Draft Raven Monitoring and Control Plan
In Response to CEC & BLM Data Request 7
Application for Certification (08-AFC-5)
SES Solar Two, LLC

Submitted to:
Bureau of Land Management
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California Energy Commission
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With Support From:
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DRAFT REPORT

RAVEN MONITORING AND CONTROL PLAN FOR THE SES SOLAR TWO SITE, IMPERIAL COUNTY, CALIFORNIA

PREPARED FOR:

BUREAU OF LAND MANAGEMENT AND
CALIFORNIA ENERGY COMMISSION

URS PROJECT NO. 27657106.00601

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D R A F T

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Prepared for

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URS Project No. 27657106.00601

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APLIC	Avian Power Line Interaction Committee
BLM	Bureau of Land Management
CDCA	California Desert Conservation Area
CDFG	California Department of Fish and Game
CEC	California Energy Commission
CSSC	California Species of Special Concern
County S-80	Evan Hewes Highway
I-8	Interstate-8
IID	Imperial Irrigation District
kV	kilovolt
kWe	kilowatt-electrical
LORS	laws, ordinances, regulations, and standards
MBTA	Migratory Bird Treaty Act
MW	Megawatt
NEMO	Northern and Eastern Mojave Desert Management Plan
ORV	Off-road Vehicle
PCU	Power Conversion Unit
Plaster City	USG Corporation
Project	Solar Two Project
RO	Reverse Osmosis
ROW	right of way
SDG&E	San Diego Gas and Electric
USFWS	U.S. Fish and Wildlife Service

SECTION 1 INTRODUCTION

The proposed Solar Two Project (Project) would develop a solar-powered electricity generating facility situated approximately 14 miles west of El Centro in Imperial County in southern California. The proposed Project area is located on approximately 6,140 acres of land authorized under a right-of-way permit from the Bureau of Land Management (BLM) to SES Solar Two LLC and approximately 360 acres of private land which may be purchased or leased by SES (Figure 1). A total of approximately 6,500 acres would be included within the fenced site. The Project site boundaries are the Evan Hewes Highway (County S-80) to the north, Interstate-8 (I-8) to the south, Dunaway Road to the east, and the western boundaries of Section 23 in Township 16 south, Range 12 East. North of the Project site is the USG Corporation (Plaster City) mining site. The main access to the site will be from Dunaway Road with a second north access from Evan Hewes Highway just east of the San Diego Gas and Electric (SDG&E) transmission line. This transmission line traverses the site from the northwest to the southeast.

The first phase of the Project will consist of approximately 12,000 SunCatchers configured in 1.5 megawatt (MW) solar groups with 60 SunCatchers per group. Other than the Solar Two interconnection transmission line to be constructed by SES to the Imperial Valley Substation, no new transmission lines or offsite substations will be required for Phase 1 of the Project. Eventually, the Project will be expanded to include up to 30,000 SunCatchers configured in 1.5 MW solar groups (Phase II). Phase 2 of the Project will require the construction of SDG&E's 500-kilovolt (kV) transmission line from the SDG&E Imperial Valley Substation to SDG&E's service territory. In accordance with the plan of development for Solar Two, the Project will be connected to the SDG&E Imperial Valley Substation via an approximate 10 mile offsite double-circuit 230-kV transmission line (Figure 1).

Approximately 6,500 acres of sparsely vegetated creosote bush scrub will be impacted by the construction of the Solar Two Project. Only the vegetation within the immediate vicinity of the SunCatcher units will be regularly trimmed to three feet in height in order to provide clearance for SunCatcher movement. Much of the vegetation between rows of SunCatchers, and additionally some of the vegetation between SunCatchers, will be allowed to regenerate naturally and will not require any height maintenance. However, these narrow (from approximately 50-110 feet wide) strips of habitat are expected to have minimal residual biological value associated with them.

The Imperial Valley and the proposed Project site and associated offsite transmission line and water pipeline are occupied by the flat-tailed horned lizard (*Phrynosoma mccalli*). This Raven Management Plan has been developed as a measure to minimize the effects of raven (*Corvus corax*) predation on flat-tailed horned lizard and other native wildlife species in the Project vicinity as a result of construction activities, increased human presence, the addition of potential roost and nest site structures, and facility operation. This Plan is being submitted to the California Department of Fish and Game (CDFG), the California Energy Commission (CEC), BLM, and the U.S. Fish and Wildlife Service (USFWS) for approval prior to implementation. The BLM is compelled to review the design and operation features of the proposed Solar Two Project to reduce or eliminate the opportunity for proliferation of ravens (BLM 2001). Once approved, the Applicant will be responsible for implementing the management plan.

SECTION 2 BACKGROUND

This section describes the Project area natural setting and includes background information regarding flat-tailed horned lizard and raven biology.

2.1 ENVIRONMENTAL SETTING

The Project area is located in the Colorado Desert in gently rolling open terrain dominated by desert scrub vegetation. The Colorado Desert is the western portion of the larger Sonoran Desert that extends across the southwest United States and into Mexico. The climate is very hot and dry in the summer months, and cool and moist in the winter. Perennial and intermittent rivers and streams are rare, and most water flow occurs as flood flows within defined washes and less defined flood-flow paths during rare major winter rain events. Habitats in this region of the Colorado Desert vary with the landscape and precipitation levels. The area to the east of the project site supports irrigated agricultural lands; to the south is I-8 and undeveloped Sonoran creosote bush scrub within the Yuha Desert Management Area; to the west of the project is undeveloped Sonoran creosote bush scrub; and north is the BLM Plaster City Off-road Vehicle (ORV) Area. With the exception of the Plaster City plant in the north-central portion of the site, a maintained dirt access road along the transmission line, and several ORV trails, the project site is comparatively undisturbed.

The approximately 6,500 acre project site is located in gently rolling, open desert scrub with several sandy washes passing through the site. Vegetation is comprised of a single vegetation community, Sonoran creosote bush scrub as mapped according to the Holland Code (1986). Disturbed areas are mostly limited to dirt roads and ORV trails that traverse the Project site. The creosote bush scrub is in a disturbed condition along the northern project boundary within the one-mile buffer areas assessed.

The project site supports a diversity of common desert wildlife. Reptiles observed included common side-blotched lizard (*Uta stansburiana*), Colorado Desert sidewinder (*Crotalus cerastes*), zebra-tailed lizard (*Callisaurus draconoides*), desert iguana (*Dipsosaurus dorsalis*), Great Basin whiptail (*Cnemidophorus tigris tigris*), and desert horned lizard. Bird species detected during surveys included common raven (*Corvus corax*), California horned lark (*Eremophila alpestris actia*; California Species of Special Concern [CSSC]), black-tailed gnatcatcher (*Polioptila melanura*), and three raptor species: turkey vulture (*Cathartes aura*), American kestrel (*Falco sparverius*), and red-tailed hawk (*Buteo jamaicenis*). Burrowing owls were detected along the transmission line route and potential burrows were also detected on the Solar Two site. Mammals observed or indirectly detected from scat, tracks, or burrows included black-tailed jackrabbit (*Lepus californicus*), kit fox (*Vulpes macrotis arsipus*), coyote (*Canis latrans*), and California ground squirrel (*Spermophilus beecheyi*); rodent tracks and burrows were commonly observed throughout the site.

Currently, there are two habitat management plans approved and being implemented by the BLM that have jurisdiction over the Project vicinity. These include the California Desert Conservation Area (CDCA) Plan (1980), and the Flat-tailed Horned Lizard Rangewide Management Strategy (1997). The Project site is adjacent to the Yuha Basin Area of Critical Environmental Concern, which is located south of I-8. The proposed project site is located in close proximity to agricultural lands, off-road vehicle areas, and I-8. Utility lines and existing dirt roads run through, and adjacent to, the Solar Two project area. The

dirt roads are used for various recreational pursuits and for access to existing utility lines. Past and ongoing development and intrusion within the area has resulted in habitat loss, degradation, fragmentation, and the introduction of non-native species. Further development will be a source of cumulative effects to the flat-tailed horned lizard.

2.2 FLAT-TAILED HORNED LIZARD BIOLOGY

2.2.1 Status

The flat-tailed horned lizard had been proposed for listing in 1993 as threatened by the USFWS under the Endangered Species Act of 1973, as amended. The proposal for listing was withdrawn by USFWS in June 2006 (USFWS 2006). The flat-tailed horned lizard is considered sensitive by the BLM and has been identified as Species of Special Concern by the CDFG.

2.2.2 Natural History, Distribution, Abundance, and Habitat

The flat-tailed horned lizard inhabits areas of fine sand in desert washes and flats in the desert areas of San Diego, Imperial, and Riverside counties in California, southwestern Arizona, and northern Baja California and Sonora in Mexico. This lizard typically occurs in flat sparse desert scrub habitats dominated by creosote bush and bursage on fine, sandy, alkaline soils. Turner and Medica (1982) found that over 97 percent of total food intake was composed of ants in specimens studied. Harvester ants (*Veromessor pergandei, Polonomyrex californicus, and P, magnacantha*) composed 75 percent, and *Conomyrma insana* composed 16 percent of the lizards' diet. Flat-tailed horned lizards are suffering habitat loss from development and off-road vehicle use. It is estimated that up to 90 percent of the lizards' original geographic range is subject to, or potentially subject to, some form of human disturbance (Turner and Medica 1982).

Horned lizards have evolved several mechanisms to avoid predators which include loggerhead shrikes, hawks, roadrunners, snakes, coyotes, and foxes. One defense is the ability to remain cryptically hidden from a predator's sight by matching the background color of the substrate, possessing various spines and fringes of scales to decrease shadows, and remaining motionless when approached. The horned lizard's body armor of spines and horns pose a significant threat to many predators as witnessed by snakes and birds found dead with lizards' horns projecting through predators' throats. Horned lizards will also inflate their bodies with air to enhance their spines (Funk 1981).

Two flat-tailed horned lizards and four desert horned lizards were detected in the Project area during 2007 surveys, and two deceased flat-tailed horned lizards were observed along the offsite transmission line (Figure 2). Two additional detections of flat-tailed horned lizards occurred onsite during 2008 rare plant surveys and geotechnical investigations. Active harvester ant mounds and horned lizard scat were observed throughout the site. Because the desert horned lizard also inhabits the area, it is impossible to determine which species of horned lizard produced the scat. The flat-tailed horned lizard has the potential to occur throughout the site and along the offsite transmission lines.

2.3 RAVEN BIOLOGY

Bird species found in the Corvidae family include magpies, jays, crows, and ravens. These medium to large-sized passerine birds are typically bold, vocal, and resourceful. In general, these species are highly intelligent and are able to quickly adapt to human-dominated landscapes. Species such as crows and ravens have expanded their geographical distribution with the aid of irrigation, agriculture, landscaping, and organic trash accumulation that accompanies human encroachment. The population density of ravens and crows has also increased in areas dominated by development.

The common raven has expanded its distribution in arid regions of the Western United States largely due to introduced food and water resources accompanying increasing human development. Increased human disturbance in and around the Project site has likely increased the abundance of ravens in the area. Additional local development has the potential to further increase occurrence of ravens in the vicinity. Measures directed at discouraging ravens by minimizing the availability of human-subsidized resources is an important component of controlling the further spread and propagation of ravens in the Imperial Valley.

The common raven is a large, adaptive bird that occupies a wide range of habitats in North America. They are found in both forested and open natural communities, and have adapted to human disturbance, particularly agricultural and suburban development. Raven abundance and distribution is increasing and expanding in some areas largely due to human encroachment. Human occupation has the potential to introduce food, water, and structural resources. In the California desert regions, the raven populations have been allowed to grow beyond the natural carrying capacity of the desert habitat due to their association with humans (Boarman 1992).

Ravens are opportunistic omnivores and are successful scavengers consuming carrion, agricultural fruits and grains, as well as organic material from landfills. They have been known to travel long distance between their territories and roost sites to visit human created food resources. Ravens are also adept predators preying upon a variety of wildlife including small reptiles. Raven foraging is typically concentrated in the morning and late afternoon, which is also when flat-tailed horned lizards are typically most active.

Breeding raven pairs defend year-round territories with an average nesting territory size of approximately 2.0 square miles in coastal California (Kristan and Boarman 2003). Territories and home ranges are highly variable, dependent on the abundance of local food resources. Juvenile or unpaired birds rely on a home range for foraging and often return to communal roosts located in trees, cliffs, or human structures near important food resources. The number of birds roosting at an individual site is dependent on the abundance of local food resources. Nest sites are often located on cliffs and trees and elevated structures such as utility poles/towers, billboards, and abandoned buildings. Breeding occurs along the fringes of the Imperial and Mexicali Valleys between March and June (Patten *et al.* 2003).

The feeding behavior of breeding common ravens is different from that of non-breeding juveniles. Large numbers of non-breeding ravens are attracted to concentrated human-subsidized sources of food, water, and roost sites, but are spatially restricted in the California desert. Breeding ravens are more evenly distributed throughout the California desert area (Kristan and Boarman 2003). Raven crowds frequently feed at concentrated food sources such as landfills and illegal dumps in the California desert (Boarman

and Heinrich 1999). Fledgling chicks will usually move to human-subsidized resources where other ravens congregate.

2.4 RAVEN PREDATION OF FLAT-TAILED HORNED LIZARDS, EXISTING RAVEN ATTRACTANTS, AND THREATS

The raven is an intelligent and resourceful scavenger and predator that has effectively expanded its range and/or presence in various locations in large part due to their close association with human encroachment. The expansion of this range has introduced a new or increased threat to the recovery of several at-risk species. Although much of the management emphasis in North America is given to raven nest predation of other bird species' eggs and nestlings, ravens are also known to prey on a variety of small to medium-sized mammals, amphibians, and reptiles. Studies have shown that ravens tend to be more common along heavily-traveled roads than away from them (Boarman *et al.* 1997).

Desert dwelling juvenile or non-breeding ravens are typically concentrated at areas with dependable food resources such as landfills; while breeding pairs are more evenly distributed throughout the desert (Kristan and Boarman 2003). Due to this difference in distribution, non-breeding and breeding ravens have varying effects on sensitive reptiles. Non-breeding ravens likely have a more concentrated effect on reptiles nearby their reliable human-created food resources while breeding ravens have a more widespread effect. The predation risk posed by nesting ravens can be widespread throughout an area as successful nest locations change from year-to year (Kristan and Boarman 2003).

Little is known about raven predation on horned lizards though studies have shown that horned lizards and other small reptile species are potential prey for the birds. Other potential avian predators of horned lizards include greater roadrunner (*Geococcyx californianus*), red-tailed hawk (*Buteo jamaicensis*), burrowing owl (*Athene cunicularia*), American kestrel (*Falco sparverius*), and loggerhead shrike (*Lanius ludovicianus*). Horned lizards are also preyed upon by several mammals including coyote (*Canis latrans*) and kit fox (*Vulpes macrotis*; Turner and Medica 1982).

2.4.1 Threats and Attractants in the Imperial Valley

Ravens depend on human encroachment to expand into areas where they were previously absent or in low abundance. Ravens adapt to human activities and are sustained by the food and water, as well as roosting and nesting resources that are introduced or enhanced by human encroachment. The Project vicinity includes several residential and commercial developments, including extensive agricultural areas that generate a considerable amount of resources that enable the presence of ravens and other bird species that are otherwise not as prevalent in the Colorado Desert. Man-made structures, such as buildings, signs, lamps, and utility poles provide roosting and nesting opportunities that otherwise would be unavailable. Landscape irrigation, swimming pools, decorative fountains and ponds provide valuable water. Several agricultural fields and residential developments occur east of the project site.

Small mammal and reptile road kill along I-8, Dunaway Road, County S-80 and other local roads provides additional food resources for opportunistic predators/scavengers such as ravens. Existing human activities and associated development present difficulties in controlling raven activities at, and adjacent to, the proposed Project despite measures that will be implemented at the Solar Two site.

The common raven is rated anywhere from fairly common to uncommon as a breeding resident in Imperial Valley, depending on the location within Imperial Valley. However, a flock of approximately 400 ravens was documented west of Seeley which is located approximately 10 miles east of the Solar Two site. Ravens generally avoid heavily cultivated areas in the region, but are frequently observed in the creosote scrub surrounding areas that support water such as the Salton Sea. Ravens are frequently observed perching and occasionally nesting on utility poles, water tanks, grain silos, and similar man-made structures (Patten *et al.* 2003). It has been estimated that raven populations have increased by more than 1,000 percent between 1968 and 1992 in the Mojave and Colorado deserts largely due to the increase in development. A current estimate for ravens in the California desert is approximately 37,500 birds (USFWS 2007). It is expected that raven populations will continue to increase in the Imperial Valley as development continues. Relatively high densities of predators, including ravens, around urban and agricultural lands appear to result in elevated predation on flat-tailed horned lizards (Flat-tailed Horned Lizard Interagency Coordinating Committee 2003).

Large-scale raven management plans have been drafted for the purposes of desert tortoise recovery, but not for the flat-tailed horned lizard. The BLM drafted their own raven management plan in 1990 (BLM 1990), and raven management goals are also stated in the Northern and Eastern Mojave Desert Management Plan (NEMO, BLM 2006), and it has become standard for project applicants to implement a raven management plan as a result of Endangered Species Act Section 7 or Section 10 consultations with USFWS.

2.5 SOLAR TWO PROJECT FEATURES, CONSTRUCTION, AND OPERATION

There are aspects associated with the design, construction, and operation of the Solar Two project that have the potential to provide resources for ravens.

2.5.1 Project Features

Solar Receivers

The SunCatcher is a 25-kilowatt-electrical (kWe) solar dish Stirling system designed to automatically track the sun and collect and focus solar energy onto a Power Conversion Unit (PCU), which generates electricity. The system consists of an approximately 38-foot-high by 40-foot-wide solar concentrator in a dish structure that supports an array of curved glass mirror facets. These mirrors collect and concentrate solar energy onto the solar receiver of the PCU. The SunCatcher pedestal on which the SunCatcher Dish Assembly is secured is approximately 18 feet 6 inches in height. The dimensions of the PCU are approximately 7 feet long by 5 feet wide by 3 feet high. The PCU consists of six subsystems: solar receiver, Solar Stirling Engine, generator; cooling system, gas management system, and the PCU control system.

Electrical System

The Project includes construction of a substation, which will include transformers, circuit breakers, metering, and other protection required to connect the Project to the SDG&E Imperial Valley Substation. The Solar Two Project interconnect transmission system will require construction of approximately 10.30 miles of double-circuit 230-kV transmission line. Power will be collected at the 34.5-kV level by a

combination of underground cables and overhead collection lines and will be delivered to the Project substation, where the voltage will be stepped up to 230-kV for transmission to the Imperial Valley Substation and connection to the grid.

Electrical service for the Main Services Complex, the water treatment structure, the water pumping stations, and other auxiliary structures will be provided separately from the Project power generation system and will be provided from the IID electrical distribution lines located north of Evan Hewes Highway by means of overhead service lines to be constructed by IID.

The off-site portion of the 230-kV interconnect transmission line will be routed in a 100-foot ROW parallel to the existing SDG&E 500-kV Southwest Powerlink transmission line on the southwest side until approximately the third tower from the SDG&E Imperial Valley Substation, where the line will cross under the existing 500-kV transmission line. This route was chosen to minimize effects on the flat-tailed lizard management area south of I-8 by using the existing access roads for the existing transmission line and by placing the disturbance for the interconnect transmission line immediately adjacent to an existing disturbance. The transmission line towers will consist of H-Frame towers at the undercrossing of the existing 500-kV transmission line and double-circuit lattice steel towers and/or steel poles elsewhere.

2.5.2 Construction

Schedule, Workforce, Access, and Laydown

Two construction staging and laydown areas will be used for the Project. An approximate 100-acre construction laydown area that includes a 25-acre construction staging area will be provided east of Dunaway Road. An 11-acre construction laydown area will be provided adjacent to the Main Services Complex. Both the 25-acre construction staging area to the east of Dunaway Road and the 11-acre construction laydown area adjacent to the Main Services Complex will contain temporary construction facilities, including site offices, restrooms, meal rooms, conference rooms, storage facilities, and parking and vehicle maintenance and storage areas.

The 100-acre laydown area east of Dunaway Road is nearly level and thus requires little grading. The 11-acre laydown area adjacent to the Main Services Complex is on a gently sloping, rocky area that will require minimum grading and fill operations to create a level area. Pads will be prepared for setting the trailers housing the temporary construction facilities.

The Solar Two Project transmission system will require construction of approximately 10.3 miles of double-circuit, 230-kV transmission line. The Project transmission line extends from the Project Site substation to a point inside the ROW of the SDG&E Imperial Valley Substation. Each circuit of the overhead line begins at a dead-end structure in the Project substation, continues south and east through the Project Site, and transits southeast adjacent to the SDG&E 500-kV Southwest Powerlink transmission line to the Imperial Valley Substation. The transmission line starts within the Project Site boundary but a 7.56-mile-long segment that connects to the Imperial Valley Substation is outside the Project Site boundary. Construction of the line will include dead-end structures in the substation and 85 to 100 lattice steel towers and/or tubular steel poles with concrete foundations and new 1,590-kilo circular miles aluminum steel-reinforced conductors for each circuit. The power poles will be spaced approximately 650 feet to 800 feet apart (the final calculation will take into account the grading and other factors to determine the final spacing).

The construction of the Solar Two Project transmission line will involve the facilities listed below:

Staging Areas: These yards are staging areas for trailers, office personnel, equipment, material staging, and employee parking and will be provided in a disturbed area (within a 100-acre laydown area) along the eastern boundary of the Project Site, just east of Dunaway Road.

Road Work: As needed, dirt roads will be cleared for access along the on-site transmission line route to coincide with the southern perimeter road for the Project Site. These roads will provide access to the tower locations. Where the off-site transmission line parallels the existing 500-kV Southwest Powerlink transmission line, the existing access road to the existing transmission line will be utilized. Short access roads will be constructed from the existing access road to each transmission tower along the route. Dirt roads will be cleared for access along the east-west portion of the offsite transmission line from the Southwest Powerlink ROW to the Imperial Valley Substation.

Foundations: Each pole will have a foundation installed that will require curing before the tower or pole installation. These pole foundations will be installed in locations that avoid sensitive environmental resources identified in Project environmental surveys.

Tower Erection: Where used, steel tower structures will be shop-fabricated to the maximum extent possible and erected at the site. The cross arms, insulators, and other hardware will be installed on the towers to the maximum extent possible before erection.

Pole Erection: Where used, each pole will be made up of two sections, which will be assembled on-site and welded together. Afterward, insulators and conductor hardware will be installed.

Conductors: From pulling sites, the conductors will be installed, sagged, and permanently connected to the insulators.

Pulling Sites: Approximately five pulling sites are required to install the conductors along the transmission line. The pulling sites will be located on existing access roads or access roads that will be constructed as part of the transmission line installation.

Cleanup: Although cleanup will be ongoing as the work proceeds, once construction is completed, a final cleanup of the entire transmission construction site will be performed to clear the area of any remaining construction-related debris.

Clearing and Grading

Site preparation will be based on avoiding major washes and minimizing surface-disturbing activities. Also, areas of sensitive habitat and/or cultural resource will be avoided wherever possible. Brush trimming will be conducted between alternating rows of SunCatchers. Brush trimming consists of cutting the top of the existing brush while leaving the existing native plant root system in place to minimize soil erosion. After brush has been trimmed, blading for roadways and foundations will be conducted between alternating rows of SunCatchers to provide access to individual SunCatchers. Blading will consist of removing terrain undulations and will be limited to three feet in cut and three feet in fill. The blading operations will keep native soils within 100 feet of the pre-development location, with no hauling of soils across the site.

Paved roadways will be constructed as close to the existing topography as possible, with limited cut-and-fill operations to maintain roadway design slope to within a maximum of 10 percent. Limited localized channel grading will take place to improve channel hydraulics and to control flow direction where buildings and roadways are proposed. The Main Services Complex and the electrical substation will be protected from a 100-year flood by berms or channels that will direct the flow around the perimeter of the sites, if required. Minor grading will also be required for building foundations and pads and parking areas in the Main Services Complex and substation areas. Preliminary estimates indicate a total of approximately 450,000 cubic yards of grading. The clearing, blading, and grading operations will be undertaken using standard contractor heavy equipment. This equipment will consist of, but not be limited to, motorgraders, bulldozers, elevating scrapers, hydraulic excavators, tired loaders, compacting rollers, and dump trucks.

2.5.3 Operation

Solar Fields

It is expected that the Solar Two Project will be operated with a staff of approximately 160 full-time employees. The Project will operate seven days per week, generating electricity during normal daylight hours when the solar energy is available. Maintenance activities may occur seven days a week, 24 hours a day to ensure SunCatcher availability when solar energy is available.

Water System

The following types of water will be required for the Project:

- equipment washing water,
- potable water,
- dust control water, and
- fire protection water.

When completed, the Solar Two Project will require a total of approximately 32.7 acre-feet of raw water per year. SunCatcher mirror washing and operations dust control under regular maintenance routines will require an average of approximately 23.3 gallons of raw water per minute, with a daily maximum requirement of approximately 39.2 gallons of raw water per minute during the summer peak months each year, when each SunCatcher receives a single mechanical wash.

Concrete Holding Basins

Wastewater or brine generated by the reverse osmosis (RO) unit will be discharged to a concrete-lined evaporation pond, or equivalent located to the east of the proposed substation on-site. Each pond will be sized at approximately 1-acre each to contain one year of discharge flow, approximately 2.5 million gallons. A minimum of one year is required for the water treatment waste to undergo the evaporation process. The second pond will be in operation while the first is undergoing evaporation. The two ponds will alternate their functions on an annual basis. These drying beds will be covered with netting or metal grating to exclude ravens during inundation.

Wastewater generated at the Main Services Complex will be discharged into a septic system with sanitary leach fields, and will be designed in accordance with applicable Laws, Ordinances, Regulations, and

Standards (LORS), including those of the county, the Regional Water Quality Control Board, and the California Department of Health Services. The septic tank will be located at the Main Services Complex; the leach fields will be located adjacent to the Main Services Complex, utilizing the open space between nearby SunCatchers.

Waste Management

The Solar Two Project will generate a variety of wastes during construction and operation. These wastes include liquids and solids from the wastewater system, replaceable parts, rags, and other waste materials and chemicals produced from maintenance activities, including equipment and vehicle maintenance.

Inert solid wastes resulting from construction activities may include recyclable items such as paper, cardboard, solid concrete and block, metals, wire, glass, Type 1 to 4 plastics, drywall, wood, and lubricating oils. Non-recyclable items include insulation, other plastics, food waste, roofing materials, vinyl flooring and base, carpeting, paint containers, packing materials, and other construction wastes. Management of these wastes will be the responsibility of the construction contractor(s). Typical management practices required for contractor waste include recycling when possible, proper storage of waste and debris to prevent wind dispersion, and weekly pickup of wastes with disposal at a local approved landfill.

Inert solid wastes generated at the Project during operation will be predominantly office wastes and routine maintenance wastes, such as scrap metal, wood, and plastic from surplus and deactivated equipment and parts. Scrap materials such as paper, packing materials, glass, metals, and plastics will be segregated and managed for recycling. Non-recyclable inert wastes will be stored in covered trash bins in accordance with local ordinances and picked up by an authorized local trash hauler on a regular basis for transport and disposal in a suitable landfill area.

Fire Protection

The Solar Two Project will have on-site fire-protection systems and will be supported by local fire protection services. The Project will include both portable and fixed fire suppression equipment and systems. Portable fire extinguishers will be located at strategic locations throughout the Project Site. The fixed fire protection system will provide a wet, water-based sprinkler fire-suppression system for the buildings.

The Solar Two Project fire water system will consist of a water storage tank, an electrical fire water pump, yard hydrants, fire risers, and fire sprinkler systems within the buildings. The fire water pump, located at the Main Services Complex, will be sized in conjunction with a potable water storage tank. The potable and fire flow water will be stored in an aboveground steel tank with supply and fire flow pumps sized to handle the specific demands. The water in the fire flow and potable fire flow tank will be chlorinated and circulated to keep it fresh. The fire distribution system will need to be flushed periodically to keep water fresh and free from algae growth.

SECTION 3 RAVEN MANAGEMENT

3.1 MANAGEMENT GOALS

The goal of this Raven Management Plan is to implement non-lethal measures to deter raven depredation of flat-tailed horned lizards that may increase with the construction or operation of the Solar Two project.

3.2 RAVEN MANAGEMENT MEASURES

Raven management measures were designed to discourage ravens by limiting the availability of human-created food and water resources as well as roost and nest site opportunities. Lethal methods of raven control, such as shooting or poisoning, will be avoided to the greatest extent possible. The non-lethal measures outlined below are primarily based on guidance from the preferred Alternative B in the USFWS *Draft Environmental Assessment to Implement a Desert Tortoise Recovery Plan Task: Reduce Common Raven Predation on the Desert Tortoise* (FWS 2007), and modified to apply to flat-tailed horned lizard conservation.

3.2.1 Reduce Access to Anthropogenic Food and Water Resources

It is unlikely that the Imperial Valley would provide sufficient year-round food and water resources for ravens without the availability of human-created sources. Ravens are known to make long distance daily flights of at least 40 miles in search of food and water. Water is a vital and limited resource in the desert and breeding ravens have been observed leaving their territories every day to find water (Boarman 2003). Several agricultural fields occur east of the Solar Two site as well as a residential development with a man-made pond that supports several bird species just northeast of the project site. Solar Two construction activities and the completed solar facilities could potentially attract the attention of ravens that are bound to investigate the site. To prevent the addition of food and water resources onsite, the following measures should be implemented:

Trash management. All trash associated with the project during construction and operation will be contained in secure receptacles to prevent the introduction of food resources for ravens, coyotes, and other predators. Self-closing trash bins will be used during construction for organic waste. Plastic bags containing trash will not be left out for pickup. In addition, the environmental awareness program will inform construction and operation personnel to not intentionally feed ravens. Any animal roadkills on the project site and along the will be promptly removed to discourage scavenger activity.

Facility fencing. The Project site will be surrounded by a security fence that will also be designed and maintained to exclude coyotes and foxes from entering the site. The facility gates will be closed at the end of each construction day. The entry gates will be automated to open and close for individual vehicles following construction and during facility operation.

Reduce availability of water. Unnatural water sources can attract ravens by providing water during the very dry times of the year and allowing ravens to range further out in the desert from natural water sources (Boarman 2002). Access to standing water on the project site will be limited during construction and operation. Truck cleaning areas will be kept free of standing water during construction. Water used

for dust suppression during construction will be applied at a rate that discourages puddling. Operational requirements necessitate the washing of some portion of the project's solar mirrors on a nightly basis while ravens are inactive. Using high pressure water will limit the amount needed. The water will run off the mirrors and should be absorbed in the soil by morning.

Water used for the site will require treatment through a Reverse Osmosis (RO) system. Wastewater or brine generated by the RO unit will be discharged to a concrete-lined evaporation pond, or equivalent. The evaporation ponds could be covered to minimize wildlife access. For instance, the covers will be designed to minimize attraction of predator and scavenger species. The evaporation ponds could be designed to discourage wildlife use by constructing perimeter fences and installing wire mesh screens above the ponds. Specific design could be implemented, regarding wire mesh size and fencing design, to ensure that implementation of these exclusion methods will be successful and that smaller wildlife will not be trapped by the pond covers.

Any water used for vegetation restoration or landscape irrigation will be delivered via a drip system that will be regularly checked to prevent leaks and puddling. Operations maintenance will prevent dripping faucets, and water misters used for comfort in hot weather will not be installed or used.

3.2.2 Discourage Nesting

The addition of buildings, billboards, signs, utility poles, landscape trees, and other structures in Imperial Valley have introduced raven nesting opportunities that were otherwise very limited. Ravens have been observed nesting on various structures such as radar towers, power poles, telephone poles, and buildings in desert areas (Boarman 2002). Transmission line structures have been shown to increase raptor and raven nesting densities (Steenhof *et al.* 1993). The majority of raven predation on flat-tailed horned lizards can be expected to occur in the late spring (April and May) when horned lizards are most active and ravens are feeding their young. Nesting ravens have been observed foraging within 0.25 miles of their nest site (Boarman 2003). Therefore, the establishment of a new nest can have significant adverse effects on the horned lizard population.

An existing transmission line occurs on the Solar Two site. The NEMO Desert Tortoise Conservation Strategy states that poles and towers of electrical distribution lines must be designed to discourage raven nesting (BLM 2001). The NEMO also states that structures which may function as common raven nesting or perching sites are not authorized except as specifically stated in the appropriate BLM document. Applicants must provide a graphic description of all structures to be erected onsite. To prevent nesting on structures associated with the Solar Two site, the following measures shall be implemented:

Utility structures. Tie-lines will be installed on utility poles designed to be incompatible with the establishment of raven nests. As suggested in Avian Power Line Interaction Committee (APLIC) guidelines, the project owner will attach PVC pipe or corrugated drain pipe to transmission line structures to discourage nesting (APLIC 2006). it is important to monitor the usefulness of the deterrence measures and implement different measures if the current effort is unsuccessful. The installation of triangles, plastic owls, and spikes has also been used to discourage nesting (APLIC 2006). Nest deterrent materials or measures will require occasional maintenance and replacement.

All new transmission lines associated with Solar Two will be designed to reduce the likelihood of raven nesting by common ravens. The project owner will remove any raven nests that are found on its structures in cooperation with BLM, CDFG, and USFWS (BLM 2001). Take of ravens or active nests require a permit from the USFWS' Division of Law Enforcement (BLM 2001). Even if an identified nest is free of eggs or young, BLM, CDFG, and USFWS will be contacted should those agencies be interested in attempting to trap, tag, and/or transmitter the raven pair.

When inspecting or removing nests, species identification is important to avoid disturbing the nest of a non-target species such as a red-tailed hawk (*Buteo jamaicensis*). Removing unoccupied nests during or outside the breeding season may be beneficial because birds with no nest in their territory at the beginning of the breeding season were less likely to commence nesting than those ravens with an intact nest (Boarman 2002). Therefore, the project owner will rely on a BLM approved biologist to conduct or direct any raven nest disturbance or removal during the breeding season. Because of protection provided to the raven by the Migratory Bird Treaty Act (MBTA), the USFWS rarely authorizes nest removal if birds are present in the nest, but does authorize removal after the birds have left (BLM 2001).

Building structures. The project owner will contact BLM when raven nests are found in any of the structures associated with the Solar Two site.

Structure Removal Following Decommission. Elevated structures including utility poles will be removed from the Solar Two site when decommissioned and dormant.

Limiting Raptor Enhancement Measures. Utility pole and tower construction will not include raptor-friendly designs or retrofits outlined in the APLIC guidelines (APLIC 2006) intended to encourage or enhance the potential for raptor nests that could also be used by ravens.

Hazing. The long term effectiveness of hazing/harassment techniques such as noise making, displaying bright objects, pyrotechnics, and chemical agents are often limited when used to deter corvid species. To be effective, hazing must be continuous, focused on the target individual(s), and bothersome enough to drive the target animal away from the resource of attraction. The Applicant will focus on limiting raven attractants rather than hazing and hazing will only be implemented under the direction of BLM, CDFG, and USFWS in situations where it is considered the best course of action.

3.2.3 Discourage Roosting

The addition of power poles and towers and other elevated structures provides roosting opportunities that are otherwise limited in the Colorado Desert. The solar technology used at the Solar Two site involves the concentration of sunlight on a PCU. The design of the solar collectors does not provide suitable roosting opportunities for ravens or other bird species. The installation of transmission lines and poles will be constructed according to the most recent "raptor-friendly" guidelines (APLIC 2006), ensuring that conductor wires are appropriately spaced to minimize the potential of raptor electrocution. Additionally, all overhead power lines will be equipped with raptor perch guards. The transmission line structures will not be designed to otherwise accommodate nesting or perching. As discussed above, this includes attaching PVC pipe or corrugated drain pipe to transmission line structures as well as the installation of triangles, plastic owls, and/or spikes to discourage nesting.

The security fence around the sites, along with faculty buildings and other facility structures, will provide likely locations for ravens to perch. The interior structures are unlikely to provide optimal foraging roost for ravens since flat-tailed horned lizards should be effectively excluded from the fenced sites during operation. Horned lizards outside the site and adjacent to the security fences could experience an increased predation risk if ravens regularly perch on the fence. Some studies have shown that there is little value in modifying structures to prevent perching because ravens primarily hunt on the wing and will frequently perch on shrubs or the ground (Boarman 2003). In addition, although anti-perching measures could be successful in keeping ravens from perching on particular features, ravens are too resourceful for broad-scale application to be successful. Despite this, it is important that the Solar Two project avoid the introduction of new perching opportunities for ravens. To discourage perching on structures associated with the Project, the Applicant will implement the following:

Roost Prevention as a Contingency. To avoid the introduction of new roost and nest locations for ravens (and other avian species), contingency measures will be implemented when a particular structure is providing daytime perches or evening roosting opportunities for ravens. In such a case, bird barrier spikes or the functional equivalent will be used to minimize the opportunity. Such a contingency measure will be implemented following specific discussion with the BLM, CDFG, and USFWS.

Hazing. As stated in the preceding nest deterrence section, hazing will only be implemented under the direction of BLM, CDFG, and USFWS in situations where it is considered the best course of action.

Structure Removal Following Decommission. Elevated structures including utility poles will be removed from the Solar Two site when decommissioned.

3.2.4 Avoid Increased Predation Risk Associated with Flat-tailed Horned Lizard Translocation

Measures developed to minimize and avoid adverse effects to flat-tailed horned lizard as a result of Project development will include the implementation of a flat-tailed horned lizard translocation plan. This plan remains in development with the cooperation and guidance of BLM, CDFG, and USFWS. Any horned lizards found during clearance surveys or construction monitoring will be relocated to suitable habitat that has been agreed upon by the BLM, CDFG, and USFWS. The optimal alternative is to move individuals the shortest distance possible beyond harm's way within the project vicinity. The chosen site should avoid areas adjacent to human activity, roads, overhead utility structures, and human-created raven resources. Translocated horned lizards will be monitored as outlined in the translocation plan.

3.2.5 Removal of Problem Ravens

Corvids were not protected under the original 1918 MBTA because they were considered agricultural pests. However, a 1972 amendment to the MBTA provided legal protection of corvids, including active raven nests. If necessary, lethal removal would only be conducted by, or under the direction of the BLM, CDFG, and USFWS, and would be considered a short-term solution. It is important to note that removal does not address the issues that enable raven presence and vacated nesting territories are likely to be quickly occupied by another raven pair.

3.3 SUCCESS CRITERIA

The effectiveness of the Raven Management Plan will be monitored through the construction of both site construction phases. Reporting associated with the implementation of the plan will continue for two years following completion of the Project. It will be difficult to determine if the project is contributing to a decline in the local flat-tailed horned lizard population due to the difficulty in monitoring flat-tailed horned lizard densities and raven predation. The success of this Raven Management Plan will be based on how successful the project design features and implementation of the Plan is in discouraging ravens from gaining food, water, nesting, or perching opportunities associated with the Solar Two project. Much of the plan's success lies in the effectiveness in discouraging human practices that would attract ravens to the area.

The Applicant proposes to discontinue the survey and reporting requirements after two years if it can be determined that the project design, operation, and raven management plan have been successful. The site maintenance; waste and water management; identification of problem ravens, roost, and nest sites; and the reporting of flat-tailed horned lizard predation aspects of the management plan will need to be continued for the life of the solar facility.

3.4 ADAPTIVE MANAGEMENT

Adaptive management will be required if existing raven management measures are not effective in controlling significant raven predation of the flat-tailed horned lizard. Because ravens are highly adaptive, the need for adaptive management would be necessary. Given that ravens threaten the recovery of other at-risk species, deterrent and aversion methods continue to be developed and tested in a variety of situations. Resource agencies also continue to work on ways to better monitor and find flat-tailed horned lizards and learn more about the dynamics of raven territoriality, dispersal, daily movements, and use of human-created resources (Boarman 1997). A willingness to adopt new or experimental methods and measures is crucial for the effectiveness of any long-term raven management plan.

The project owner will consult with the CDFG, BLM, and the USFWS prior to implementing adaptive management changes. The minimum two year monitoring period will be re-initiated following the implementation of any adaptive management changes.

SECTION 4 RAVEN MONITORING PLAN

4.1 RAVEN POPULATION MONITORING

The objective of raven monitoring is to determine raven abundance, distribution, nest site locations, and behavior exhibited in the project area prior to, during, and for a minimum of two years following completion of Project facilities.

4.1.1 Methodology

Abundance and Behavior Surveys

Surveys for raven monitoring will begin following the construction of the transmission line for the project. The objective of the surveys will be to characterize raven presence in the project vicinity and to monitor abundance and behavior in those areas over time. The purpose of the surveys will be to identify the local sources of human-created resources and raven activity relative to the Project. The investigation will consist of driving surveys that will target the within Project site, the translocation site (location yet to be determined), the nearby transmission line corridors, and the surrounding areas. The survey area will be revised if it becomes apparent that the route is not providing adequate observation of raven activity centers in the general project area.

The roads will be driven slowly. Binoculars and spotting scopes will be used to observe raven activity within two kilometers of the site. All raven observations will be documented and will include date, time, location, habitat, number of individuals, and behavior. The locations of occupied and potential nests will also be recorded. Survey visits will occur twice monthly during the peak of breeding raven activity (March to June) and once a month for the remainder of the year (July to February). Each survey visit will consist of a two day effort. Each day the survey route will be driven once in the early morning (starting 30 minutes prior to sunrise), a second time in the midday (starting between noon and 2 p.m.), and a third time in the evening (completed within one hour following sunset).

Nest Surveys

The areas under occupied and potential nests will be surveyed during the March through June visits for sign of flat-tailed horned lizard predation. The carcass survey will cover a 50-meter radius originating from the nest location. This area will be walked with 10-meter interval transects. The location of all horned lizard carcasses or other sign of predation will be mapped and photographed. The sign will be collected or marked based on guidance from the resource agencies.

Incidental Observations

Biologists will be present on the Solar Two site conducting clearance surveys, monitoring construction activity, monitoring environmental compliance, translocating flat-tailed horned lizards, and monitoring translocated horned lizards. Biologists will be instructed to document raven observations during those surveys. Incidental raven or horned lizard observations will be included in the yearly monitoring reports and will be immediately reported to the appropriate resource agency of particular interest or concern.

4.2 SURVEY PARTICIPANTS

The flat-tailed horned lizard and raven surveys associated with the Solar Two project will be conducted by experienced desert biologists that will be subject to BLM, CDFG, and USFWS approval.

4.3 MONITORING REPORTS

Monitoring reports will be sent to the CDFG, BLM, and USFWS no later than December 31 of each raven management year. If after two years of reporting the agencies determine that the raven management program is effective, and ravens are not adversely affecting the local flat-tailed horned lizard population due to Solar Two site operation, then the raven surveys and reporting schedule will be phased out. Raven management practices, such as employee education, trash containment, and reporting raven nests, will be implemented for the life of the solar facility.

The annual report will include:

- The number and behavior of observed ravens
- Raven nest and perch locations
- Results of the management techniques;
- The observed effectiveness of the techniques in minimizing raven presence; and
- Suggestions for improving raven management.

Observations of raven predation of flat-tailed horned lizards (including sign) and occupied raven nests will be reported to the designated contacts at BLM, CDFG, and USFWS by an electronic mail message within two days of the observation.

SECTION 5 REFERENCES

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Proposed Waterline (11.8 miles)

Main Services Complex (24.27 acres)

25-Acre Laydown Area

Laydown Area (11.04 acres)

IID Westside Main Canal

Existing SDG&E Southwest Powerlink Transmission Line

Proposed Main Access Road

Proposed 750-MW
Substation (6.00 acres)

Proposed 750-MW/230-KV
Transmission Line (10.30 miles)

Existing SDG&E Imperial Valley Substation

LEGEND

- Project Boundary (6,176.65 acres)
- Proposed Main Access Road
- N.A.P. Not A Part (Owned by Others)
- Proposed Substation and Main Services Complex
- Laydown Areas
- Existing Transmission Line
- Proposed 750-MW/230-KV Transmission Line (10.30 miles)
- Proposed Waterline (11.8 miles)

SOURCES: SDG&E (existing t-line 2006); Stantec (proposed project features 2008); USGS TOPO! (100K topo, various dates).

GENERAL VICINITY MAP
SOLAR TWO PROJECT

URS

0.5 0 0.5 1 Miles

SCALE: 1" = 1 Miles (1:63,360)
SCALE CORRECT WHEN PRINTED AT 11X17

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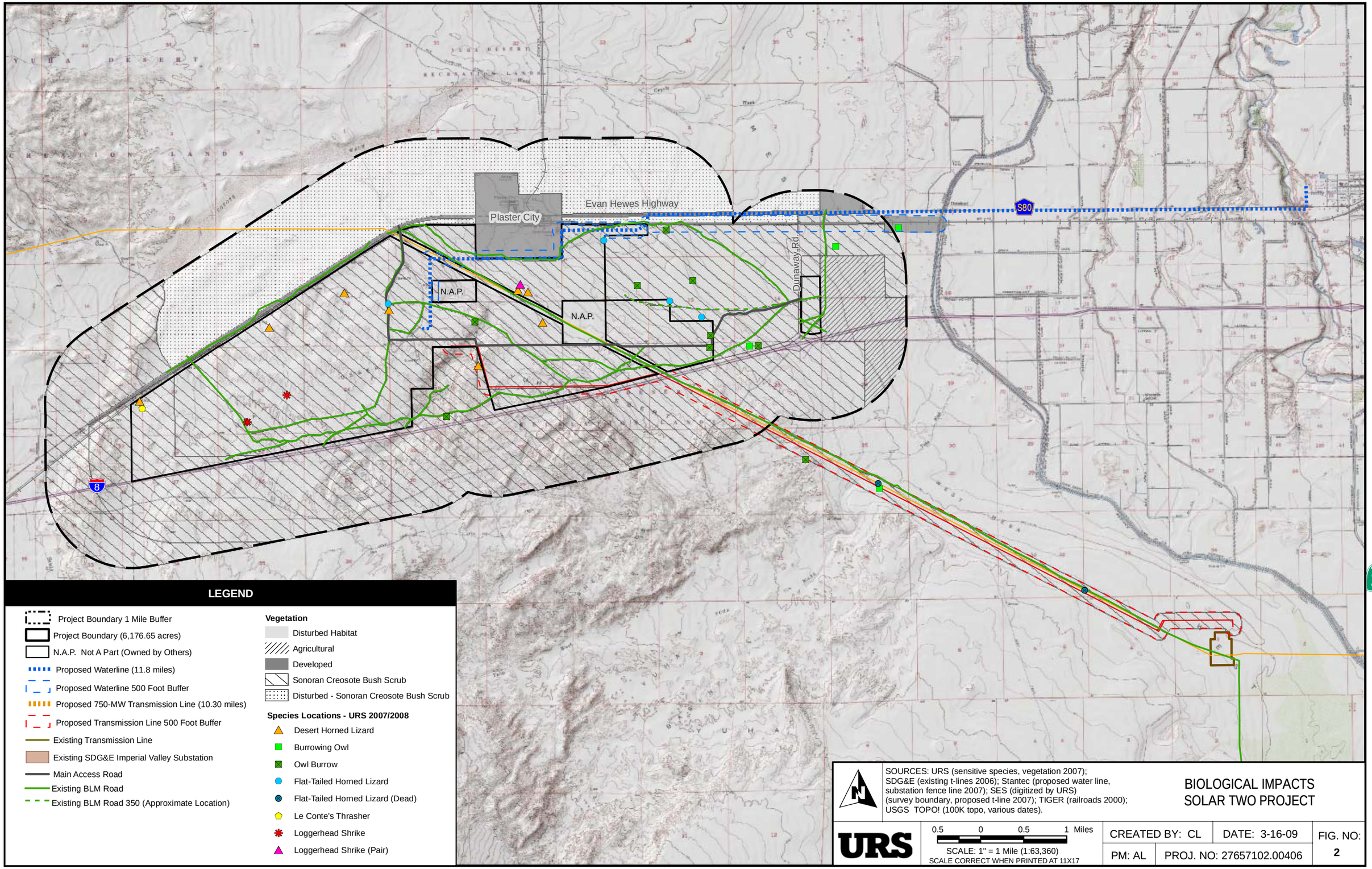

LEGEND

- Project Boundary 1 Mile Buffer
- Project Boundary (6,176.65 acres)
- N.A.P. Not A Part (Owned by Others)
- Proposed Waterline (11.8 miles)
- Proposed Waterline 500 Foot Buffer
- Proposed 750-MW Transmission Line (10.30 miles)
- Proposed Transmission Line 500 Foot Buffer
- Existing Transmission Line
- Existing SDG&E Imperial Valley Substation
- Main Access Road
- Existing BLM Road
- Existing BLM Road 350 (Approximate Location)

Vegetation

- Disturbed Habitat
- Agricultural
- Developed
- Sonoran Creosote Bush Scrub
- Disturbed - Sonoran Creosote Bush Scrub

Species Locations - URS 2007/2008

- Desert Horned Lizard
- Burrowing Owl
- Owl Burrow
- Flat-Tailed Horned Lizard
- Flat-Tailed Horned Lizard (Dead)
- Le Conte's Thrasher
- Loggerhead Shrike
- Loggerhead Shrike (Pair)

SOURCES: URS (sensitive species, vegetation 2007); SDG&E (existing t-lines 2006); Stantec (proposed water line, substation fence line 2007); SES (digitized by URS) (survey boundary, proposed t-line 2007); TIGER (railroads 2000); USGS TOPO! (100K topo, various dates).

BIOLOGICAL IMPACTS
SOLAR TWO PROJECT

URS

0.5 0 0.5 1 Miles

SCALE: 1" = 1 Mile (1:63,360)

SCALE CORRECT WHEN PRINTED AT 11X17

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BEFORE THE ENERGY RESOURCES CONSERVATION AND DEVELOPMENT COMMISSION OF THE STATE OF CALIFORNIA
1516 NINTH STREET, SACRAMENTO, CA 95814
1-800-822-6228 – WWW.ENERGY.CA.GOV

APPLICATION FOR CERTIFICATION
For the SES SOLAR TWO PROJECT

Docket No. 08-AFC-5

PROOF OF SERVICE
(Revised 2/25/09)

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DECLARATION OF SERVICE

I, Angela Leiba, declare that on March 19, 2009, I served and filed copies of the attached Draft Raven Monitoring and Control Plan. The original document, filed with the Docket Unit, is accompanied by a copy of the most recent Proof of Service list, located on the web page for this project at: **[www.energy.ca.gov/sitingcases/solartwo]**. The document has been sent to both the other parties in this proceeding (as shown on the Proof of Service list) and to the Commission's Docket Unit, in the following manner:

(*Check all that Apply*)

FOR SERVICE TO ALL OTHER PARTIES:

_**X**___sent electronically to all email addresses on the Proof of Service list;

_**X**___by personal delivery or by depositing in the United States mail at Sacramento, California with first-class postage thereon fully prepaid and addressed as provided on the Proof of Service list above to those addresses **NOT** marked "email preferred."

AND

FOR FILING WITH THE ENERGY COMMISSION:

__**X**___sending an original paper copy and one electronic copy, mailed and emailed respectively, to the address below (***preferred method***);

OR

_____depositing in the mail an original and 12 paper copies, as follows:

CALIFORNIA ENERGY COMMISSION
Attn: Docket No. 08-AFC-5
1516 Ninth Street, MS-4
Sacramento, CA 95814-5512

docket@energy.state.ca.us

I declare under penalty of perjury that the foregoing is true and correct.

Original Signed By:
Angela Leiba

URS

DOCKET
08-AFC-5
DATE MAR 19 2009
RECD. MAR 20 2009

March 19, 2009

Mr. Christopher Meyer
Project Manager
Attn: Docket No. 08-AFC-5
California Energy Commission
1516 Ninth Street
Sacramento, CA 95814-5512

Subject: SES Solar Two (08-AFC-5)
Raven Monitoring and Control Plan
URS Project No. 27657106.00400

Dear Mr. Meyer:

On behalf of SES Solar Two, LLC, URS Corporation Americas (URS) hereby submits the Draft Raven Monitoring and Control Plan in Response to CEC and BLM Data Request 7 (SES Solar Two 08-AFC-5).

I certify under penalty of perjury that the foregoing is true, correct, and complete to the best of my knowledge. I also certify that I am authorized to submit the Draft Raven Monitoring and Control Plan on behalf of SES Solar Two, LLC.

Sincerely,

Angela Leiba
Project Manager

AL:ml

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