a minimum distance of 10 km (6 mi) from the recipient site to preclude interaction between the resident and translocated desert tortoises and individuals used as controls. In addition, control sites should not support any translocated desert tortoises and would be used to monitor resident tortoises only; no tortoises from the project areas would be translocated to the control sites (Service 2010a).

Two control sites for the Solar Farm component have been proposed and one would be selected prior to implementation of any translocation activities. No control site is required for the SCE components because fewer than five desert tortoises are expected to be translocated from the Red Bluff Substation project area (Ironwood Consulting and Woodard 2010).

*Red Cloud Control Site*

If the constraints described below prevent the use of the Sunlight Control Site, the 528.9 ha (6,248 ac) Red Cloud Control Site located approximately 11.3 km (7 mi) southwest of Desert Center and I-10 would be utilized. Based on the estimated density for the Chuckwalla CHU of 3.7 tortoises/km$^2$ (9.6 tortoises/mi$^2$) (Service 2010e), 93 subadult or adult desert tortoises may be present on site for use as control animals.

Based on the site characteristics Red Cloud Control Site relative to the six PCEs, we determined that the critical habitat area overlapping the site provides for all PCEs. The critical habitat area overlapping the control site is contiguous with largely undisturbed habitat and supports intact creosote bush scrub with active alluvial fans with friable soils and prominent washes supporting desert dry wash woodland. These vegetation types provide forage and shelter sites for desert tortoises, although site-specific surveys have not yet been conducted. Because the USGS habitat model identifies this area as moderate to high predicted desert tortoise habitat (Nussear *et al*. 2009, Service 2006) and the site and surrounding area are relatively undisturbed, this area is expected to provide suitable physical and biological characteristics associated with the PCEs as discussed above. These PCEs operate together in supporting occupancy of suitable habitat by desert tortoises, and associated dispersal and gene flow from a regional perspective.

*Sunlight Control Site (Outside of Desert Tortoise Critical Habitat)*

The Sunlight Control Site is located outside of designated critical habitat within the original study area north of the proposed Solar Farm site where a resident population of desert tortoise was documented during pre-project surveys. However, because this area is part of a SEZ proposed under the Solar PEIS, this control site would only be used if BLM takes formal action through their land use planning process to ensure protection of the control population from ROW or other encumbrances for the duration of the long-term monitoring period.

The Sunlight Control Site is 1,613 ha (3,986 ac). Because of its proximity to the Pinto Basin, we used density data for Joshua Tree National Park [2.8 tortoises/km$^2$ (1.1/mi$^2$); Service 2010e]. Based on this density, we estimate that 45 subadult and/or adult desert tortoises may be within this control site.

***Acquisition Lands***

Land acquisition is proposed to offset the permanent loss of desert tortoise habitat; the applicants would provide compensatory mitigation by phase at the ratios and for the acreages identified in the “Conservation Measures” section [see Habitat Compensation Plan (AM-BIO-1) and Offsite Compensation (MM-BIO-2)]. While the location of these lands has not yet been determined, lands selected for acquisition would be within the Eastern Colorado Recovery Unit (Service 2008) for the primary purpose of securing a desert tortoise habitat linkage along the I-10 corridor. Acquisition would occur along this corridor in the Chuckwalla CHU and DWMA between Cactus City and Desert Center, where existing crossings connect contiguous desert

tortoise habitats to the north and south of the freeway, and ultimately with Pinto Wash linkage at the proposed power plant site. For Sunlight, no less than 1,618 ha (3,998 ac) (Solar Farm and gen-tie A-2) will be acquired along the I-10 corridor. For SCE, no less than 348 ha (860 ac) will be acquired along the I-10 corridor (see Desert Tortoise Connectivity Acquisition Area Figure).

Using available data on landownership and willing sellers, the Service has determined that privately owned lands that support desert tortoise habitat are available for acquisition within these areas. The Service is also aware that private conservation groups and for-profit mitigation banking organizations are actively identifying and acquiring lands targeted for offsetting impacts to desert tortoise habitats associated with renewable energy projects in this region. We recognize that as the demand for acquisition of these private parcels increases, the price per acre also may increase; however, this does not result in a reduction in availability.

The abundance of desert tortoise populations within potential acquisition lands is unknown since the specific areas have not yet been identified. However, because acquisition would focus on areas connected to lands with desert tortoise habitat of equal or higher quality/role and function as the project area, we anticipate that the acquisition lands would contain suitable habitat that is currently occupied, likely to be occupied in the future, and enhance the connectivity role and function of adjoining habitat. Acquired lands would be managed for desert tortoise survival and recovery.

## EFFECTS OF THE ACTION

Effects of the action refer to the direct and indirect effects of an action on the species or critical habitat that would be added to the environmental baseline, along with the effects of other activities that are interrelated or interdependent with that action. Interrelated actions are those that are part of a larger action and depend on the larger action for their justification.

Interdependent actions are those that have no independent utility apart from the action under consideration. Indirect effects are those that are caused by the proposed action and are later in time, but are still reasonably certain to occur. Indirect effects can be both spatial and temporal in nature. In contrast to direct effects, indirect effects can often be more subtle, and may affect species and habitat quality over an extended period, long after project activities have been completed. Indirect effects are of particular concern for long-lived species such as the desert tortoise, because project-related effects may not become evident in individuals or populations until years later.

In the “Environmental Baseline” section above, we derived estimates of the numbers of subadult, adult, and juvenile desert tortoises and eggs that are likely to occur within the action area from pre-project survey data, published literature, and long-term monitoring reports prepared by the Service. Because these sources constitute the best available information, we have used the estimates for the following analyses. We acknowledge, however, that not all individuals killed or injured during construction, operations, and maintenance activities will be detected by biological monitors or project staff and subsequently reported to us. The inability to detect all

killed or injured individuals is largely due to the cryptic nature of desert tortoises, fossorial habits, and limited abundance; and in the case of juveniles and eggs, their small size and location underground reduce detection probabilities of these life stages. Another confounding factor is that scavengers may locate carcasses before monitors and either remove them from the site or dismember them to the extent that the cause of death cannot be determined.

**Direct Effects**

***Construction and O&M***

Death and injury of desert tortoises could result from excavation activities such as clearing and grubbing of vegetation; trenching activities and entrapment in open trenches and pipes; and collisions with or crushing by vehicles or heavy equipment, including individuals that take shelter under parked vehicles and are killed or injured when vehicles are moved. Mortality mechanisms also include individual desert tortoises or their eggs being crushed or buried in burrows during construction and O&M-related activities. Because of increased human presence in the area, desert tortoises may be killed or injured due to collection or vandalism associated with increased encounters with workers, visitors, and unauthorized pets. Desert tortoises may also be attracted to the construction area by application of water to control dust, placing them at higher risk of death or injury.

To minimize incidental death and injury of desert tortoises residing in or entering the construction or O&M disturbance areas (e.g., project sites, linear facilities, access roads), the applicants would implement the general and species-specific actions specified in the "Conservation Measures" section as part of the proposed action. This section outlines nine specific measures and their component parts that are summarized below with representative examples of how the applicants would minimize adverse effects to the desert tortoise. Conservation Measure 3 includes, but is not limited to, delineating all areas to be disturbed (including new and existing roads and turn-around areas), using previously disturbed areas as staging and material sites whenever possible, and minimizing traffic impacts by prohibiting cross country vehicle traffic and enforcing a 40 kph (25 mph) speed limit on all roads used during construction. In addition, Authorized Biologists or Biological Monitors would be present during all ground-disturbing construction activities that have the potential to disturb soil, vegetation, and wildlife [Conservation Measure 1(MM-BIO-1)]. The Authorized Biologist must meet the Service's Authorized Biologist qualifications and be approved by the Service, BLM, and CDFG prior to the initiation of ground-disturbing construction activities.

Prior to construction, the project sites would be permanently fenced by phase with desert tortoise exclusion fencing. Each phase would be cleared of all desert tortoises prior to any ground disturbance. During construction of the permanent and temporary exclusion fencing, any desert tortoises located during the surveys would be either moved out of harm's way or translocated to the approved recipient site as outlined in the Service-approved translocation plan [Conservation Measure 4 (AM-WIL-1)] (Ironwood Consulting and Woodard 2010).

Any desert tortoises undetected during the initial clearance surveys may be located during construction activities by routine site inspections by the Authorized Biologist or incidental observations by construction workers. The WEAP would be administered to all onsite personnel and be repeated annually for all permanent personnel and within a week of arrival to any new construction personnel [Conservation Measure 2 (AM-BIO-4)]. This training would enhance the effectiveness of onsite personnel to improve detection and avoidance of desert tortoises, and ensure proper translocation procedures are adhered to during construction and O&M activities.

Additional actions under Conservation Measure 3 to avoid and minimize incidental death and injury of desert tortoises include covering or backfilling trenches, storing construction materials and piping inside the perimeter security fence, and minimizing the amount of water used for dust abatement to avoid ponding, which acts as an attractant to desert tortoises and their predators.

Overall, we expect death and injury of most subadult and adult tortoises to be avoided during construction and O&M activities through implementation and compliance of Conservation Measure 1 (MM-BIO-1: Construction Monitoring and Authorized Biologists), Conservation Measure 2 (AM-BIO-4: WEAP), Conservation Measure 3 (Avoidance and Minimization Measures), and Conservation Measure 4 (AM-WIL-1: Desert Tortoise Translocation Plan). In addition, Conservation Measure 5 (Desert Tortoise Compliance Verification) would ensure adherence to the actions described in the "Conservation Measures" section through rigorous monitoring and reporting.

However, because juvenile desert tortoises and eggs are difficult to detect, surveyors may overlook most of them during clearance surveys and construction monitoring, leaving these life stages susceptible to death and injury. Based on the calculations performed for the "Environmental Baseline" section, we estimate that as many as 6 to 25 juvenile desert tortoises may occur within the proposed Solar Farm site. No estimates were calculated for the gen-tie alternatives, Red Bluff Substation site, or the telecommunications sites due to a lack of live desert tortoise observations during surveys and the disturbed nature of the Chuckwalla Mountain Communications Site. Again, because of low detection probabilities, we anticipate that all of the juvenile desert tortoises occurring in the project footprint would be destroyed, killed, or injured due to construction and O&M activities if they are not detected and translocated.

As calculated under the "Environmental Baseline" section, we also estimate that reproductive females on the proposed Solar Farm site may produce as many as 129 eggs per year. No estimates were calculated for the gen-tie alternatives, Red Bluff Substation site, or the telecommunications sites. Because the estimate for the number of eggs is for total annual production, we cannot predict what portion of this total would be present on site during construction activities for any given phase, and therefore, cannot estimate how many eggs would be destroyed by construction and O&M activities.

Based on 1) the estimated number of subadult, adult, juvenile, and desert tortoise eggs expected to occur within the action area; 2) understanding that early life stages naturally suffer higher mortality rates and are not as demographically/ecologically important as reproducing adults in

long-lived species, such as desert tortoises, which reproduce many times over their reproductive lives [r/K selection theory in MacArthur and Wilson (1967)]; and 3) the conservation measures that have been identified for each project component, we conclude that death and injury resulting from implementation of the proposed action would not appreciably reduce the desert tortoise population or reproductive success within the Eastern Colorado Recovery Unit.

***Desert Tortoise Translocation***

In addition to construction and O&M-related activities, the primary effects of the proposed action on desert tortoises will result from capture and translocation of individuals prior to any ground disturbance associated with the project. Capture and translocation of desert tortoises may result in accidental death and injury from stress or disease transmission associated with handling tortoises; stress associated with moving individuals outside of their established home range; stress associated with artificially increasing the density of tortoises in an area and thereby increasing competition for resources; and disease transmission between and among translocated and resident desert tortoises. Capture and handling of translocated and resident desert tortoises for the purposes of conducting health assessments, which include visual inspection relative to body condition, clinical signs of disease, and collection of biological samples for disease screening [i.e., blood samples to test for antibodies to pathogens that cause upper respiratory tract disease or enzyme-linked immunosorbent assay (ELISA)], could also result in accidental death or injury.

Capturing, handling, and moving tortoises for the purposes of translocating them out of the project areas or out of harm's way may result in accidental death or injury if these methods are performed improperly, such as during extreme temperatures, or if individuals void their bladders and are not rehydrated. Averill-Murray (2002) determined desert tortoises that voided their bladders during handling had lower overall survival rates (0.81 to 0.88) than those that did not void (0.96). If multiple desert tortoises are handled by biologists without the use of appropriate protective measures and procedures, such as reused latex gloves, pathogens may be spread among individuals. To address these potential effects, the applicants' translocation plan has been drafted in accordance with the most recent Service guidance (Service 2010a); however, implementation would continue to be adaptively managed over time to facilitate a successful translocation effort. Because the applicants would adhere to the most recent Service guidance in addition to implementing the conservation measures outlined in the proposed action, we anticipate any mortality or injury to desert tortoises from activities associated with removing individuals from the proposed project sites is unlikely.

We anticipate that the applicants will capture and translocate all subadult and adult desert tortoises from the fenced project areas and any portion of the action area where individuals may be in harm's way of project activities. Desert tortoises located on the proposed Solar Farm site, perimeter fence line, and Red Bluff Substation site would be moved more than 500 m (1,640 ft) outside of their existing home ranges to the approved recipient sites. Because the project would be built in phases over a period of at least 26 months, during which time desert tortoise abundance within the project area will likely change, we cannot predict exactly how many

individuals will be removed from the project site and other related work areas. Based on the survey results for the proposed Solar Farm site, we estimate that up to 31 subadult and adult desert tortoises will be translocated to either the Chuckwalla or DuPont Recipient Sites; we have estimated that the project site may support between 6 to 25 juvenile desert tortoises and reproductive females may produce as many as 129 eggs per year.

For the Red Bluff Substation site, we have estimated that up to four subadults or adults will be translocated to the Red Bluff Recipient Site. No estimates were calculated for the number of juveniles or eggs at the substation site or the telecommunications due to zero observations of live desert tortoises during surveys and the disturbed nature of the Chuckwalla Mountain Communication Site. Because of the difficulty in locating juvenile desert tortoises and eggs, some but not all are likely to be translocated from the project areas. Effects to juvenile desert tortoises and eggs that are undetected on the project sites are discussed later in this section. Translocation has the potential to increase the prevalence of diseases, such as upper respiratory tract disease, in a resident population. Physiological stresses associated with handling and movement or from density-dependent effects could exacerbate this risk if translocated individuals with subclinical upper respiratory tract disease or other diseases present symptoms subsequent to translocation. This potential conversion of translocated desert tortoises from a non-contagious to contagious state may increase the potential for infection in the resident population above pre-translocation levels. To minimize this risk, health assessments would be conducted on all desert tortoises to be translocated (i.e., up to 31 from the Solar Farm site) prior to being released in accordance with the most recent Service guidance (Service 2010a).

Translocated desert tortoises will not be released into the recipient sites until results of the disease tests have been received and the Service approves the disposition plan for each individual. While awaiting test results, desert tortoises will be monitored *in-situ* or penned (i.e., quarantined) on site. Handling and blood collection may result in elevated stress levels that render individuals more susceptible to disease or dehydration from loss of fluids. Because the applicants will employ experienced biologist, approved by the Service, BLM, and CDFG, and sanctioned handling techniques to perform health assessments and collection of biological samples, we do not expect these activities to result in death or injury of any individuals. Furthermore, required disease screening and quarantine procedures will reduce the potential for introduction and spread of disease due to translocation.

For each phase, desert tortoises will be monitored *in-situ* or quarantine pens will be used to hold individuals located above ground during clearance surveys, individuals that may emerge from hibernation during the winter, and individuals for which disease screening results are pending. The applicants will construct the quarantine pens and follow husbandry procedures in accordance with the most recent Service guidance (Service 2010a). The pens will be 20 m × 20 m (65.6 ft × 65.6 ft) and a veterinarian-approved husbandry plan will direct care of desert tortoises while in quarantine. Maintaining desert tortoises in quarantine pens could increase their vulnerability to exposure, stress, dehydration, inadequate food resources, and increased predation. However, because desert tortoises will be monitored regularly, care will be administered following specific procedures, and the quarantine period will not exceed 18 months, we anticipate that quarantined

individuals are unlikely to experience death or injury from the vulnerabilities identified above. The potential exists, however, for predators or poachers to target quarantined desert tortoises. This risk also is expected to be eliminated through regularly scheduled monitoring in accordance with the desert tortoise translocation plan (Ironwood Consulting and Woodard 2010). Desert tortoises monitored *in-situ* may be subject to similar effects as those in quarantine pens; however, because these individuals will be confined to large areas within their existing home ranges, we anticipate that the potential for increased stressors would be relatively low and adequate shelter and food resources would be accessible until translocation.

Prior to translocation of desert tortoises from the project areas, surveys of the recipient and control sites will be conducted to confirm densities, perform health assessments on all desert tortoises encountered, and attach transmitters for monitoring purposes. The number of desert tortoises at the recipient and control sites should be equal to the number of individuals expected to be translocated from the project sites. If fewer than five desert tortoises will be translocated, no control site or control animals are required. In addition, disease prevalence at the recipient sites should not exceed 5 percent within the resident population (Service 2010a). Therefore, the prevalence and distribution of disease within the recipient site will dictate the number of desert tortoises that can be translocated to the site.

The minimum sample size needed to detect less than 5 percent disease prevalence at the 95 percent confidence level is dependent upon the estimated abundance at the site. Based on the estimate of 49 resident desert tortoises at the Chuckwalla Recipient Site, blood collection would be required for all of the individuals to establish the disease prevalence baseline of less than 5 percent with 95 percent confidence for the site (Averill-Murray 2010). If results for any of the resident desert tortoises at this site are ELISA-positive, the DuPont Recipient Site must be used. Based on the estimate of 111 resident desert tortoises at the DuPont Recipient Site, blood collection would be required for a minimum of 79 of the individuals to establish the baseline. However, because translocated desert tortoises are known to disperse from initial release sites (see discussion on dispersal distances below), to further reduce the potential for disease transmission, translocated desert tortoises will be placed a minimum distance of 1.5 km (0.9 mi) from diseased [documented seropositive or clinically ill (showing outward signs of disease)] resident desert tortoises.

Red Bluff Recipient Site has been proposed for translocation of desert tortoises from the Red Bluff Substation project site; however, because the estimated number of tortoises expected to be moved (i.e., up to one) is less than five, only the translocated individual would be monitored at this site, pending disease screening results. Therefore, affixing transmitters and conducting health assessments on resident and control desert tortoises would not be required.

While we cannot reasonably predict if an increase in disease prevalence within the resident population may occur due to translocation, our analysis considers the following mitigating circumstances that are likely to reduce the magnitude of this risk:

1. The applicant would use experienced biologists and approved handling techniques that are unlikely to result in substantially elevated stress levels in translocated animals;

2. If the Chuckwalla and Red Bluff Recipient Sites are used, desert tortoises in the project areas are part of a continuous population with the resident populations of the recipient sites and are likely to share similar pathogens and immunities;
3. Translocated desert tortoises from the Red Bluff Substation site would be moved a relatively short distance, which is likely to reduce post-translocation stress associated with long-distance translocations;

4. Density-dependent stresses are unlikely to occur for reasons stated below;

5. Any animal that has clinical signs of disease or ELISA-positive blood test would not be translocated; and

6. Long-term monitoring of translocated individuals would be implemented to determine the prevalence of disease transmission.

Because ELISA testing can yield false-positive results (i.e., an animal may test positive even though it is not a carrier of the disease), the removal of healthy individuals from the translocated population may occur due to concern over disease. These individuals would be removed from the wild and, thereby, no longer contribute to the environmental baseline for the action area. Removing these individuals may inadvertently reduce the resistance of the population to disease outbreaks. Because the applicants would coordinate with the Service and follow-up testing of ELISA-positive individuals would be performed, the potential for removing false-positive individuals from the translocated population is low. Consequently, we conclude that few, if any, desert tortoises would be removed from the population due to false-positive results. Similarly, some of the animals that test positive may have survived past disease infections and remain healthy. Despite gaps in our knowledge relative to disease pathology and recognition that removal of seropositive desert tortoises may eliminate individuals with superior fitness and genetic adaptations for surviving disease from the gene pool, the low number of individuals expected to be removed would not be large enough to affect population genetics in the wild.

Apart from disease, translocation may also affect resident desert tortoises within the recipient site due to local increases in population densities. Desert tortoises from the Solar Farm site would be moved to areas now supporting a resident population, which may result in increased inter-specific encounters and, thereby, an increased potential for spread of disease, potentially reducing the health of the overall population; increased competition for shelter sites and other limited resources; increased competition for forage, especially during drought years; or increased incidence of aggressive interactions between individuals (Saethre *et al*. 2003). To minimize potential density-dependent effects, recipient sites must be sufficiently large to accommodate and maintain the resident and translocated desert tortoises (Service 2010a).

Based on our estimate of the resident population at the recipient sites as discussed in the "Environmental Baseline" section, we calculated the maximum allowable final density[6] and abundance (i.e., residents plus translocatees) at the recipient sites. For Chuckwalla Recipient Site, density of desert tortoises after translocation should not exceed 6.5 tortoises/km$^2$ (17 tortoises/mi$^2$) and abundance should not exceed 114[7] individuals. Since we estimated the population at the Chuckwalla Recipient Site to be up to 49 subadult and adult tortoises, we do not anticipate that translocation of up to 31 subadult and adult tortoises (from the project site and perimeter security fence line) to the recipient site would exceed the 130 percent density threshold. For the DuPont Recipient Site, density and abundance of desert tortoises after translocation should not exceed 6.5 tortoises/km$^2$ (17 tortoises/mi$^2$) and 196, respectively. Therefore, the translocation of up to 31 subadult and adult tortoises from the project area combined with the estimated 111 resident desert tortoises does not exceed the maximum threshold for this site.

Should the density of resident desert tortoises at the recipient sites or the number of desert tortoises to be translocated be higher than estimated, the size of the recipient sites may need to be expanded to ensure the final density following translocation stays within the allowable threshold. Because of land management constraints, the Chuckwalla Recipient Site cannot be expanded into surrounding lands; therefore, the DuPont Recipient Site would be used. By virtue of its size, the DuPont site will likely support all of the desert tortoises to be translocated and can be expanded if necessary. We anticipate that density-dependent effects on resident desert tortoise populations are likely to be minor for the following reasons:

1. Health assessments will be performed on all desert tortoises prior to translocation thus decreasing the potential for introduction of infectious diseases to the recipient site;

2. A threshold density has been calculated for the recipient sites so as not to exceed 130 percent of the mean density for the recovery unit. This threshold is significantly lower than that which adverse effects were observed in previous post-translocation studies (Saethre *et al.* 2003);

3. Translocation will be implemented such that individuals are distributed throughout the site;

4. The recipient sites are contiguous with suitable desert tortoise habitats, which will facilitate dispersal into other areas; and

5. Long-term monitoring will provide opportunities to implement adaptive management to address any observed unanticipated effects.

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[6] Defined as 130 percent of the mean density calculated for the respective recovery unit (Service 2010a). Mean density in the Eastern Colorado Recovery Unit is estimated to be 5 tortoises/km$^2$ (13 tortoises/mi$^2$) (Service 2009b); therefore, maximum allowable density equals 130 percent multiplied by the mean density of the recovery unit (5 tortoises/km$^2$) or 6.5 tortoises/km$^2$.

[7] Calculated as 17.47 km$^2$ for the Chuckwalla Recipient Site multiplied by 6.5 tortoises/km$^2$. The DuPont Recipient Site equals 30.19 km$^2$.

The proposed translocation plan and the best available information regarding density estimates and thresholds and methods for determining disease prevalence indicate that all of the desert tortoises expected to be translocated from the project areas can be accommodated at each of the recipient sites. However, if disease prevalence or density thresholds prevent the use of all selected recipient sites, the applicants will need to identify alternative suitable areas for translocation. Such alternative translocation area would constitute a change in the project description that likely would necessitate a reinitiation of consultation.

After verification of density estimates, receipt of disease screening results, and approval of disposition plans, the applicants will translocate all desert tortoises to the respective recipient sites. Following release, desert tortoises are expected to disperse, but we cannot predict the movement patterns that all translocated individuals are likely to exhibit. Dispersal distances following translocation appear to be influenced by the distance they are moved from their home range and the availability of resources in the area to which they are moved. Desert tortoises translocated relatively short distances [i.e., less than 500 m (1,640 ft)] from their home ranges tend to move shorter distances from their release points than desert tortoises translocated more than 500 m (1,640 ft). Nussear (2004) reported that for adult desert tortoises translocated greater than 500 m (1,640 ft), the mean straight-line dispersal distance for both males and females ranged from 1 to 6 km (0.6 to 3.7 mi). Walde *et al*. (2008) reported that the mean straight-line dispersal distances for adult desert tortoises using 2 experimental treatments was approximately 2.6 km (1.6 mi) and 4.2 km (2.6 mi) for males and 1.5 km (0.9 mi) and 2.3 km (1.4 mi) for females. Maximum straight-line dispersal distances for translocated adult males ranged from 6.2 km (3.9 mi) (Field *et al.* 2007) to 12.6 km (7.8 mi) in the first year following translocation (Walde *et al.* 2008).

The degree to which translocated desert tortoises expand the area they use depends on whether tortoises are released into typical or atypical habitat; that is, if the recipient area supports habitat that is similar to that of the source area, desert tortoises are likely to move less (Nussear 2004). Translocated desert tortoises appear to reduce movement distances following their first post-translocation hibernation to a level that is not significantly different from resident populations (Field *et al*. 2007; Nussear 2004). As time increases from the date of translocation, most desert tortoises alter their movement patterns from dispersed, random patterns to more constrained patterns, which may indicate establishment of a new home range (Nussear 2004).

Just as we cannot predict the distances translocated desert tortoises will move, we also cannot predict the direction these individuals are likely to move. Berry (1986) observed that translocated desert tortoises have exhibited a tendency to orient toward the location of their capture and attempt to move in that direction, but other research showed no discernible homing tendency in translocation individuals (Field *et al.* 2007). Data specific to short-distance translocations indicate that at least some individuals will attempt to return to their former home ranges after release (Stitt *et al*. 2003, Rakestraw 1997).

Previous translocation studies generally have shown straight-line dispersal distances from release points vary during the first year following translocation. While the mean straight-line distances

reported for several studies are close to or less than 2.5 km (1.6 mi), some translocated desert tortoises move much farther (Drake *et al*. 2009, Field *et al*. 2007, Nussear 2004). Based on our analysis of the available data, we expect the movements of most tortoises translocated more than 500 m (1,640 ft) to remain within 6.5 km (4.0 mi) of their release points. This distance was derived by examining the upper limits of the 95 percent confidence intervals for available data. However, as mentioned above, translocated individuals can also significantly expand the area they occupy in the first year following translocation [e.g., 10.1 to 17.9 $km^2$ (3.9 to 6.9 $mi^2$) at a Nevada site and from 0.5 to 26.7 $km^2$ (0.2 to 10.3 $mi^2$) at a Utah site].

In one study, the majority of dispersal movement away from the release site occurred during the first 2 weeks after translocation (Field *et al*. 2007). During this time and over the period prior to establishment of a new home range, translocated desert tortoises may experience higher potential for mortality because they are moving through unfamiliar habitats and are less likely to have established cover sites that provide protection. Studies have documented various sources of mortality for translocated individuals, including predation, exposure, fire, disease, and flooding (Nussear 2004; Field *et al*. 2007; Berry 1986; U.S. Army 2009, 2010). Of these, predation appeared to be the primary mortality mechanism in most translocation studies (Nussear 2004; Field *et al*. 2007; U.S. Army 2009, 2010).

Various studies have documented mortality rates of 0, 15, 21, and 21.4 percent of translocated desert tortoises in other areas (Cook *et al.* in Nussear 2004, Nussear 2004, Field *et al.* 2007). Nussear (2004) found that mortality rates among translocated desert tortoises were not statistically different from that observed in resident populations. However, this study did not compare mortality rates in resident populations to those in control groups; therefore, we cannot determine if the translocation caused increased mortality rates in the resident population. Recent studies in support of the Fort Irwin expansion (U.S. Army 2009 and 2010) compared mortality rates associated with resident and translocated desert tortoise populations with that of control populations; preliminary results indicated translocation did not increase mortality above natural levels (Esque *et al*. 2010). This and other fieldwork indicate that desert tortoise mortality is most likely to occur during the first year after release. After the first year, translocated individuals are likely to establish new home ranges and mortality is likely to decrease.

Juvenile desert tortoises will comprise a portion of the overall mortality predicted within resident and translocated populations. In general, this life stage experiences higher mortality rates than subadults and adults under natural circumstances and are more susceptible to predation. We estimate 6 to 25 juvenile desert tortoises may occur on the Solar Farm site and that the applicants will move up to half of these; therefore, we do not anticipate a large amount of juvenile mortality associated with translocation. Because of the difficulty in locating juvenile desert tortoises, individuals that are not translocated are likely to die during construction. However, as stated above for direct effects from construction and O&M, based on the estimated desert tortoises expected to occur within the action area and the conservation measures that have been identified for each project component, we conclude that death and injury resulting from translocation of juvenile desert tortoises will not appreciably reduce the desert tortoise population or reproductive success within the Eastern Colorado Recovery Unit.

Based on the available data on translocation and consistent with the findings in Esque *et al.* (2010), we conclude that mortality rates in the resident and translocated populations are unlikely to be elevated above levels that these populations would experience in the absence of translocation. Therefore, we anticipate that death or injury of few, if any, subadults, adults, juveniles, or eggs will be the direct result of translocation. The monitoring of the translocated, resident, and control populations will assist us in determining if this conclusion is accurate. One shortcoming of the proposed monitoring program is that, while it considers observations of a control population that will not be affected in any manner by the translocation, it does not establish mortality thresholds or adaptive management measures in the event that significant differences in mortality rates are observed among the populations that can be attributed to the translocation. Therefore, we cannot analyze the adaptive management component of the translocation plan or its effectiveness in addressing elevated mortality rates.

Based on the pre-project survey data, we have estimated that few, if any, desert tortoises are likely to be moved during construction of the gen-tie alternatives. Because disturbance areas for this project component are relatively small, moving desert tortoises immediately outside of the work area is not likely to displace them from their current home ranges. Consequently, any desert tortoises moved from the gen-tie line will continue to occupy familiar territory and use known shelter sites and are unlikely to suffer post-translocation mortality associated with temporary removal from the disturbance areas. Furthermore, subsequent to completion of the gen-tie construction, desert tortoises will be able to return to these areas.

Finally, to prevent translocated desert tortoises from entering nearby roadways following translocation, the applicants would construct desert tortoise exclusion fencing in accordance with the following: 1) if the Chuckwalla Recipient Site is used, exclusion fencing would be constructed along 8.4 km (5.2 mi) of Kaiser Road and conservation measures would be implemented to minimize impacts along Eagle Mountain Road. Desert tortoise exclusion fencing would also be constructed along the north side of I-10 for up to 30.4 km (18.9 mi) to the east and west of the recipient site. Measures would also be taken to minimize the potential for increased predation within the project area including installation of raven and raptor deterrents on the transmission infrastructure (Ironwood Consulting 2010c) and buffering the translocation site by a minimum of 500 m (1,640 ft) from Kaiser Road and the inactive Riverside County landfill located west of Kaiser Road; 2) if the DuPont Recipient Site is used, 28.3 km (17.6 mi) of desert tortoise exclusion fencing would be constructed along the south side of I-10 to the east and west of the recipient site; and 3) if the Red Bluff Recipient Site is used, 18.4 km (11.4 mi) of desert tortoise exclusion fencing would be constructed along the south side of I-10 to the east and west of the site. All fencing along roadways would be constructed to accommodate existing crossings to perpetuate surface water flows and wildlife movement.

Assuming a 3.1-m (10-ft) wide disturbance area to install desert tortoise exclusion fencing along these roadways, we estimate that fence installation will directly affect up to 23.5 ha (58 ac). Boarman and Sazaki (2006) found that desert tortoise populations are depressed next to major roadways out to a distance of at least 400 m (0.25 mi). Because the fence construction would occur within the road ROWs that are largely disturbed and desert tortoise abundance has been

documented to be depressed along these kind of features, we expect this activity to affect few, if any, desert tortoises or eggs.

In conclusion, we do not anticipate that moving desert tortoises out of harm's way of construction of linear features would result in death or injury because these individuals would remain near or within their existing home range, which is not likely to result in significant social or competitive impacts to resident desert tortoises in the area. Following release of desert tortoises translocated outside of their home range, a small number may die due to exposure, stress, dehydration, inadequate food resources, and increased predation. We anticipate most of this mortality is likely to occur in the first year after release, during the period that translocated animals are attempting to establish new home ranges. In addition, we anticipate that a small number of resident desert tortoises at the recipient site may die from natural causes due to these same vulnerabilities. However, we cannot determine if mortality rates in the translocated or resident populations would be above natural mortality levels for the recipient site. In addition, the potential impacts of capturing, handling, and moving tortoises for the purposes of translocation would be avoided or reduced through implementation of the actions specified in the "Conservation Measures" section. Lastly, as described in the draft translocation plan, translocated desert tortoises will be monitored, findings reported to the Service, and adaptive management strategies implemented, as needed (Ironwood Consulting and Woodard 2010).

*Desert Tortoise Translocation: Post-Translocation Monitoring*

Based on the description of post-translocation monitoring in the translocation plan (Ironwood Consulting and Woodard 2010) and our estimate of the number of desert tortoises on the Solar Farm site, we anticipate that the applicants will attach transmitters to no more than 93 subadult and/or adult desert tortoises (i.e., 31 each of translocated, resident, and control animals) to facilitate monitoring. Thus, desert tortoises will have transmitters attached and be monitored and handled periodically for visual health assessments throughout the monitoring period. Some potential exists that handling of desert tortoises may cause elevated levels of stress that may render these animals more susceptible to disease or dehydration from loss of fluids. However, because the applicants will employ experienced biologist, approved by the Service, BLM, and CDFG, and sanctioned handling techniques to perform health assessments, we do not expect handling and monitoring activities to result in death or injury of any individuals.

Although portions of the proposed Sunlight Control Site are within 10 km (6 mi) of the Chuckwalla Recipient Site, desert tortoise exclusion fencing would be constructed along the west side of Kaiser Road to prevent translocated animals from crossing the road into the project area if this site is used (Ironwood Consulting and Woodard 2010).

***Effects of Accessing Work Sites***

Primary access to the proposed Solar Farm site would be via Kaiser Road. No additional access roads would be constructed outside of the perimeter security fence and permanent desert tortoise exclusion fencing. Thus, ingress to and egress from the main fenced facility is unlikely to result

in death or injury of desert tortoises. In the event that the fence is damaged, a small number of desert tortoises could enter the roadway and be injured or killed. In addition, access to project work areas outside of the fenced facilities (e.g., gen-tie line, highway fence) may kill or injury desert tortoises due to elevated use of existing routes.

As presented under the "Description of the Proposed Action," impacts associated with access to the SCE Red Bluff Substation and Desert Center Telecommunications Site include 7.7 ha (19 ac) and less than 0.2 ha (0.5 ac), respectively. No impacts from the use of the access road to the Chuckwalla Mountain Communication Site are expected along this already established route. Implementation of Conservation Measures 1, 2, 3, 4, and 5 are expected to minimize impacts to desert tortoises from access proposed project components. Because all workers will participate in the WEAP about desert tortoises and speed limits will be limited to 40 kph (25 mph), workers may be less likely to strike desert tortoises than a casual user. In addition, clearance surveys and the use of Authorized Biologists and Biological Monitors during construction of the access roads will minimize adverse effects to desert tortoises. Subsequent to construction, speed limit and WEAP requirements will continue to be implemented over the life of the project. We cannot predict how many individuals will be killed or injured because of variables such as weather conditions, the nature and condition of the roads, and activity patterns of desert tortoises at the time the roads are in use; however, we expect this number to be small.

### *Effects of Loss of Habitat*

Phased construction of the proposed Solar Farm and associated SCE components would cause the long-term loss of up to 1,690 ha (4,176 ac) of desert tortoise habitat (Table 6). The biological assessment (Ironwood Consulting 2010a), including subsequent clarifications, provides details regarding the disturbance associated with each project component by phase.

**Table 6. Total project impacts by component by phase for the Solar Farm, associated transmission, and SCE components**

| Project Component | Phase IA | Phase IB | Phase II | Phase III |
|---|---|---|---|---|
| Solar Farm | 121.41 ha (300 ac) | 312.82 ha (773 ac) | 972.05 ha (2,402 ac) | 176.85 ha (437 ac) |
| Gen-tie A-1 | NA | NA | 37.23 ha (92 ac) | NA |
| Gen-tie A-2 | NA | NA | 34.80 ha (86 ac) | NA |
| Red Bluff Substation Components* | 172 ac (172 ac) | NA | NA | NA |
| Telecommunications Sites* | (0.40 ha) (<1 ac) | NA | NA | NA |
| Cumulative Total with Gen-tie A-1 | 228.64 ha (565 ac) | 541.5 ha (1,338 ac) | 1,513.52 ha (3,740 ac) | 1,690.0 ha (4,177 ac) |
| Cumulative Total with Gen-tie A-2 | 226.2 ha (559 ac) | 539.04 ha (1,332 ac) | 1,511.0 ha (3,734 ac) | 1,687.94 ha (4,171 ac) |

*Construction of these components may not coincide with construction of Phase IA.

Because recovery of vegetation in the desert can take decades or longer, we consider all ground-disturbing impacts associated with the proposed project to be permanent. Vasek *et al*. (1975) found that in the Mojave Desert transmission line construction and O&M activities resulted in a permanently de-vegetated maintenance road, enhanced vegetation along the road edge and between tower sites (often dominated by nonnative species), and reduced vegetation cover under the towers, which recovered significantly but not completely in about 33 years. Webb (2002) determined that absent active restoration following extensive disturbance and compaction in the Mojave Desert, soils in this environment could take between 92 and 124 years to recover. Other studies have shown that recovery of plant cover and biomass in the Mojave Desert could require 50 to 300 years in the absence of restoration efforts (Lovich and Bainbridge 1999). Based on a quantitative review of studies evaluating post-disturbance plant recovery and success in the Mojave and Sonoran deserts, Abella (2010) found that reestablishment of perennial shrub cover (to amounts found on undisturbed areas) generally occurs within 100 years but no fewer than 40 years in some situations. He also found that a number of variables likely affect vegetation recovery times, including but not limited, to climate (e.g., precipitation and temperatures), invasion by nonnative plant species, and the magnitude and extent of ongoing disturbance.

While the applicants would implement restoration activities following decommissioning, such as decompacting soils, seeding, and nonnative species control, based on this information, up to 1,690 ha (4,176 ac) of desert tortoise habitat would be permanently lost or ecologically unsuitable for decades to come. Therefore, when and if successful restoration of these areas would render the habitat suitable for desert tortoises in the future cannot be determined at this time. As noted in the "Description of the Proposed Action" section, if the proposed project is approved, analysis and regulatory review of potential effects of decommissioning would be deferred until closure of the proposed project is foreseeable.

Based on the work by Nussear *et al.* (2009), we calculated that approximately 634,721.1 ha (1,568,430 ac) or 59.5 percent of the 1,066,165.8 ha (2,634,553 ac) Eastern Colorado Recovery Unit is considered habitat modeled at the 0.5 or greater "predicted habitat potential level" for desert tortoise. The habitat that would be disturbed on a long-term basis [i.e., up to 1,690 ha (4,176 ac)] constitutes approximately 0.003 percent of the modeled habitat at the 0.5 level in the Eastern Colorado Recovery Unit. While the model does not take into account anthropomorphic disturbances that have historically or are currently affecting the species, it is unlikely that consideration of these would result in a substantial change in this estimate; less than 10 percent of the lands within the Sonoran Desert ecoregion are categorized as "disturbed lands" (Marshall *et al*. 2000). However, in light of existing research on edge effects along roads (Bury *et al*. 1977, Nicholson 1978, Boarman and Sasaki 2006), areas of suitable habitats within 400 m (0.25 mi) on either side of portions of I-10, SR 177, and other well-traveled roadways in the Eastern Colorado Recovery Unit may support depressed desert tortoises densities because of these effects.

While this percentage (0.003) does not constitute a numerically significant portion of the Eastern Colorado Recovery Unit, we do not have the ability to place a numerical value on edge effects, habitat degradation, and overall fragmentation that the proposed action may cause or that occurs in the recovery unit as a whole. As a result, the low percentage of habitat within the recovery

unit that would be lost underestimates impact of the proposed project on the desert tortoise, especially in light of existing land uses, changes in species composition and fire regimes due to establishment of nonnative plant species, existing and increasing disease and predation rates, and the expansion of human occupancy in what were once remote desert landscapes. The draft revised recovery plan (Service 2008) and 5-year review (Service 2010d) provide detailed discussions of these and other past, present, and future threats facing the desert tortoise.

Although the estimated percentage of habitat expected to be lost due to construction and O&M of the proposed project does not constitute a significant portion of the recovery unit, the location of the proposed project site within an important habitat and population linkage between the Chuckwalla CHU and DWMA and populations in the northern portion of the species' range has the potential to affect long-term genetic connectivity in this region. The effects to habitat and population connectivity are discussed below.

**Indirect Effects**

Indirect effects associated with the construction and O&M of the proposed project may also result in death or injury to desert tortoises. Some of these effects include increased predation by common ravens, loss or fragmentation of habitat linkages important to maintaining population and genetic connectivity, degradation of habitat and the diet of desert tortoises from the spread of nonnative plant species, and noise and lighting from project construction and operations.

***Predator Subsidies*:** Common ravens are attracted to human activities in the desert because food and water subsidies, and roosting and nesting substrates that would otherwise be unavailable are introduced or augmented by human encroachment. Human activities also facilitate expansion of raven populations into areas where they were previously absent or in low abundance. Ravens likely will frequent the project areas because of the potential availability of such subsidies, which likely are now found in and around the small communities of Lake Tamarisk and Desert Center and other nearby rural and urban areas. Road-kill of wildlife along I-10 and other roads provides additional attractants and subsidies for opportunistic predators and scavengers; road-kill is likely to increase during project construction and O&M activities, further exacerbating the raven/ predator attractions and increasing the risk of predation on desert tortoises.

Facility infrastructure, such as power poles, fences, buildings, and other structures on the project site, may provide perching, roosting, and nesting opportunities for ravens and other avian predators. Natural predation rates may be altered or increased when natural habitats are disturbed or modified. As stated above, common raven populations in some areas of the Mojave Desert have increased 1,500 percent from 1968 to 1988 in response to expanding human use of the desert (Boarman 2002). Since ravens were scarce in the Mojave Desert prior to 1940, the existing level of raven predation on juvenile desert tortoises is considered an unnatural occurrence (BLM 1990). In addition to ravens, feral dogs have emerged as significant predators of desert tortoises adjacent to residential areas. Though feral dogs may range several miles into the desert and have been found digging up and killing tortoises (Service 1994a, Evans 2001), we are not aware of any reports of feral dogs in the project area.

To avoid and minimize the availability of predator subsidies from construction and O&M-related activities, refuse and water management, worker awareness, and construction and post-project monitoring will be implemented in accordance with the *Common Raven Management Plan for the Desert Sunlight Solar Farm Project* [Conservation Measure 6 (AM-WIL-2)] (Ironwood Consulting 2010c). Some of the provisions of the plan include proper disposal of all trash materials in self-closing containers, removal of road-kill from the project area and associated access roads immediately upon discovery, and minimizing the amount of water used for dust abatement to avoid standing water. In addition, the applicants will contribute funds to the regional common raven management program, which addresses indirect and cumulative impacts associated with projects that facilitate the expansion of raven populations into desert tortoise habitats. Funding implementation of this program is expected to enable the Service and other agencies to monitor and control raven populations at the regional scale. The one-time contribution from Sunlight in the amount of up to $420,420.00 (for the Solar Farm and gen-tie A-1) and from SCE in the amount of $18,060.00 will fund the proposed project's portion of the regional raven management program for the 30-year life of the ROW grant anticipated by the BLM.

***Nonnative Plant Species*:** Another indirect effect from the development of the proposed project is the potential introduction and spread of nonnative, potentially invasive plant species into habitats adjacent to the project sites. Nonnative plant species now occur on the proposed project sites at various densities and within the action area, and numerous existing features act as vectors that facilitate infestations (e.g., roads, routes, transmission lines, railroad, Colorado River Aqueduct). However, construction and O&M activities of the proposed project components may increase distribution and abundance of nonnative species within the action area due to ground-disturbing activities that favor these species. Project equipment may transport nonnative propagules into the project area where they may become established and proliferate. In addition, the introduction of nonnative plant species may lead to increased wildfire risk, which ultimately may result in future habitat losses (Brooks *et al*. 2003) and changes in forage opportunities for desert tortoises (Service 2008).

The applicants have proposed numerous measures as part of the proposed action to address the potential effects from nonnative plant species. While we cannot reasonably predict the increase in nonnative species abundance that this project may cause within the action area, the degradation of habitat due to spread of nonnative plants would be minimized through the measures outlined in the *Integrated Weed Management Plan for the Desert Sunlight Solar Farm Project* [Conservation Measure (AM-BIO-2)] (Ironwood Consulting 2010e). Moreover, the applicant's use of herbicides to control weeds would have minimal effects because their use would be limited to areas within the perimeter security fence and in accordance with the BLM's *Vegetation Treatments Using Herbicides on BLM Lands in 17 Western States* (BLM 2007) and the *National Invasive Species Management Plan* (National Invasive Species Council 2008).

***Edge Effects*:** Finally, increased noise levels and the presence of full-time facility lighting may affect desert tortoise behavior during construction and operations of the facility over a 30-year period. While limited data exists on the effect of noise on desert tortoises, Bowels *et al.* (1999 in

Service 2008) demonstrated that the species has relatively sensitive hearing (i.e., mean = 34 dB SPL), but few physiological effects were observed with short-term exposures to jet air craft noise and sonic booms. These results cannot be extrapolated to chronic exposures over the lifetime of an individual or a population. We also do not have sufficient data documenting the effects of artificial lighting on desert tortoise behavior and therefore cannot reasonably predict the magnitude of effect either noise or light will have on adjacent desert tortoise populations. Based on the ability of other species to adapt to noise disturbance, noise attenuation as distance from the project increases, and the fact that desert tortoises do not rely on auditory cues for their survival, we do not expect any desert tortoises to be injured or killed as a result of project-related noise impacts. In addition, the applicants have included measures as part of the proposed action to minimize noise and light-related impacts to the species (Conservation Measure 3) (Ironwood Consulting 2010a, BLM 2011).

Another type of edge effect affecting desert tortoise populations results from roads and highways (Bury *et al*. 1977, Nicholson 1978, Boarman and Sasaki 2006). Boarman and Sazaki (2006) found that desert tortoise populations are depressed next to major roadways out to a distance of at least 400 m (0.25 mi). Therefore, as discussed above, desert tortoises densities may be depressed in areas of suitable habitats within 400 m (0.25 mi) on either side of portions of I-10, SR 177, and other well-traveled roadways in the Eastern Colorado Recovery Unit.

Because few data exist relative to edge effects from noise, light, vibration, and increased dust from construction and O&M activities, we cannot determine how these potential impacts may affect desert tortoise populations adjacent to the development sites. The lack of information is especially relevant when evaluating effects to individuals within the habitat linkage that would be impacted by the proposed project. Thus, the magnitude and extent of these edge effects cannot be articulated at this time, but conceivably could disturb individual desert tortoises to the extent that they abandon all or a portion of their established home ranges and move elsewhere.

**Effects of Impacts to Habitat and Population Connectivity**

As discussed above in the “Status of the Species” and “Environmental Baseline” sections, the proposed project ROW lies within a naturally constricted linkage in the Upper Chuckwalla Valley and Upper Pinto Wash that connects the desert tortoise population in the Chuckwalla CHU and DWMA with populations in Joshua Tree National Park, Pinto Mountain CHU, Chemehuevi CHU and DWMA, and thence the Mojave Desert portion of the species’ range (Connectivity Figure 1). This linkage is defined by topography, elevation, and geomorphology, with steep, rocky mountains limiting desert tortoise distribution to the west, and low elevations and sand dunes and playas limiting the distribution to the east. The linkage boundaries in Connectivity Figure 1 are based on the BLM’s NECO Plan landform data (i.e., dunes, playas, mountains, and hills), the 152-m (500-ft) elevation contour, our knowledge of habitat conditions in the action area, and desert tortoise survey data from other lowland areas in the Colorado/Sonoran Desert with comparable habitat conditions. This linkage corresponds well with the USGS desert tortoise habitat model (Nussear *et al.* 2009).

As discussed in the draft revised recovery plan (Service 2008) and elsewhere, habitat linkages are essential to maintaining range-wide genetic variation (Edwards *et al.* 2004, Segelbacher *et al.* 2010) and the ability to shift distribution in response to environmental stochasticity, such as climate change [Ricketts 2000, Fischer and Lindenmayer 2007, U.S. Environmental Protection Agency (EPA) 2009]. Natural and anthropomorphic constrictions can limit gene flow and the ability of desert tortoises to move between larger blocks of suitable habitat and populations. In the action area, existing anthropomorphic constrictions (see below) compound effects of natural barriers on desert tortoise population connectivity (Connectivity Figure 2). Construction of the proposed project, particularly Phase III [176.9 ha (437 ac)], would further constrict the already constrained linkage within the Upper Chuckwalla Valley and Upper Pinto Wash area.

Within this connectivity area, the higher predicted desert tortoise habitats occur to the west within the upper bajadas of the Eagle Mountains and to the northeast in the upper bajadas of the Coxcomb Mountains (Nussear *et al*. 2009), and pre-project surveys documented higher densities of desert tortoises in the western portion of the project site compared to the eastern portion of the site (though surveys were not conducted east of Pinto Wash within the high predicted habitats along the bajadas of the Coxcomb Mountains). However, even though the eastern portion of the proposed Solar Farm site is modeled as low predicted habitat (Nussear *et al*. 2009) and relatively little desert tortoise sign was observed during pre-project surveys, the intact nature of the entire site (i.e., the lack of barriers to dispersal), its adjacency to habitats currently occupied by desert tortoises, and the availability of suitable habitat establishes the importance of the this area for population connectivity, even if at a presumed lower level of functionality. While the eastern portion of the site supports suitable habitats based on slope, vegetative composition and structure, substrate conditions, and the presence of inactive sign, desert tortoises are likely to occur in low densities that may not be detected during the single point-in-time survey conducted for the proposed project. Because individuals are known to move across extensive tracts of marginal habitats (Averill-Murray and Averill-Murray 2005; Edwards *et al.* 2004; M. Massar, BLM, pers. comm. 2010), we anticipate that low numbers of desert tortoises occasionally use the entire project site in such a manner. This area likely supports dispersal of desert tortoises from the western side of Pinto Wash, including the proposed project site, and together with the presumed resident population along these eastern alluvial slopes of the Coxcomb Mountains, contributes to regional connectivity across the portions of the ROW that are not now identified for development as part of the proposed project.

If constructed, Phase III would have the greatest impacts on habitat connectivity due to its location at an upper elevation contour of the bajada system, which coincides with the highest densities of desert tortoises within the proposed project ROW (Ironwood Consulting 2010a, b) and high predicted desert tortoise habitat (Nussear *et al*. 2009). The spatial constriction posed by Phase III would result in a 1.6 km (1.0 mi) wide habitat "pinch point" on BLM lands. This dimension is less than that of a typical 3.9 $km^2$ (1.5 $mi^2$) lifetime home range [represented as circular polygons with a 2.25 km (1.4 mi) diameter] in Connectivity Figure 2 (Service 1994a). As described below, this pinch point is further compromised by the several existing anthropogenic obstructions, amplifying the impact to habitat connectivity because the linkage occurs within one of the few areas of diffuse gene flow in this region (Hagerty *et al*. 2010).

Pre-project surveys documented more than 45 desert tortoises in the northwestern portion of the proposed Solar Farm ROW; while not all of these individuals would be directly affected by the construction and O&M of the proposed Solar Farm, an undetermined number would be removed through capture and translocation from home ranges that may overlap the pinch point and proposed project area (Connectivity Figure 2). If translocation is carried out as proposed because of land use constraints, individuals within the proposed Solar Farm site would be moved to the DuPont Recipient Site south of I-10; removal of desert tortoises from home ranges in this area would alter population dynamics within the residual population west of the proposed project site by changing the pattern of overlapping home ranges needed for gene flow across the linkage. However, the Service intends to work with BLM and CDFG during implementation of the translocation plan to minimize demographic impacts by potentially using the proposed Sunlight Control site as the preferred recipient site. The use of this site would be contingent on the BLM committing to conserving these lands.

Connectivity includes two components: habitat availability and behavior of the focal species (Bennett 1999, With *et al*. 1997). Edge effects, such as the impacts from construction-related noise, light, dust, increased vehicular traffic, and ground vibration, thus become of concern. Desert tortoise behavioral tolerances to such disturbances have not been studied and remain unknown. The reduced population level of resident desert tortoises, especially in and around Phase III, along with the introduction of edge effects and higher levels of mortality in the pinch point west of Phase III resulting from construction and O&M activities, would each increase the risk of fragmenting the existing panmictic population within this linkage.

Moreover, the Phase III pinch point coincides with numerous existing facilities and obstacles to desert tortoise occupancy and movement, including the Colorado River Aqueduct, a non-operational railroad, Eagle Mountain Road, Kaiser Road, numerous utility lines and associated access roads, flood control structures, and mining spoil piles and levees (Connectivity Figure 2). Some of these facilities function as sources of mortality (Ironwood Consulting 2010a, b). Thus, the combined impacts from the edge effects described above, existing obstacles to occupancy and movement, and potential increases in mortality have the potential to exert a significant adverse effect on the connectivity function of this narrow band of remaining habitat.

If Phase III were not constructed, the pinch point within the linkage would be about 2.6 km (1.6 mi) wide, slightly larger than the 2.25 km (1.4 mi) diameter of a typical desert tortoise lifetime home range (Service 1994a). Whether this additional corridor width of 1.0 km (0.6 mi) would improve ecological function at this particular location remains unknown and could only be determined by monitoring post-project effects on desert tortoise occupancy and movement patterns within the habitat linkage and adjacent habitats. According to the tenets of conservation biology and principles of reserve design (With *et al.* 1997), wider linkages are more likely to retain ecological functionality and reducing the linkage to biological *minima* increases the likelihood of ecological dysfunction (Pascual-Hortal and Saura 2006). Therefore, future demographic movement and gene flow may be placed at risk, further compromising the evolutionary resilience of the species to respond to future environmental change and other potential threats (Barrett and Schluter 2007, Fischer and Lindenmayer 2007). To address this

potential impact to connectivity, as discussed above and analyzed below, the Service, BLM, CDFG, and USGS have collaborated on a pair of conservation measures that would likely reduce the degree of risk to an acceptable level (see "Conservation Measures" section).
Using the USGS desert tortoise habitat model, we evaluated the potential for all linkages in this region. Based on our analyses, the Upper Chuckwalla Valley and Upper Pinto Wash, especially along the upper bajadas of the Eagle and Coxcomb mountains, represent the most viable remaining linkage in this region. As discussed above and in the "Status of the Species" and "Environmental Baseline" sections, the steep and rocky Eagle and Cottonwood mountains limit the distribution of desert tortoises to the west. Cottonwood Canyon and Big Wash potentially provide limited linkages through the Eagle and Cottonwood mountains, but both are long, narrow washes the may not support resident tortoise populations. The viability of Cottonwood Canyon, in particular, is limited because of a busy paved road that likely functions as a mortality sink, which further constrains desert tortoise occupancy and movement potential in this narrow canyon (M. Vamstad, Joshua Tree National Park, pers. comm. 2010).

Beyond these few linkage opportunities through otherwise steep rugged topography to the west, the only other potential connection in the action area with 0.5 or higher predicted desert tortoise habitat (Nussear *et al*. 2009) lies on the eastern side of the proposed project ROW, in the narrow band of alluvium along Pinto Wash and the base of the Coxcomb Mountains. SR 177 truncates this area at its southernmost extent, and the matrix of largely unsuitable disturbed private lands and extensive sand dune and playa system here would not function effectively as a reliable alternative north-south linkage between the Chuckwalla CHU and DWMA populations and populations to the north connecting with the Mojave Desert (Connectivity Figure 2). Unknown future changes in land uses and the extent of interest in renewable energy development across this BLM/private lands matrix add further uncertainty to reliance upon these lesser value habitats for connectivity.

Climate change may exacerbate this circumstance, given that future temperatures generally are expected to rise; the effects of climate change on rainfall are less predictable at this time (International Panel on Climate Change 2007). A future rise in temperature would increase environmental variability and desert tortoise mortality within the few hypothetical and putative linkages described above. Because of its habitat requirements and life history traits, the desert tortoise is considered to be highly vulnerable to the effects of climate change (U.S. EPA 2009, National Wildlife Federation 2011). The combination of increased environmental variability and decreased genetic variation in desert tortoise populations would lead to a higher likelihood of extirpation in linkage areas due to stochastic factors and human-related activities. Thus, landscape-scale redundancy in core habitat-linkage reserve design is an important principle in conservation strategies for widely distributed species like the desert tortoise (Service 1994a, 2008). As summarized by Rayfield *et al*. (2011), the ability of organisms to move among habitat patches and populations is undermined by habitat fragmentation processes (Fischer and Lindenmayer 2007), and restricted movements have significant consequences to species' conservation (Damschen *et al*. 2006). Maintaining wildlife movement in the short-term allows for juvenile dispersal, recolonization of unoccupied habitat and population persistence, while in the long-term it enables range shifts in response to climate change and conserves genetic

heterozygosity needed for evolutionary adaptation (Barrett and Schluter 2008). As a result, quantifying the degree to which landscapes promote or hinder a given species occupancy and movement is essential to inform conservation decision-making (Calabrese and Fagan 2004). Based on the above discussion on the effects of the proposed project on habitat connectivity, our assessment of the range-wide status of the species indicates that the loss of the habitat linkage within the Upper Chuckwalla Valley and Upper Pinto Wash would potentially eliminate gene flow between the Chuckwalla CHU and DWMA populations and those to the north in the Mojave portion of the species' range. Since redundancy in the linkage network between core populations in this portion of the species' range are extremely limited, maintenance of connectivity along the I-10 corridor through Pinto Wash now becomes imperative. Therefore, conserving the smaller-scale, internal redundancy within remaining portions of the habitat linkage is essential; these include 1) habitat connections to as many culverts and bridges under I-10 as possible; and 2) minimizing the loss of desert tortoise habitat within the BLM/private landownership checkerboard that would preclude habitat connections to these crossings along this section of the I-10 (Desert Tortoise Connectivity Acquisition Area Figure), or would fragment habitat, overlapping home ranges, and desert tortoise movement along the north and south sides of I-10 and the southern base of the Cottonwood and Eagle mountains.

Some private lands along this section of I-10 are at risk of development, as evidenced by the high asking prices for parcels located within the DWMA exclusion areas in BLM's NECO Plan associated with each of the freeway on-and off-ramp intersections along I-10 (R. Lopez, Wildlands Inc., pers. comm. 2010), and the Paradise Valley project proposed near Cactus City in Shavers Valley. In addition, BLM is pursuing a land exchange on a parcel near Chiriaco Summit that would transfer a BLM parcel to private ownership that would be subject to development (M. Massar, BLM, pers. comm. 2011). The disjunct landownership pattern introduces a high level of risk to maintenance of desert tortoise connectivity unless development pressure can be eliminated through acquisition of private lands through the REAT's bundled habitat acquisition strategy, which would help to offset cumulative impacts of solar development along the I-10 corridor and impacts to habitat connectivity from individual developments.

As discussed above, the loss of habitat and potential impacts to connectivity associated with the proposed project is contrary to objectives in the desert tortoise recovery plans (Service 1994a, 2008) and BLM's NECO Plan. Therefore, we have coordinated with the BLM, CDFG, and USGS to optimize the chances for maintaining a habitat-based linkage that would continue to function ecologically, demographically, and genetically should the BLM, CDFG, and CPUC permit the construction of Phase III as proposed. The agencies have devised a set of conservation measures (see "Description of the Proposed Action" section) that would include:

1. An additional conservation measure that entails a Desert Tortoise Habitat Linkage Management and Monitoring Plan and a Desert Tortoise Population Connectivity Effectiveness-Monitoring Plan will be funded by the applicants and implemented over the life of the project and term of the ROW grant. In general, the emphasis of the plans are twofold: to minimize the effects of the proposed project by improving habitat conditions and maintaining desert tortoise habitat and population connectivity within the corridor pinch

point and adjacent linkage habitats through identification of natural and anthropogenic obstacles to connectivity and implementation of management actions to eliminate those obstacles; and to monitor the effectiveness of the habitat linkage in maintaining gene flow using adaptive management principles. Under this component, the baseline genetic composition of resident desert tortoises within the study area will be determined and monitored over time to evaluate gene flow and differentiation across the geographic extent of the study area over the life of the project; data on mortality mechanisms and the fate of individuals and spatial habitat use within the study area will also be monitored. These data are necessary to adaptively manage the linkage to optimize the opportunity for maintaining connectivity and better understand the implications of habitat loss within linkages and the factors limiting gene flow within these areas.

2. BLM would exercise its authorities pursuant to existing ROW grants in the action area to ensure that crossings along existing facilities (e.g., Kaiser Railroad, Kaiser and Eagle Mountain roads, aqueduct) are either upgraded or maintained such that desert tortoise occupancy and connectivity are not compromised. This action would include strategic placement of desert tortoise fences and culverts along these roads, and repair of existing culverts under the railroad. In addition, if NFWF funds become available through the REAT process and may be used for such purposes, weed control and habitat restoration, as needed, also would be conducted; and

3. No less than 1,968.4 ha (4,864 ac) of habitat would be acquired within the BLM/private landownership checkerboard along the I-10 corridor between Cactus City and Desert Center (Desert Tortoise Connectivity Acquisition Area Figure). This acquisition would facilitate 1) the consolidation of landownership and management; 2) minimize the risk of these lands being developed; and 3) strengthen the internal redundancy of connectivity opportunities along the corridor to help ensure habitat continuity and access by desert tortoises and other wildlife species to a network of conserved lands connected to the numerous culverts and bridges that span the freeway. Consolidated BLM landownership is necessary to help safeguard the persistence of resident desert tortoises in the narrow band of suitable habitats between the I-10 and the Cottonwood and Eagle mountains, which ultimately connects populations in the Upper Chuckwalla Valley, Upper Pinto Wash, Pinto Basin, and Pinto Mountain and Chemehuevi CHUs and DWMAs.

In consideration of the conservation measures that will be implemented as part of the proposed action, including those described above, we anticipate that opportunities for desert tortoise connectivity would be maintained if the proposed project were constructed. The effectiveness monitoring program described herein would provide the necessary data to determine whether this program is ultimately successful, and as discussed above, at the end of the term of the ROW grant, the BLM will consider these data during its review of any renewal request for the Solar Farm prior to issuing a decision on the extension of the ROW grant. If the BLM determines that an extension of the ROW grant may conflict with maintenance of habitat linkage functions and desert tortoise habitat and population connectivity, decommissioning and habitat restoration may commence to reestablish population connectivity. Therefore, we conclude the proposed three-part strategy, along with ecological restoration of the proposed Solar Farm site, if needed to

maintain connectivity, would reasonably be expected to achieve regional conservation objectives for the desert tortoise along the western portions of Pinto Wash and Chuckwalla Valley, and thereby avoid the risk of isolating the Chuckwalla CHU and DWMA populations from the remainder of the species' range.

**Effects of Compensation**

To offset the permanent loss of tortoise habitat, the applicants would provide habitat compensation by phase of project construction at the ratios and for the acreages described in Conservation Measure 9: [Habitat Compensation Plan (AM-BIO-1) and Offsite Compensation (MM-BIO-2)] of the "Conservation Measures" section and the draft *Habitat Compensation Plan for the Desert Sunlight Solar Farm Project* (First Solar 2011). While the precise location of these lands has not yet been determined, lands selected for acquisition will be within the Eastern Colorado Recovery Unit (Service 2008) and Chuckwalla CHU and DWMA. Acquisition priorities would be along the I-10 corridor between Cactus City and Desert Center, where existing crossings could be utilized to access contiguous desert tortoise habitats on either side of the freeway (Desert Tortoise Connectivity Acquisition Area Figure). The Service, BLM, CDFG, and CPUC, as appropriate, will reach mutual agreement on the parcels selected for acquisition based on the criteria stipulated in Conservation Measure 9 to ensure the agencies' respective biological objectives for offsetting impacts to desert tortoise and other resources are achieved.

The abundance of desert tortoise populations within potential acquisition lands is unknown since the specific areas have not yet been identified. However, because acquisition will focus on areas connected to lands with desert tortoise habitat of equal or higher quality/role and function than the project area, and acquired lands would enjoy an improved level of management above existing levels, we anticipate that the acquisition lands will contain suitable habitat that is currently occupied or likely to be occupied in the future. Acquired lands will be managed for desert tortoise conservation.

Although the acquisition and protection of suitable desert tortoise habitat through these compensation requirements would not create new habitat within the recovery unit, it would ensure a no net loss of desert tortoise habitat managed for the conservation of the species within targeted conservation areas. Acquisition, management, and permanent protection of any newly acquired lands may facilitate a reduction in the number and magnitude of threats and mortality mechanisms in areas not currently protected within the Eastern Colorado Recovery Unit.

Using available data on landownership and willing sellers, the Service has determined that privately owned lands that support desert tortoise habitat are available for acquisition within the priority area identified (Desert Tortoise Connectivity Acquisition Area Figure). We are aware that not-for-profit conservation groups and for-profit mitigation banking organizations are actively identifying and acquiring lands targeted for offsetting impacts to desert tortoise habitats associated with renewable energy projects in this region. Though we are aware that numerous land acquisitions and option agreements have been successfully executed to date, and over 10,000 ha (>25,000 ac) of private lands occur within the I-10 corridor priority acquisition area,

Sunlight has targeted compensation lands in Imperial County through SB 34 due to the potential lack of availability of lands within the priority acquisition area. While acquisition of lands in Imperial County may serve to consolidate land management in the Chuckwalla DWMA, these lands would not appropriately offset impacts to connectivity from the proposed project. Given privately owned parcels may be deemed "unavailable" by the applicant for a number of reasons, including the following: 1) landowner(s) may not respond to inquiries or are otherwise inaccessible; 2) the land title is in dispute, under lien, held in trust and trustees cannot reach agreement on a sale, or otherwise encumbered by legal action; 3) constrained by easements and ROWs inconsistent with habitat conservation purposes, 4) an agreement on purchase price may not be reached; or 5) the land is not for sale regardless of price because of other pending land use actions. However, according to BLM realty specialists, these potential complications are seldom an obstacle to acquisition except #4, and this factor is invariably based on what the buyer is willing to pay (S. Eubanks, BLM, pers. comm. 2011). Therefore, we conclude that virtually all of the privately owned lands within the approximate 10,000-ha (25,000-ac) priority acquisition area are available, based on the premise that willing sellers are primarily influenced by price.

**Effects to Desert Tortoise Critical Habitat**

***Direct Effect to Desert Tortoise Critical Habitat***

The PCEs provided by critical habitat operate together in facilitating movement, dispersal, and gene flow of desert tortoise populations. Availability of the PCEs is dependent upon access to suitable physical and biological features and the integrity of the associated ecosystem.

The DuPont Recipient Site and the Red Cloud Control Site associated with the proposed Solar Farm component would be located within Chuckwalla CHU. No effects to critical habitat PCEs are expected from the translocation of up to 31 desert tortoises to the DuPont Recipient Site. Similarly, effects to PCEs from post-translocation monitoring at the recipient and control sites are expected to be negligible, as only existing routes would be used to gain access to the sites and conservation measures, such as reduced speed limits and the use of Authorized Biologists and Monitors, would be implemented. Thus, the potential effects from translocation of desert tortoises from the project areas into the Chuckwalla CHU are not likely to appreciably diminish the value of any PCEs at the local or landscape level, provided all actions relative to access described in the "Conservation Measures" section are properly implemented.

***Gen-tie Lines A-1 and A-2: Sunlight***

Direct loss of approximately 13.8 ha (34 ac) of designated critical habitat for desert tortoise would occur with the construction of gen-tie A-1 and 5.7 ha (14 ac) from gen-tie A-2. This loss of habitat is negligible relative to the 413,022 ha (1,020,600 ac) of critical habitat that has been designated within the Chuckwalla CHU. Impacts from construction of the selected gen-tie would occur in an area that already experiences considerable edge effects from I-10, and direct effects from existing utility lines and access roads. The impacts associated with this component of the proposed project are not likely to appreciably diminish the value of the PCEs essential to

the species' recovery within the Eastern Colorado Recovery Unit or the Chuckwalla CHU, and is not likely to result in substantial adverse effects to critical habitat throughout the species' range. However, despite the small area of impact, new gen-tie lines and access roads may attract avian and other predators and result in an increase of unnatural predation rates within this important habitat linkage. To avoid and minimize the availability of predator subsidies from construction and O&M-related activities associated with the gen-tie, refuse and water management, a WEAP, and construction and post-project monitoring would be implemented in accordance with the *Common Raven Management Plan for the Desert Sunlight Solar Farm Project* (Ironwood Consulting 2010c) (see "Predator Subsidies" section above).

*Sufficient space to support viable populations within each of the six recovery units, and to provide for movement, dispersal, and gene flow*: Because of the linear nature of the impact and relatively small area of ground disturbance, construction of the gen-tie and concomitant loss of not more than 13.8 ha (34 ac) of desert tortoise critical habitat is not likely to preclude movement, dispersal, or gene flow within the local population.

*Sufficient quality and quantity of forage species and the proper soil conditions to provide for the growth of the species*: Although soil compaction around the pole sites and along the access roads could preclude the germination and growth of forage species within the disturbance areas, these impacts are not likely to appreciably reduce the quality and quantity of forage species because the impact areas are relatively small and forage species would be available in the surrounding undisturbed habitats.

*Suitable substrates for burrowing, nesting, and overwintering; burrows, caliche caves, and other shelter sites:* Although soil compaction around the pole sites and along the access and spur roads may render these areas unsuitable for burrowing and nesting, these impacts are not likely to appreciably reduce the availability of shelter sites because the impact areas are relatively small and suitable soils for burrowing would be available in the surrounding undisturbed habitats. In addition, this area has been previously disturbed by the construction and O&M activities associated with existing utility infrastructure and access roads.

*Sufficient vegetation for shelter from temperature extremes and predators*: Vegetation would be removed from each of the pole sites and for improvements along the access and spur roads, thereby eliminating shelter sites that could be used to escape temperature extremes and predators in these areas. However, because the area of impact is relatively small and surrounding vegetation would remain intact, desert tortoises can escape temperature extremes and predators in the adjacent undisturbed habitats.

*Habitat protected from disturbance and human-caused mortality*: The lands encompassed by the Chuckwalla CHU and DWMA are managed for desert tortoise conservation; however, other land uses are allowed within these areas. Construction of the Sunlight gen-tie, access road, and spur roads to each pole would remove 13.8 ha (34 ac) of critical habitat within a designated utility corridor with some existing disturbance. The increase in vehicle traffic for construction and O&M activities has the potential to kill or injure desert tortoises; however, the conservation

measures that would be implemented as part of the proposed action, including the WEAP, speed limit shall not exceed 40 kph (25 mph) on access roads and signs would be posted, and biological resource compliance monitoring, are expected to minimize impacts to desert tortoises and critical habitat. While the new and improved roadways may attract unauthorized OHV use, this area now experiences edge effects from I-10 and direct effects from existing utility lines and access roads. Because these impacts would occur in previously disturbed areas within the unit, the loss of 13.8 ha (34 ac) is not likely to appreciably reduce the integrity of the Chuckwalla CHU.

***Red Bluff Substation and Associated Components: SCE***

Direct loss of approximately 69.6 ha (172 ac) of designated critical habitat for desert tortoise would occur with the construction of the Red Bluff Substation and associated components; the Chuckwalla Mountain Communication Site and access road are located within the Chuckwalla CHU but on previously disturbed lands. This loss of habitat is negligible relative to the 413,022 ha (1,020,600 ac) of critical habitat that has been designated within the Chuckwalla CHU. As described above for the gen-tie line, impacts from construction of the Red Bluff Substation and associated components would occur in an area that already experiences considerable edge effects from I-10, and direct effects from existing utility lines and access roads. The impacts associated with this component of the proposed project are not likely to appreciably diminish the value of the PCEs essential to the species' recovery within the Eastern Colorado Recovery Unit or the Chuckwalla CHU. In addition, these impacts are not likely to result in substantial adverse effects to critical habitat throughout the species' range.

Again, despite the relatively small area of impact, the new substation, gen-tie lines, and access roads may attract avian and other predators and result in an increase of unnatural predation rates within this important habitat linkage. To avoid and minimize the availability of predator subsidies from construction and O&M-related activities associated with the proposed Red Bluff Substation, conservation measures would be implemented in accordance with the *Common Raven Management Plan for the Desert Sunlight Solar Farm Project* (Ironwood Consulting 2010c) (see "Predator Subsidies" section above).

The Red Bluff Recipient Site would be located within Chuckwalla CHU if translocation is required for desert tortoises located on the Red Bluff Substation site. Although no live desert tortoises or active sign were observed within the disturbance area, up to four desert tortoises may require translocation. Because no effects to critical habitat PCEs from the potential translocation of up to four desert tortoises to the Red Bluff Recipient Site are expected, this action is not likely to appreciably diminish the value of any PCEs at the local or landscape level.

*Sufficient space to support viable populations within each of the six recovery units, and to provide for movement, dispersal, and gene flow*: Permanent removal of 69.6 ha (172 ac) of critical habitat equates to a relatively small percentage of the Chuckwalla CHU and the project components are sited at the edge of the unit in a designated utility corridor with some existing disturbance. However, as discussed below, the proposed substation would be adjacent to the Desert Tortoise Connectivity WHMA.

*Sufficient quality and quantity of forage species and the proper soil conditions to provide for the growth of the species*: Permanent removal of 69.6 ha (172 ac) of habitat would preclude this area from supporting forage species and eliminate proper soil conditions for germination and growth of forage species into the future. However, this loss of habitat would not likely appreciably reduce the quality and quantity of forage species within the Chuckwalla CHU because the project components are sited at the edge of the unit in a designated utility corridor with some existing disturbance.

*Suitable substrates for burrowing, nesting, and overwintering; burrows, caliche caves, and other shelter sites*: Permanent removal of 69.6 ha (172 ac) of habitat would preclude this area from supporting substrates suitable for desert tortoise burrowing and nesting into the future. However, this loss of habitat would not likely appreciably reduce the integrity of the Chuckwalla CHU because the project components are sited at the edge of the unit in a designated utility corridor with some existing disturbance, and suitable burrowing, nesting, and overwintering substrates would remain intact and available in the surrounding undisturbed habitats.

*Sufficient vegetation for shelter from temperature extremes and predators*: Permanent removal of 69.6 ha (172 ac) of habitat would eliminate shelter sites that could be used to escape temperature extremes and predators in this area. However, because the area of impact is relatively small and surrounding vegetation would remain intact, desert tortoises can escape temperature extremes and predators in the adjacent undisturbed habitats. Perimeter security fencing of the substation site would prevent desert tortoises from entering the site and succumbing to temperature extremes and predation due to a lack of vegetative cover. Although the drainage sites [up to 5.7 ha (14 ac)] and linear components of the Red Bluff Substation would remain unfenced, they present less of an exposure risk to the desert tortoises because the disturbance area is relatively small and intact habitat would be accessible immediately adjacent to these features.

*Habitat protected from disturbance and human-caused mortality*: As described above for the proposed gen-tie component, the lands encompassed by the Chuckwalla CHU and DWMA are managed for desert tortoise conservation; however, other land uses are allowed within these areas. The Red Bluff Substation and associated components are sited within a designated utility corridor with some existing disturbance. The increase in vehicle traffic for construction and O&M activities has the potential to kill or injure desert tortoises. While the new facility and associated access road may attract unauthorized OHV use, this area already experiences edge effects from I-10 and direct effects from existing utility lines and access roads. Because these impacts would occur on the edge of the unit where some disturbance has already occurred, the loss of 69.6 ha (172 ac) is not likely to appreciably reduce the integrity of the Chuckwalla CHU.

***Indirect Effects to Desert Tortoise Critical Habitat***

Some portion of the Chuckwalla CHU and DWMA may experience indirect effects from construction and O&M activities associated with the proposed action. These include operational noise and fugitive dust and the potential for increases of nonnative plant species in the area. The

applicants will implement numerous conservation measures as part of the proposed action to ensure that these indirect effects are minimized. The measures, which include but are not limited to adhering to the Service-approved translocation plan and disease screening procedures and the BLM-approved integrated weed management plan, are set forth in ”Conservation Measures” section of this biological opinion, the *Biological Assessment for the Desert Sunlight Solar Farm Project* and its appendices (Ironwood Consulting 2010a), and the FEIS (BLM 2011).

***Compensation for Loss of Designated Critical Habitat***

Conservation Measure 9 [Habitat Compensation Plan (AM-BIO-1) and Offsite Compensation (MM-BIO-2)], identified as part of the proposed action, to offset impacts to critical habitat through land acquisition within the CHU at a 5:1 ratio, would help to maintain the role and function of the Chuckwalla CHU. Acquisition lands would support equivalent or higher quality desert tortoise habitats than those within the project areas and be configured such that they would contribute to habitat linkages and offset adverse effects to the primary constituent elements of critical habitat. In addition, as discussed in the *Habitat Compensation Plan for the Desert Sunlight Solar Farm Project* (First Solar 2011) and FEIS (BLM 2011), the Service, BLM, and CDFG would have approval authority over the parcels proposed for acquisition to ensure they meet the compensation target objectives. As such, compensation would ensure that the habitat base for supporting viable desert tortoise populations within critical habitat is maintained and that the environmental baseline on BLM lands within the highest value habitats, which are the primary focus of recovery efforts, is not eroded due to impacts from the proposed action.

**Effect on Recovery**

Per section 2(b), the primary purposes of the Act are to provide a means whereby the ecosystems upon which listed species depend may be conserved, and to provide a program for the recovery of listed species. Per section 2(c), Congress established a policy requiring all Federal agencies to use their authorities in seeking to recover listed species in furtherance of the purposes of the Act. Consistent with these purposes and Congressional policy, sections 3(5), 4(f), 7(a)(1) of the Act, and the implementing regulations (50 CFR § 402.02) to section 7(a)(2) of the Act, and related preamble (see 51 FR 19926), generally require Federal agencies to further the survival and recovery of listed species in the use of their authorities. Pursuant to these mandates, our analysis below assesses: 1) whether adverse effects from the proposed project to the environmental baseline of the desert tortoise are adequately offset; and 2) the extent to which the proposed action would cause “significant impairment of recovery efforts” or adversely affect the “species’ chances for survival to the point that recovery is not attainable” (51 FR 19934).

The applicants would implement conservation measures as part of the proposed action to avoid, minimize, and offset the adverse effects to desert tortoises in the project areas. Overall, we expect few, if any, subadult and adult desert tortoises per year would be killed or injured during construction and O&M of the proposed project, and that a relatively small number of juvenile desert tortoises and eggs may be moved or destroyed during construction and O&M activities. Few, if any, desert tortoises would be killed or injured during O&M of the facilities. We expect

that most subadult and adult tortoises encountered during work activities would be either moved short distances out of harm's way or translocated to specific recipient sites. Because the BLM and applicants would implement a variety of measures to reduce stress to these animals, we do not anticipate that death or injury would result from the handling and translocation of these individuals.

Based on the results of translocation studies discussed above, most of the subadult and adult desert tortoises moved or translocated from the project areas would continue to survive and reproduce at the sites to which they are moved (i.e., in adjacent habitats or the recipient sites). Consequently, we anticipate that the proposed action would not appreciably diminish the reproductive capacity of the species, particularly in light of the relatively few desert tortoises that would be affected.

We do not anticipate that the loss of habitat in the project areas would substantially reduce the ability of desert tortoises to survive for the foreseeable future in the wild. This conclusion is based on the assumption that the majority of higher value habitat areas generally found within designated CHUs or other conserved lands in the 1994 Recovery Plan (Service 1994a), final rule for designation of critical habitat for the species (Service 1994b), and draft revised recovery plan (Service 2008), will be conserved. The proposed acquisition of up to 2,757.1 ha (6,813 ac) of desert tortoise habitat would contribute to this base of conserved lands by adding to habitat linkages and population connectivity along the I-10 corridor within and between desert tortoise conservation areas, known populations of desert tortoises, and other lands allocated for conservation in the Eastern Colorado Recovery Unit. In addition, impacts of the proposed project to designated critical habitat would be compensated through land acquisition to benefit connectivity and recovery within the unit where the impacts occur (i.e., the Chuckwalla CHU).

However, if Phase III were built, the proposed project would further limit habitat and population connectivity that would result from construction of Phases I and II, which would occur within low predicted habitats that would otherwise be available for occupancy. As described in the "Status", "Environmental Baseline", and "Effects" sections, maintenance of established lifetime home ranges and viable desert tortoise populations in the Upper Chuckwalla Valley and contiguous habitats within the Upper Pinto Wash is needed to perpetuate habitat and population connectivity between the Mojave and Colorado/Sonoran portions of the species' range. Because Phase III would constrain the habitat linkage to a biological minimum, we conclude that the ability of this linkage to sustain a viable resident population will depend largely on the suitability and availability of habitat within the linkage, the number of mortality mechanisms within the linkage, and the ability of the population in adjacent areas to rebound after project-related effects. Thus, the proposed action could significantly impair inter-CHU and DWMA connectivity, which is counter to objectives in the approved and draft recovery plans (Service 1994a, 2008) and BLM's land use plans. However, to address this potential impact to desert tortoise recovery, the Service, BLM, and CDFG have agreed to a set of science-based conservation measures that will be implemented as part of the proposed action. Though significant effort would be required to implement the proposed conservation measures, we anticipate that identifying and addressing existing anthropomorphic constraints to connectivity,

establishing the baseline genetic composition of the resident population, and elucidating the species' use of spatially-constrained habitats in areas with potentially significant edge effects will inform the proposed adaptive management program necessary to maintain gene flow within the habitat linkage at issue, consistent with established desert tortoise conservation objectives.

## CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, local, tribal, or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act. We are not aware of future State, local, Tribal, or private actions reasonably certain to occur within the action area.

## CONCLUSION

After reviewing the current status of the species, environmental baseline for the action area, effects of the proposed action, and cumulative effects, it is the Service's biological opinion that the proposed action is not likely to jeopardize the continued existence of the desert tortoise or destroy or adversely modify designated critical habitat. We base this conclusion on the following:

1. The applicants would implement conservation measures as part of the proposed action to ensure that mortality and injury of desert tortoises are minimized (see "Conservation Measures" section). Measures include, but are not limited to employing Service-approved Authorized Biologists and Biological Monitors throughout project construction, performing pre-construction clearance surveys, and installing permanent and temporary desert tortoise exclusion fencing.

2. The applicants would implement translocation in accordance with the most current Service guidance (Service 2010a) to ensure as many individuals are removed from the project sites as possible and to minimize any risk such that no desert tortoises are killed or injured due to translocation.

3. The applicants would implement measures to reduce the potential for increased predation by common ravens, both in close proximity to the project area and regionally.

4. The applicants would implement measures to avoid, minimize, and control the introduction of and spread of nonnative plant species.

5. The best available data relative to densities of the Mojave population of the desert tortoise do not document a statistical population trend for this recovery unit. Hence, we do not have information to indicate that the loss of a relatively small number of individuals as a result of the proposed action would appreciably reduce our ability to achieve recovery objectives within the Eastern Colorado Recovery Unit.

6. Translocation of some desert tortoises to an approved recipient site will increase desert tortoise numbers in those areas. Successful translocation would minimize some adverse effects of the proposed action by allowing those individuals to remain in the population and contribute towards recovery of the species.

7. Compensation required by the BLM, CDFG, and CPUC would result in an increase in the quantity and quality of habitat managed for the conservation of the desert tortoise.

8. The applicants would implement conservation measures as part of the proposed action to avoid, minimize, and offset impacts from the proposed project and to ensure that the impacts are not likely to appreciably diminish the conservation role and function of designated critical habitat for desert tortoise in the project area or the species' range.

9. Though the proposed project may affect the recovery potential of the species by reducing habitat and population connectivity between the Chuckwalla CHU and DWMA and the northern portion of the species range, this impact is not likely to appreciably reduce the reproduction, numbers, or distribution of the species to the extent that both the survival and recovery of the species would be jeopardized provided that the conservation measures specific to habitat and population connectivity and habitat compensation are implemented, and upon decommissioning, if needed to maintain connectivity, BLM requires habitat restoration across the project ROW.

## INCIDENTAL TAKE STATEMENT

Section 9 of the Act, and Federal regulation pursuant to section 4(d) of the Act, prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined as intentional or negligent actions that create the likelihood of injury to a listed species by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not the purpose of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this incidental take statement.

The measures described below for desert tortoises are non-discretionary and must be undertaken by the BLM so that they become binding conditions of any grant or permit issued to the applicants/permittees, as appropriate, for the exemption in section 7(o)(2) to apply. The BLM has a continuing duty to regulate the activity covered by this incidental take statement. If the BLM: 1) fails to assume and implement the terms and conditions; or 2) fails to require the applicants/permittees to adhere to the terms and conditions of the incidental take statement through enforceable stipulations that are incorporated into the permit or grant document, the

protective coverage of section 7(o)(2) may lapse. To monitor the impact of incidental take, the BLM must report the progress of the action and its impact on the species to the Service as specified in the incidental take statement [50 CFR § 402.14(i)(3)].

AMOUNT AND EXTENT OF TAKE

The proposed action will result in the take of all desert tortoises in the proposed project areas (i.e., within the Solar Farm, Red Bluff Substation, and telecommunication sites; along the gen-ties and associated access roads; in areas where exclusion fencing would be installed; and within recipient and control sites) as a result of construction and long-term O&M of the proposed project, moving individuals out of harm's way, and from translocation and subsequent health assessments during the monitoring period. However, we cannot precisely quantify the amount of take that will occur during these activities. Some of the constraints that make it difficult to determine desert tortoise densities and abundance include the cryptic nature of the species (i.e., individuals spend much of their lives underground or concealed under shrubs), inactivity in years of low rainfall, and low abundance across a broad distribution within several different habitat types. In addition, population numbers and distribution of individuals fluctuate in response to weather patterns and other biotic and abiotic factors over time; hence, it is likely that the numbers and distribution of desert tortoises within the project area have changed since project-specific surveys were completed. The number of juvenile desert tortoises and eggs is even more difficult to quantify because of small size, their location underground, and low detection probabilities during surveys. The following paragraphs define the form of take and the number of individuals we anticipate the proposed action will take.

**Construction, O&M, and Loss of Habitat**

For the anticipated take, in the form of mortality or injury, of juvenile desert tortoises and eggs resulting from construction of the proposed project (identified below), we would consider the amount or extent of that taking to be exceeded if the number of subadult and adult desert tortoises captured or collected on the proposed project sites and perimeter fence lines exceeds 35 individuals (i.e., 31 on the proposed Solar Farm site and 4 on the Red Bluff Substation site). We have established this threshold because the BLM will not be able to accurately monitor the actual incidences of death and injury resulting from the construction of the proposed project (i.e., up to 25 juveniles and 129 eggs on the proposed Solar Farm site) due to the likelihood that virtually all of the individuals missed during clearance surveys and killed during construction will be juveniles or eggs and locating the carcasses or shell fragments would not be feasible. To address this issue, we have used the threshold for capture or collection of subadult and adult individuals on the proposed project sites as a surrogate measure of mortality of the smaller size classes. Using this threshold as a surrogate assumes that our method of calculating the number of reproductive females, which is based on the estimated abundance of subadult and adult desert tortoises on the proposed project sites, allows us to also calculate the number juveniles and eggs that may be affected. Consequently, finding more than 35 subadult and adult desert tortoises would indicate that a larger number of juveniles and eggs may be killed or destroyed during construction. Because clearance surveys would occur prior to commencement of construction

activities, use of this threshold would allow reinitiation of consultation and a reassessment of the estimated mortality take prior to any mortality occurring on the ground. Because we estimate below that few, if any, subadult or adult desert tortoises would be killed, the terms and conditions below set additional thresholds for reinitiation of consultation related to take, in the form of death or injury, of desert tortoises in that size class.

***Desert Sunlight Solar Farm and Associated Components***

The disturbance of up to 1,620.36 ha (4,004 ac) of habitat from construction of the proposed Solar Farm, gen-tie, and associated access roads and O&M-related activities may result in accidental death or injury of subadults, adults, and juvenile desert tortoises and eggs from crushing, trampling, or burial. If the proposed project-related activities result in impacts to desert tortoise habitat beyond this acreage, the amount or extent of take will be exceeded.

As discussed in the "Environmental Baseline" section, we estimate that up to 31 subadult and adult desert tortoises, up to 25 juveniles, and 129 eggs may occur within the proposed Solar Farm project area. The applicants would construct permanent or temporary desert tortoise exclusion fencing around construction zones, locate most subadult and adult individuals during preconstruction clearance surveys, and implement numerous conservation measures to avoid and minimize death and injury to desert tortoises, including moving individuals out of harm's way or translocating them appropriately (see section on "Desert Tortoise Translocation" below). Consequently, we anticipate that construction of the proposed Solar Farm and associated components (i.e., gen-tie line, associated access roads, and perimeter security fence) is likely to take, in the form of mortality or injury, no more than two (2) subadult and adult desert tortoises.

Though we do not know how many juvenile desert tortoises and eggs will remain undetected on the proposed project site, we anticipate that construction of the proposed Solar Farm is likely to take, in the form of mortality or injury, all juvenile desert tortoises and eggs (i.e., up to 25 juvenile desert tortoises and 129 eggs) that occur on the proposed project site. However, as described above, because of the difficulty in monitoring take of these size classes, the number of subadults and adults captured or collected during construction of the proposed Solar Farm (i.e., 31) would serve as the surrogate to determine when the amount or extent of take is exceeded.

No incidental take of desert tortoises is anticipated due to O&M of the proposed Solar Farm itself because all activities would occur within the perimeter security fence. However, maintenance and repair of the perimeter security fence may result in incidental take, in the form of mortality or injury, of no more than one (1) subadult or adult desert tortoise per calendar year.

Although unlikely, desert tortoises that were undetected during clearance surveys for construction may be located during ground-disturbing activities. Though we do not know how many desert tortoises will subsequently be detected, all individuals located will be captured and translocated and any desert tortoise eggs that are located will be excavated and translocated. Thus, take, in the form of capture and collection of all desert tortoises resulting from these incidental detections is exempted to ensure mortality and injury of desert tortoises is minimized.

Up to 16 desert tortoises were estimated along the gen-tie line and associated access roads; however, because of the imprecise nature of this estimate, the actual number of individuals that may be moved out of harm's way along the gen-tie line and access road is unknown. Because the applicant will implement the conservation measures identified under the proposed action, take, in the form of capture and collection, is anticipated for few, if any, individuals located during O&M activities along the gen-tie and associated access roads over the life of the project. Take, in the form of death or injury, of no more than one (1) subadult or adult desert tortoise per calendar year is anticipated during O&M activities, which will be localized and infrequent because access will be along existing routes and the applicants will implement numerous conservation measures to avoid and minimize death and injury of desert tortoises.

***SCE Red Bluff Substation, Telecommunications Sites, and Associated Components***

The disturbance of up to 69.61 ha (172 ac) of habitat from construction of the proposed Red Bluff Substation, telecommunications sites, and associated components, and the subsequent O&M-related activities may result in accidental death or injury of desert tortoise subadults, adults, juveniles, and eggs from crushing, trampling, or burial. If the proposed project-related activities result in impacts to desert tortoise habitat beyond this acreage, the amount or extent of take will be exceeded.

As discussed in the "Environmental Baseline" section, we estimate that up to four (4) subadult or adult desert tortoises and an unknown number of juveniles and eggs may occur within the proposed Red Bluff Substation project areas. The applicants would construct permanent or temporary desert tortoise exclusion fencing around construction zones, locate most individuals during preconstruction clearance surveys, and implement numerous conservation measures to avoid and minimize death and injury to desert tortoises, including moving individuals out of harm's way or translocating them appropriately (see section on "Desert Tortoise Translocation" below). Consequently, we anticipate that construction of the proposed Red Bluff Substation and associated components (i.e., distribution lines, associated access roads, and perimeter security fence) is likely to take, in the form of mortality or injury, no more than one (1) subadult or adult desert tortoise.

Up to 29 desert tortoises were estimated within the buffer area along the existing Red Cloud Road, which will serve as access to the Chuckwalla Mountain Communications Site, though the actual number of individuals that may be moved out of harm's way along the access road is unknown. Because of numerous conservation measures to avoid and minimize death and injury to desert tortoises will be implemented, the construction at the Chuckwalla Mountain Communications Site and use of the Red Cloud access road is not expected to result in the incidental take of any subadult or adult desert tortoises in the form of mortality or injury.

No incidental take of desert tortoises is anticipated due to O&M of the proposed Red Bluff Substation itself because all activities would occur within the perimeter security fence. Although unlikely, desert tortoises that were undetected during clearance surveys for construction may be located during O&M activities. It is unknown how many desert tortoises may subsequently be

detected, but all individuals located will be captured and translocated and any juvenile desert tortoise or eggs that are located will be excavated and translocated. Take, in the form of capture and collection, of all desert tortoises resulting from these incidental detections is exempted to ensure mortality and injury of desert tortoises is minimized.

Incidental take, in the form of capture and collection, is anticipated for all desert tortoises located during O&M activities along linear components, such as perimeter security fence, access roads, and the distribution and loop-in lines. However, the actual number of individuals that may be moved out of harm's way along these linear features is unknown. Because maintenance activities would be localized and infrequent, access would be along existing routes, and the applicants would implement numerous conservation measures, including the use of experienced biologists, approved by the Service, BLM, and CDFG, and sanctioned handling techniques, to avoid and minimize adverse effects to desert tortoises, incidental take, in the form of mortality or injury, of no more than one (1) subadult or adult desert tortoise per calendar year is anticipated.

Because no live tortoises were observed during project specific surveys, we cannot estimate the number of juvenile desert tortoises and eggs that may occur within the proposed project areas; however, as described above, because of the difficulty in monitoring take of these size classes, the number of subadults and adults captured or collected during construction of the proposed Red Bluff Substation and associated components (i.e., 4) would serve as the surrogate to determine when the amount or extent of take is exceeded.

**Desert Tortoise Translocation**

***Desert Sunlight Solar Farm and Associated Components***

Take, in the form of capture or collection, of up to 31 subadult and adult desert tortoises, up to 25 juveniles, and 129 eggs may occur for the purpose of translocation from the proposed Solar Farm project area during construction and O&M activities. We emphasize that these numbers are estimates based on pre-project survey results and the upper limit of the 95 percent confidence range; the actual number of individuals requiring translocation may be lower. Therefore, we do not anticipate that more than 31 subadult and adult desert tortoises will be captured or collected for translocation during construction of the proposed Solar Farm component. Because the applicants will employ experienced biologists, approved by the Service, BLM, and CDFG, and sanctioned handling techniques to perform health assessments and collection of biological samples, we do not expect these activities to result in death or injury of any individuals.

***Desert Sunlight Solar Farm Recipient Sites: Chuckwalla and DuPont***

Take, in the form of capture or collection, of desert tortoises at the recipient sites will occur in support of translocation activities. Based on our estimate of 49 subadult and adult desert tortoises at the Chuckwalla Recipient Site, we anticipate that health assessments, including collection of biological samples, and affixing transmitters would be performed on all of these individuals. This estimate is the minimum sample size needed to detect less than 5 percent

disease prevalence at the 95 percent confidence level within the resident population (Averill-Murray 2010).

Based on our estimate of 111 subadult and adult desert tortoises at the DuPont Recipient Site, we anticipate that health assessments, including collection of biological samples, and affixing transmitters would be performed on 79 of these individuals. This estimate is the minimum sample size needed to detect less than 5 percent disease prevalence at the 95 percent confidence level within the resident population (Averill-Murray 2010).

Although such an invasive procedure presents some likelihood that individuals could be injured or killed, we do not anticipate that the collection of blood samples will result in the death or injury of any individuals because Service-approved Authorized Biologists will perform health assessments in accordance with the most recent Service guidance (Service 2010a).

***SCE Red Bluff Substation, Telecommunications Sites, and Associated Components***

Take, in the form of capture or collection, is not expected to occur at the Red Bluff Recipient Site. Based on the estimate of four subadult or adult desert tortoises at Red Bluff Substation site, we anticipate that only the translocated individuals would be monitored at this location, pending disease screening results. Therefore, no take of resident desert tortoises is expected at this site.

**Desert Tortoise Translocation: Post-translocation Monitoring**

***Desert Sunlight Solar Farm Control Sites: Sunlight and Red Cloud***

Take, in the form of capture or collection, of up to 31 subadult and adult and up to 25 juvenile desert tortoises is anticipated at either the Sunlight or the Red Cloud control site as part of the post-translocation monitoring program. Activities will include attaching transmitters and conducting periodic health assessments. Although transmittered desert tortoises may be captured multiple times over the course of the post-translocation monitoring period, we do not anticipate that any tortoises will be directly killed or injured due to post-translocation monitoring activities.

***SCE Red Bluff Substation, Telecommunications Sites, and Associated Components***

As stated above, take, in the form of capture or collection, is not expected to occur at the Red Bluff Recipient Site. Based on the estimate of four subadult or adult desert tortoises at Red Bluff Substation site, we anticipate that only the translocated individuals would be monitored at this location, pending disease screening results. Therefore, no take of resident or control desert tortoises associated with post-translocation monitoring is expected to occur.

IMPACT OF THE INCIDENTAL TAKING OF THE SPECIES

In the accompanying biological opinion, the Service determined that these levels of anticipated take associated with this project alone are not likely to jeopardize the continued existence or

adversely affect the recovery of the desert tortoise. However, the loss suitable desert tortoise habitat on the proposed project site could significantly impair habitat and population connectivity and long-term recovery potential of the species for the reasons discussed above under the "Effects of the Action" section.

## REASONABLE AND PRUDENT MEASURES

The BLM and the applicants will implement numerous conservation measures as part of the proposed action to minimize the incidental take of desert tortoises. Our evaluation of the proposed action is based on the assumption that the actions as set forth in the "Conservation Measures" section of this biological opinion will be implemented. Any changes to the conservation measures proposed by BLM or the applicants or in the conditions under which project activities were evaluated may constitute a modification of the proposed action. If this modification causes an effect to desert tortoises that was not considered in the biological opinion, reinitiation of formal consultation pursuant to the implementing regulations of section 7(a)(2) of the Act (50 CFR § 402.16) may be warranted. The following reasonable and prudent measures supplements and clarifies select conservation measures included as part of the proposed action. The reasonable and prudent measures are necessary and appropriate to minimize the impact of take on desert tortoises.

1. The BLM shall ensure the level of incidental take anticipated in this biological opinion is commensurate with the analysis contained herein.

2. The BLM and Sunlight shall implement Conservation Measure 8 only if a) fewer than five (5) desert tortoises are located on the proposed Solar Farm site and b) a suitable facility can be identified.

3. The BLM and applicants shall adhere to procedures set forth by CDFG when moving sick or injured desert tortoises out of the State of California.

## TERMS AND CONDITIONS

To be exempt from the prohibitions of section 9 of the Act, the BLM and applicants, and all agents and/or contractors, must comply with the following terms and conditions, which implement the reasonable and prudent measures described above, and are intended to minimize the impact of incidental take on the desert tortoise. These terms and conditions are non-discretionary.

1. The following terms and conditions implement reasonable and prudent measure 1:

    a. To ensure that the measures proposed by the BLM and the applicants are effective and properly implemented, the BLM must contact the Service immediately if it becomes aware that a desert tortoise has been killed or injured as a result of project activities. At that time and in coordination with the Service, the BLM must review the circumstances

surrounding the incident to determine whether additional protective measures are required. Project activities may continue pending outcome of the review, provided the conservation measures included as part of the proposed action (see "Conservation Measures" section) and the terms and conditions in this biological opinion have been and continue to be fully implemented.

b. If two (2) subadult or adult desert tortoises are directly killed or injured as a result of any construction activities covered by this biological opinion for the proposed Solar Farm, gen-tie and associated access road, and the perimeter security fence, the BLM must reinitiate consultation on the proposed action.

c. If one (1) subadult or adult desert tortoise is directly killed or injured in any 1 calendar year as a result of any O&M activities covered by this biological opinion along the perimeter security fence of the proposed Solar Farm site, the BLM must reinitiate consultation on the proposed action.

d. Because of the difficulty in estimating the number of desert tortoises that may occur along linear components and the applicants will employ experienced biologists, approved by the Service, BLM, and CDFG, and sanctioned handling techniques, we do not expect that take, in the form of capture or collection, required to move desert tortoises out of harm's way during construction of the linear project components, will result in mortality or injury of any individuals. Therefore, we are not establishing a reinitiation criterion or notification requirement for the number of individuals that would be moved out of harm's way during construction of linear project components.

e. If one (1) subadult or adult desert tortoise is directly killed or injured in any 1 calendar year as a result of any O&M activities covered by this biological opinion for the gen-tie line and associated access road, the BLM must reinitiate consultation on the proposed action.

f. If one (1) subadult or adult desert tortoise is directly killed or injured as a result of any construction activities covered by this biological opinion for the SCE project components (i.e., Red Bluff Substation, associated distribution and loop-in lines, telecommunications facilities, perimeter security fences, and access roads), the BLM must reinitiate consultation on the proposed action.

g. If one (1) subadult or adult desert tortoise is directly killed or injured in any 1 calendar year as a result of any O&M activities covered by this biological opinion for the SCE project components identified above, the BLM must reinitiate consultation on the proposed action.

h. If more than 31 subadult or adult and 4 subadult or adult desert tortoises are identified for translocation during clearance surveys of the proposed Solar Farm site and the Red Bluff Substation, respectively, the BLM must reinitiate consultation on the proposed action.

As described above, the identification of more than these numbers of subadult or adult desert tortoises would also indicate that the anticipated level of take of juveniles and eggs will be exceeded, requiring reinitiation of consultation. This term and condition only applies to clearance of the project sites for construction and does not apply to the short distance movement of desert tortoises out of harm's way during activities that occur along the linear components.

2. The following term and condition implements reasonable and prudent measure 2:

   Because of the uncertainty involved with removing numerous, otherwise healthy desert tortoises from the wild population, Conservation Measure 8 can only be implemented if fewer than five individuals were expected to be removed from the proposed project sites. In addition, because only desert tortoises exhibiting clinical signs of disease or having positive ELISA test results may be transferred to the Desert Tortoise Conservation Center in Nevada, an alternative facility would have to be identified to successfully implement Conservation Measure 8.

3. The following term and condition implements reasonable and prudent measure 3:

   Desert tortoises that are determined to be sick or injured may be relocated to an appropriate facility outside the State of California only with CDFG's prior written consent. The applicants shall submit to CDFG a written request indicating the number of desert tortoises to be relocated, the reason for relocating them (i.e., the nature of the disease or injury), the proposed facility to which the desert tortoises will be relocated, and the date on which they are proposed to be relocated. CDFG will provide a written response to each such request indicating, on a case-by-case basis, whether the relocation is authorized.

REPORTING REQUIREMENTS

Within 60 days of the completion of the proposed action, the BLM must provide a report to the Service that provides details on the effects of the action on the desert tortoise. The BLM must also provide an annual report by February 1 of each year during construction of each phase and during the post-construction translocation monitoring. Specifically, these reports must include information on any instances when desert tortoises were killed, injured, or handled; the circumstances of such incidents; and any actions undertaken to prevent similar incidents from reoccurring. In addition, these reports should provide detailed information on the results of translocation monitoring, including the following: 1) location of all transmittered desert tortoises; 2) mortality rate from each of the translocated, resident, and control populations; 3) statistical analysis of differences in the mortality rates among all three populations; and 4) the health status and body condition of all transmittered desert tortoises. The BLM must also provide to the Service copies of the Monthly and Annual Compliance Reports as required under the conservation measures described in the proposed action.

We request that the BLM provide us with any recommendations that would facilitate the implementation of the conservation measures while ensuring protection of the desert tortoise. We also request that the BLM provide us with the names of any Biological Monitors who assisted the Authorized Biologist and an evaluation of the experience they gained on the project and the Service qualifications form filled out for this project (available at: http://www.fws.gov/ventura/sppinfo/protocols/deserttortoise_monitor-qualifications-statement.pdf), along with any narrative that would provide an appropriate level of information. This information would provide us with additional reference material in the event any of these individuals are proposed as potential Authorized Biologists for future projects.

DISPOSITION OF SICK, INJURED, OR DEAD SPECIMENS

The CFWO is to be notified immediately at 760-431-9440 if any desert tortoises are found sick, injured, or dead in the action area. Immediate notification means verbal (if possible) and written notice within 1 workday, and must include the date, time, and location of the carcass, and any other pertinent information. Care must be taken in handling sick or injured individuals to ensure effective treatment and care can be administered, and in handling dead specimens to preserve biological material in the best possible state.

The CFWO should also be notified immediately at 760-431-9440 if any endangered or threatened species not addressed in this biological opinion is located in the project areas during the permit period. The same reporting requirements also shall pertain to any healthy individual(s) of any threatened or endangered species located in the action area that requires handling to move the individual(s) out of harm's way.

## CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs Federal agencies to use their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information.

1. The NECO Plan (BLM 2002) did not contemplate the approval of utility-scale solar development to the extent reflected by recent ROW approvals and pending applications. As a result, the NECO Plan did not include specific protections for desert tortoise habitat linkages needed to connect designated CHUs and DWMAs and other conserved lands because landscape-level threats (i.e., renewable energy) were not identified at the time of plan approval.

   Therefore, we recommend BLM either: 1) place the ROW application in abeyance until the NECO Plan is amended to address current threats to desert tortoise connectivity from renewable energy development; or 2) deny Phase III of the ROW application as proposed and

incorporate the lost energy generation to a less-damaging ROW application held by the applicant.

2. We recommend that the BLM amend the CDCA Plan to prohibit additional renewable energy development (i.e., utility-scale solar and wind energy facilities) within the unused portion of the 7,600 ha (19,000 ac) ROW proposed for construction and O&M of the proposed Desert Sunlight Solar Farm project. Given this proposed project, the potential exists that desert tortoise habitat adjacent to project components may be disturbed and habitat linkages fragmented to the extent that desert tortoises and other wildlife populations in the area may be severely compromised.

3. We recommend that the BLM amend the CDCA Plan to prohibit additional renewable energy development (i.e., utility-scale solar and wind energy facilities) within the upper bajadas (mapped as "dissected fans" on the Landforms Map 3-4 in BLM 2002) adjacent to the mountains of northeastern Riverside County. This recommendation is intended to protect the higher quality desert tortoise habitats in the recovery unit.

4. We recommend that the BLM work with the applicants and Service to determine if the translocated, resident, and control desert tortoises attributed to the post-translocation monitoring program can be used to resolve additional research questions related to translocation and/or desert tortoise biology and ecology.

## REINITIATION NOTICE

This concludes formal consultation on the BLM's proposal to issue ROW grants to Sunlight and SCE for construction of the Desert Sunlight Solar Farm and Red Bluff Substation in Riverside County, California. Consistent with 50 CFR §402.16, reinitiation of formal consultation is required where discretionary Federal involvement or control over the action has been retained (or is authorized by law) and if: 1) the amount or extent of take specified in the incidental take statement is exceeded; 2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; 3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in this biological opinion; and 4) a new species is listed or critical habitat designated that may be affected by the action. In addition, if any of the stated assumptions used in our analysis are invalidated, BLM must reinitiate consultation.

If you have any questions regarding this biological opinion, please contact Jody Fraser of this office at 760-431-9440, extension 354.

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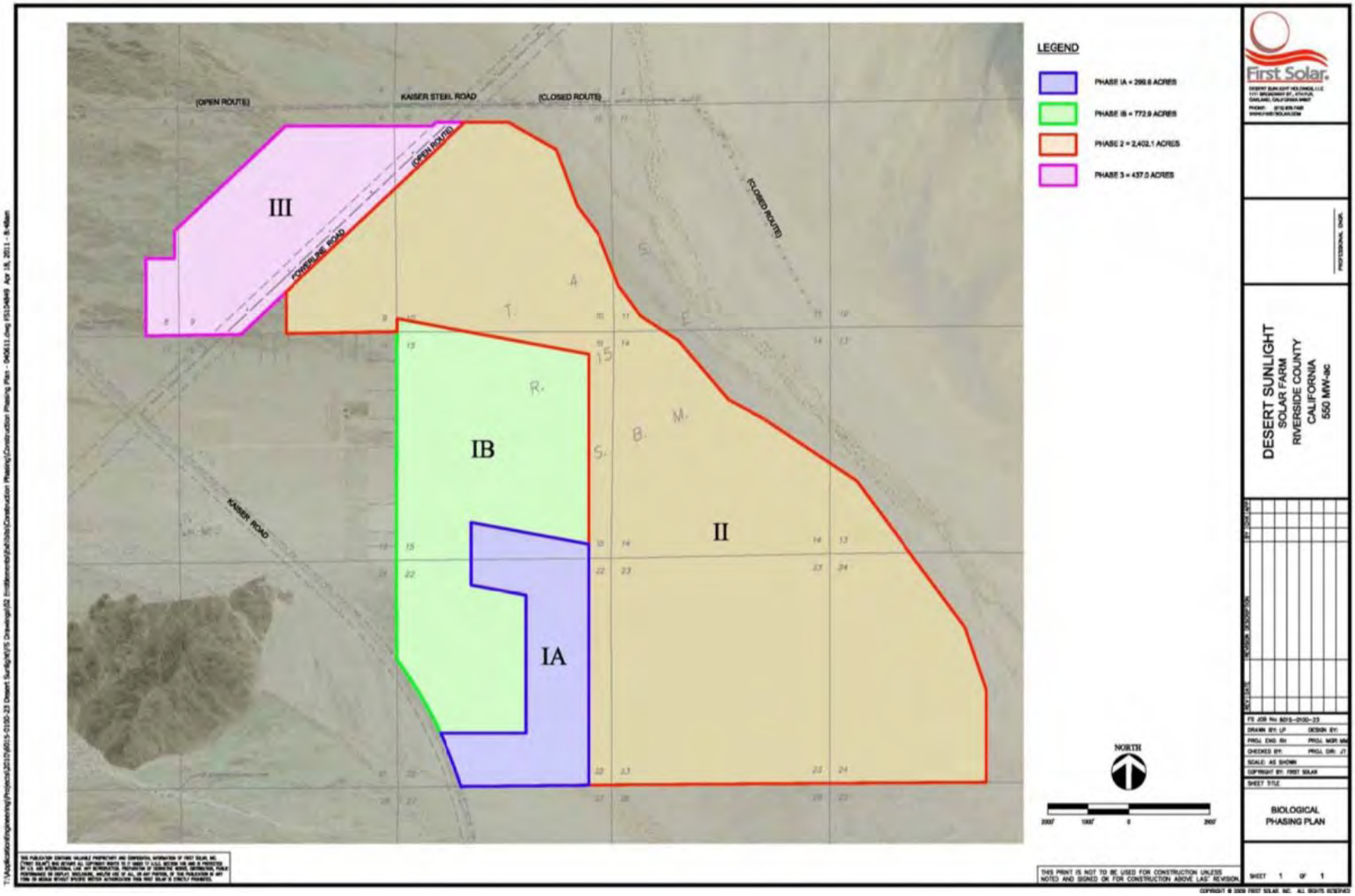
# APPENDIX 1
# FIGURES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POWERLINE ROAD
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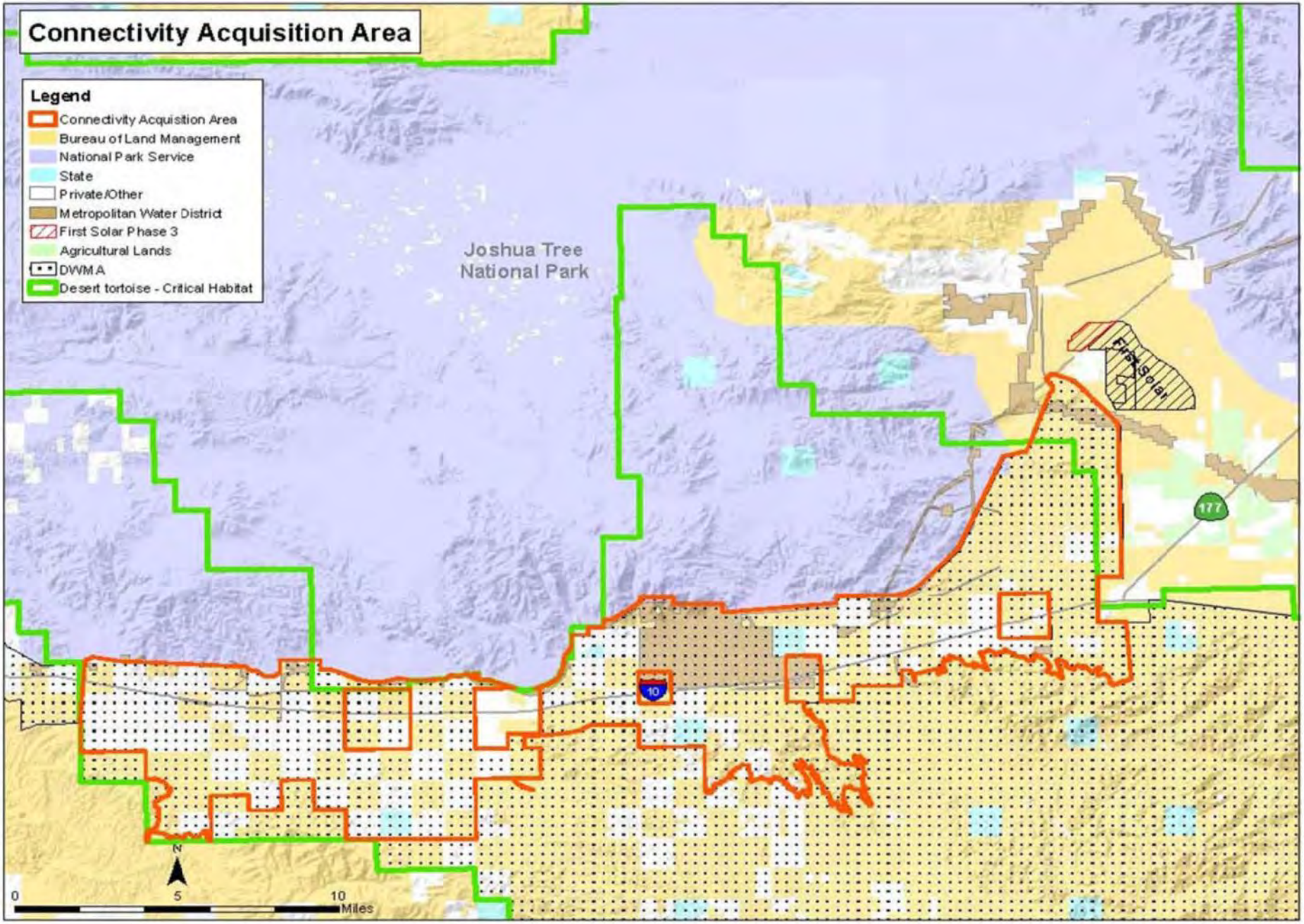
KAISER ROAD
III
IB
IA
II
LEGEND
PHASE IA = 299.6 ACRES
PHASE IB = 772.9 ACRES
PHASE 2 = 2,402.1 ACRES
PHASE 3 = 437.0 ACRES
NORTH
First Solar
DESERT SUNLIGHT
SOLAR FARM
RIVERSIDE COUNTY
CALIFORNIA
550 MW-ac
BIOLOGICAL
PHASING PLAN
SHEET 1 OF 1
THIS PRINT IS NOT TO BE USED FOR CONSTRUCTION UNLESS NOTED AND SIGNED OK FOR CONSTRUCTION ABOVE LAST REVISION


Connectivity Acquisition Area
Legend
Connectivity Acquisition Area
Bureau of Land Management
National Park Service
State
Private/Other
Metropolitan Water District
First Solar Phase 3
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Desert tortoise - Critical Habitat
Joshua Tree
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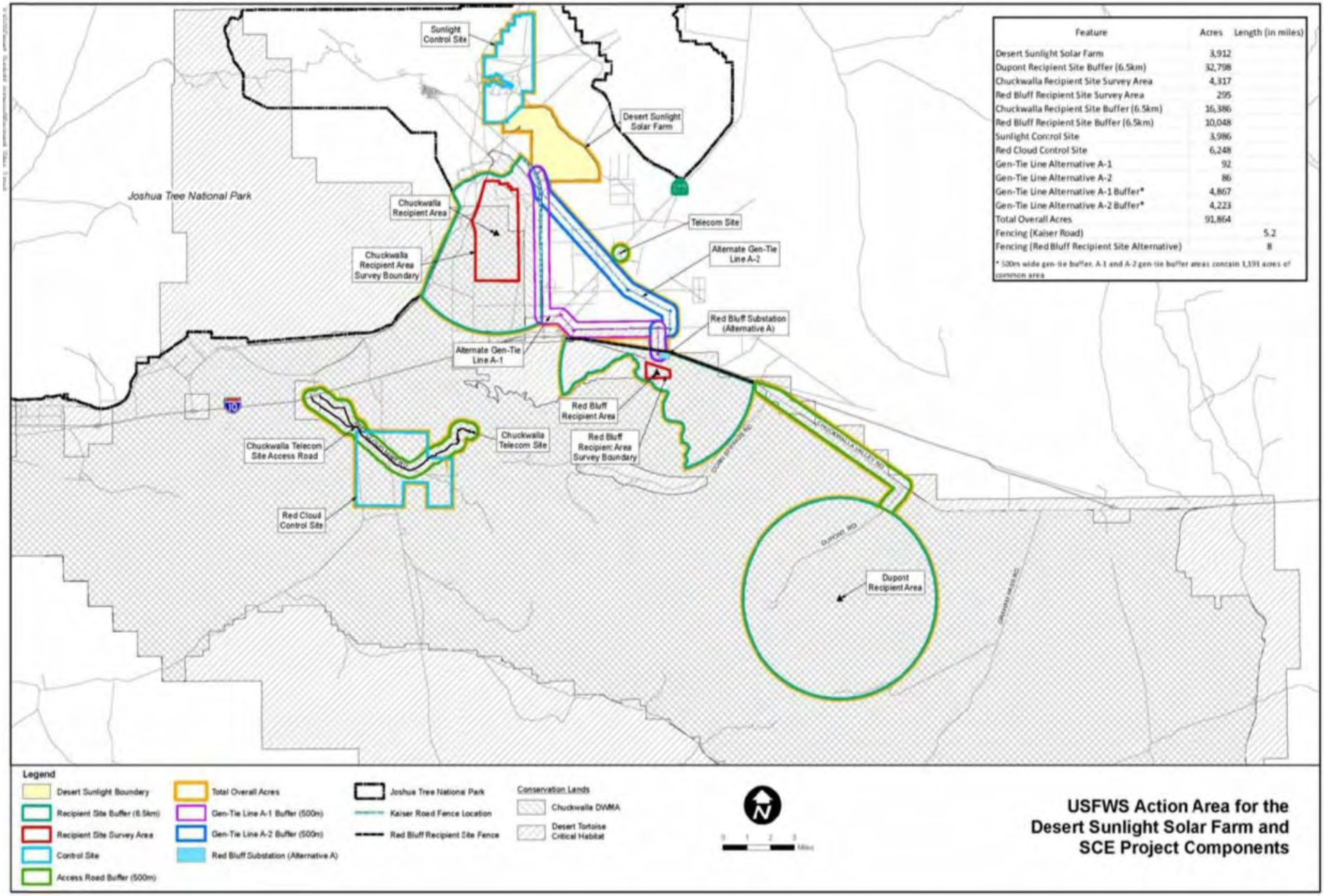



| Feature | Acres | Length (in miles) |
|---|---|---|
| Desert Sunlight Solar Farm | 3,912 | |
| Dupont Recipient Site Buffer (6.5km) | 32,798 | |
| Chuckwalla Recipient Site Survey Area | 4,317 | |
| Red Bluff Recipient Site Survey Area | 295 | |
| Chuckwalla Recipient Site Buffer (6.5km) | 16,386 | |
| Red Bluff Recipient Site Buffer (6.5km) | 10,048 | |
| Sunlight Control Site | 3,986 | |
| Red Cloud Control Site | 6,248 | |
| Gen-Tie Line Alternative A-1 | 92 | |
| Gen-Tie Line Alternative A-2 | 86 | |
| Gen-Tie Line Alternative A-1 Buffer* | 4,867 | |
| Gen-Tie Line Alternative A-2 Buffer* | 4,223 | |
| Total Overall Acres | 91,864 | |
| Fencing (Kaiser Road) | | 5.2 |
| Fencing (Red Bluff Recipient Site Alternative) | | 8 |

* 500m wide gen-tie buffer. A-1 and A-2 gen-tie buffer areas contain 1,191 acres of common area

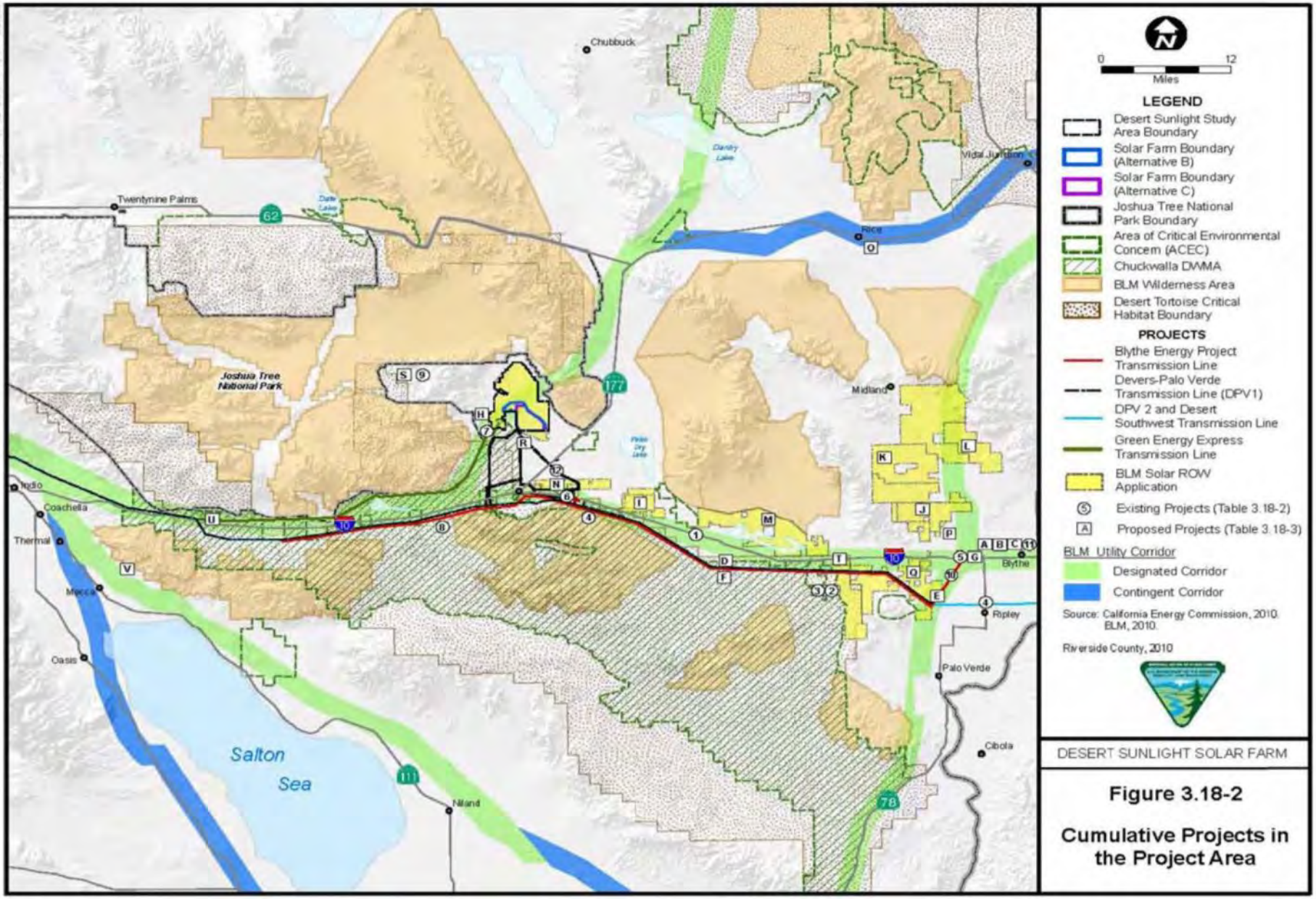



**Figure 3.18-2**

**Cumulative Projects in the Project Area**

**Table 3.18-2**
**Existing Projects along the I-10 Corridor (Eastern Riverside County)**

| ID # on Figure 3.18-2 | Project Name; Agency ID | Location | Ownership | Status | Acres | Project Description |
|---|---|---|---|---|---|---|
| 1 | Interstate 10 | Linear *interstate highway* running from Santa Monica to Blythe (in California) | Caltrans | Existing | N/A | Interstate 10 (I-10) is a major east-west route for trucks delivering goods to and from California. It is a four-lane divided highway in the project region. |
| 2 | Chuckwalla Valley State Prison | 19025 Wiley's Well Rd. Blythe, CA | CA Dept. of Corrections & Rehabilitation | Existing | 1,080 | State prison providing long-term housing and services for male felons classified as medium and low-medium custody inmates jointly located on 1,720 acres of state-owned property. APN 879040006, 008, 012, 027, 028, 029, 030 |
| 3 | Ironwood State Prison | 19005 Wiley's Well Rd. Blythe, CA | CA Dept. of Corrections & Rehabilitation | Existing | 640 | ISP jointly occupies with Chuckwalla Valley State Prison 1,720 acres of state-owned property, of which ISP encompasses 640 acres. The prison complex occupies approximately 350 acres with the remaining acreage used for erosion control, drainage ditches, and catch basins. *APNs* 879-040-001, 004, 009, 010, 011, 015, 016, 017, 018, 019, 020 |
| 4 | Devers-Palo Verde 1 Transmission Line | From *Palo Verde (Arizona)* to Devers Substation | SCE | Existing | N/A | Existing 500 kV transmission line parallel to I-10 from *Arizona* to the SCE Devers Substation, near Palm Springs. *DPV1 will loop into the approved Midpoint Substation (now called Colorado River Substation), which will be located 10 miles southwest of Blythe. See D and E in Table 3.18-3.* |
| 5 | Blythe Energy Project | City of Blythe, north of I-10, 7 miles west of the CA /AZ border | Blythe Energy, LLC | Existing | 76 | 520 MW combined-cycle natural gas-fired electric-generating facility. Project is connected to the Buck Substation owned by WAPA. |
| 6 | West-wide Section 368 Energy Corridors | Riverside County, parallel to DPV corridor | BLM, DOE, US Forest Service | Approved by BLM and US Forest Service | N/A | Designation of corridors on federal land in the 11 western states, including California, for oil, gas, and hydrogen pipelines and electricity transmission and distribution facilities (energy corridors). One of the corridors runs along the southern portion of Riverside County. |

**Table 3.18-2 (continued)**
**Existing Projects along the I-10 Corridor (Eastern Riverside County)**

| ID # on Figure 3.18-2 | Project Name; Agency ID | Location | Ownership | Status | Acres | Project Description |
|---|---|---|---|---|---|---|
| 7 | Eagle Mountain Pumping Plant | Eagle Mountain Road, west of Desert Center | Metropolitan Water District of Southern California | Existing | | 144-foot pumping plant that is part of the Metropolitan Water District of Southern California's facilities. APNs 807-150-007, 807-150-009, 807-150-010 |
| 8 | Recreational Opportunities | Eastern Riverside County | BLM | Existing | N/A | BLM has numerous recreational opportunities on lands in eastern Riverside County along the I-10 corridor including the Wiley's Well Campground, Coon Hollow Campground, and Midland Long-Term Visitor Area. |
| 9 | Kaiser Mine | Eagle Mountain, north of Desert Center | Kaiser Ventures, Inc. | Existing | | Kaiser Steel mined iron ore at Kaiser Mine in Eagle Mountain and provided much of the Pacific Coast steel in the 1950s. Mining project also included the Eagle Mountain Railroad, 51 miles long. Imported steel captured market share in the 1960s and 1970s and primary steelmaking closed in the 1980s. 701380031 |
| 10 | Blythe Energy Project Trans-mission Line | From the Blythe Energy Project (Blythe, CA) to Julian Hinds Substation | Blythe Energy, LLC | Existing | N/A | Transmission line modifications including upgrades to Buck Substation, approximately 67.4 miles of new 230 kV transmission line between Buck Substation and Julian Hinds Substation, upgrades to the Julian Hinds Substation, installation of 6.7 miles of new 230 kV transmission line between Buck Substation and SCE's DPV 500 kV transmission line. |
| 11 | Blythe PV Project | Blythe | First Solar | CPUC approved project terms of a 20 year power purchase agreement for sale of 7.5 MW. Under construction in fourth quarter, 2009 | 200 | 7.5 MW solar photovoltaic project located on 200 acres. Project was constructed by First Solar and sold to NRG Energy. |
| 12 | Chuckwalla Valley Raceway | Desert Center Airport (no longer a community airport) | Developer Matt Johnson | Existing | 400 | Proposed 500-mile race track located on 400 acres of land that used to belong to Riverside County and was used as the Desert Center Airport. APNs 811-142-016, 811-142-006. Small private airstrip kept as part of project. Construction completed in March 2010. |

**Table 3.18-3**
**Future Foreseeable Projects along the I-10 Corridor (Eastern Riverside County)**

| ID # on Figure 3.18-2 | Project Name; Agency ID | Location | Ownership | Status | Acres | Project Description |
|---|---|---|---|---|---|---|
| A | Four Commercial Projects | Blythe, CA | Various | Approved | N/A | Four commercial projects have been approved by the Blythe Planning Department including the Agate Road Boat & RV Storage, Riverway Ranch Specific Plan, Subway Restaurant and Motel, and Agate Senior Housing Development. |
| B | Intake Shell | Blythe, CA | | Under Construction | N/A | Reconstruction of a Shell facility located at Intake & Hobson Way. Demolition occurred in 2008, reconstruction planned for 2009-2010. |
| C | Fifteen residential developments | Blythe, CA | Various | Approved or Under Construction | N/A | Twelve residential development projects have been approved by the Blythe Planning Department including: Vista Palo Verde (83 Single Family Residential [SFR]), Van Weelden (184 SFR), Sonora South (43 SFR), Ranchette Estates (20 SFR), Irvine Assets (107 SFR), Chanslor Village (79 SFR), St. Joseph's Investments (69 SFR), Edgewater Lane (SFR), The Chanslor Place Phase IV (57 SFR), Cottonwood Meadows (103 Attached SFR), Palo Verde Oasis Phase IV (29 SFR).<br>Three residential development projects have been approved and are under construction including: The Chanslor Phase II & III (78 SFR), River Estate at Hidden Beaches, Mesa Bluffs Villas (26 Attached SFR). |
| D | Devers-Palo Verde 2 Trans-mission Line Project | From the Midpoint Substation to Devers Substation *(CA-only portion)* | SCE | *CPUC Petition to Modify Request to construct CA-only portion was* approved by CPUC 11/2009. *DPV2 to Arizona was originally approved by CPUC in 6/2007. BLM ROD not yet issued.* | N/A | New 500 kV transmission line parallel to the existing Devers-Palo Verde Transmission Line from Midpoint Substation, approximately 10 miles southwest of Blythe, to the SCE Devers Substation, near Palm Springs. The ROW for the 500 kV transmission line would be adjacent to the existing DPV ROW and would require an additional 130 feet of ROW on federal and State land and at least 130 feet of ROW on private land and Indian Reservation land. |
| E | Colorado *River* Substation *Expansion* | 10 miles southwest of Blythe | SCE | Approved by CPUC 11/2009. *Application for expansion filed with CPUC in 11/2010. Expansion currently under environmental review.* | 44 | The *substation was approved by the CPUC (as the "Midpoint Substation"), but is proposed to be expanded as a* 500/230 kV substation *and* would be constructed in an area approximately 1,000 feet by 1,900 feet, permanently disturbing approximately *90* acres. The 500 kV switching station would include buses, circuit breakers, and disconnect switches. The switchyard would be equipped with 108-foot-high dead-end structures. Outdoor night lighting would be designed to illuminate the switchrack when manually switched on. *The Draft Supplemental EIR was published by the CPUC in February 2011.* |

**Table 3.18-3 (continued)**
**Future Foreseeable Projects along the I-10 Corridor (Eastern Riverside County)**

| ID # on Figure 3.18-2 | Project Name; Agency ID | Location | Ownership | Status | Acres | Project Description |
|---|---|---|---|---|---|---|
| F | Desert Southwest Trans-mission Line | 118 miles primarily parallel to DPV | Imperial Irrigation District | Final EIR/EIS prepared in 2005. Approved by the BLM in 2006. | N/A | New, approximately 118-mile 500 kV transmission line from a new substation/switching station near the Blythe Energy Project to the existing Devers Substation located approximately 10 miles north of Palm Springs, California. |
| G | Blythe Energy Project II | Blythe, CA. Near the Blythe Airport and I-10 | Blythe Energy, LLC | Approved by CEC in December 2005 | 30 acres (located on Blythe Energy Project land) | 520 MW combined-cycle power plant located entirely within the Blythe Energy Project site boundary. Blythe Energy Project II will interconnect with the Buck Substation constructed by WAPA as part of the Blythe Energy Project. Project is designed on 30 acres of a 76-acre site. |
| H | Eagle Mountain Pumped Storage Project | Eagle Mountain iron ore mine, north of Desert Center | Eagle Crest Energy Company | License application filed with FERC in June 2009. EIR published in mid- 2010; FERC Draft EIS published in December 2010. | 1,524 | 1,300 MW pumped storage project designed to store off-peak energy to use during peak hours. The captured off-peak energy would be used to pump water to an upper reservoir. When the water is released to a lower reservoir through an underground electrical generating facility the stored energy would be added into the Southwestern grid during "high demand peak" times, primarily weekdays. Estimated water use is 8,100 AFY for the first four-year start-up period and replacement water is 1,763 AFY thereafter. |
| I | Palen Solar Energy Project | North of I-10, 10 miles east of Desert Center | Solar Millennium LLC/ Chevron Energy | Approved by CEC in December 2010. Undergoing environmental review by BLM. Proposed to have one unit online in 2012 and one unit online in 2013. | 5,200 | 500 MW solar trough project on 5,200 acres. Facility would consist of two 250 MW plants disturbing approximately 3,870 acres. Project would include interconnection to the SCE Red Bluff Substation. Project would use an estimated 300 AFY of water. |
| J | Blythe Solar Power Project | North of I-10, immediately north of the Blythe Airport | Solar Millennium LLC/Chevron Energy | Approved by CEC and BLM in 2010; under construction. | 9,400 | 1,000 MW solar trough facility on 9,400 acres. |
| K | NextEra (FPL) McCoy | Northwest of Blythe, CA, immediately north of Blythe Solar Power Project | NextEra (FPL) | Plan of Development in to Palm Springs BLM | 20,608 | 250 MW solar trough project. ROW in process for monitoring water well drilling. |

**Table 3.18-3 (continued)**
**Future Foreseeable Projects along the I-10 Corridor (Eastern Riverside County)**

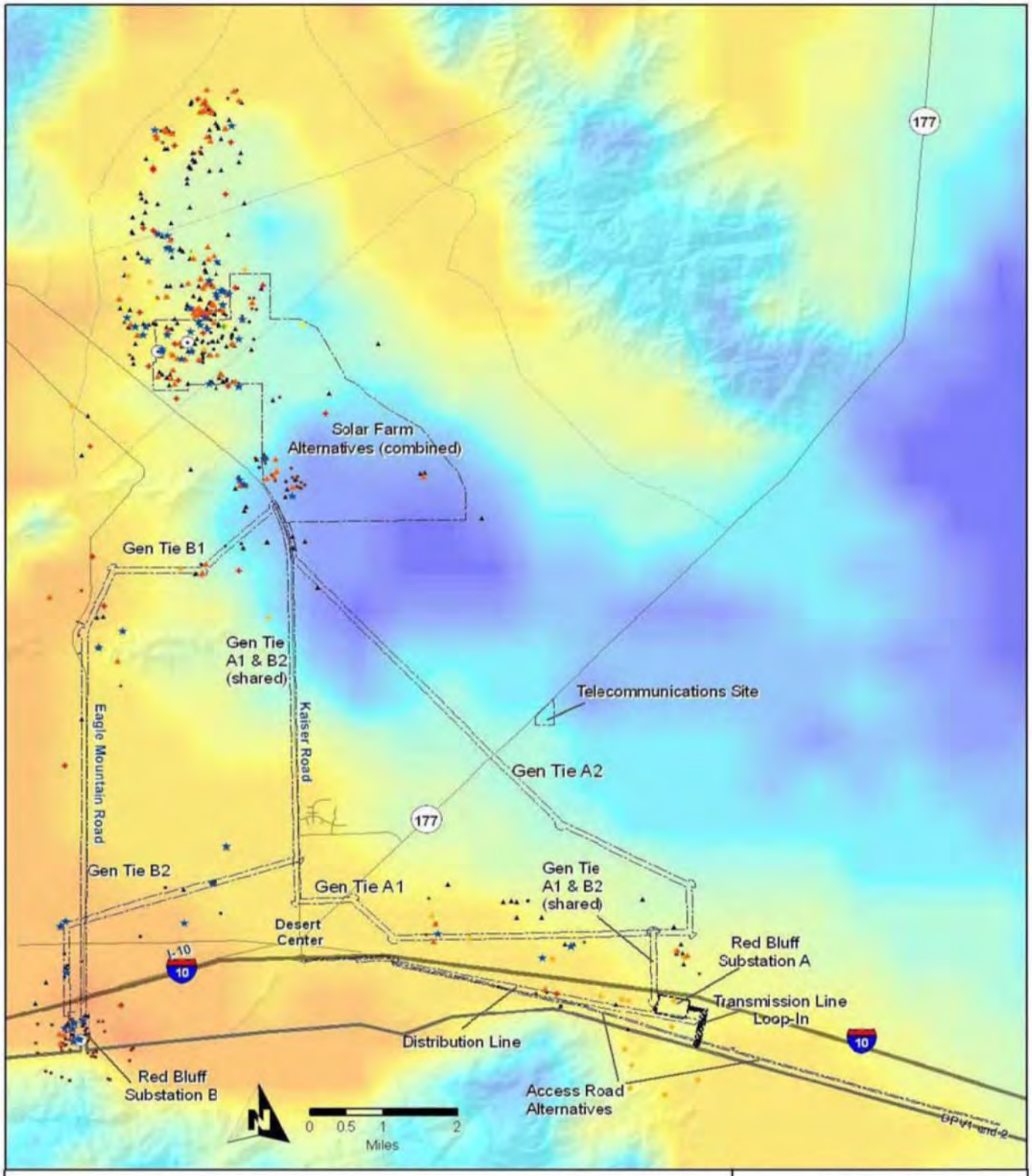
| ID # on Figure 3.18-2 | Project Name; Agency ID | Location | Ownership | Status | Acres | Project Description |
|---|---|---|---|---|---|---|
| L | McCoy Soleil Project | 10 miles northwest of Blythe | enXco | Plan of Development in to Palm Springs BLM | 1,959 | 300 MW solar power tower project located on 1,959 acres. Project would require a 14-mile transmission line to proposed SCE Colorado Substation south of I-10. Would use 575-600 AFY of water. |
| M | Genesis Solar Energy Project | North of I-10, 25 miles west of Blythe and 27 miles east of Desert Center | NextEra (FPL) | *Approved by CEC and BLM in 2010; under construction* | | 250 MW solar trough project on 4,640 acres north of the Ford Dry Lake. Project includes six-mile natural gas pipeline and a 5.5-mile gen-tie line to the Blythe Energy Center to Julian Hinds Transmission Line, then travel east on shared transmission poles to the Colorado River Substation. |
| N | Chuckwalla Solar I | 1 mile north of Desert Center | Chuckwalla Solar I, LLC | Plan of Development submitted to BLM | 4,083 | 200 MW solar photovoltaic project on 4,083 acres. Project would be developed in several phases and would tap into an existing SCE 161-kV transmission line crossing the site. |
| O | Rice Solar Energy Project | Rice Valley, Eastern Riverside County | Rice Solar Energy, LLC (Solar Reserve, LLC) | *Approved by CEC; construction to begin in 2011* | 1,410 | 150 MW solar power tower project with liquid salt storage. Project is located on approximately 1,410 acres and includes a power tower approximately 650 feet tall and a 10-mile long interconnection with the WAPA Parker-Blythe transmission line. |
| P | Blythe Airport Solar I Project | Blythe Airport | U.S. Solar | City of Blythe approved the project in November, 2009 | 640 | 100 MW solar photovoltaic project located on 640 acres of Blythe airport land. |
| Q | Desert Quartzite | South of I-10, 8 miles southwest of Blythe | First Solar (previously OptiSolar) | POD in to BLM | 7,724 | 600 MW solar photovoltaic project located on 7,724 acres. Adjacent to DPV transmission line and SCE Colorado Substation. Approximately 27 AF of water would be used during construction and 3.8 AFY during operation. |
| R | Desert Harvest Project | 6 miles north of Desert Center | enXco | *POD submitted to BLM* | 1,057 | 100 MW photovoltaic plant on 1,057 acres of BLM land. Would require a 5- to 8-mile transmission line to planned SCE Red Bluff Substation. |
| S | Eagle Mountain Landfill Project | Eagle Mountain, North of Desert Center | Mine Reclamation Corporation and Kaiser Eagle Mountain, Inc. | US Court of Appeals for the Ninth Circuit issued its opinion regarding the EIS for the project in 11/09 and ruled that the land exchange for the project was not properly approved by | ~ 3,500 | The project proposed to be developed on a portion of the Kaiser Eagle Mountain Mine in Riverside County, California. The proposed project comprises a Class III nonhazardous municipal solid waste landfill and the renovation and repopulation of Eagle Mountain Townsite. The proposal by the proponent includes a land exchange and application for rights-of-way with the Bureau of Land Management and a Specific Plan, General Plan Amendment, Change of Zone, Development Agreement, Revised Permit to Reclamation Plan, and Tentative Tract Map with the County. The Eagle Mountain |

**Table 3.18-3 (continued)**
**Future Foreseeable Projects along the I-10 Corridor (Eastern Riverside County)**

| ID # on Figure 3.18-2 | Project Name; Agency ID | Location | Ownership | Status | Acres | Project Description |
|---|---|---|---|---|---|---|
| | | | | the administrative agency. Kaiser's Mine and Reclamation is considering all available options. | | landfill project proposes to accept up to 20,000 tons of non-hazardous solid waste per day for 50 years. |
| T | Wiley's Well Communi-cation Tower (part of the Public Safety Enterprise Communi-cation System) | East of Wiley's Well Road, just south of I-10 | Riverside County | Final EIR for the Public Safety Enterprise Communication System published in August 2008. | N/A | The Public Safety Enterprise Communication project is the expansion of Riverside County's fire and law enforcement agencies approximately 20 communication sites to provide voice and data transmission capabilities to personnel in the field. |
| U | Paradise Valley "New Town" Development | Approximately 30 miles west of Desert Center (7 miles east of the city of Coachella) | Glorious Land Company | Notice of Preparation (NOP) of an EIR published in December 2005. Still under environmental review. | 6,397 | Company proposes to develop a planned community as an international resort destination with residential, recreational, commercial, and institutional uses and facilities. The project is planned as a self-contained community with all public and quasi-public services provided. The project is located outside the Coachella Valley Water District (CVWD) boundaries and the applicant has entered into an agreement with the CVWD to manage artificial recharge of the Shaver's Valley groundwater. The proponent has purchased a firm water supply from Rosedale-Rio Bravo Water District in Kern County. In-kind water would be transferred to the MWD that would release water from the Colorado River Aqueduct to a 38-acre percolation pond on the project site. MWD would deliver approximately 10,000 AFY to the percolation pond and over the long term, no net loss of groundwater in storage is anticipated. |
| V | Mecca Specific Plan | North of Salton Sea, east of community of Mecca, southeast of City of Coachella. | Mecca Group LLC | NOP of an EIR published in June 2008. Still under environmental review. | 2,934 | The proposed project includes 19,476 units with a mix of low-, medium- and high-density residential development. Non-residential uses include retail/commercial, mixed use, a golf course, and open space with civic uses and agricultural buffers. The Specific Plan incorporates existing residential, commercial, industrial, and civic uses with a blend of proposed low-, medium- and high-density residential and commercial land uses. The proposed General Plan Amendment and Change of Zone would be changed to Specific Plan and Specific Plan zoning. |

**Table 3.18-3 (continued)**
**Future Foreseeable Projects along the I-10 Corridor (Eastern Riverside County)**

| ID # on Figure 3.18-2 | Project Name; Agency ID | Location | Ownership | Status | Acres | Project Description |
|---|---|---|---|---|---|---|
| **Additional Projects Outside Cumulative Figure Boundaries or Not Analyzed in Cumulative Discussion** | | | | | | |
| W | Proposed National Monument (former Catellus Lands) | Between Joshua Tree National Park and Mojave National Preserve | | In December 2009, Senator Feinstein introduced bill S.2921 that would designate two new national monuments including the Mojave Trails National Monument. | 941,000 | The proposed Mojave Trails National Monument would protect approximately 941,000 acres of federal land, including approximately 266,000 acres of the former railroad lands along historic Route 66. The BLM would be given the authority to conserve the monument lands and also to maintain existing recreational uses, including hunting, vehicular travel on open roads and trails, camping, horseback riding and rockhounding. |
| X | BLM *Solar Energy Zones (SEZs)* | Along the I-10 corridor between Desert Center and Blythe | BLM | Proposed | 202,*896* (eastern Riverside County only) | The DOE and the BLM identified 24 tracts of land as Solar Energy Study Areas in the BLM and DOE Solar Programmatic *Draft* EIS, *published in December 2010.* These areas have been identified for in-depth study of solar development and may be found appropriate for designation as solar energy zones in the future. |




Project Alternatives*

* Disturbance areas for linear components and telecommunications site are less than area depicted in map.

**Observed Active Sign**

- Tortoise
- Mating Ring
- Active Burrow/Pallet
- Scat - Fresh

**Desert Tortoise Habitat Value**

High

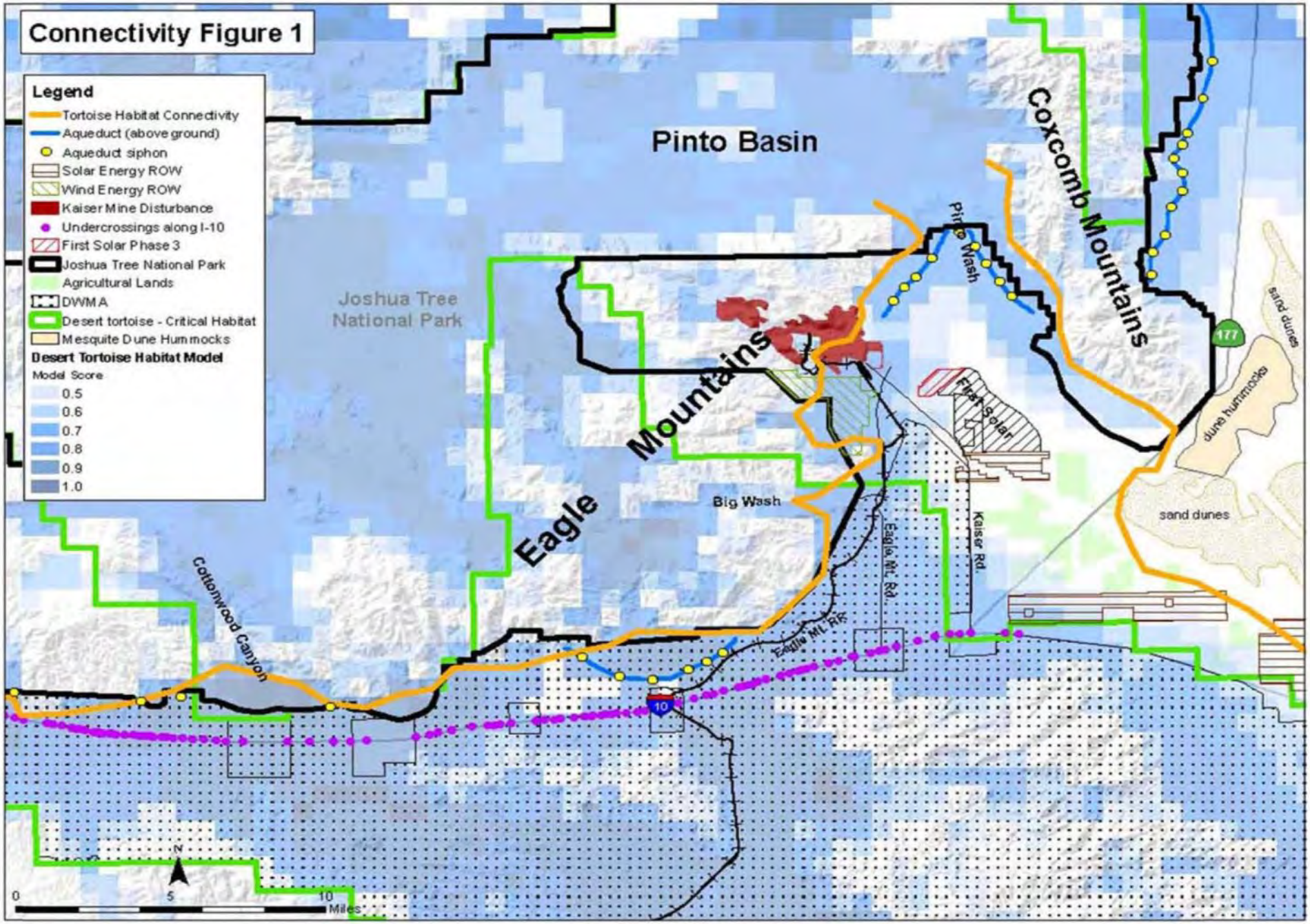
Low

Source: Nussear et al. 2009

DESERT SUNLIGHT
SOLAR FARM PROJECT
DESERT SUNLIGHT HOLDINGS, LLC

**Figure 16**
**Project Alternatives**
**USGS Habitat Model**
**Active Tortoise Sign**

Prepared by Ironwood Consulting, Inc. - June 2010


Connectivity Figure 1
Legend
Tortoise Habitat Connectivity
Aqueduct (above ground)
Aqueduct siphon
Solar Energy ROW
Wind Energy ROW
Kaiser Mine Disturbance
Undercrossings along I-10
First Solar Phase 3
Joshua Tree National Park
Agricultural Lands
DWMA
Desert tortoise - Critical Habitat
Mesquite Dune Hummocks
Desert Tortoise Habitat Model
Model Score
0.5
0.6
0.7
0.8
0.9
1.0
Pinto Basin
Coxcomb Mountains
Pinto Wash
Joshua Tree National Park
Eagle Mountains
First Solar
Big Wash
Eagle Mt. Rd.
Kaiser Rd.
Eagle Mt. RR
Cottonwood Canyon
sand dunes
dune hummocks
sand dunes
177
10
N
0
5
10
Miles