APPENDIX M

BIOLOGICAL RESOURCES TECHNICAL REPORT, WEST MEMORANDUM, USFWS BIOLOGICAL OPINION, AND BIRD AND BAT CONSERVATION STRATEGY

(see PDF files on enclosed CD)

BIOLOGICAL RESOURCES TECHNICAL REPORT
DESERT QUARTZITE SOLAR PROJECT
BLM CASE FILE NUMBER CACA-49397
RIVERSIDE COUNTY, CALIFORNIA

Prepared for
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LIST OF ACRONYMS

ACEC	Area of Critical Environmental Concern
amsl	above mean sea level
BBCS	Bird and Bat Conservation Strategy
BLM	U.S. Bureau of Land Management
BO	Biological Opinion
BRTR	Biological Resources Technical Report
BUOW	Burrowing Owl
CAA	California Airport Authority
CDFW	California Department of Fish and Wildlife
CDNPA	California Desert Native Plant Act
CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
CHU	Critical Habitat Unit
CNDDB	California Natural Diversity Database
CNPS	California Native Plant Society
CNPSEI	California Native Plant Society's Electronic Inventory
DDWW	Dry desert Wash Woodland
Dr	Doctor
DTCC	Desert Tortoise Conservation Center
DWMA	Desert Wildlife Management Area
EIS	Environmental Impact Statement
FEIS	Final Environmental Impact Statement
FESA	Federal Endangered Species Act
ft	Feet
GBBO	Great Basin Bird Observatory
GPS	Global Positioning System
HMA	Herd Management Area

HMANA	Hawk Migration Association of North America
HMP	Habitat Management Plan
I-10	Interstate 10
IWMP	Integrated Weed Management Plan
kHz	Kilohertz
kv	Kilovolt
m	Meter
MBTA	Migratory Bird Treaty Act
MCL	Mean carapace length
mm	Millimeters
MP	Migratory Point
mph	Miles per hour
NECO	Northern and Eastern Colorado Coordination Plan
NEPA	National Environmental Policy Act
NRCS	Natural Resources Conservation Service
O&M	Operations and Maintenance
OHV	Off-Highway Vehicle
POD	Plan of Development
PST	Pacific Standard Time
PV	Photovoltaic
ROW	Right of Way
SCE	Southern California Edison
SSC	Species of Special Concern
URTD	Upper respiratory tract disease
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
UTM	Universal Transverse Mercator
VRMP	Vegetation Resources Management Program
WEAP	Workers Environmental Awareness Program

SUMMARY

Desert Quartzite, LLC has requested a right-of-way grant from the Bureau of Land Management (BLM) to construct and operate a new solar photovoltaic energy generating facility, near the interstate boundary of California and Arizona, just east of Blythe in unincorporated Riverside County, California (Case File Number CACA-49397). The solar facility and associated generation interconnection line (gen-tie line) are collectively referred to in this report as the Desert Quartzite Solar Project (Project). The Project site is located outside the boundaries of any Area of Critical Environmental Concern, Desert Wildlife Management Area, BLM Wilderness Area, or designated Critical Habitat Unit.

This report provides a comprehensive description of methods and results of biological resource surveys and investigations conducted in the fall of 2012 to the spring of 2015 within the Study Area (See Section 1.4). The purpose of the surveys was to provide information supporting consultation between BLM, United States Fish and Wildlife Service (USFWS), and California Department of Fish and Wildlife (CDFW) with respect to the California and Federal Endangered Species Acts, National Environmental Policy Act (NEPA) and the California Environmental Quality Act (CEQA). Survey standards and recommended protection measures described in this report are consistent with the Best Management Practices and Guidance Manual: Desert Renewable Energy Projects (Renewable Energy Action Team 2010).

Focused botanical surveys resulted in the documentation of six special status (California Native Plant Society list status) plant species within the Study Area including Harwood's milkvetch (*Astragulus insularis var. harwoodii*), Abram's spurge (*Chamaesyce abramsiana*), ribbed cryptantha (*Cryptantha costata*), Harwood's eriastrum (*Eriastrum harwoodii*), Utah vine milkweed (*Funastrum utahense*) and desert unicorn-plant (*Proboscidea althaeifolia*). More than 124 species of plants were identified during the surveys. Federal or state listed (endangered or threatened) plant species were not observed.

Full-coverage surveys for desert tortoise (*Gopherus agassizii*), the only animal species listed as federal and state endangered with potential to occur on site, were conducted in 2013. Tortoise sign observed during the survey consisted of six carcasses, all-greater than 4 years old and disarticulated, and one set of tortoise tracks. Live desert tortoises were not observed during surveys; however, a tortoise was observed incidentally within the buffer zone during avian surveys

Numerous Mojave fringed-toed lizards (*Una scoparis*), which is a species of concern, were found while performing surveys in the western portion of the Project where soils consist of much finer sand. Other special status wildlife species observed or likely to occur within the Project site included loggerhead shrike (*Lanius ludovicianus*), burrowing owl (*Athene cunicularia*), LeConte's thrasher (*Toxostoma lecontei*),

American badger (*Taxidea taxus*), desert kit fox (*Vulpes macrotis arsipus*), pallid bat (*Antrozous pallidus*), cave myotis (*Myotis velifer*), and western mastiff bat (*Eumopus perotis*).

1.0 INTRODUCTION

1.1 PURPOSE

This Biological Resources Technical Report (BRTR) provides a comprehensive description of methods and results of biological resource surveys and investigations conducted to date within the Study Area (See Section 1.4) for the Desert Quartzite Solar Project (Project) as proposed by Desert Quartzite, LLC. The purpose of the surveys is to support consultations between Bureau of Land Management (BLM) and United States Fish and Wildlife Services (USFWS) under Section 7 of the Federal Endangered Species Act (FESA), and any necessary incidental take authorization from the California Department of Fish and Wildlife (CDFW) with respect to the California Endangered Species Act (CESA). The data contained within this report also provides information to promote compliance with requirements of the National Environmental Policy Act (NEPA) and the California Environmental Quality Act (CEQA). Survey standards and recommended protection measures described in this report are consistent with the Best Management Practices and Guidance Manual: Desert Renewable Energy Projects (Renewable Energy Action Team 2010).

1.2 SITE LOCATION

The Project site is located in unincorporated Riverside County within California. It is situated south of Interstate 10 (I-10), approximately ten miles west of the City of Blythe, California (Figure 1). The Project site is located on the Ripley and Roosevelt Mine 7.5-Minute United States Geological Survey (USGS) topographic quadrangle. Elevation at the site ranges from approximately 320 to 475 feet above mean sea level (amsl). The Project is located on the Palo Verde Mesa within BLM land designated as Multiple-Use Class M (Moderate Use). The Project site is located outside the boundaries of any Area of Critical Environmental Concern (ACEC), Desert Wildlife Management Area (DWMA), BLM wilderness area, or USFWS designated critical habitat unit for desert tortoise. The Mule Mountains ACEC, which was established to manage prehistoric resources, is located less than one mile west of the Project site. The Chuckwalla DWMA for desert tortoise is located approximately twenty miles west and the current Herd Management Area (HMA) for burros is located approximately five miles south of the Project site. Please see Table 1 for additional adjacent land uses.

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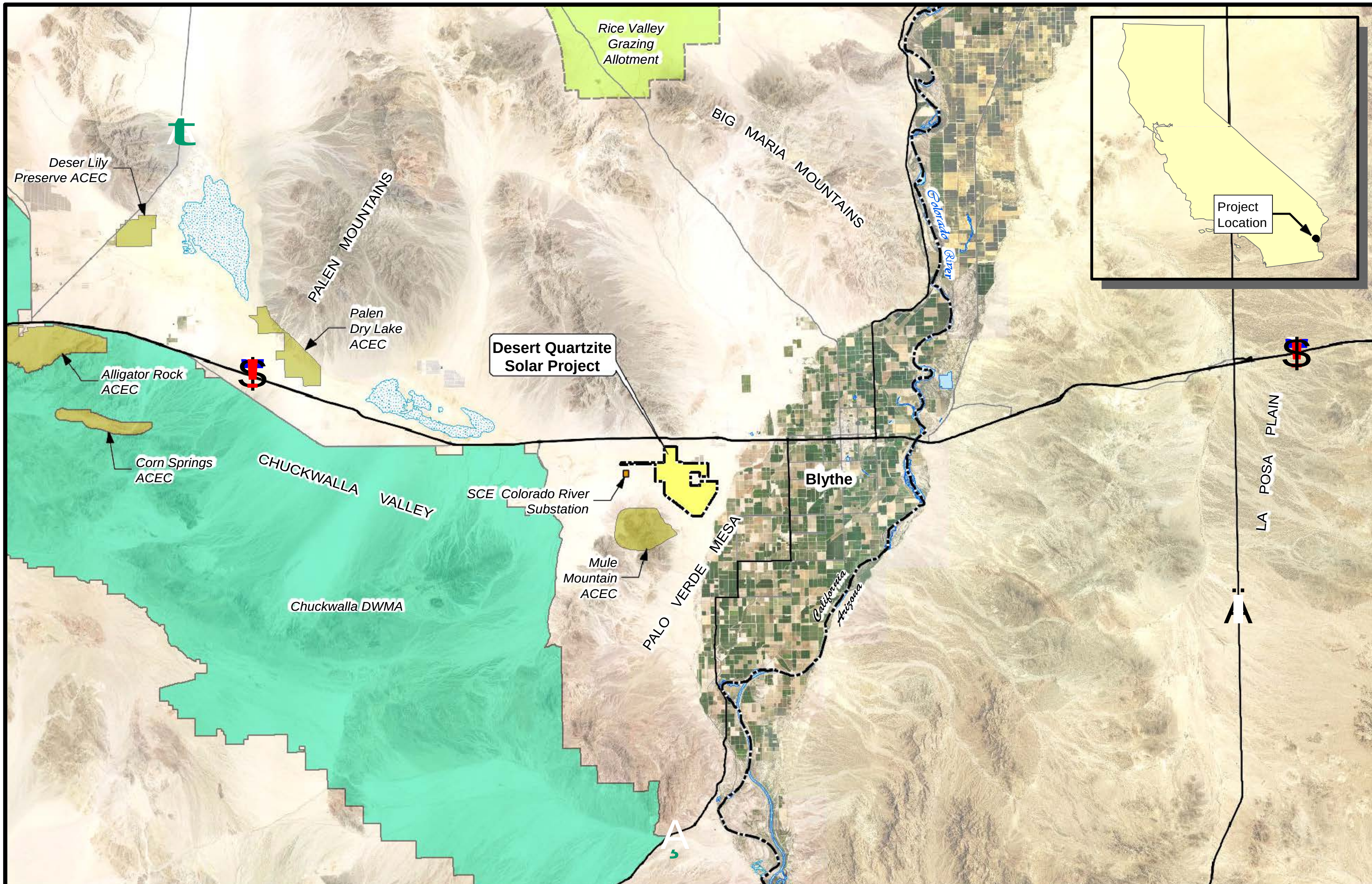

Desert Quartzite Site Boundary

State Boundary

Proposed SCE Colorado River Substation

BLM Grazing Allotment

Area of Critical Environmental Concern (ACEC)

Desert Wildlife Management Area (DWMA)

0 5 10

Miles

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Figure 1

Regional Setting

Table 1 Adjacent Land Use

Direction	Land Uses
North	McCoy Mountains; McCoy Wash; BLM Limited MUC land with interspersed privately owned land and an existing solar facility, small single family home community of Mesa Verde, Interstate 10
East	Palo Verde Valley; privately owned agricultural land; some fallow land
South	Southern extent of Palo Verde Mesa; Mule Mountains; BLM Limited MUC land with interspersed privately owned land
West	Southern California Edison's Colorado River Substation; Mule Mountains; BLM Moderate and Limited MUC land with interspersed privately owned land

1.3 SITE CHARACTERISTICS

Based on visual observations of surface soils, soils within the Project site appear to be dominated by gravely sands and sandy loams, and ranged in texture from very fine sand to gravel. Formal site soil data from the Natural Resources Conservation Service (NRCS) is not available in the northwest portion of the Project site. Desert pavement is present in the extreme northwest and southwest limits of the Project site. Human disturbances within the Project site include off-highway vehicle (OHV) activity, existing utility corridors (i.e., overhead power transmission lines and underground petroleum pipeline), residential trash dumping and access roads for both utilities and fallow agriculture sites.

In 2014, a 160-acre inholding (privately owned land surrounded by public lands), which was originally excluded from the biological surveys that took place in 2008 and 2012 on the surrounding BLM lands, became part of the Project. The inholding is a historical jojoba farm that is a square 160-acre parcel situated within diffuse creosote bush scrub (Photograph 1). Presumably the farm was constructed in the late 1970s to early 1980s and abandoned within 10 years thereafter. The entire site was either chained or bulldozed and is surrounded by bulldozed berms about 4 to 5 ft. high. Soil is soft decomposed granitic sand with occasional patches of gravel and larger cobbles. There is a well-traveled access road around the inner perimeter of the berms on all four sides.

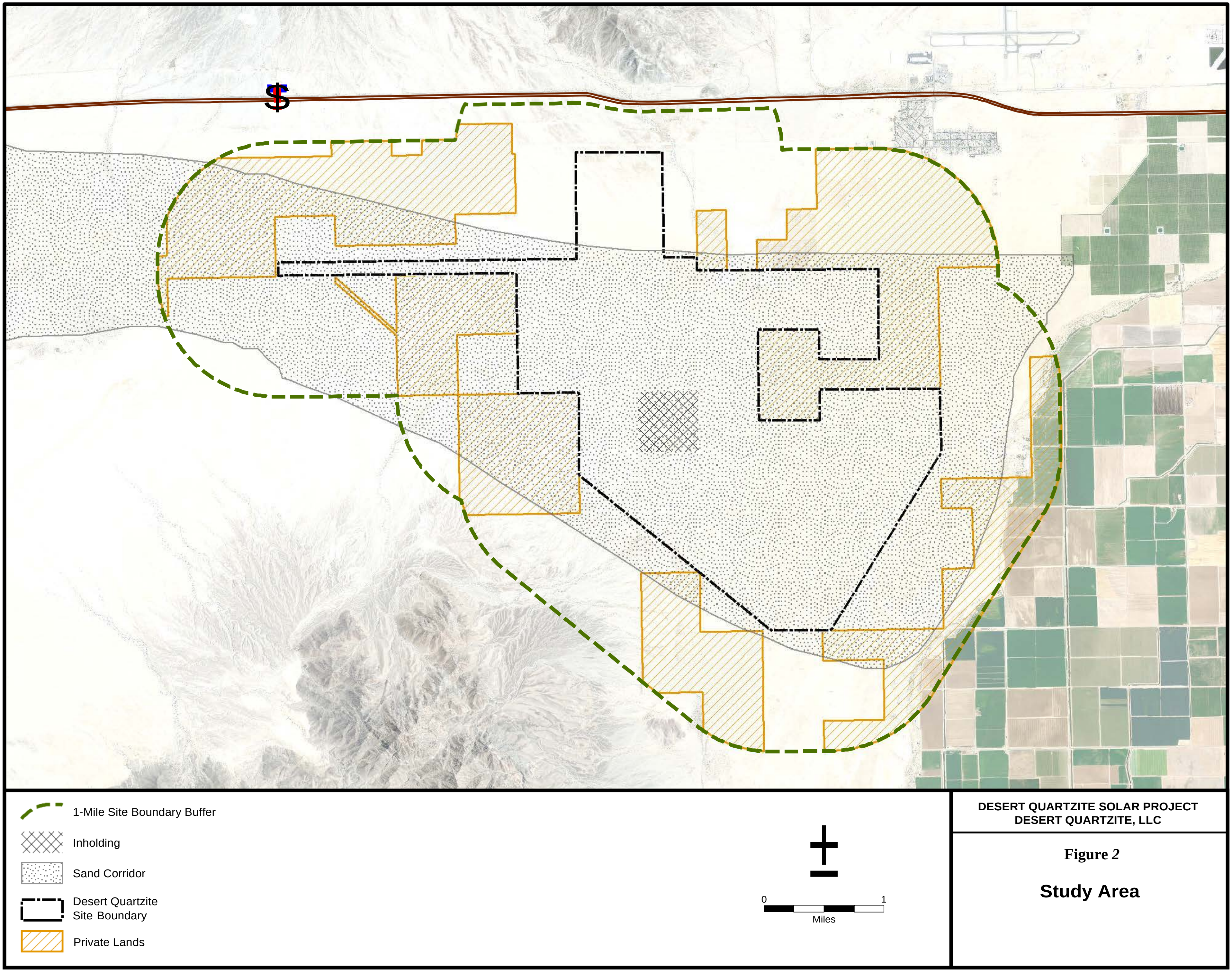
Photograph 1 Inholding

1.4 STUDY AREA

For the purposes of this report, the Project site is the area that was described in the updated Application for Transportation and Utility Systems and Facilities on Federal Lands (SF 299). This updated version decreased the size of the Project site from 7,272 acres to the current 4,885 acres. The Project site includes the electrical generation interconnection (gen-tie) transmission line to the existing Southern California Edison’s (SCE) Colorado River Substation. Generally, the Study Area is the combination of the Project site and a one-mile buffer around the Project site (Figure 2). Specific species survey protocols may require a buffer larger or smaller than the one established for this project (e.g., golden eagles and bats). This buffer area will allow for adjustments to access roads and or other project related activities outside of the current proposed location. Since the gen-tie line is included as part of the Project site, the Study Area also included this area.

In 2014, a 160-acre inholding (privately owned land) situated within the Project site, which was originally excluded from the biological surveys that took place in 2008 and 2012 on the surrounding BLM lands, was added to the Project. This area has since been surveyed and has become part of the larger Project. With the inclusion of the inholding, the current acreage of the entire Project site is 5,045 acres.

It should be noted that although this inholding is privately owned land and not necessarily under BLM jurisdiction, all BLM protocols were followed ensuring that the surveys on this parcel are consistent throughout the Desert Quartzite Solar Project.



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DESERT QUARTZITE, LLC

Figure 2

Study Area

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1.5 PROJECT SUMMARY

The Project, as proposed, is described in general terms below. Specific details of the Project description are included in other related documents including the Plan of Development (POD). The Project would include the solar facility (where the electrical power will be generated) and a 230-kilovolt (kV) transmission line (gen-tie line). The solar facility would consist of several main components, all located within the Project security and permanent desert tortoise fencing:

- Main Generation Area – Photovoltaic (PV) arrays, combining switchgear, overhead lines, and access corridors;
- Operations and Maintenance (O&M) Facility;
- On-site substation; and
- Fencing and lighting.

The Project would interconnect with the regional transmission system via a 230-kV single-circuit gen-tie line that will be located on the western portion of the Project site and follow a 160-foot-wide transmission right of way (ROW) to the existing SCE's Colorado River Substation located approximately one mile west of the solar facility's western boundary. Construction of the Project would be completed in three basic phases: 1) pre-construction activities, 2) site preparation; and 3) construction and installation of the solar photovoltaic (PV) modules and electrical components, including the gen-tie line.

2.0 METHODS

2.1 SPECIAL STATUS SPECIES DEFINITION

For assessment purposes in this report, a special status species has been defined as a plant or wildlife species that meets one or more of the following criteria:

- Designated as either rare, threatened, or endangered by CDFW or the USFWS, and are protected under either CESA or FESA;
- Candidate species being considered or proposed for listing under these same Acts;
- Species of special consideration as referenced in the Northern and Eastern Colorado Coordinated Coordination Plan (NECO) and Final Environmental Impact Statement (FEIS) (Bureau of Land Management 2002) and Biological Opinion for the NECO Plan (United States Fish and Wildlife Service 2005);
- State Species of Special Concern as designated by CDFW;
- Considered endangered, threatened, or rare pursuant to CEQA Guidelines, Section 15380; or
- Considered listed under special status by California Native Plant Society (CNPS).

2.2 PRELIMINARY MAPPING

A large-scale aerial photograph of the Study Area was created and used to preliminarily map vegetation communities, soil substrates, and other areas of interest during the survey. Such areas included those that appeared to have unique plant assemblages or areas of interest under NECO including Desert Dry Wash Woodland habitat. The preliminary mapping effort allowed surveyors to focus on areas most likely to support special status species and habitats, while characterizing each type of vegetation community and soil substrate.

The 2008 mapping depicted a Project site of approximately 7,272 acres. The southern portion of the original site boundary has been removed. The current Project site on BLM lands is 4,885 acres. Although the inholding had always been on the maps, it was depicted as “Not A Part” of the Project. In 2014, all mapping started to show the inclusion of the inholding.

2.3 SOILS

Soils within the Project site are dominated by gravely sands and sandy loams, and ranged from very fine sand to gravel (Figure 3). The Natural Resources Conservation Service (NRCS) Web Survey contained data for the majority of the Project site. NCRS data is not available for the northwest portion of the Project site.

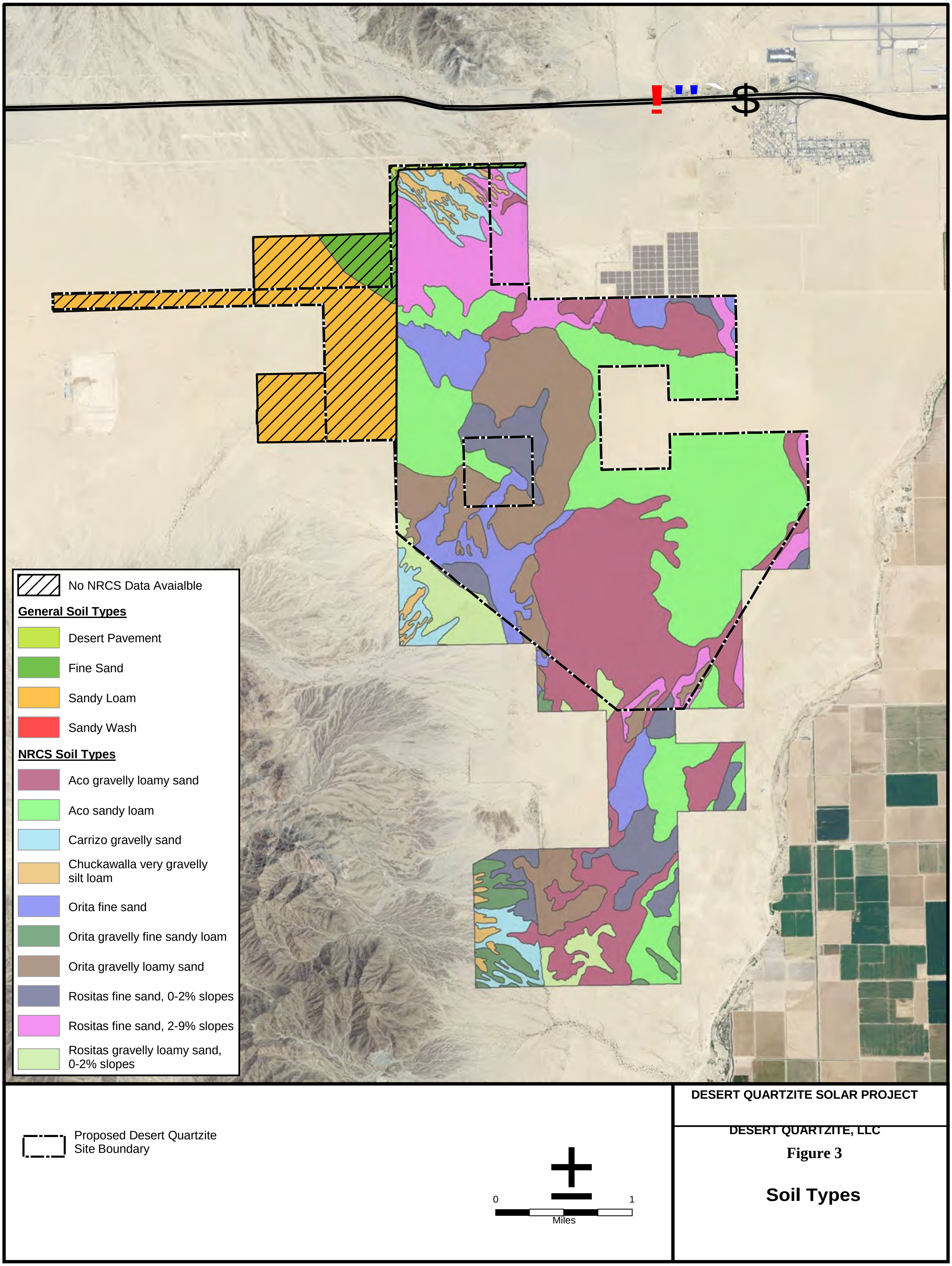

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Figure 3

Soil Types

2.4 RAINFALL ANALYSIS

Measurements of total and average precipitation during winter periods (October through March) are important in determining the efficacy of both desert tortoise and special status plant surveys. Per the USFWS desert tortoise protocol, data was obtained from the Western Regional Climate Center (2013). The Blythe CAA Airport, California weather station [elevation 390 feet (ft) above mean sea level (amsl)], approximately three miles north of the Project site and is the most proximate station. The rainfall data that was obtained and utilized for the surveys can be located in Appendix A.

Surveys performed during fall 2014 through spring 2015 were performed during extreme historical drought conditions; however, the actual rainfall on the Study Area was only slightly below average.

2.5 STUDY AREA

Several species of flora and fauna known to occur on or near the Project are accorded "special-status" by federal and state agencies because of their recognized rarity or potential vulnerability to extinction. These species typically have a limited geographic range and/or limited habitat and are collectively referred to as "special-status" species. Additional species protected by other regulations within the region were added to the overall species survey list and are referred to in this document as the target species. According to the NECO Plan (Bureau of Land Management and California Department of Fish and Game 2002) surveys must be completed where a project intersects the species' ranges as represented and mapped within the plan. Since the Project site is within NECO, species covered in this document but not necessarily recognized as a "special status" species were added to the target species list. Managed big game species and burros (protected by the Wild Free-Roaming Horse and Burro Act) were also included as target species. Desert kit fox (*Vulpes macrotis*) being a protected furbearer, per California Department of Fish and Game Code (California Department of Fish and Wildlife 2013b), was also included as a target animal species.

Comprehensive biological resource surveys designed to meet all applicable USFWS, BLM, and CDFW requirements were performed in the fall of 2012 to the spring of 2015 depending on survey specifics. Surveys for biological resources were conducted within the Project site and up to a one-mile buffer around the proposed disturbance area. The entire 5,045 acre survey area with the buffer area will collectively be called the Study Area within this BRTR. (The Project Site Boundary and the Site Boundary Buffer depicted on Figure 2 make up the Study Area.) Any modifications to this Study Area due to specific protocol or guideline changes will be discussed for the species for which they occur.

During the fall of 2012 and spring of 2013, a full focused rare plant survey was performed on the Project site. In the spring of 2015, plant surveys were also completed for the inholding portion of the Project. In addition to the focused rare plant surveys, Project biologists completed the following surveys within the

Study Area: vegetation mapping, general wildlife surveys, protocol desert tortoise surveys, protocol western burrowing owl surveys and avian point count and migration surveys. Other studies performed on site were the spadefoot and elf owl habitat assessments and the protocol golden eagle surveys. The section below details the specific methodologies and protocols utilized for the Project's biological resources surveys within the Study Area.

"Established protocols," which in this case is a species listed as threatened or endangered by the federal or state government, are guidelines promulgated by USFWS or CDFW, respectively. In an effort to gain consensus regarding the survey methodologies to be employed, the Project team initiated discussions with USFWS, BLM, and CDFW (hereafter collectively referred to as "the agencies"). The protocols were submitted for review to the agencies and modified slightly based on input received from the agencies.

The non-avian wildlife species detected in the Study Area are listed in Appendix B, the bird species list is in Appendix D and the plant species list for the Study Area are provided in Appendix E and F.

2.6 BASELINE SAMPLING

Twelve primary sampling stations (vegetation, avian, reptile, and small mammal sampling), were established (Figure 4) to provide information of species composition and provide baseline quantitative data for future monitoring associated with the Project. Ten sampling stations were established within the Project site and two offsite as controls. Sampling stations were randomly generated to obtain a sufficient representation of the area. Each sampling location represented the center or corner point of larger linear transects or grids depending on the specific survey methodology as described in the following sections.

2.7 BOTANICAL STUDIES

Surveys were performed to determine the presence and distribution of special status plant species and estimates of succulent species (cacti and yucca) within the Study Area. Vegetation sampling was also performed under the baseline survey effort as described in this section.

2.7.1 Special Status Plant Species

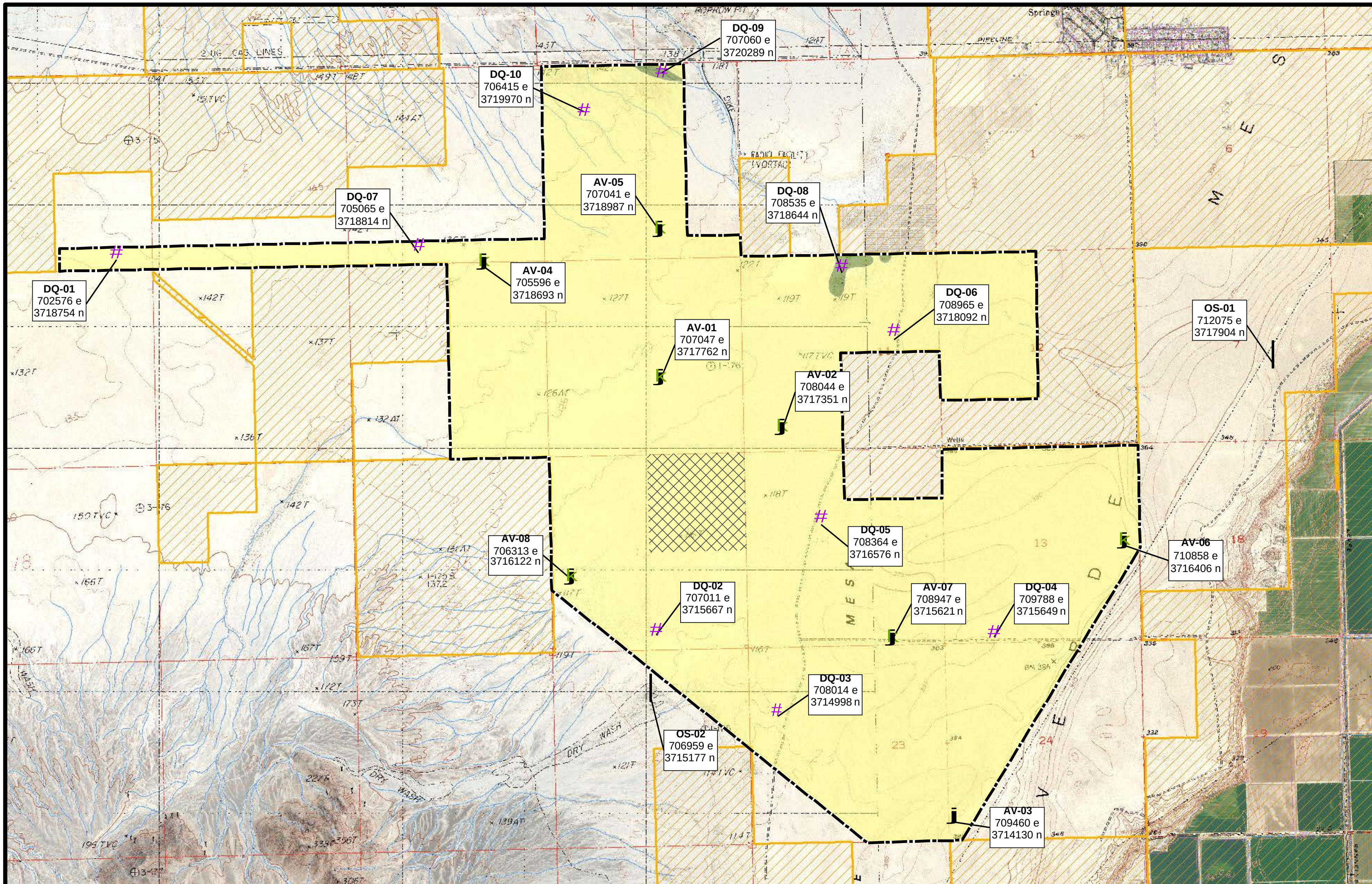
Special status plant species have been identified as potentially occurring in the vicinity of the Project site. The site specific special status target plant species list (Appendix C) was generated by searching multiple databases and reference sources for occurrence records, including:

- California Natural Diversity Database (California Department of Fish and Wildlife 2013a);
- Northern and Eastern Colorado Desert Coordinated Management Plan (Bureau of Land Management 2002);
- Consortium of California Herbaria, 10,000 meter search centered at Project site (Consortium of

California Herbaria 2012); and

- BLM Palm Springs South Coast Field Office Sensitive Plant List: Desert Species (Bureau of Land Management 2012).

In addition, records were reviewed from the greater southern California desert region.



Baseline Point Location

Avian

Avian

Off Site

On Site

Desert Quartzite Site Boundary

Site Boundary

Private Land

Inholding

Desert Wash Woodland (microphyll woodland)

(microphyll woodland)

Sonoran Creosote Bush Scrub

0 500 1,000

Meters

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Figure 4

Baseline Points

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A list of special status target plants, as defined in Section 2.5, was assembled from a 12-quad CNDDB search centered on Ripley and Roosevelt Mine quads, as well as California Consortium of Herbaria records queried within a 10,000 meter (m) radius of the site (Appendix C). Additional information (especially on probability of occurrence and habitat) was gathered from several biologists with extensive experience in the surrounding areas. Rarity ranks conform to the CDFW CNDDB plant listing of April 2013 (California Department of Fish and Wildlife 2013a).

Surveys were developed and conducted to maximize the likelihood of locating special status plant species or special status natural communities within the Project site. The primary objective was to identify all plant species to the taxonomic level (i.e., species, subspecies, or variety) necessary to determine rarity status.

Rare Plant Surveys were designed and timed to conform to practices detailed in BLM and CDFW protocols; BLM: Survey Protocols Required for NEPA/ESA Compliance for BLM Special Status Plant Species (Bureau of Land Management 2009). For the CDFW, the following protocol is required: Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Natural Communities (California Department of Fish and Wildlife 2009). In summary, these protocols emphasize these major methods:

- Timing: Surveys should be conducted during the optimal season for positive identification of all target plant species, as well as justifiable on-site conditions for finding plants (adequate seasonal rainfall).
- Survey Intensity: Site coverage and surveyor spacing should be adequate for seeing and recording all potential rare plant species.
- Surveyor Qualifications: Surveyors should have experience identifying California desert rare plants, particularly Colorado Desert flora, be trained on the specific target plants through orientation meetings, specimen examples, and reference population checks prior to performing surveys on site.

Two formal Rare Plant Surveys were conducted across the BLM lands and one formal Rare Plant Survey was completed on the inholding. The details for each survey are as follows:

- Fall 2012 (September 11 - 19) surveys were conducted after significant summer monsoon rainfall germinated abundant annuals and timing was good to observe and identify all potentially occurring fall-blooming target plants. Full coverage at 10 m spacing occurred across approximately 50 percent of the site (on loose sandy-gravelly soil in creosote bush scrub), and 20 m spacing was done on the remaining dry sandy areas where there was not significant annual germination.

- Spring 2013 (March 18 - 30) surveys were also conducted. Localized winter rainfall was enough to germinate copious annual blooms, and the timing was excellent for observing and identifying all potentially occurring target plants. Full coverage transects were performed at 10 m spacing across the entire Study Area.
- Spring 2015 (March 10-12) surveys were conducted on the 160-acre inholding. The survey was performed when the soil was still quite moist at a depth of about 3 inches. This survey provided 100 percent coverage of the entire parcel, including the surrounding berms. Transects were walked slowly along existing jojoba rows in North-South and South-North directions, at a spacing of less than 10 m between surveyors.

All data was recorded in triplicate form: paper data sheets, Global Positioning System (GPS) waypoints, and Pendragon handheld data collection forms. A Quality Control review of the data was provided by Ironwood staff and periodically posted for review by the Ironwood Project Manager on Ironwood's Egnyte website.

In addition to Rare Plant Surveys, botanists also compiled and surveyed for a general Floristic Plant List (Appendix E) with many voucher specimens, mapped vegetation communities, tracked weed infestations, and counted cacti.

2.7.2 Cacti and Yucca

Systematic sampling of succulents (cacti and yucca) was conducted during the fall 2012 plant surveys by botanists experienced with Colorado Desert flora. The purpose of this sampling effort was to estimate the number of individual cacti and yucca present. All species of cactus were documented and cumulative counts of the number of individual cacti were recorded. Yuccas were not observed on site.

2.7.3 Special Status Vegetation Communities

The science of vegetation classification is undergoing continued revision, with new nomenclature for previously described "vegetation communities." For the purposes of this report NECO common names (Bureau of Land Management 2002), with the latest nomenclature from **A Manual of California Vegetation, Second Edition** (Sawyer et al, 2009), and corresponding "Holland types" nomenclature (Holland 1986) were used for each of these communities described in this report.

2.7.4 Non-Native and Invasive Species

Non-native and invasive species were documented during both the fall 2012 and spring 2013 plant survey season. During the fall season survey, the surveyors identified two invasive and two weedy non-native plants on the Project site. Due to the fact the species were found as dried up stems, the general location of these weeds were noted, but not located with a GPS or recorded. During the spring season, surveyors performed a detailed survey account of non-native and invasive plants on the Project site. The purpose of this sampling effort was to estimate the number of non-native and invasive species that were present on the site. All non-native and invasive species were documented and cumulative counts of the number of individual species were recorded.

2.7.5 Inholding (Historical Jojoba Farm)

A cursory site check was performed by Michael Honer on February 24, 2015. Many common annuals and one target plant were observed leafing-out at that time. It was decided that survey timing should be in mid-March to catch most of the target plants in optimal identifiable condition. During the survey of March 10-12, the soil was still quite moist at a depth of about 3 inches.

Reference population checks were performed for the three special status species with the highest probability of being encounter during the survey: *Astragalus insularis* var. *harwoodii*, *Cryptantha costata*, and *Eriastrum harwoodii*. All three of these plants were located off-site from populations found during the spring 2013 surveys, and observed in flowering and/or fruiting condition on March 10, 2015.

This survey provided 100 percent coverage of the entire jojoba farm site, including the surrounding berms. Transects were walked slowly along the jojoba rows in North-South and South-North directions, at a spacing of less than 10 m between surveyors. This was appropriate spacing for detecting any special status plants, no matter how small or cryptic.

This survey was conducted during the optimal season for positive identification of all target plants, as well as justifiable on-site conditions for finding target plants.

2.8 WILDLIFE SURVEYS

2.8.1 Amphibians

2.8.1.1 Couch’s Spadefoot

There is one amphibian with the potential to be found on the Project site, Couch's spadefoot (*Scaphiopus couchii*). There were 27 different points in the Study Area identified as having standing water at some time from 2008 until 2012 (Figure 5). Two locations were identified as likely to support Couch’s spadefoot in the event of rains, due to the fact they were the most extant areas for having held water and exhibited a

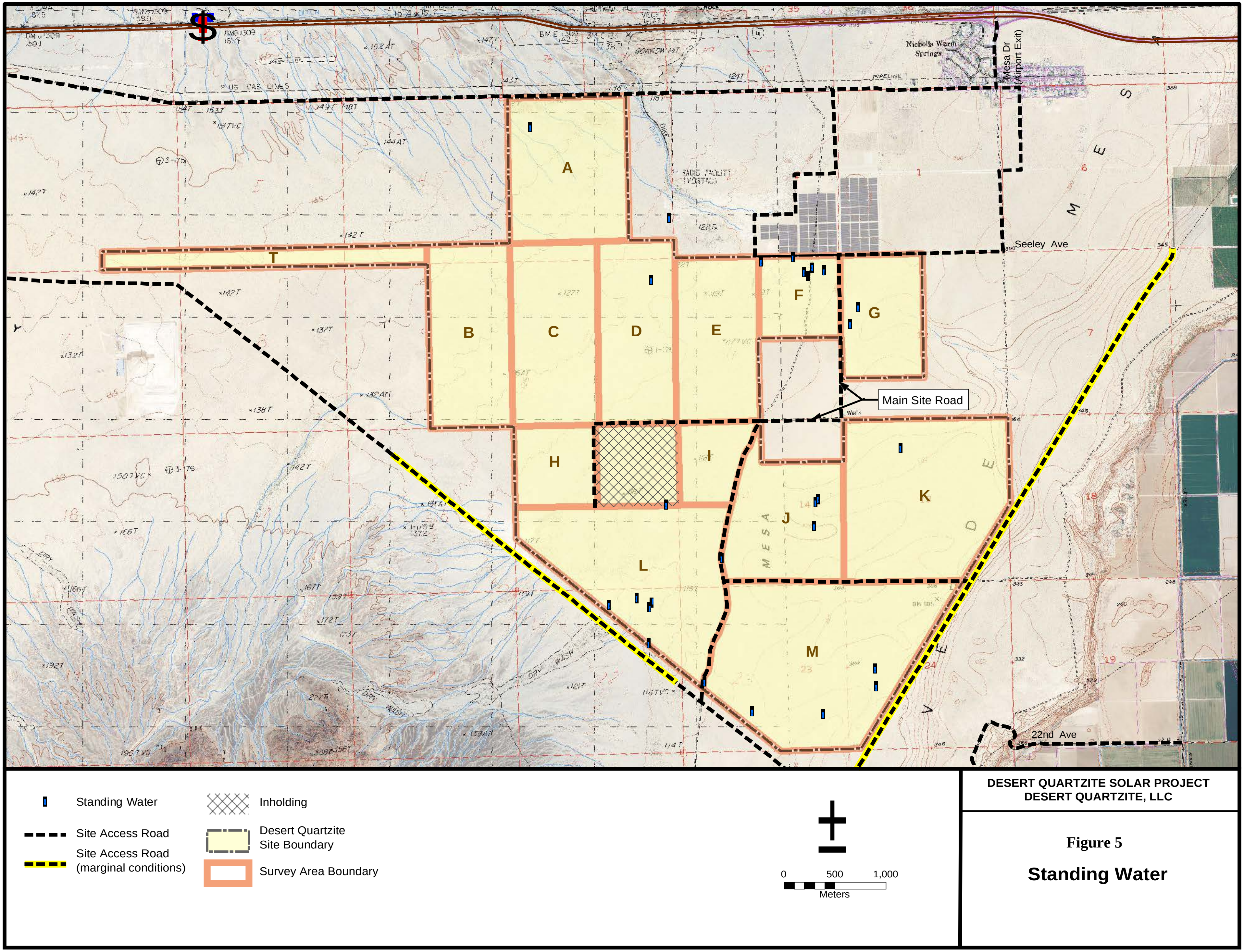

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Figure 5

Standing Water

#343 P:\GIS\Ironwood\Shared\Projects\Projects\Quartzite\ArcGIS project files\Water_Spots.mxd 8/26/2015 strong component of dry desert wash woodland plant species. One area was southeast of the existing solar facility and the second was south of the Project site in the Study Area buffer zone. Using this information, the surveyors monitored the areas during the monsoon season, summer of 2013, both to determine how long water was standing in these locations and to potentially identify if individuals were present.

2.8.2 Reptiles

2.8.2.1 Desert Tortoise Focused Surveys

Full-coverage protocol desert tortoise (*Gopherus agassizii*) surveys were conducted in the spring of 2013 (March 25 –April 15, 2013) according to the most current USFWS issued survey protocols (United States Fish and Wildlife Service 2010a). The protocols also provide methods to estimate the abundance of tortoises occurring within the Study Area. These desert tortoise surveys employed belt transects approximately 10 meters (33 feet) wide in order to provide 100 percent (full) coverage of the entire Study Area.

The survey crews consisted of highly experienced desert tortoise surveyors and field technicians of varying experience who attended field and training sessions prior to conducting surveys. The desert tortoise surveyors were divided into crews of approximately 3-4 people, with one or two highly experienced desert tortoise surveyors on each crew. Each of these crews typically surveyed approximately one square-mile section until the entire surveyed portion of the Study Area was covered.

All tortoise sign [e.g., live tortoises (all age classes), shell/bone/scutes, scats, burrows/pallets, tracks, egg shell fragments, and courtship rings] were recorded (Table 2). The location of tortoise sign was recorded on a Garmin GPS unit (GPS 72, 76, or 60CSx) using a unique identification code. In addition to recording sign with the GPS unit, standardized paper datasheets were completed. Data was entered from these datasheets into a Microsoft Access database, during post processing.

Table 2 Desert Tortoise Data Recorded

Type of Sign	Measurements	Estimates	Other
Live tortoise		Sex, age class	Location, activity
Cover site (burrow, pallet)	Width, height	Depth	Condition (active [excellent], inactive [good, fair, or poor]) and location. Each burrow was investigated by using a handheld mirror and/or flashlight to detect if a tortoise was present
Shell or bone (carcass or fragments)		Sex, age class, time since death	Location
Tracks		Age	Location

2.8.2.2 Mojave Fringe-Toed Lizard and Herpetofaunal Surveys

Three herpetofaunal surveys were completed on the Project site. Two preliminary baseline herpetofaunal investigations (October 22-23, 2012 and March 25-April 12, 2013) and one Visual Encounter Survey (April 10 -25, 2013) were completed. Twenty-one qualified and trained field wildlife biologists took part in the surveys.

Preliminary herpetofaunal baseline investigations had two objectives; 1) to census extant squamate populations and 2) identify and determine species of concern and/or their required habitat. Sampling took place in three distinct bouts; twice during 100 percent coverage surveys. The herp surveys consisted of walking belt transects approximately 10 m (33 ft) wide to provide 100 percent (full) coverage of the entire Project site.

The Visual Encounter Survey, which is a more intensive survey, was also conducted. This survey was employed to augment the incidental data collected during the 100 percent coverage wildlife surveys. Using the 12 baseline sampling points (Figure 4) employed by the avian, botanical, and small mammal teams, 12 transects were set up (ten on site and two in the buffer zone) and sampled using visual encounter surveys. Six different wildlife biologists carried out these surveys across five different times of day over two weeks. Transects were intensively searched and although localized effects had been exhibited by various sampling points, when viewed on the whole, the data bore out similar data collected by the wildlife biologist crews.

A habitat assessment of the 160-acre inholding parcel was conducted on March 22-23, 2015 by two qualified and trained field wildlife biologists. The surveyors walked 100 percent of the parcel.

2.8.3 Avian

Avian Surveys at Quartzite used various sampling methodologies to depict the occurrence and habitat (site) use by birds during all critical life stages. Sampling models and survey techniques were designed to maximize the detection of migratory birds and local residents; including all raptor, shorebird, waterfowl and passerine species. Each sampling methodology was selected to increase the potential for species detection respective to habitat type, and particular attention was focused on the detection of sensitive and/ or listed species.

2.8.3.1 Unlimited Distance Extended Observation Surveys

The purpose of the Migratory Bird Surveys was to record observed avian migration and use patterns at, and adjacent to, the Project site. Data on diurnal bird migration will provide information on:

- Seasonal and individual population pulses
- Range of daily behavior and movements
- Flight elevation through and near the Project
- Duration of visitation by migratory birds, including raptors

Survey results will be used in the development of an avian risk characterization (illustrating species use and occurrence within the proposed Project Site) as part of the Project's Bird and Bat Conservation Strategy (BBCS).

An avian biologist monitored migration trends following guidance provided by BLM, USFWS, and CDFW, and protocol based on Hawk Migration Association of North America (HMANA) standard field survey techniques. The HMANA protocol, modeled after Cape May Raptor observation methods, is now standard for hawk migration counts (Bird and Bildstein 2007, Bildstein et al. 2007). A survey-specific protocol (Appendix D) was developed based on the above referenced documents.

Two migration points (MP) bisect the proposed Project site footprint along the central east-west axis, and exhibit near 360 degree views of the distant horizon to maximize visual capture of migrating birds passing over the area (Table 3). After the fall 2013 season, avian biologists determined that, due to the pattern of migratory movement prevalent in the area, the survey points should be adjusted to maximize visibility of migrating birds to the observer. Beginning during the spring of 2014, MP01 and MP02 were replaced with MP03 and MP04 (Table 4; Figure 6). During peak migration periods in the spring and fall of 2013 and 2014 an avian biologist conducted a survey at each MP, once per week, using unlimited-distance bird migration survey methods.

Each migration point was visited 6 times between April 18, 2013 and May 18, 2013 and 11 times between September 2, 2013 and November 12, 2013. The number of visits was limited during the spring 2013 migration period by delays surrounding agency acceptance of the Project-specific Avian Work Plan (Table 4). During the spring and fall of 2014, the new MPs were each visited 11 times between March 3 and May 22 and between September 5 and November 15.

Table 3 Migration Point Locations

Survey Point	UTM (WGS 84)	
	Easting	Northing
MP01	706914	3717172
MP02	710176	3717195
MP03	712050	3717046
MP04	707330	3720406

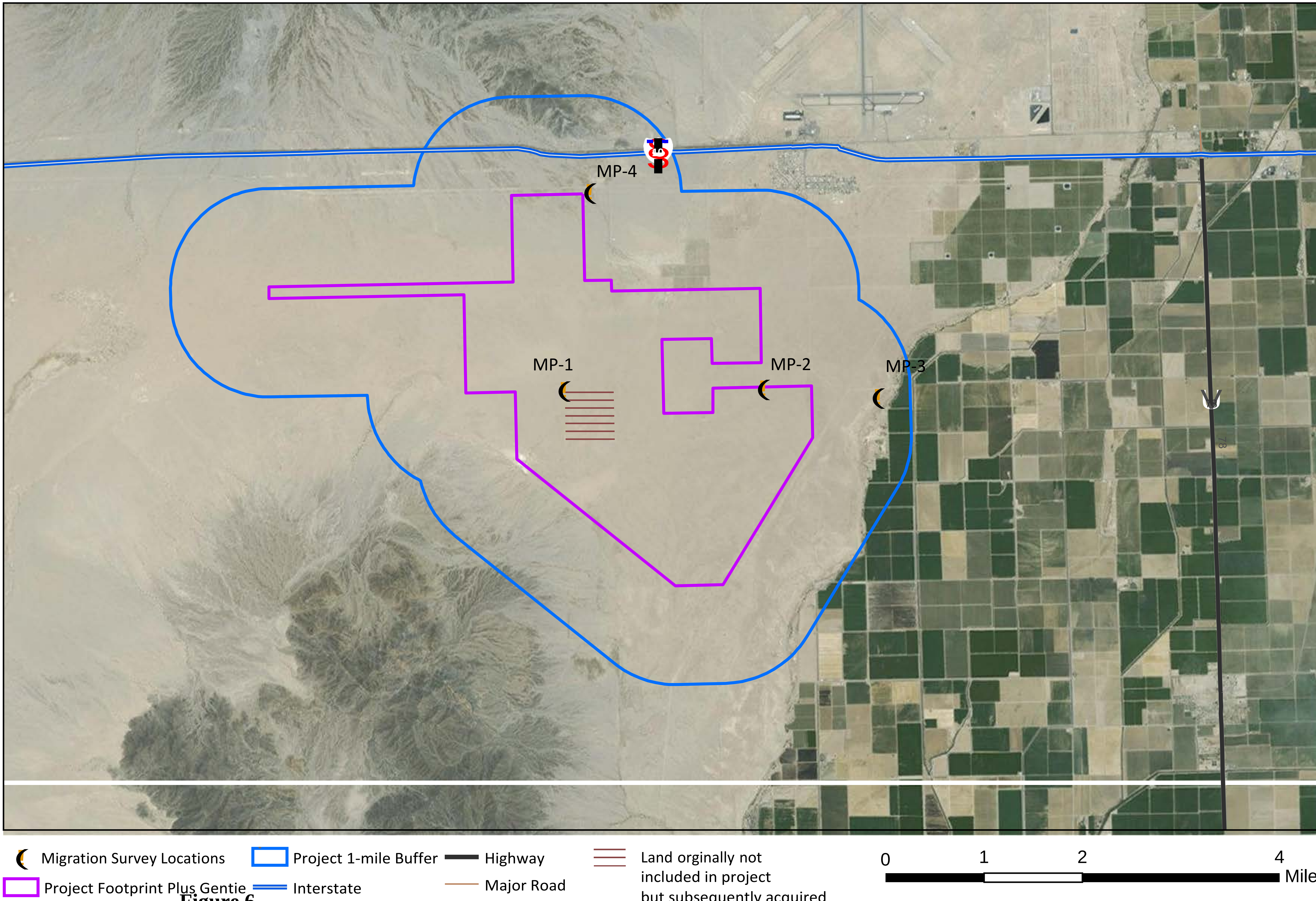

Figure 6

MIGRATORY BIRD SURVEY LOCATIONS

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CORVUS
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Table 4 Migration Point Visits -- Spring 2013-Fall 2014

2013			2014		
Point ID	Visit Date	Observer	Point ID	Visit Date	Observer
MP-1	4/18/2013	J. Yerger	MP-3	3/5/2014	Roger Radd
	4/25/2013	Roger Radd		3/10/2014	Roger Radd
	4/28/2013	Roger Radd		3/17/2014	Roger Radd
	5/3/2013	Roger Radd		3/24/2014	Roger Radd
	5/10/2013	Roger Radd		4/1/2014	Roger Radd
	5/13/2013	Roger Radd		4/1/2014	Roger Radd
	5/23/2013	Roger Radd		4/8/2014	Roger Radd
	5/30/2013	Roger Radd		4/21/2014	Roger Radd
	9/3/2013	Roger Radd		5/5/2014	Roger Radd
	9/11/2013	Roger Radd		5/15/2014	Roger Radd
	9/17/2013	Roger Radd		5/22/2014	Roger Radd
	9/23/2013	Roger Radd		9/5/2014	Erin Lockward
	10/2/2013	Roger Radd		9/11/2014	Erin Lockward
	10/7/2013	Roger Radd		9/21/2014	Erin Lockward
	10/15/2013	Roger Radd		9/27/2014	Erin Lockward
	10/21/2013	Roger Radd		10/2/2014	Erin Lockward
	10/29/2013	Roger Radd		10/9/2014	Erin Lockward
	11/4/2013	Roger Radd		10/13/2014	Brooks Hart
	11/11/2013	Roger Radd		10/23/2014	Erin Lockward
MP-2	4/18/2013	Roger Radd		10/27/2014	Erin Lockward
	4/26/2013	Roger Radd		11/6/2014	Erin Lockward
	5/2/2013	Roger Radd		11/10/2014	Erin Lockward
	5/6/2013	Roger Radd	MP-4	3/6/2014	Roger Radd
	5/11/2013	Roger Radd		3/11/2014	Roger Radd
	5/18/2013	Roger Radd		3/17/2014	Roger Radd
	5/22/2013	Roger Radd		3/25/2014	Roger Radd
	5/28/2013	Roger Radd		4/2/2014	Roger Radd
	9/2/2013	Roger Radd		4/9/2014	Roger Radd
	9/12/2013	Roger Radd		4/22/2014	Roger Radd
	9/18/2013	Roger Radd		5/7/2014	Roger Radd

2013			2014		
Point ID	Visit Date	Observer	Point ID	Visit Date	Observer
	9/24/2013	Roger Radd		5/14/2014	Roger Radd
	10/3/2013	Roger Radd		5/20/2014	Roger Radd
	10/8/2013	Roger Radd		9/6/2014	Erin Lockward
	10/17/2013	Roger Radd		9/14/2014	Erin Lockward
	10/23/2013	Roger Radd		9/18/2014	Erin Lockward
	10/30/2013	Roger Radd		9/28/2014	Erin Lockward
	11/5/2013	Roger Radd		10/6/2014	Erin Lockward
	11/12/2013	Roger Radd		10/12/2014	Erin Lockward
				10/15/2014	Brooks Hart
				10/25/2014	Erin Lockward
				10/29/2014	Brooks Hart
				11/8/2014	Erin Lockward
				11/15/2014	Erin Lockward

2.8.3.2 Line Transect Sampling

The purpose of these surveys is to depict avian use patterns at and adjacent to the Project site. Data will provide information on the following:

- Sedentary and migratory populations;
- Species richness (number of different species present);
- Species diversity (species richness combined with species evenness);
- Species use, behavior and movements; and
- Species distribution across the project.

Qualified biologists conducted surveys from the spring of 2013 to the winter of 2014-15, not including the summer months, recording all species observed and documenting their site use. Surveyors followed a sampling model that implemented a line-transect survey methodology.

Survey results will be used in the development of an avian risk characterization (illustrating species use and occurrence within the proposed Project site) as part of the Bird and Bat Conservation Strategy (BBCS).

Line-transect sampling was conducted by traveling a pre-determined route and recording all bird detections (visual or aural) on either side of the transect line. The distance a bird was detected from the transect line was estimated and recorded as an absolute measure. The observer scanned the sky as well as the surrounding habitat and recorded bird use and movement data under good weather conditions, good visibility, no sustained precipitation and average wind speeds less than 15 miles per hour (mph). Each line-transect was surveyed in an effort to capture species occurrences and temporal site use through the spring season. Surveys were timed to capture migrants, breeding birds and local residents.

Information recorded during the line-transect sampling included the following:

- Transect start time;
- Species identification;
- Number of birds seen;
- Flight height;
- Time of day;
- Horizontal distance (perpendicular) to the survey line;
- Behavior during observation; and
- Transect end time.

Project-specific survey protocol were developed to ensure consistent data collection (Appendix D).

A total of eight (8) 2000 meter long transects were established in spring 2013 and eight (8) more were added in fall of 2013 (Table 5). To facilitate robust data analysis, half (8) of the line-transects were situated within the Project site and half were located outside the Project site on public lands with similar habitat composition. One transect of each subset samples microphyll woodland. The control to sample ratio is therefore; 1:1. In October of 2014, we were notified to begin surveying the small 160-acre inholding that was previously excluded from surveys (shown in Figure 7). Two shorter (500 m) transects were added in this area for a total of 18 transects.

Transects within the Project site were aligned to promote continuity so that post-construction surveys could use the same transects and be unimpeded by installed solar panel arrays, if arrays are positioned where proposed (Figure 8).

To reduce temporal bias, transects randomized with respect to order performed and also at which end to start for each survey. At least three visits per transect per season were used in analysis (Table 6).

Table 5 Line Transect Start and End Points

Transect ID	Site Name	Start Point		End Point	
		Easting	Northing	Easting	Northing
T1	Project Footprint	707,056	3,718,437	709,056	3,718,464
T2	Project Footprint	706,625	3,718,060	706,666	3,716,060
T3	Project Footprint	708,120	3,717,427	708,120	3,715,427
T4	Project Footprint	709,439	3,716,511	709,494	3,714,512
T5	Project Control	711,338	3,718,342	711,378	3,716,343
T6	Project Control	711,213	3,715,380	709,722	3,714,047
T7	Project Control	709,278	3,713,697	709,344	3,711,698
T8	Project Control	705,184	3,715,178	706,759	3,713,945
T9	Project Footprint	707,892	3,718,197	709,892	3,718,200
T10	Project Footprint	708,539	3,716,485	708,539	3,714,490
T11	Project Footprint	708,886	3,716,512	708,886	3,714,510
T12	Project Footprint	709,888	3,716,943	709,888	3,714,940
T13	Project Control	708,156	3,720,221	710,062	3,719,778
T14	Project Control	702,774	3,720,043	704,686	3,719,486
T15	Project Control	703,314	3,718,563	704,016	3,716,690
T16	Project Control	706,845	3,713,635	708,829	3,713,748
T17	Project Footprint	707,245	3,717,067	707,245	3,716,617
T18	Project Footprint	707,645	3,716,876	707,645	3,716,426

Table 6 Summary of Line Transect Surveys Conducted April 2013 through February 2015

Transect ID	Start Point	Visit Date	Observer	Start Time	End Time	Start Point	Visit Date	Observer	Start Time	End Time
T1	B	4/18/2013	John Yerger	6:39 AM	7:43 AM	B	3/24/2014	Roger Radd	7:17 AM	8:46 AM
	A	4/28/2013	Roger Radd	6:45 AM	7:40 AM	A	4/21/2014	Roger Radd	7:07 AM	8:36 AM
	B	5/2/2013	Roger Radd	6:16 AM	7:09 AM	B	5/9/2014	Roger Radd	6:06 AM	7:37 AM
	B	9/2/2013	Roger Radd	6:29 AM	7:59 AM	A	9/11/2014	Erin Lockward	6:43 AM	7:07 AM
	A	10/4/2013	Roger Radd	7:12 AM	8:38 AM	B	10/2/2014	Erin Lockward	9:53 AM	10:15 AM
	A	11/7/2013	Roger Radd	6:55 AM	8:47 AM	A	11/6/2014	Erin Lockward	6:25 AM	6:51 AM
	A	12/2/2013	Roger Radd	7:09 AM	8:55 AM	B	12/11/2014	Erin Lockward	8:19 AM	8:56 AM
	B	1/6/2014	Roger Radd	7:07 AM	8:58 AM	A	1/27/2015	Erin Lockward	8:56 AM	9:41 AM
	B	2/3/2014	Roger Radd	7:11 AM	9:09 AM	B	2/5/2015	Erin Lockward	9:41 AM	10:20 AM
T2	A	4/19/2013	John Yerger	6:28 AM	7:32 AM	A	3/26/2014	Roger Radd	7:25 AM	8:43 AM
	A	5/2/2013	Roger Radd	7:25 AM	8:06 AM	B	4/28/2014	Roger Radd	12:13 PM	1:35 PM
	A	5/24/2013	Roger Radd	9:21 AM	10:37 AM	A	5/15/2014	Roger Radd	6:06 AM	7:29 AM
	A	10/2/2013	Roger Radd	7:04 AM	8:36 AM	A	9/12/2014	Erin Lockward	10:40 AM	10:59 AM
	B	10/16/2013	Roger Radd	2:52 PM	4:08 PM	B	10/3/2014	Erin Lockward	8:40 AM	8:58 AM
	A	11/11/2013	Roger Radd	7:22 AM	9:08 AM	A	11/7/2014	Erin Lockward	9:36 AM	10:02 AM

Transect ID	Start Point	Visit Date	Observer	Start Time	End Time	Start Point	Visit Date	Observer	Start Time	End Time
T3	B	12/3/2013	Roger Radd	10:10 AM	11:52 AM	A	12/6/2014	Erin Lockward	8:05 AM	8:46 AM
	A	1/8/2014	Roger Radd	10:39 AM	12:29 PM	B	1/28/2015	Erin Lockward	10:03 AM	10:47 AM
	A	2/7/2014	Roger Radd	2:06 PM	3:54 PM	A	2/12/2015	Erin Lockward	8:08 AM	8:43 AM
	B	4/19/2013	John Yerger	8:21 AM	9:20 AM	A	3/17/2014	Roger Radd	7:44 AM	9:17 AM
	A	4/28/2013	Roger Radd	8:32 AM	9:30 AM	B	5/2/2014	Roger Radd	10:45 AM	12:08 PM
	A	5/23/2013	Roger Radd	6:15 AM	7:22 AM	A	5/9/2014	Roger Radd	9:46 AM	10:52 AM
	A	9/3/2013	Roger Radd	6:23 AM	7:50 AM	A	9/12/2014	Erin Lockward	7:10 AM	7:40 AM
	B	10/10/2013	Roger Radd	1:11 PM	2:28 PM	B	10/3/2014	Erin Lockward	7:38 AM	8:12 AM
	A	11/12/2013	Roger Radd	7:03 AM	8:53 AM	A	11/7/2014	Erin Lockward	8:08 AM	8:32 AM
	B	12/6/2013	Roger Radd	10:43 AM	12:12 PM	A	12/5/2014	Erin Lockward	11:02 AM	11:50 AM
	A	1/7/2014	Roger Radd	7:18 AM	9:08 AM	A	1/20/2015	Erin Lockward	8:03 AM	9:37 AM
	B	2/3/2014	Roger Radd	1:42 PM	3:30 PM	B	2/6/2015	Erin Lockward	7:23 AM	8:07 AM
T4	B	4/22/2013	Roger Radd	9:45 AM	10:48 AM	A	3/25/2014	Roger Radd	7:20 AM	8:48 AM
	B	5/10/2013	Roger Radd	7:12 AM	8:13 AM	A	4/28/2014	Roger Radd	6:52 AM	8:18 AM
	A	5/23/2013	Roger Radd	8:33 AM	9:35 AM	B	5/22/2014	Roger Radd	6:55 AM	8:21 AM

Transect ID	Start Point	Visit Date	Observer	Start Time	End Time	Start Point	Visit Date	Observer	Start Time	End Time
	A	9/13/2013	Roger Radd	6:34 AM	8:24 AM	B	9/11/2014	Erin Lockward	7:38 AM	8:01 AM
	B	10/3/2013	Roger Radd	7:19 AM	9:22 AM	A	10/2/2014	Erin Lockward	9:14 AM	9:36 AM
	A	11/7/2013	Roger Radd	10:14 AM	11:59 AM	B	11/6/2014	Erin Lockward	7:10 AM	7:32 AM
	B	12/2/2013	Roger Radd	1:38 PM	3:24 PM	A	12/12/2014	Erin Lockward	7:18 AM	7:59 AM
	A	1/6/2014	Roger Radd	10:18 AM	12:09 PM	B	1/27/2015	Erin Lockward	11:05 AM	11:47 AM
	B	2/13/2014	Roger Radd	10:57 AM	12:45 PM	A	2/6/2015	Erin Lockward	10:11 AM	10:59 AM
T5	A	4/22/2013	Roger Radd	6:30 AM	7:38 AM	A	3/10/2014	Roger Radd	7:45 AM	9:19 AM
	B	5/3/2013	Roger Radd	6:50 AM	7:56 AM	B	4/23/2014	Roger Radd	7:05 AM	8:30 AM
	B	5/20/2013	Roger Radd	6:22 AM	7:33 AM	A	5/5/2014	Roger Radd	6:48 AM	8:21 AM
	A	9/17/2013	Roger Radd	6:33 AM	8:27 AM	A	9/18/2014	Erin Lockward	10:16 AM	10:38 AM
	B	10/10/2013	Roger Radd	7:02 AM	8:52 AM	A	10/9/2014	Erin Lockward	10:41 AM	11:03 AM
	A	11/4/2013	Roger Radd	6:56 AM	8:50 AM	B	11/8/2014	Erin Lockward	9:02 AM	9:32 AM
	B	12/2/2013	Roger Radd	10:29 AM	12:20 PM	A	12/5/2014	Erin Lockward	9:23 AM	10:18 AM
	A	1/7/2014	Roger Radd	10:39 AM	12:26 PM	B	1/29/2015	Erin Lockward	9:09 AM	9:49 AM
	B	2/4/2014	Roger Radd	2:05 PM	3:53 PM	A	2/3/2015	Erin Lockward	10:04 AM	10:48 AM

Transect ID	Start Point	Visit Date	Observer	Start Time	End Time	Start Point	Visit Date	Observer	Start Time	End Time
T6	B	4/22/2013	Roger Radd	8:15 AM	9:19 AM	A	3/7/2014	Roger Radd	9:28 AM	10:53 AM
	A	5/3/2013	Roger Radd	8:58 AM	9:44 AM	B	4/3/2014	Roger Radd	7:40 AM	9:17 AM
	A	5/20/2013	Roger Radd	8:43 AM	9:50 AM	A	5/8/2014	Roger Radd	6:55 AM	8:27 AM
	A	9/15/2013	Roger Radd	6:40 AM	8:31 AM	B	9/18/2014	Erin Lockward	7:03 AM	8:11 AM
	B	10/7/2013	Roger Radd	7:14 AM	9:01 AM	A	10/9/2014	Erin Lockward	7:08 AM	8:02 AM
	A	11/5/2013	Roger Radd	6:49 AM	8:38 AM	B	11/8/2014	Erin Lockward	6:44 AM	7:13 AM
	B	12/3/2013	Roger Radd	6:55 AM	8:46 AM	B	12/7/2014	Erin Lockward	8:06 AM	8:40 AM
	A	1/8/2014	Roger Radd	7:22 AM	9:13 AM	A	1/25/2015	Erin Lockward	7:50 AM	8:45 AM
	B	2/3/2014	Roger Radd	10:26 AM	12:17 PM	A	2/12/2015	Erin Lockward	10:14 AM	11:03 AM
T7	A	4/26/2013	Roger Radd	6:45 AM	7:35 AM	B	3/19/2014	Roger Radd	12:55 PM	2:06 PM
	B	5/6/2013	Roger Radd	6:50 AM	7:52 AM	A	4/24/2014	Roger Radd	12:03 PM	1:25 PM
	A	5/22/2013	Roger Radd	8:52 AM	9:45 AM	B	5/13/2014	Roger Radd	6:24 AM	7:49 AM
	B	9/15/2013	Roger Radd	9:51 AM	11:26 AM	A	9/20/2014	Erin Lockward	7:07 AM	7:50 AM
	B	10/10/2013	Roger Radd	10:00 AM	11:25 AM	B	10/10/2014	Erin Lockward	8:57 AM	9:33 AM
	A	11/7/2013	Roger Radd	1:34 PM	2:54 PM	A	11/9/2014	Erin Lockward	6:23 AM	6:52 AM

Transect ID	Start Point	Visit Date	Observer	Start Time	End Time	Start Point	Visit Date	Observer	Start Time	End Time
	B	12/3/2013	Roger Radd	1:22 PM	3:02 PM	A	12/7/2014	Erin Lockward	9:22 AM	10:05 AM
	A	1/7/2014	Roger Radd	1:53 PM	3:30 PM	A	1/24/2015	Erin Lockward	9:20 AM	10:12 AM
	B	2/10/2014	Roger Radd	10:16 AM	12:01 PM	A	2/19/2015	Erin Lockward	7:08 AM	7:51 AM
T8	B	4/25/2013	Roger Radd	7:08 AM	8:18 AM	A	3/11/2014	Roger Radd	7:42 AM	9:16 AM
T8	B	5/4/2013	Roger Radd	6:37 AM	7:42 AM	B	4/23/2014	Roger Radd	12:19 PM	1:37 PM
T8	A	5/22/2013	Roger Radd	6:24 AM	8:14 AM	A	5/16/2014	Roger Radd	6:27 AM	7:53 AM
T8	B	9/4/2013	Roger Radd	6:50 AM	8:12 AM	B	9/20/2014	Erin Lockward	9:12 AM	9:44 AM
T8	A	10/8/2013	Roger Radd	7:19 AM	8:58 AM	A	10/10/2014	Erin Lockward	11:37 AM	11:58 AM
T8	A	11/6/2013	Roger Radd	7:21 AM	8:58 AM	B	11/9/2014	Erin Lockward	8:32 AM	8:52 AM
T8	B	12/6/2013	Roger Radd	7:26 AM	9:19 AM	B	12/12/2014	Erin Lockward	9:15 AM	10:07 AM
T8	A	1/6/2014	Roger Radd	1:56 PM	3:44 PM	A	1/20/2015	Erin Lockward	10:45 AM	11:26 AM
T8	A	2/4/2014	Roger Radd	10:54 AM	12:46 PM	B	2/5/2015	Erin Lockward	7:40 AM	8:36 AM
T9						B	3/19/2014	Roger Radd	7:29 AM	9:05 AM
T9						A	4/24/2014	Roger Radd	9:42 AM	11:12 AM
T9						B	5/14/2014	Roger Radd	5:58 AM	7:17 AM

Transect ID	Start Point	Visit Date	Observer	Start Time	End Time	Start Point	Visit Date	Observer	Start Time	End Time
	B	9/24/2013	Roger Radd	7:04 AM	8:44 AM	A	9/28/2014	Erin Lockward	7:57 AM	8:23 AM
	A	10/21/2013	Roger Radd	7:31 AM	9:21 AM	B	10/25/2014	Erin Lockward	8:34 AM	8:56 AM
	B	11/19/2013	Roger Radd	10:03 AM	11:59 AM	A	11/17/2014	Erin Lockward	8:00 AM	8:19 AM
	A	12/11/2013	Roger Radd	2:10 PM	3:40 PM	A	12/11/2014	Erin Lockward	9:12 AM	9:46 AM
	B	1/15/2014	Roger Radd	7:16 AM	9:07 AM	B	1/27/2015	Erin Lockward	7:56 AM	8:37 AM
	B	2/13/2014	Roger Radd	2:14 PM	4:01 PM	A	2/5/2015	Erin Lockward	10:36 AM	11:18 AM
T10	A	9/23/2013	Roger Radd	6:47 AM	8:21 AM	A	9/27/2014	Erin Lockward	9:39 AM	10:04 AM
	B	10/16/2013	Roger Radd	10:20 AM	11:42 AM	B	10/14/2014	Brooks Hart	8:22 AM	9:02 AM
	A	11/19/2013	Roger Radd	6:58 AM	8:47 AM	A	11/15/2014	Erin Lockward	9:40 AM	9:58 AM
	B	12/9/2013	Roger Radd	7:14 AM	8:55 AM	A	12/11/2014	Erin Lockward	7:00 AM	7:44 AM
	A	1/15/2014	Roger Radd	2:16 PM	4:00 PM	A	1/28/2015	Erin Lockward	11:27 AM	12:02 PM
	B	2/7/2014	Roger Radd	7:26 AM	9:20 AM	B	2/11/2015	Erin Lockward	7:36 AM	8:11 AM
T11						B	3/26/2014	Roger Radd	9:56 AM	11:33 AM
						A	5/2/2014	Roger Radd	6:37 AM	8:09 AM
						B	5/15/2014	Roger Radd	8:27 AM	9:38 AM

Transect ID	Start Point	Visit Date	Observer	Start Time	End Time	Start Point	Visit Date	Observer	Start Time	End Time
	A	9/19/2013	Roger Radd	6:49 AM	8:33 AM	A	9/27/2014	Erin Lockward	7:50 AM	8:07 AM
	B	10/23/2013	Roger Radd	7:28 AM	9:26 AM	B	10/16/2014	Brooks Hart	9:50 AM	10:22 AM
	A	11/21/2013	Roger Radd	10:12 AM	12:02 PM	A	11/15/2014	Erin Lockward	8:10 AM	8:30 AM
	A	12/10/2013	Roger Radd	2:19 PM	3:52 PM	A	12/7/2014	Erin Lockward	10:58 AM	11:42 AM
	A	1/16/2014	Roger Radd	2:07 PM	3:53 PM	B	1/29/2015	Erin Lockward	7:14 AM	7:56 AM
	B	2/4/2014	Roger Radd	7:22 AM	9:16 AM	A	2/10/2015	Erin Lockward	11:23 AM	12:00 PM
T12						B	3/18/2014	Roger Radd	10:20 AM	11:44 AM
						A	4/23/2014	Roger Radd	9:17 AM	10:35 AM
						B	5/8/2014	Roger Radd	8:51 AM	10:09 AM
	B	9/25/2013	Roger Radd	6:52 AM	7:49 AM	A	9/28/2014	Erin Lockward	9:39 AM	10:04 AM
	A	10/17/2013	Roger Radd	7:10 AM	8:56 AM	B	10/25/2014	Erin Lockward	9:56 AM	10:19 AM
	B	11/20/2013	Roger Radd	7:05 AM	8:52 AM	A	11/17/2014	Erin Lockward	6:42 AM	7:08 AM
	A	12/11/2013	Roger Radd	7:06 AM	8:55 AM	A	12/11/2014	Erin Lockward	10:38 AM	11:17 AM
	B	1/16/2014	Roger Radd	7:26 AM	9:17 AM	B	1/28/2015	Erin Lockward	7:54 AM	8:42 AM
	A	2/10/2014	Roger Radd	6:58 AM	8:48 AM	B	2/6/2015	Erin Lockward	9:20 AM	9:58 AM

Transect ID	Start Point	Visit Date	Observer	Start Time	End Time	Start Point	Visit Date	Observer	Start Time	End Time
T13						B	3/6/2014	Roger Radd	6:57 AM	7:44 AM
						B	4/24/2014	Roger Radd	7:11 AM	8:39 AM
						B	5/14/2014	Roger Radd	8:00 AM	9:21 AM
	B	9/25/2013	Roger Radd	10:24 AM	11:26 AM					
	A	10/29/2013	Roger Radd	7:40 AM	9:22 AM					
	B	11/21/2013	Roger Radd	1:11 PM	2:55 PM					
	A	12/10/2013	Roger Radd	7:12 AM	9:12 AM	B	12/5/2014	Erin Lockward	7:33 AM	8:26 AM
	B	1/9/2014	Roger Radd	2:20 PM	4:09 PM	A	1/29/2015	Erin Lockward	10:02 AM	11:41 AM
	B	2/7/2014	Roger Radd	10:37 AM	12:24 PM	B	2/3/2015	Erin Lockward	7:45 AM	8:40 AM
T14						B	3/20/2014	Roger Radd	7:53 AM	9:42 AM
						A	4/22/2014	Roger Radd	6:59 AM	8:36 AM
						B	5/7/2014	Roger Radd	6:41 AM	8:12 AM
	B	9/19/2013	Roger Radd	10:36 AM	11:52 AM					
	A	10/30/2013	Roger Radd	7:44 AM	9:34 AM					
	B	11/19/2013	Roger Radd	2:09 PM	3:37 PM					

Transect ID	Start Point	Visit Date	Observer	Start Time	End Time	Start Point	Visit Date	Observer	Start Time	End Time
	A	12/9/2013	Roger Radd	2:12 PM	3:50 PM	B	12/6/2014	Erin Lockward	9:44 AM	10:42 AM
	B	1/30/2014	Roger Radd	1:30 PM	3:22 PM	A	1/25/2015	Erin Lockward	11:36 AM	12:27 PM
	A	2/10/2014	Roger Radd	2:20 PM	4:07 PM	B	2/10/2015	Erin Lockward	7:45 AM	8:46 AM
T15						B	3/5/2014	Roger Radd	6:54 AM	8:43 AM
						A	4/1/2014	Roger Radd	7:47 AM	9:21 AM
						B	5/20/2014	Roger Radd	6:28 AM	7:37 AM
	B	9/13/2013	Roger Radd	6:33 AM	7:57 AM					
	A	10/16/2013	Roger Radd	7:39 AM	9:07 AM					
	B	11/20/2013	Roger Radd	11:32 AM	1:17 PM					
	A	12/10/2013	Roger Radd	10:57 AM	12:40 PM	A	12/7/2014	Erin Lockward	6:46 AM	7:27 AM
	B	1/15/2014	Roger Radd	10:54 AM	12:44 PM	B	1/25/2015	Erin Lockward	9:52 AM	10:30 AM
	A	2/14/2014	Roger Radd	2:04 PM	3:50 PM	A	2/10/2015	Erin Lockward	10:00 AM	10:36 AM
T16						B	3/17/2014	Roger Radd	7:43 AM	9:17 AM
						A	4/28/2014	Roger Radd	9:22 AM	10:49 AM
						B	5/27/2014	Roger Radd	6:25 AM	7:44 AM

Transect ID	Start Point	Visit Date	Observer	Start Time	End Time	Start Point	Visit Date	Observer	Start Time	End Time
	B	9/18/2013	Roger Radd	6:39 AM	8:27 AM					
	B	10/15/2013	Roger Radd	7:23 AM	9:15 AM					
	A	11/21/2013	Roger Radd	7:17 AM	8:56 AM					
	B	12/11/2013	Roger Radd	10:40 AM	12:26 PM	B	12/12/2014	Erin Lockward	8:33 AM	9:09 AM
	A	1/16/2014	Roger Radd	10:57 AM	12:44 PM	A	1/24/2015	Erin Lockward	7:40 AM	8:18 AM
	A	2/13/2014	Roger Radd	7:00 AM	8:50 AM	B	2/3/2015	Erin Lockward	11:17 AM	12:02 PM
T17	B	12/6/2014	Erin Lockward	7:14 AM	7:26 AM					
	A	1/20/2015	Erin Lockward	9:15 AM	9:25 AM					
	A	2/12/2015	Erin Lockward	7:11 AM	7:30 AM					
T18	A	12/6/2014	Erin Lockward	6:53 AM	7:06 AM					
	A	1/20/2015	Erin Lockward	8:56 AM	9:04 AM					
	A	2/6/2015	Erin Lockward	6:47 AM	6:58 AM					

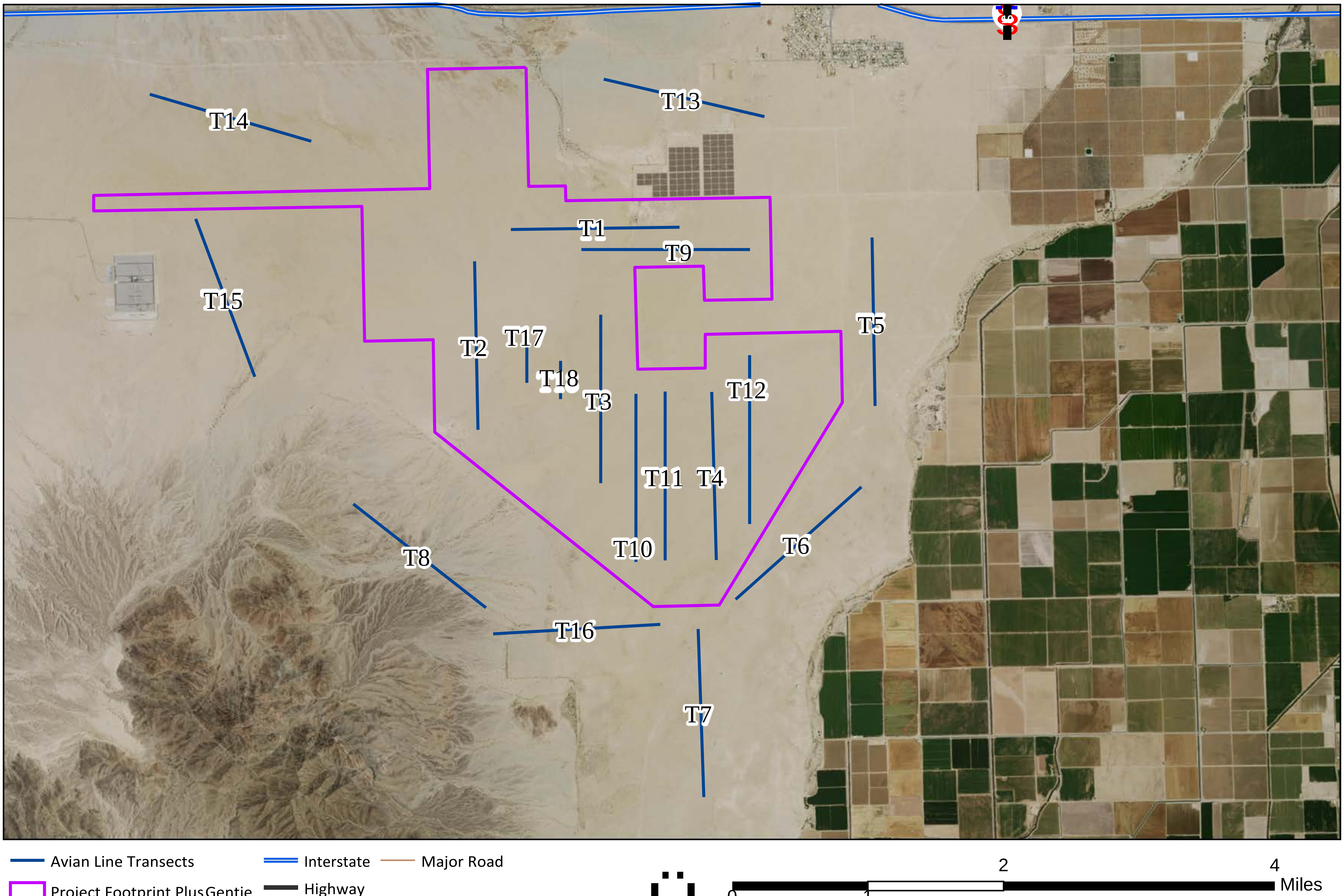

Figure 7

AVIAN LINE TRANSECT LOCATIONS

DESERT QUARTZITE SOLAR | RIVERSIDE COUNTY, CA

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2.8.3.3 Burrowing Owl Surveys

Burrowing owl *(Athene cunicularia)* surveys were scheduled and performed according to "Staff Report on Burrowing Owl Mitigation" (California Department of Fish and Wildlife, 2012) and the *Burrowing Owl Survey Protocols and Mitigation Guidelines* (California Burrowing Owl Consortium 1993). Phase II burrowing owl surveys (California Burrowing Owl Consortium 1993) were conducted across all portions of the Study Area.

Burrowing Owl surveys were conducted across all portions of the project site and within a 150-meter buffer of the proposed Project site, in an effort to assess occupancy, abundance, site use and distribution. Wildlife crews surveyed the entire Project site between October 22, 2012 and April 15, 2013, walking belt transects with 10 meter spacing. Surveys within the 150-meter buffer were conducted May 14-17, 2013, by walking straight-line belt transects spaced no more than 30-meters apart, adjusting for vegetation height and density (Rosenberg et al. 2007).

Additional surveys were conducted during the spring of 2014. Burrowing owls surveys conducted during 2014 followed a project-specific protocol which incorporates agency (California Department of Fish and Wildlife 2012) and resource-specific guidance *(*California Burrowing Owl Consortium 1993) to achieve management goals and effectively assess potential impacts. This project-specific Burrowing Owl Survey Protocol is included as Appendix D. From April 4, 2014 through April 16, 2014, a burrowing owl specific survey crew conducted comprehensive pedestrian belt transects spaced 7-20 meters, within suitable habitat. Follow-up surveys focused at confirming occupancy and determining site use and breeding success were conducted between May 6 and June 12, 2014.

During each of these survey efforts, at the start of each transect and at least every 100 meters, survey crews scanned the entire visible Project site for burrowing owls using binoculars. Some burrowing owls may be detected by their calls, so observers listened for burrowing owls while conducting the survey. Care was taken to minimize disturbance near occupied burrows during all seasons and not to "flush" burrowing owls from their burrows.

All burrowing owl sightings and burrows with burrowing owl sign (including: whitewash, tracks, pellets, feathers) were mapped and recorded using standardized data forms that include Pendragon mobile data management software and backup paper data sheets. Any burrow, with associated burrowing owl sign, was ranked by Class (1 to 4) depending on the age and type of sign present. Burrow Class are defined as follows:

- 1=Excellent (Usable burrow with burrowing owl present);
- 2=Good (Usable burrow, fresh sign but no burrowing owl present);
- 3=Fair (Usable burrow, inactive with old sign, no burrowing owl present); and
- 4=Poor (Inactive, burrow, no burrowing owl sign).

In addition to comprehensive presence/ absence site surveys and a burrow inventory (Phase II surveys), extended observational monitoring (Phase III) was conducted per the Staff Report on Burrowing Owl Mitigation (CDFG, 2012). Observational efforts were conducted from as many fixed points as necessary to provide full visual coverage using spotting scopes and binoculars.

Phase III surveys were conducted at every burrow recorded as a Class 1, Class 2 or Class 3. In 2013 these follow-up surveys consisted of 3-hour visits to each burrow that ranked Class 3 or better. In 2014 follow-up surveys followed a modified routine included in the Project-specific protocol (Appendix D). Follow-up visits conducted during 2014 were performed during the intervals: April 4-6, May 6-12, May 26-28 and June 2. During all follow-up efforts, observers recorded each burrow's current status and condition and visually searched the surrounding area for live owls. In February 2015, biologists re-visited all Class 1 and 2 burrows as well as any locations where adult burrowing owls had incidentally been reported.

2.8.3.4 Golden Eagle Surveys

Agency approval of the Quartzite Avian Work Plan was not granted until after the 2013 golden eagle breeding season ended. In 2013-14 and 2014-15, in addition to Unlimited Distance Extended Observation Surveys (Section 2.8.3.1), eagle surveys were conducted in December and January following the Interim Golden Eagle Inventory and Monitoring Protocols; and other recommendations (Pagel *et al*., 2010). Surveys for breeding and non-breeding bald and golden eagles were conducted within a 10-mile radius of the Project. Occurrence of non-breeding golden eagles within at least 10 miles of the Project boundary during the courtship season (*e.g.,* late December through early February) were documented in order to estimate potential Project-related impacts to golden eagles, including: juveniles, sub-adults, adult floaters, and breeding adults.

No potential golden eagle nesting habitat exists within the proposed Project site. Potential golden eagle nesting habitat exists within 10 miles of the Project site boundary; in the Little Chuckwalla Mountains, the Mule Mountains and the McCoy Mountains. There is one historic nest within the 10-mile buffer. Historic nest data for the entire region was used to model golden eagle habitat and assess the terrain for suitable nest sites within a 10-mile buffer of the proposed Project site. These data were used to optimally place Observation Points throughout the survey area. Eighteen (18) Observation Points were established in the study area and each was visited twice during the courtship/breeding season (Table 7; Figure 9). In 2014-15, some of the points were moved (renamed) and replaced some points with new locations with the end result being 18 points overall.

Table 7 Golden Eagle Observation Points and Survey Dates

Observation Point	2013/ 2014		2014/ 2015	
	Phase I Survey Date	Phase II Survey Date	Phase I Survey Date	Phase II Survey Date
QZ_GOEA_OP01	12/17/2013	1/25/2014	12/18/2014	1/21/2015
QZ_GOEA_OP02	12/16/2013	1/22/2014	12/17/2014	1/17/2015
QZ_GOEA_OP03	12/16/2013	1/21/2014	Dropped in 2014	
QZ_GOEA_OP04	12/17/2013	1/25/2014	12/17/2014	1/20/2015
QZ_GOEA_OP05	12/16/2013	1/22/2014	12/18/2014	1/18/2015
QZ_GOEA_OP06	12/19/2013	1/23/2014	Dropped in 2014	
QZ_GOEA_OP07	12/18/2013	1/22/2014	12/15/2014	1/20/2015
QZ_GOEA_OP08	12/19/2013	1/24/2014	12/15/2014	1/21/2015
QZ_GOEA_OP09	12/20/2013	1/21/2014	12/18/2015	1/18/2015
QZ_GOEA_OP10	12/16/2013	1/21/2014	12/18/2015	1/19/2015
QZ_GOEA_OP11	12/17/2013	1/25/2014	12/19/2015	1/24/2015
QZ_GOEA_OP12	12/18/2013	1/24/2014	Dropped in 2014	
QZ_GOEA_OP13	12/19/2013	1/24/2014	12/16/2014	1/26/2015
QZ_GOEA_OP14	12/20/2013	1/21/2014	Dropped in 2014	
QZ_GOEA_OP15	12/20/2013	1/22/2014	12/18/2015	1/20/2015
QZ_GOEA_OP16	12/19/2013	1/23/2014	Dropped in 2014	
QZ_GOEA_OP17	12/18/2013	1/23/2014	12/16/2014	1/27/2015
QZ_GOEA_OP20	12/18/2013	1/23/2014	12/16/2014	1/22/2015
QZ_GOEA_OP21			12/16/2014	1/20/2015
QZ_GOEA_OP22			12/16/2014	1/22/2015
QZ_GOEA_OP23			12/17/2014	1/17/2015
QZ_GOEA_OP24			12/19/2014	1/23/2015
QZ_GOEA_OP25			12/15/2014	1/27/2015

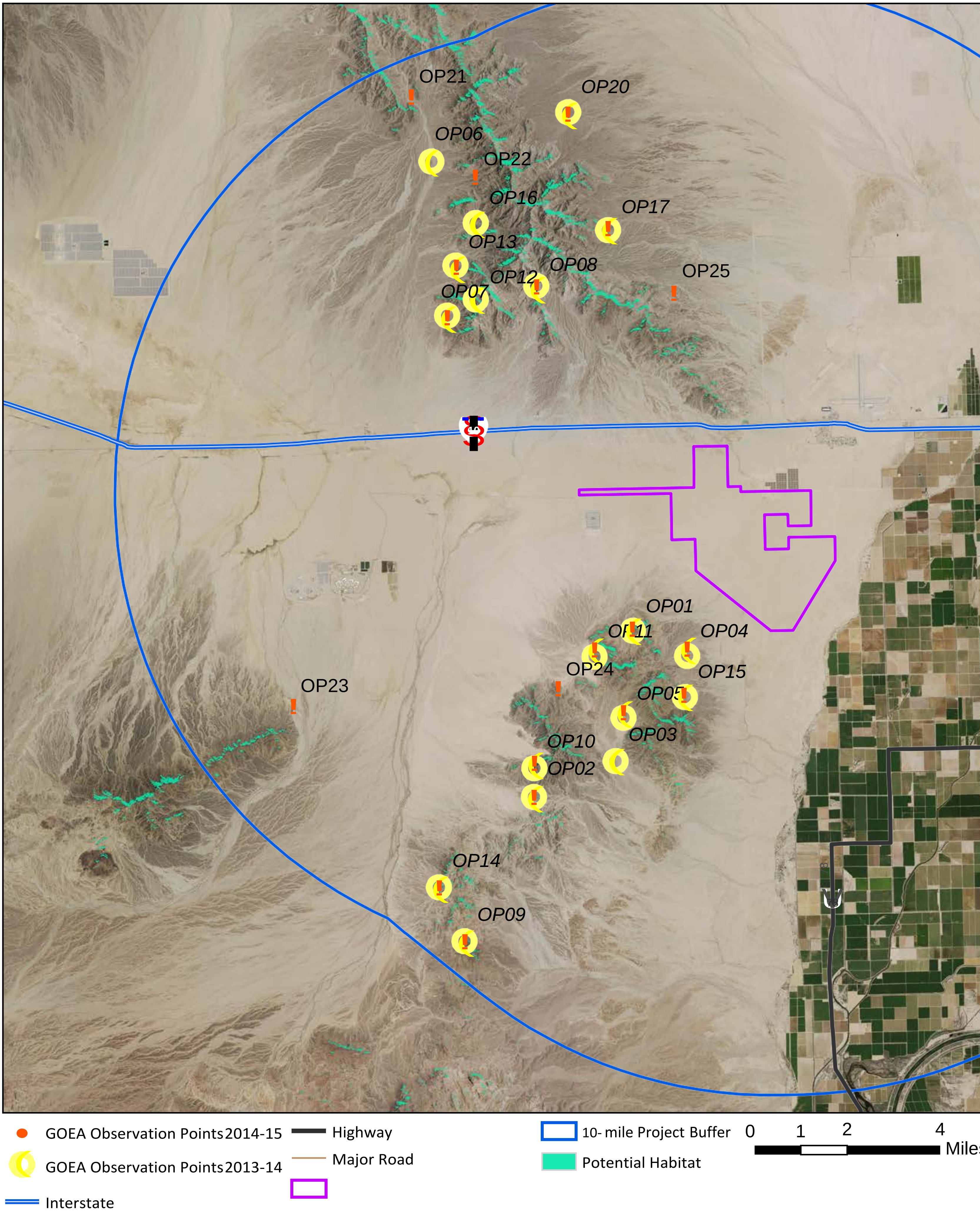

Figure 8

2013-2015 GOLDEN EAGLE OBSERVATION POINT LOCATIONS

QUARTZITE SOLAR | RIVERSIDE COUNTY, CALIFORNIA

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There have been no golden eagle detections during avian-focused surveys, including: Avian Point Counts, Unlimited Distance Extended Observation Surveys and Line Transect surveys. There have been zero (0) reports of incidental sightings of golden eagles, which would have been reported on standardized, "General Sensitive Species" data forms that are included as required reporting for all of the various biological resource disciplines.

Golden eagle survey data includes:

- Assignment of identification number;
- Recording of Universal Tranverse Mercator (UTM) location via GPS;
- Assessment of any nests for condition (fresh greens, good, fair, old and decrepit); and
- Recording of any birds present (species, behavior).

Surveyors utilized high-powered spotting scopes from the greatest effective distance possible during the breeding season.

Black-tailed jackrabbits and cottontail rabbits were documented using line-transect surveys to estimate population densities within the Project site. Small mammal surveys were conducted across the entire proposed Project site, using pedestrian transects spaced at 10-meter intervals. Observers made their best effort to avoid double counting. This survey methodology assess prey abundance on the Project site as forage for golden eagles.

2.8.3.5 Elf Owl Surveys

In July 2013, an owl-specialist biologist, Dorothy Crowe with Great Basin Bird Observatory (GBBO), toured the Project site to determine whether habitat suitable for nesting elf owls was present. Dorothy Crowe was given a comprehensive tour of the Project site and a surrounding one-mile buffer zone, and examined some habitat features just outside of the one-mile buffer that merited attention. She took extensive notes on her observations and recorded coordinates of any notable features.

2.8.3.6 Nesting Raptor/Raven Surveys

Nesting raptor/Raven survey efforts focused on the detection of all raptor/raven nests within 1-mile of the Project site in order to collect baseline data on the following.

- The number and distribution of raptor/raven nests prior to project development; and
- Success rates of raptor/raven nests prior to project development.

All bird nests (including the incidental detection of resident passerine species) were mapped and recorded on standardized datasheets. Monthly monitoring efforts were completed to update the datasheets to include the development stage and breeding status at each raptor/raven nest.

2.8.4 Mammals

There were three mammal surveys performed for the Project; small mammal trapping, desert kit fox and bats.

2.8.4.1 Small Mammal Trapping

Small mammal trapping was performed to document species types, abundance and locations. Trapping grids were established at all baseline survey locations. Narrow grids consisting of 100 Sherman large (12 inches) live-traps were set at each location. For most baseline locations, the sampling location point represented the southwest corner of the trapping grid. Depending on the width of the habitat being sampled, either a 10 by 10 configuration or a 4 by 25 configuration was used. All traps were spaced approximately 10 m apart. Trapping grids were run for three consecutive nights at all baseline locations. Traps were opened near sunset and checked and closed at sunrise. Traps were not opened if scheduled temperatures were estimated to drop below 50 degrees Fahrenheit. Traps were baited with standard small mammal bait, which consisted of a mixture of birdseed, rolled oats and peanut butter. Individuals found in the first two morning checks on each grid were marked with a colored sharpie marker to indicate recapture status.

2.8.4.2 Desert Kit Foxes

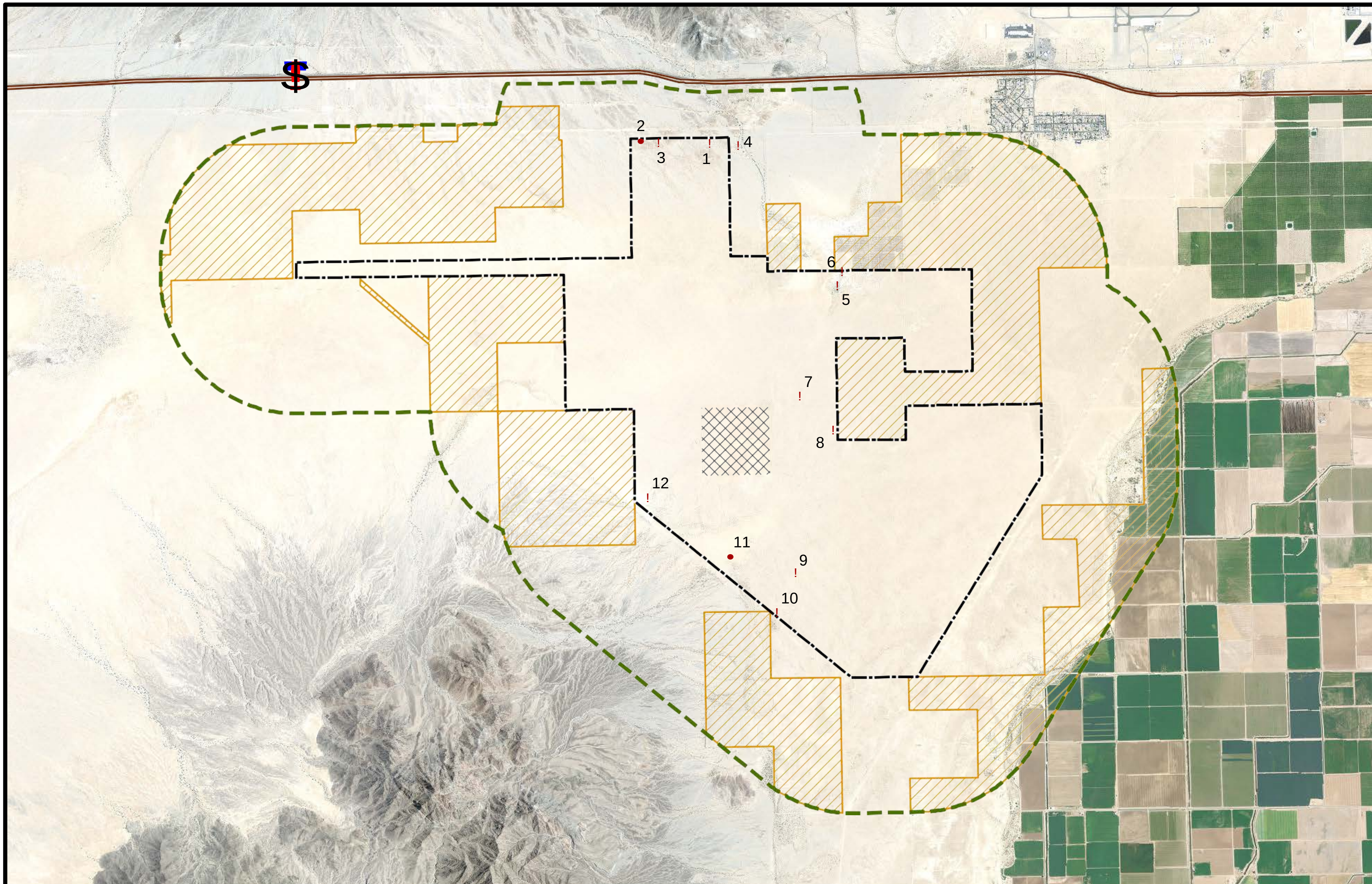
Surveys of the Project site were conducted by qualified biologists walking transects at 10 m spacing to ensure total visual coverage of the area. All desert kit fox single-entrance dens and canid complexes that could be occupied without modification were recorded. A camera station was set up at a total of eight dens and run for three consecutive days and nights.

A qualified biologist revisited each of these 24 dens to search for signs of activity such as lay-down spots on the entrance mounds and make a determination of active status. Up to 16 of the most active dens were monitored with cameras for three nights each. Photo images were analyzed to attempt to identify individual foxes, their sex and age group to try to determine a rough demographic index of desert kit fox presence on the Project site.

2.8.4.3 Bats

A bat assessment was performed by Patricia Brown, Ph.D. and William Rainey, Ph.D. (Brown-Berry Biological Consulting) to assess potential bat habitat within the Study Area. Suitable roosting and foraging habitat for several bat species that are known to occur in the vicinity (including pallid bats, cave myotis and California leaf-nosed bats) was reviewed in the field.

Acoustic monitoring was conducted for three nights to sample bat species utilizing the Study Area (Figure 10). Passive acoustic monitors consisted of a sealed enclosure containing a battery, broadband frequency-dividing ultrasound detector and a programmable data storage device (Anabat II and CF-ZCAIM; Titley Electronics, Ballina, NSW, Australia), with an extension cable microphone in a weather shroud, flat acoustic reflector and bracket (P). The microphone and reflector assemblies were elevated approximately 3 ft above the terrain on a metal stake (Photograph 2). Recorded data were stored on compact flash cards that were programmed with sampling start and stop times (1800-0600 PST) for a sampling interval longer than the time from local sunset to sunrise. An estimate of local sunset times (ignoring local horizon topography effects) was obtained from Project site coordinates and U.S. Naval Observatory web services (http://aa.usno.navy.mil/data/docs/RS_OneYear.php). Twelve monitors were deployed (Figure 10) at sites with different vegetative components to identify bat species and document activity levels at this season. Half of the monitors had standard microphones and half had low frequency microphones with higher sensitivity to sounds in the audio range [4.5 to 20 kilohertz (kHz)]. This enhances recording of certain bat sounds (e.g., pallid and California leaf-nosed bat social calls, western mastiff and other freetailed bat calls) along with insect and bird calls.



• Bat Monitoring Locations

Site Boundary Buffer

Desert Quartzite Site Boundary

Inholding

Private Lands

0 1,000 2,000
Meters

DESERT QUARTZITE SOLAR PROJECT
DESERT QUARTZITE, LLC

Figure 9
Acoustic Bat Monitor Locations

#343 P:\GIS\Ironwood\Shared\Projects\Projects\Quartzite\ArcGIS project files\Acoustic Bat Locs.mxd 8/26/2015

Photograph 2 Detector 5, Microphyll Woodland

Roost surveys were conducted of mines in the mountains adjacent to the Project site during the day and at night for evidence of bats and guano. Two mines in the southern McCoy Mountains (located approximately 4.4 miles northwest of the Study Area) had previously been identified by Dr. Brown as California leaf-nosed bat maternity colonies and had been gated with bat-compatible closures by the Bureau of Land Management in 2011. These mines were monitored on May 8, 2013 at dusk by surveyors with night vision equipment to obtain accurate exit and entry counts of bats and acoustic records with additional Anabat detectors. The surveyors kept two counts, entry and exit, for at least sixty minutes after the first bat exited of how many bats entered and exited the mines. Video cameras with auxiliary infrared lights were used to remotely monitor mines and to obtain permanent records of exiting bats.

Using topographic maps and Google Earth images, ground reconnaissance was conducted of possible mine features on the north end of the Mule Mountains (1.8 miles south of the Study Area) and no underground features that could shelter bats were discovered. The closest known bat colony in the Mule Mountains is the Hodge Mine (a.k.a. Stonehouse, 33.51145, -114.79383) situated 3.4 miles south of the Study Area. This mine contains the largest winter colony of California leaf-nosed bats (*Macrotus californicus*) in the United States, as well as a maternity colony. It is also one of four maternity colonies for the cave myotis (*Myotis velifer*) in California. This mine has been a research site for Dr. Brown since 1976.

3.0 RESULTS

3.1 RAINFALL ANALYSIS

Available historical winter rainfall data from the Blythe CAA Airport was summarized to obtain a useful average for the Blythe area (Tables 8, 9 and 10). The historical average monthly rainfall for the Blythe area was estimated to be 0.30 inches.

Table 8 Historical Winter Rainfall Data (inches)[1]

	October	November	December	January	February	March	Annual Total	Monthly Average
Blythe CAA Airport[1]	0.26	0.19	0.41	0.48	0.44	0.35	3.55	0.30

[1] Western Regional Climate Center (2013)

Table 9 Rainfall 2012 and 2013 (inches)[1]

	October	November	December	January	February	March	2012 Total	2012 Monthly Average
Blythe CAA Airport[1]	0.27	0.00	0.86	0.77	0.01	0.03	4.47	0.37

[1] Western Regional Climate Center (2013)

Table 10 Blythe Rainfall: October 2014-March 2015

Station ID	Location	OCT 2014	NOV 2014	DEC 2014	JAN 2015	FEB 2015	MAR 2015
BLH	Blythe	0.03	0	0.78	0.57	0.04	1.02

Notes:

Precipitation in inches
Source: National Weather Service California Nevada River Forecast Center Lower Colorado Region;
Station: Blythe, http://www.cnrfc.noaa.gov/monthly_precip.php

3.2 BOTANICAL SURVEYS

Thirty-three special status plant species had been identified as potentially occurring in the vicinity of the Project site (Appendix C). This list was generated by searching multiple databases and reference sources for occurrence records.

3.2.1 Special Status Plant Species

On BLM lands, the fall 2012 survey on September 11 -19, 2012, and spring surveys were conducted March 18-30, 2013. The inholding surveys were conducted on March 10-12, 2015. Localized winter rainfall for each of the surveys was very good, enough to germinate abundant annual blooms, and timing was optimal for observing and identifying all potentially occurring target plants. For the fall survey, full coverage at 10 m spacing was achieved across about half of the Study Area and the remainder was surveyed at 20 m spacing. The spring surveys covered 100 percent of the site at 10 m spacing. Fall and spring 2013 surveys yielded a full plant list of 124 taxa, representing 25 plant families. Of this total, 114 are native and 10 are non-native. The inholding parcel, being an old jojoba farm, yielded 41 species of vascular plants. Figure 11 depicts a combination of all Special Status Plants observed. The floristic plant list is in Appendix E and F.

NOTE: Due to the fall special status plants having particularly high status rankings and any additional discoveries on these would be relatively insignificant in light of widely scattered documentation throughout the larger Project site during the fall 2012 plant surveys, fall 2015 plant surveys were not performed within the inholding (California Native Plant Society Electronic Inventory 2015).

3.2.1.1 Special Status Plants Found on Site

Table 11 below lists all the Special Status plants found onsite during fall and spring surveys. None of these plants are federally or state listed, but they all qualify as special status to different degrees by California State-ranking and CNPS ranking.

Table 11 Special Status Plants Found on Site

Scientific Name Common Name	Status		Flowering Period	Occurrence on Site (does not include inholding)	Occurrence on Inholding (old jojoba farm)
Astragalus insularis var. *harwoodii* Harwood's milkvetch	Global: Federal Listing: State Listing: **State Rank:** **CNPS Rank:** NECO:	G5T3 none none **S2** **2.2** covered	Jan - May	**PRESENT:** 13,712 individuals estimated on site.	**PRESENT:** 12,658 individuals estimated on site
Euphorbia abramsiana =Chamaesyce abramsiana Abrams' spurge	Global: Federal Listing: State Listing: **State Rank:** **CNPS:** NECO:	G4 none none **S2S3** **2.2** not covered	Sep – Nov	**PRESENT:** appx. 2104 individuals found during Fall 2012 surveys	**None Found during surveys.**
Cryptantha costata ribbed cryptantha	Global: Federal Listing: State Listing **State Rank:** **CNPS:** NECO:	G4G5 none none **S3.3** **4.3** not covered	Jan - May	**PRESENT:** appx. 56,748 individuals estimated on site	**PRESENT: 2 individuals**
Eriastrum harwoodii Harwood's eriastrum	Global: Federal Listing: State Listing: **State Rank:** **CNPS:** NECO:	G3 none; BLM sensitive none **S3** **1B.2** not covered	Mar - May	**PRESENT:** appx. 882 individuals found on site	**None found- Appropriate habitat was not present**
Funastrum utahense Utah vine milkweed	Global: Federal Listing: State Listing: **State Rank:** **CNPS:** NECO:	G4 none none **S3.2** **4.2** not covered	Apr - Sep	**PRESENT:** 1 individual found on site	**None Found during surveys**
Proboscidea althaeifolia desert unicorn-plant	Global: Federal Listing: State Listing: **State Rank:** **CNPS:** NECO:	G5 none none **S3.3** **4.3** covered	May - Aug	**PRESENT:** appx. 811 individuals estimated during Fall 2012 surveys	**None Found during surveys**

Ranking Source: CNPS 2012

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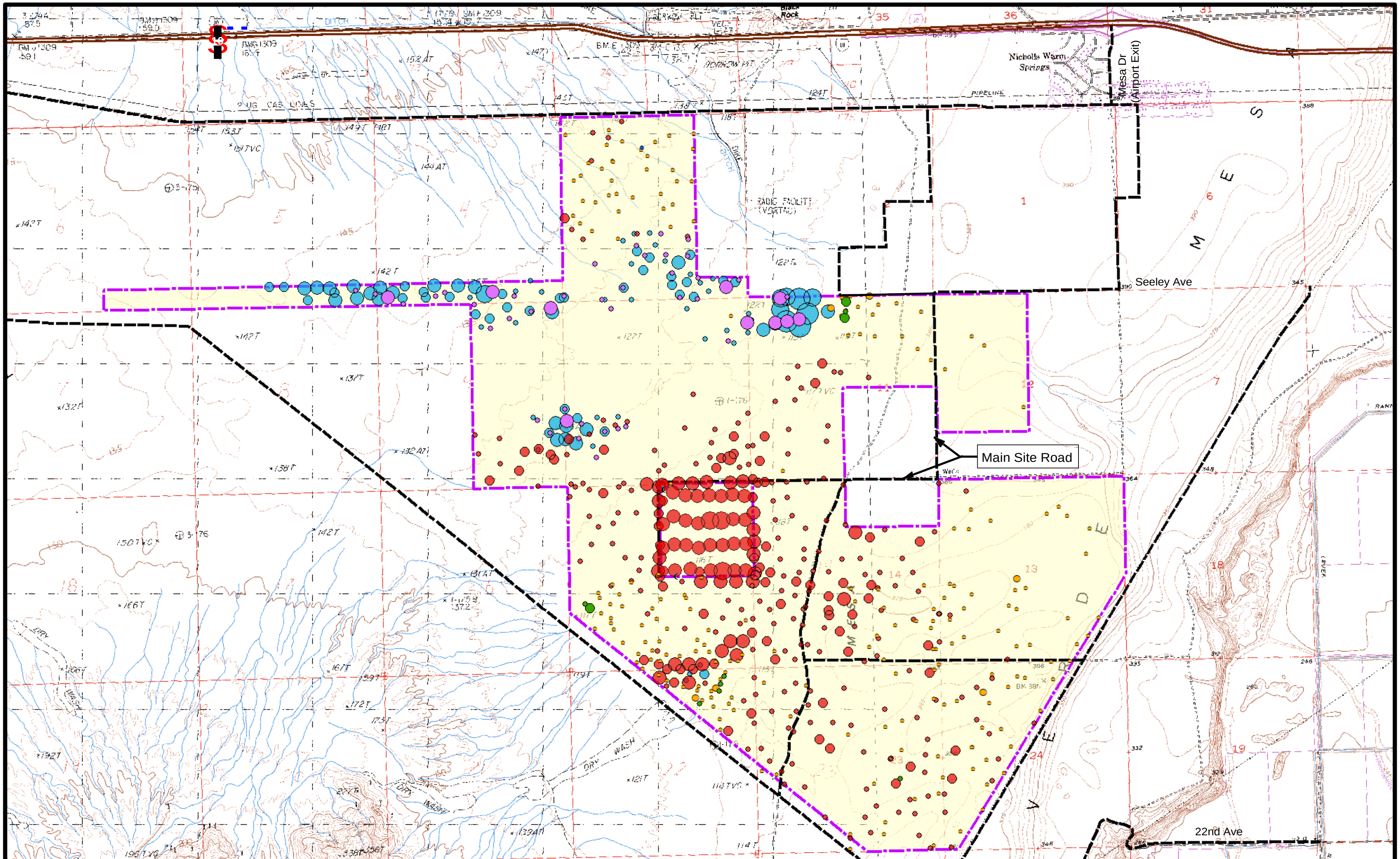

Species

- Harwood's Eriastrum
- Ribbed Cryptantha
- Adam's Prostrate Spurge
- Desert Devil's Claw
- Harwood's Milkvetch
- Utah Vine Milkweed

Plant Density

- 1 - 10
- 10 -100
- 100 - 1,000
- 1,000 - 5,000
- 5,000 - 12,200

Site Access Roads

Desert Quartzite Site Boundary

Note:
Dot size does not represent Area of Occurrence

0 500 1,000
Meters

DESERT QUARTZITE SOLAR PROJECT
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Figure 10

Combined Rare Plants Map

3.2.1.2 Harwood’s Milkvetch

Harwood's milkvetch (*Astragalus insularis var. harwoodii*) is an annual herb in the Fabaceae family. It is historically known to occur in desert dunes and Mojavean and Sonoran desert scrub at elevations ranging from 0 to 2,300 feet (0 to 710 meters) amsl. Harwood's milkvetch has a State Rank of 2 and a CNPS Rank of 2.2, which means that it is fairly endangered in California but more common elsewhere.

Large populations of Harwood’s milkvetch, were documented in the spring 2013 survey (Photograph 3) (Figure 12). It was locally abundant in certain areas and the surveying botanists estimated numbers of individuals per waypoint. The total estimated count across the site was 13,712 individuals. It is distributed widely across most of south half of the Project site, with concentrated populations along the disturbed berm surrounding the inholding (abandoned jojoba farm) and some very shallow sand dunes at the southwest corner of the site. Its mechanism for dispersal is unknown, but most likely its inflated seed pods get carried by the stiff westerly winds and deposited at some wind-breaking disturbance such as soil berms.

The majority of the plants were in fertile condition, often both flowering and fruiting and there appeared to be a robust fruit and seed set in spring 2013. There is certainly a significant seed bank in the soil after that spring.

Other nearby solar projects (McCoy and Blythe) also documented large occurrences of this plant. These projects are in advanced stages of approval and share a common right-of-way with this proposed Project’s gen-tie line location.

Harwood’s milkvetch was disturbed widely across the entire inholding, including the peripheral berms (Figure 13). There was no particular pattern of distribution. These plants could be found against the irrigation berms or within the interspaces. When found, they were usually in patches of 2 to 30 individuals, most often accompanied by other flowering native annuals.

The inholding, being a fallow jojoba farm, was a regular grid of shallow mounds and berms, providing micro-breaks in the flow of wind. Thus there are many opportunities for milkvetch seedpods to drop and accumulate anywhere within the inholding, leading to the large numbers of individuals counted during the survey.

The linear distribution of Harwood’s milkvetch waypoints as depicted in Figure 13 is an artifact of the mapping protocol. Actual distribution of this plant was patchy and evenly dispersed across the entire inholding with no evident pattern visually observed.

This Project’s populations, however, are mostly spread across the main solar site. The proposed methods of site development involve intensive and comprehensive soil surface disturbance by grubbing, grading, compaction, and application of soil surface stabilizers. This type of development inhibits re-establishment of natural plant communities: essentially nothing is allowed to grow between the panels.

Photograph 3 Harwood's Milkvetch (*Astragalus insularis* var. *harwoodii*)

Photograph 4 Abram's Spurge (*Euphorbia abramisana*) (R), growing next to common *Euphorbia micromeria* (L)

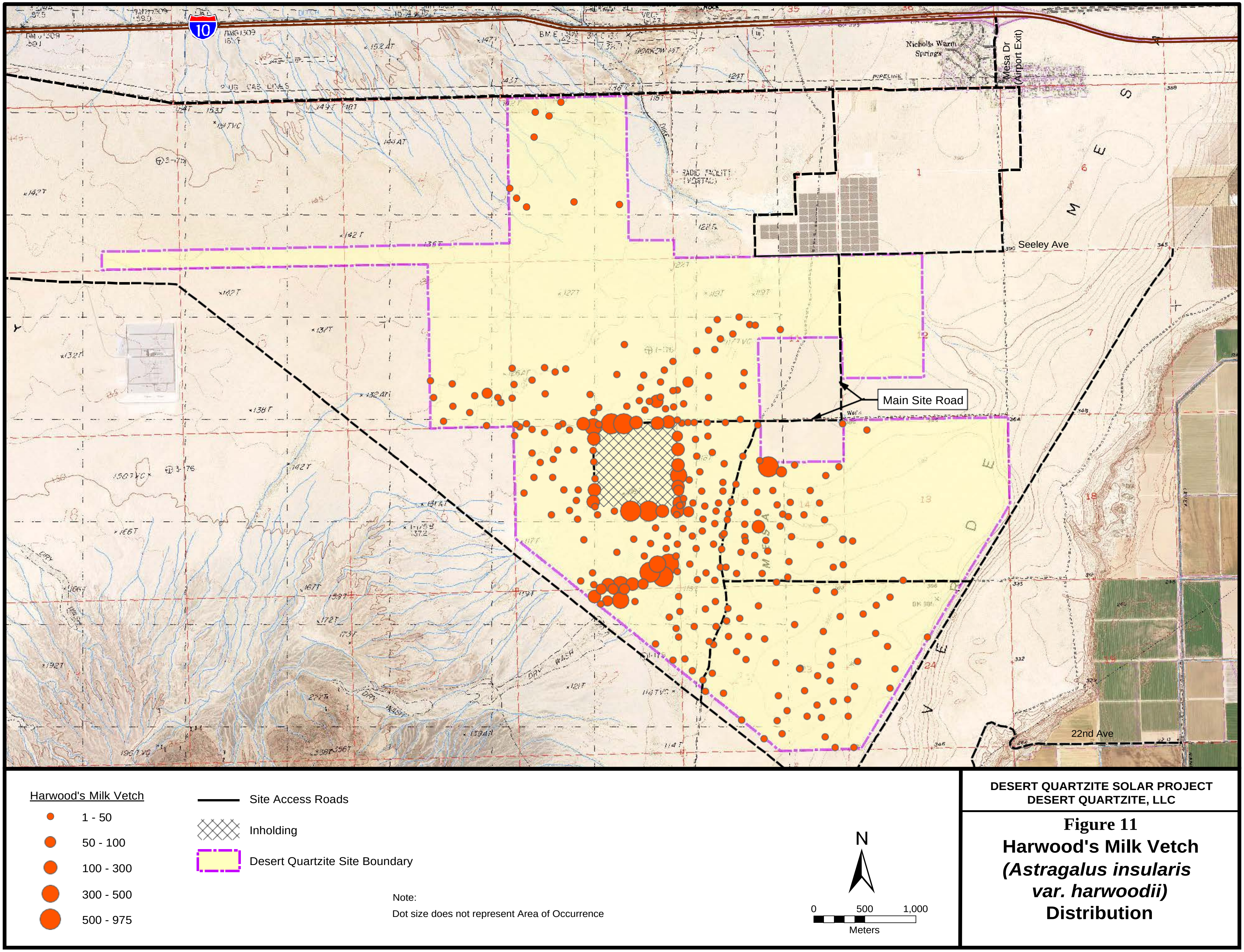

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Figure 11

Harwood's Milk Vetch

(Astragalus insularis var. harwoodii)

Distribution

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INHOLDING
INHOLDING
Detail
Map Area
0
100
200
Meters

3.2.1.3 Abram’s Spurge

Abram's spurge (*Euphorbia abramsiana*) is a CNPS Rank 2.2 annual herb in the Euphorbiaceae family. It is historically known to occur in Mojavean desert scrub, playas, and sandy/silty Sonoran desert scrubs at elevations ranging from sea level to 3,000 feet (0 to 915 meters) amsl.

It was documented as a few small occurrences and one large population during the fall 2012 surveys (Photograph 4) (Figure 14). The total number of individuals was estimated to be approximately 2,104. The majority of these are existing as depauperate dwarf plants on a cracked-muddy flat at the southwest border of the site (called "population 1" in this document).

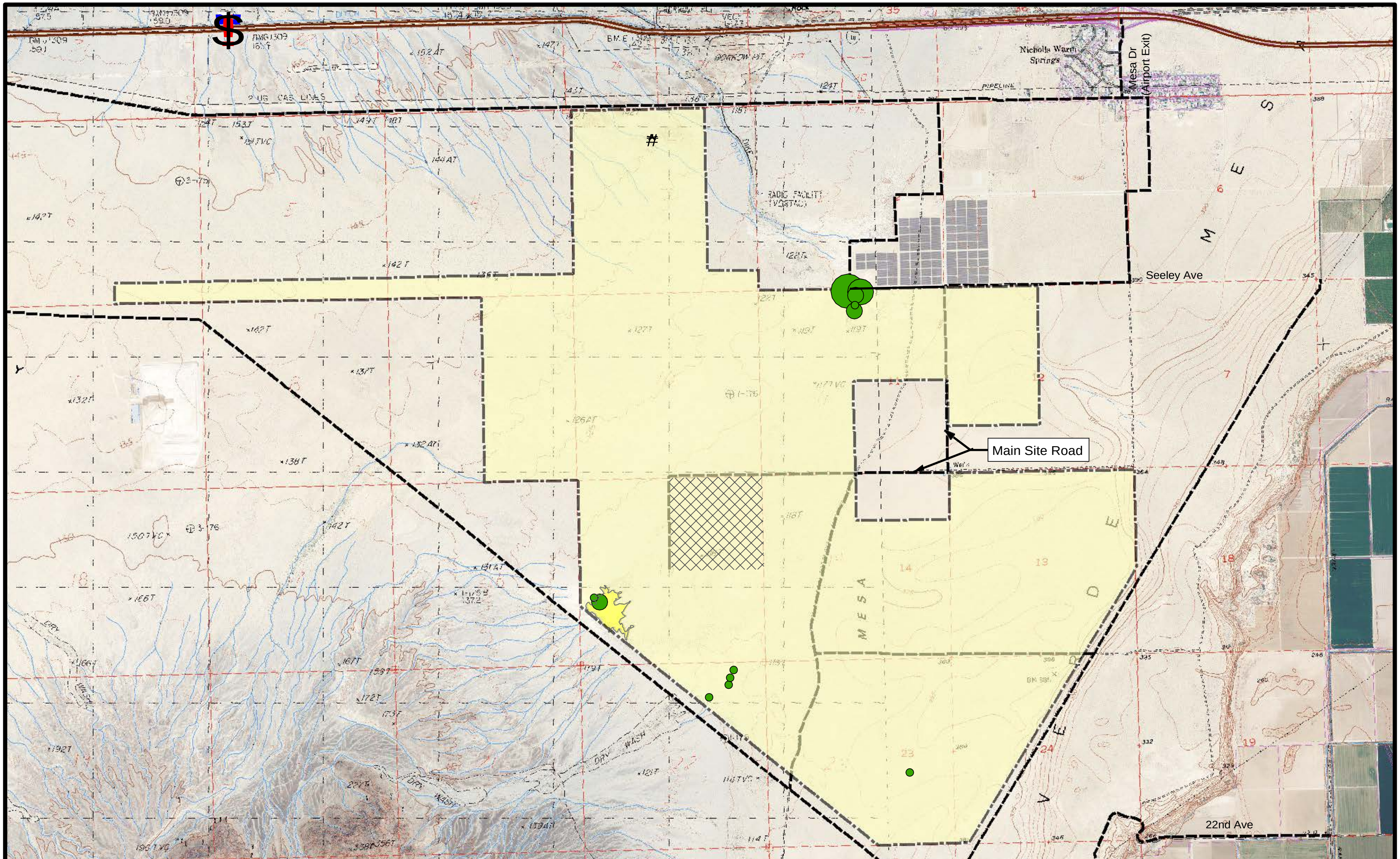
The regional distribution of Abram's spurge and its concept of rarity have been undergoing some revision lately. Recent surveys on the McCoy Solar Project have yielded over 4,000 individuals, and reports of populations in the "tens of thousands" have been observed on Ford Dry Lake and Hayfields Dry Lake (Karl, Pers. comm. 2012). Due to its fall-blooming phenology, this plant may have been overlooked during most botanical surveys, which typically occur in the spring. Consequently, its Special Status in California is presumed to be due to under-sampling.

Nonetheless, because of its State Ranking of S2 and CNPS Ranking as 2.2, any unavoidable disturbance will most likely require mitigation.

3.2.1.4 Utah Vine Milkweed

Utah vine milkweed (*Funastrum utahense*) is a perennial herb in the Apocynaceae family. It typically grows along wash margins and in sandy/gravelly areas throughout the Sonoran and Mojave deserts of California, sprawling and clambering over common shrubs for support. Flowering from April to September, its elevation range is 300 to 4,700 feet (100 to 1,436 meters) amsl.

Only one small individual of Utah vine milkweed was observed onsite in the spring 2013 survey (Figure 14). It was located near the northern most border of the site in a shallow runnel margin. This is an insignificant occurrence, especially with respect to large distributed populations found on the McCoy (5,180 individuals) and Blythe (398 individuals) Solar Projects. Utah vine milkweed has also been widely documented during solar project surveys across California and Nevada, and appears to be much more common than previously thought.



Utah_Vine_Milkweed

1

Adam's_Prostrate_Spurge

1 - 5

5 - 10

10 - 20

20 - 40

Chamaesyce abramsiana pop #1

Inholding

Desert Quartzite Site Boundary

Site Access Roads

Note:

Dot size does not represent Area of Occurrence

0 500 1,000

Meters

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Figure 13

Abram's Prostrate Spurge *(Chamaesyce abramsina)* and Utah Vine Milkweed *(Funastrum utahense)* Distribution

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3.2.1.5 Ribbed Cryptantha

Ribbed cryptantha (*Cryptantha costata*) is an annual herb in the Boraginaceae family. It occurs on fine sandy soil and shallow dunes within Sonoran and Mojavean creosote bush scrub, at an elevation range below 3,200 feet (1,000 meters) amsl. Flowering from January through May, it has been widely documented from California herbarium records, with several occurrences within five miles of the Quartzite Project site, as well as a reference population near the site.

The spring 2013 surveys documented approximately 56,748 individuals of ribbed cryptantha, exclusively on sandy areas of the site (Photograph 5). Some occurrences were so dense that the numbers of individuals were estimated systematically. Very dense populations were recorded along the gen-tie line and on sandy areas southwest of the exiting solar facility (Figure 15).

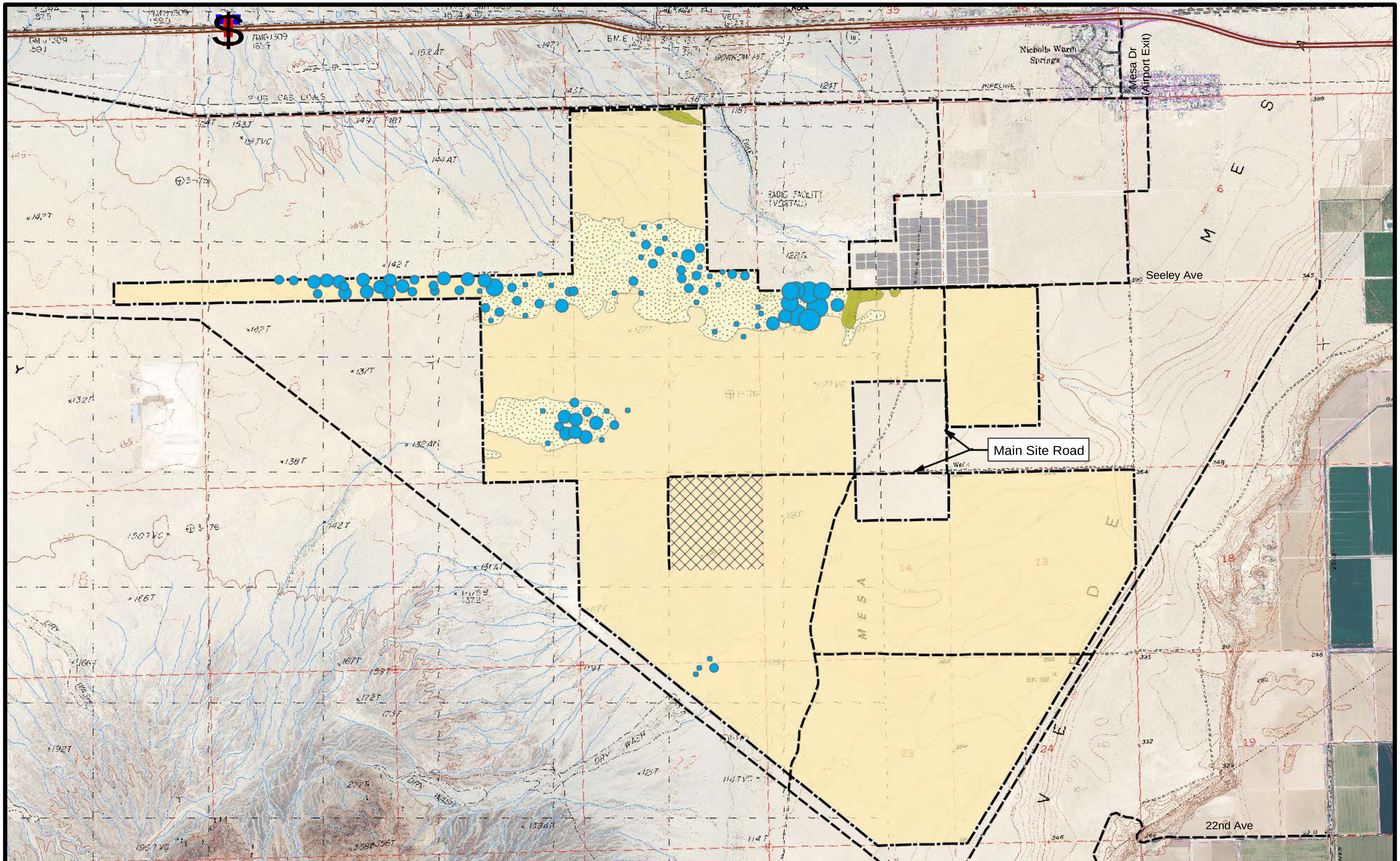
From the many solar project surveys conducted throughout the region, several large populations of ribbed cryptantha have been documented. A total of 1,715 individuals, were observed at the McCoy Solar Project mostly around the sandy gen-tie line alignment to be shared with both the Blythe Solar Project and this Project. The Blythe Solar Project recorded around 71,000 individuals along the same gen-tie line; however, this record seems to also include individuals found in the existing substation footprint.

Only two individuals of ribbed cryptantha were found during the spring 2015 surveys on the inholding (Figure 13). Both appear to be waifs and it is unlikely that they will promote establishment of larger populations on the inholding. This occurrence is insignificant when compared to the approximately 56,000 individuals found on deeper sandy areas of the Project site and gen-tie line.

The main threats to this species are: major disturbances of sandy areas; disruption of sand transport processes and flows; and further introduction of weeds, especially Saharan mustard (*Brassica tournefortii*). Many of the sandy locations of the site are already infested with Saharan mustard, and construction of the gen-tie line most likely will increase this weed. The large population on sandy areas just southwest of the existing solar facility is on the Project site. These areas are highly populated with Saharan mustard, but mostly at the margins of the sand dunes.

Photograph 5 Ribbed Cryptantha (*Cryptantha costata*) (L) growing alongside the common *Cryptantha angustifolia*

Photograph 6 Harwood's Eriastrum (*Eriastrum harwoodii*)



Ribbed Cryptantha

- 1 - 10
- 10 -100
- 100 - 1,000
- 1,000 - 5,000
- 5,000 - 12,200

Dry Desert Wash Woodland

Sandy Dunes

Sonoran Desert Creosote Bush Scrub

Note:

Dot size does not represent Area of Occurrence

Site Access Roads

Inholding

Desert Quartzite Site Boundary

Desert Quartzite Site Boundary

0 500 1,000

Meters

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Figure 14
Ribbed Cryptantha
(Cryptantha costata)
Distribution

3.2.1.6 Harwood’s Eriastrum

Harwood's eriastrum *(Eriastrum harwoodii)* is an annual herb in the Polemoniaceae family. It is a California endemic, distributed on sand dunes in desert areas of Riverside, San Bernardino, and San Diego counties. Typically flowering occurs from March to May, its elevation range is 400–3,000 feet (125 - 915 meters) amsl.

Spring 2013 surveys on the Project site documented 882 individuals of this plant, exclusively on sandy areas of the gen -tie line and Study Area (Photograph 6) (Figure 16). Harwood's eriastrum appears to co-occur sympatrically with ribbed cryptantha, with similar substrate preferences and distribution, although in fewer numbers and more sporadically dispersed. It is vulnerable to the same threats, especially weeds as discussed in Section 3.1.4.

Ironwood looked carefully for any occurrences of Harwood’s eriastrum across the inholding but none were found. This plant is restricted to deeper sand dunes. Appropriate habitat was not present on the inholding.

Other nearby solar projects have likewise documented populations of Harwood's eriastrum on the same sandy gen-tie line alignment. A total of 386 individuals were found during the survey for the McCoy site. A total of 2,134 individuals were found during the survey for the Blythe Solar Project; however, this record appears to include individuals found in the existing substation footprint.

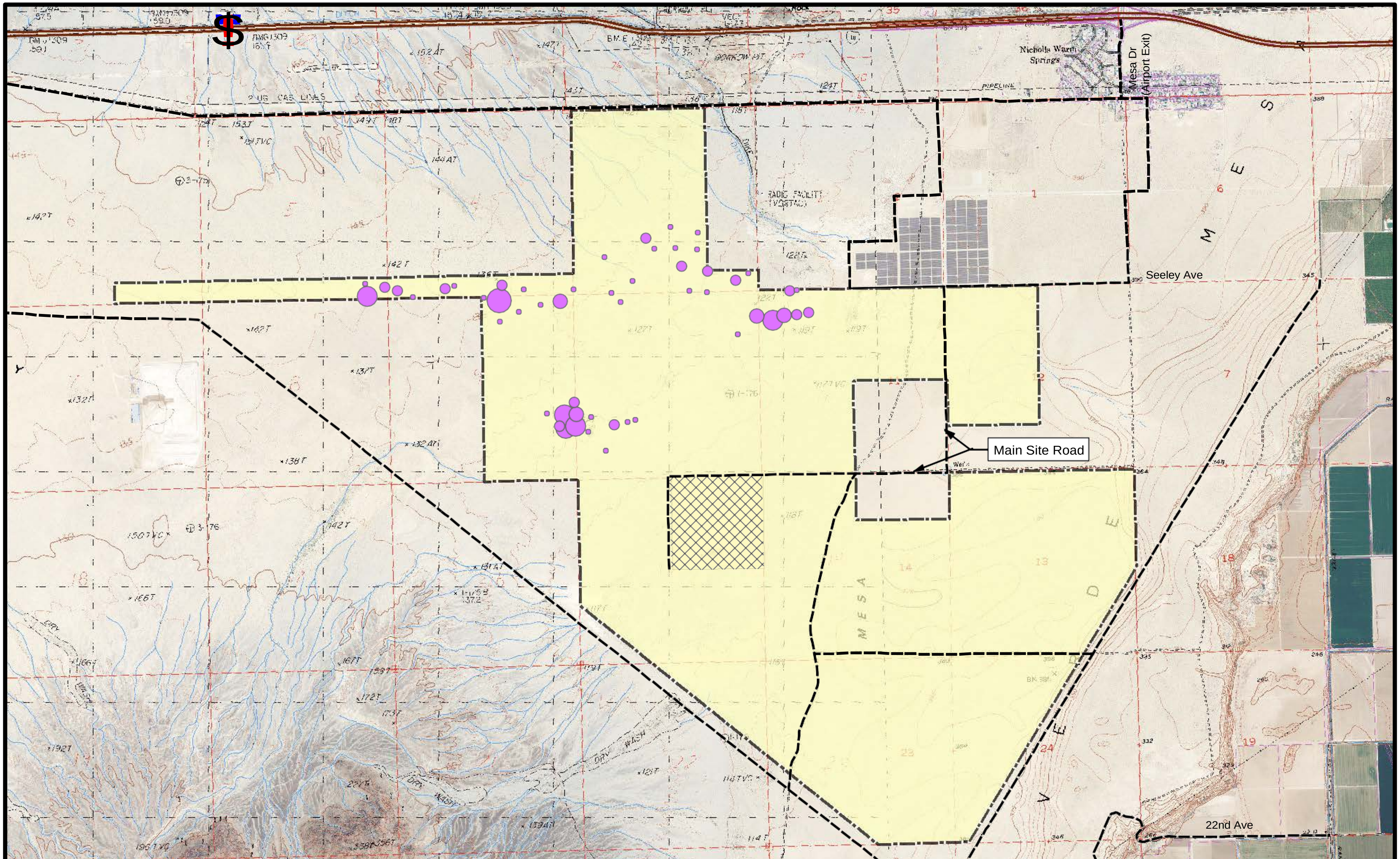
Although Harwood's eriastrum is assigned the State Rank of S3 (apparently requiring no compensatory mitigation), its CNPS Rank is 1B.2. This is the highest Special Status ranking of any of the plants on the Project site.

3.2.1.7 Desert Unicorn Plant

Desert unicorn plant (*Proboscidea altheifolia*) is a perennial herb belonging to the Martyniaceae family. It is historically known to occur in sandy Sonoran desert scrub at elevations ranging from 490 to 3,280 feet (150 to 1,000 meters) amsl.

811 individuals of desert unicorn plant were documented within the Study Area during fall 2012 Rare Plant Surveys (Photograph 7) (Figure 17). This is an estimate because sometimes a single root tuber might produce two to three above ground leaf rosettes, and closely spaced aboveground stems were counted as separate individuals.

Desert unicorn's distribution across the Project site followed no particular pattern. It was found occasionally on shallow sand sheets, but was mostly seen in innocuous creosote bush scrub, on both loose sandy-gravelly soils, and silty areas. It prefers shallow swales where summer monsoonal rainfall collects and soaks-down.



Harwood's Eriastrum

- 1 - 5
- 5 - 20
- 20 - 50
- 50 -100
- 100 - 171

Site Access Roads

Inholding

Desert Quartzite Site Boundary

Note:

Dot size does not represent Area of Occurrence

0 500 1,000 Meters

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Figure 15
Harwood's Eriastrum
(Eriastrum harwoodii)
Distribution

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The largest concentrations of this plant were the silty outwash flats on the southwest border of the site, and on similar silty areas near the existing solar facility.

Since fall rare plant surveys became required for desert solar projects, our knowledge of the distribution and abundance of desert unicorn has been significantly broadened. McCoy Solar surveys recorded 662 individuals distributed across its site. Blythe Solar also conducted fall surveys in 2012, documenting 1,687 individuals with many of these re-sprouting within a recently graded access road. It is presumed that this plant is much more common than believed, but has been misinterpreted as rare because of the limited number of fall surveys performed as seen with surveys not conducted at the correct time of the year for Abram's spurge noted earlier.

Photograph 7 Desert Unicorn Plant (*Proboscidea althaeifolia*)

Photograph 8 Desert Dry Wash Woodland

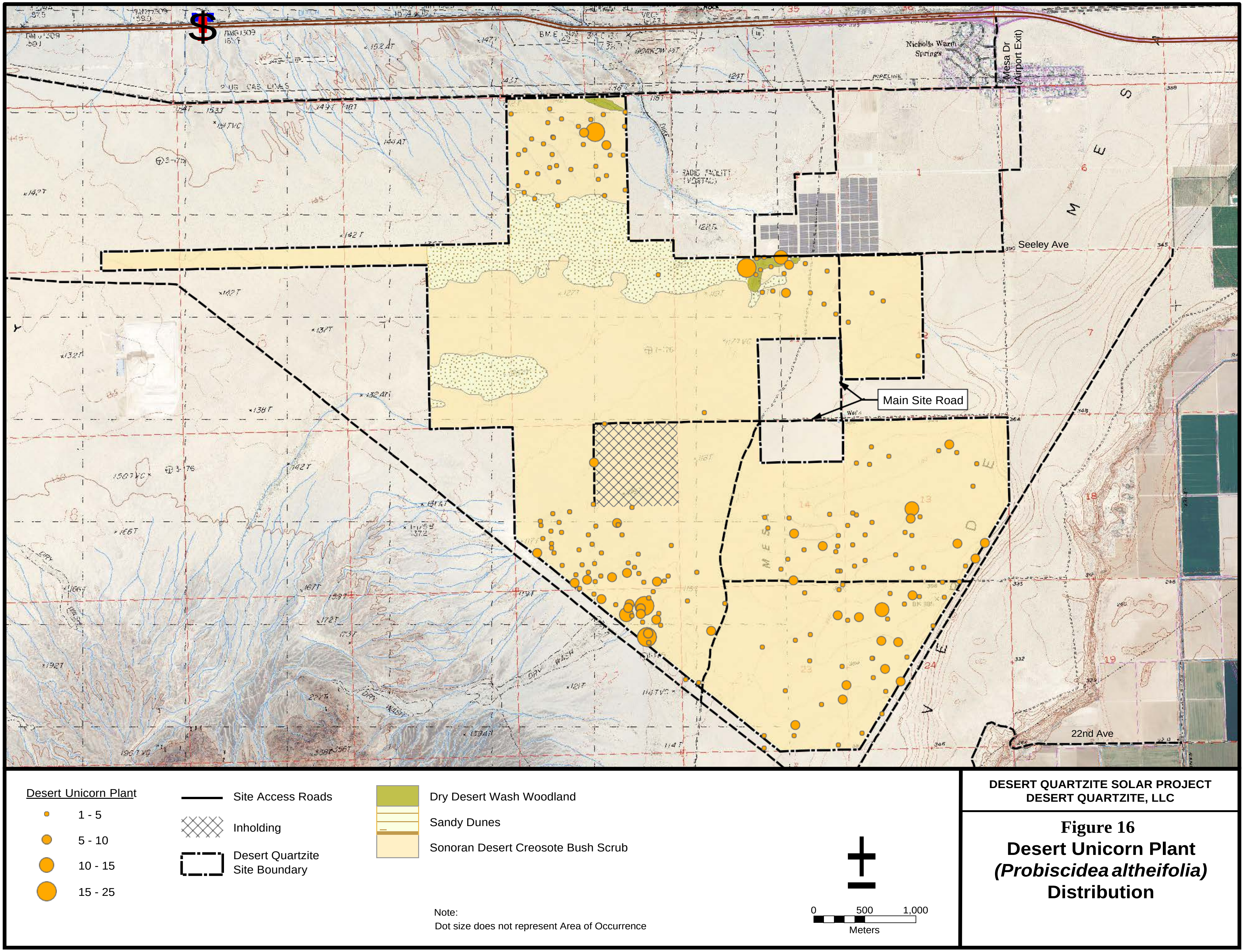

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Figure 16
Desert Unicorn Plant
(Probiscidea altheifolia)
Distribution

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3.2.2 Cacti and Yucca

Yuccas were not found on site, but three species of cactus were documented during the fall 2012 Plant Survey. Due to the fact that all cacti were already recorded, they were not documented in the spring 2013 surveys. The cacti were not recorded with GPS waypoints or in the electronic database; however, they were tallied by species on the paper datasheets by field surveyors, and represent a good census of all cacti onsite.

No cacti or yucca were observed on the inholding.

The estimated totals of all cacti found on site are presented as follows:

- *Cylindropuntia echinocarpa*: 106 individuals;
- *Mammillaria tetrancistra*: 11 individuals; and
- *Ferocactus cylindraceus*: 1 individual.

3.2.3 Special Status Vegetation Communities

The preliminary vegetation communities are mapped on Figure 18 and described as follows.

3.2.3.1 Desert Dry Wash Woodland

Desert Dry Wash Woodland (DDWW) is located in two distinct washes, comprising approximately 2 percent of the Project site. Desert Dry Wash Woodland habitat consists of small-leaved (microphyllous) leguminous trees, in association with sandy or gravelly washes with braided channels in active alluvial fans (Photograph 8). Dominant plants species include ironwood (*Olneya tesota*), blue palo verde (*Parkinsonia florida*), with occasional honey mesquite (*Prosopis glandulosa*). This community is considered sensitive by the California Resources Agency and BLM due its limited distribution, value to wildlife, and susceptibility to disturbance (Bureau of Land Management 2002 and Zeiner, et al., 1990). The presence of water at least on a seasonal flow regime is vital for this community to persist.

The NECO regulations consider DDWW as a sensitive resource and recommend avoidance of disturbance. There are three areas within the Study Area, which qualify as DDWW, and each of these are at the margins or borders of the proposed Project. One DDWW area is just south of the existing solar facility. It is a rich woodland environment with palo verdes, ironwoods, and a few mesquites, and is good habitat for many species of avian wildlife. The second DDWW area is down by the southwest powerlines where water flows and pools from the mountains to the southwest. Fine silty soil supports a lot of unicorn plant (*Proboscidea althaeifolia*), plus a nice diversity of common native plant species. The existing Project boundaries mostly avoid this area. There are, however, a few scattered palo verdes and ironwoods scattered in the scrub beyond this DDWW about one quarter to one half mile into the site. The third DDWW is at the northern

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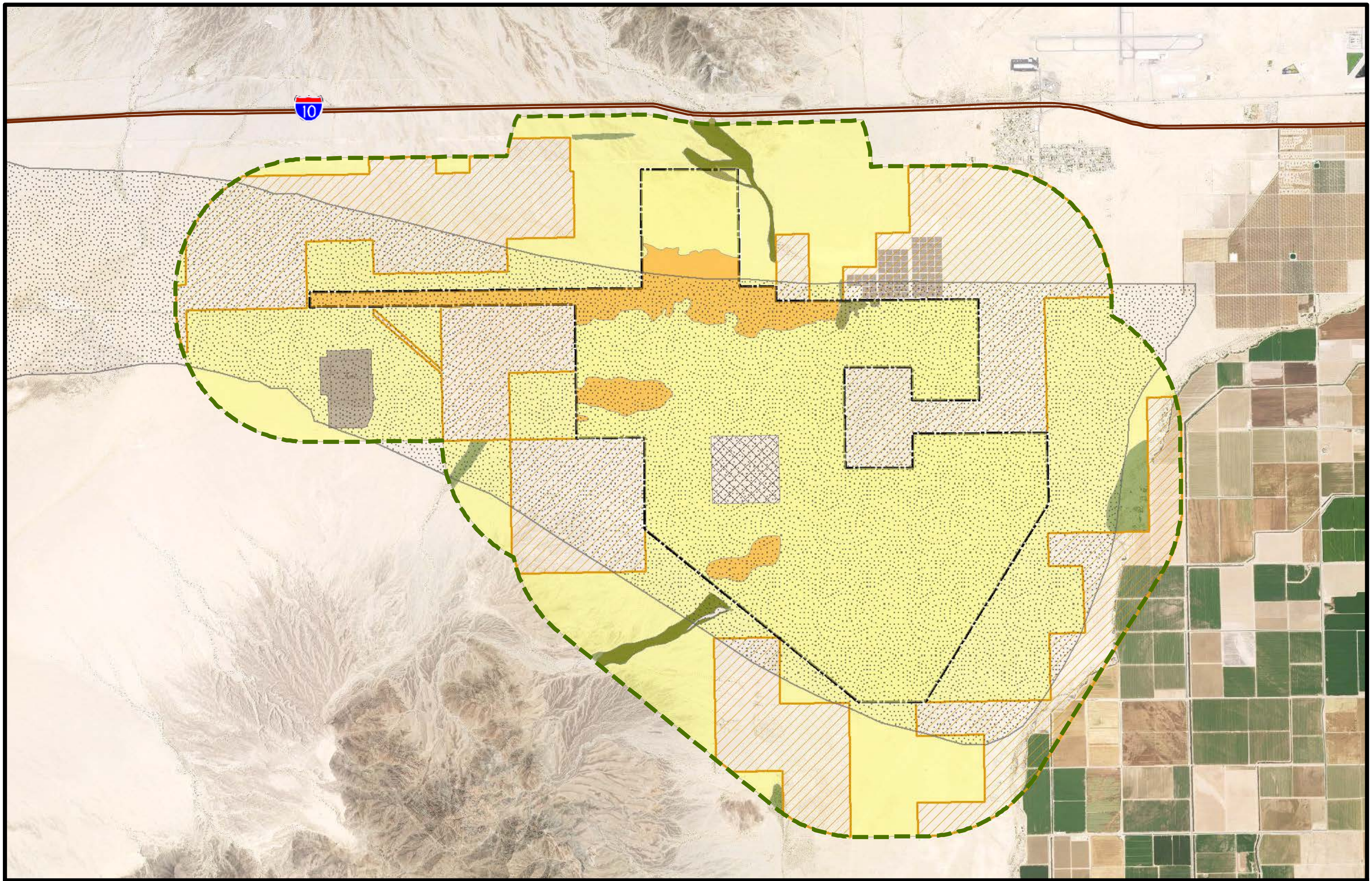

Vegetation Communities

- Desert Wash Woodland (microphyll woodland)
- Sonoran Creosote Bush Scrub
- Disturbed/Developed
- Stabilized Sand Dune
- 1-Mile Site Boundary Buffer
- Sand Corridor
- Inholding
- Desert Quartzite Site Boundary

N

0 1 Miles

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Figure 17

Vegetation Map

edge of the site, starting on the north border and running downstream in a southeast direction. There are palo verdes and ironwoods in this area.

3.2.3.2 Sonoran Desert Scrub

Larrea tridentata-Ambrosia dumosa Shrubland Alliance (Sawyer et. al. 2009)

Sonoran Creosote Bush Scrub (Holland Code 33100)

Sonoran Desert Scrub covers approximately 98 percent (7,160 acres) of the Study Area (Photograph 9) This alliance on the site is dominated by creosote bush (*Larrea tridentata*), burro bush (*Ambrosia dumosa*), with scattered occurrences of cheese bush (*Ambrosia salsola*), brittlebush (*Encelia farinosa*), Emory's Indigo bush (*Psorothamnus emoryi*), big galleta grass (*Hilaria rigida*), and occasional cactus species. Most of this onsite scrub is sparsely vegetated with widely scattered relatively low-growing individual shrubs.

3.2.3.3 Sand Dunes

Pleuraphis (Hillaria) rigida Herbaceous Alliance (Sawyer et al. 2009)

Stabilized and Partially Stabilized Desert Dunes (Holland Code 22200)

Sand Dunes onsite are stabilized and partially stabilized accumulations supporting an herbaceous alliance dominated by the perennial bunch grass, big galleta grass (*Hilaria rigida*) (Photograph 10). Co-dominants are widely scattered creosotes (*Larrea tridentata*), with occasional occurrences of Emory's indigo bush (*Psorothamnus emoryi*), desert wire lettuce (*Stephanomeria pauciflora*), fan-leaved tiquilia (*Tiquilia plicata*) and desert dicoria (*Dicoria canescens*). This vegetation type is present on the sandiest areas around the northwest parts of the Project site and along the gen-tie alignment. It is important to note that dense infestations of the invasive weed Saharan mustard are evident on many areas of this vegetation type.

Photograph 9 Sonoran Desert Scrub

Photograph 10 Sand Dunes

3.2.4 Non-Native and Invasive Species

Ten non-native plant species were observed on the Study Area during the fall 2012 and spring 2013 surveys (Table 12).

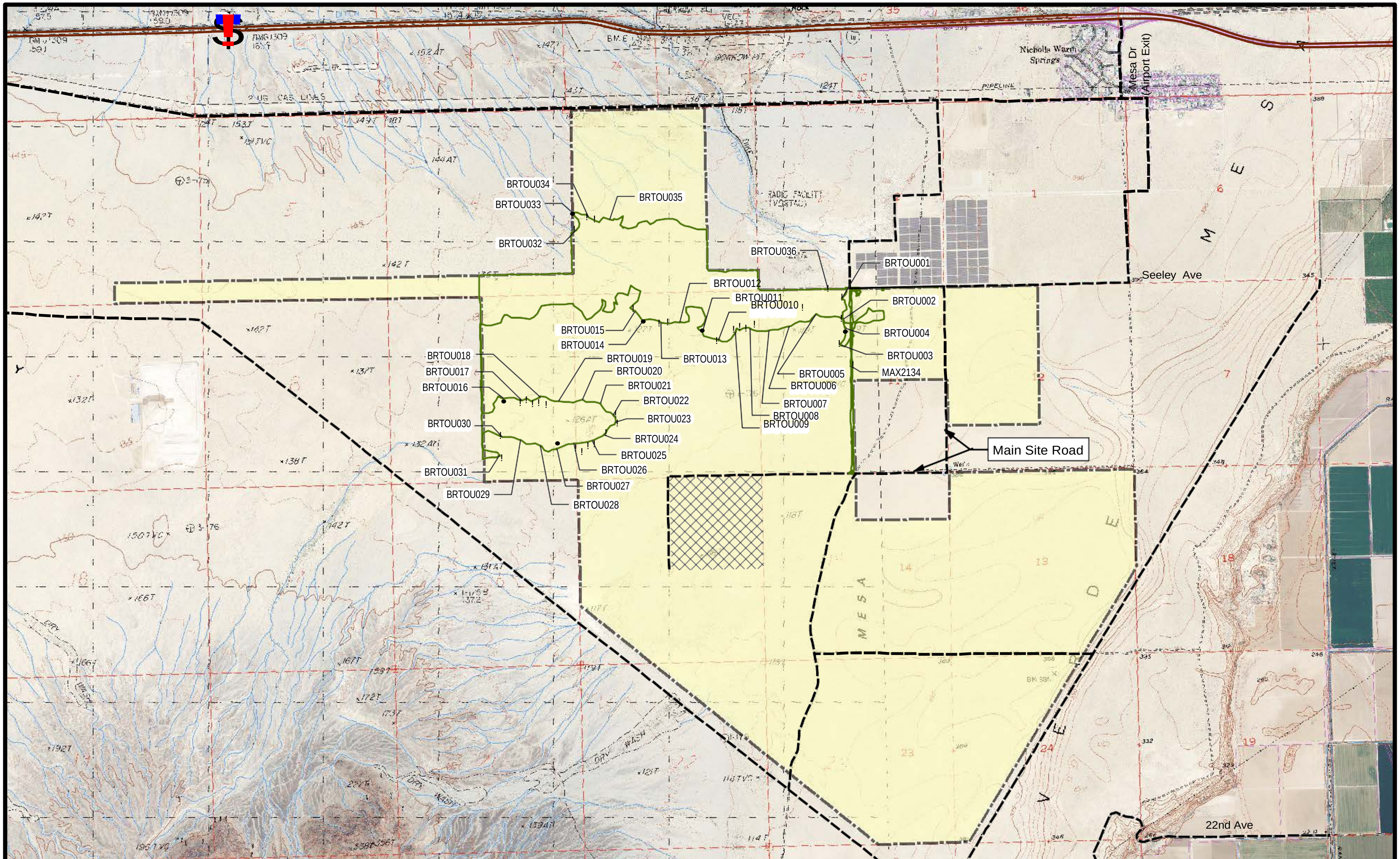
Table 12 Non-Native Plants Found on Project Site (Fall 2012 and Spring 2013 & 2015)

Taxon	Common Name	Abundance	Invasive Potential
**Brassica tournefortii*	Sahara mustard	Widespread, Locally abundant on sand	HIGHLY INVASIVE
**Chenopodium album*	Lamb's quarters	Scarce	Low
**Chenopodium murale*	Nettleleaf goosefoot	Scarce	Low
**Cynodon dactylon*	Bermuda grass	Scarce	Invasive but unlikely
**Eucalyptus sp.*	Eucalyptus	Scarce	Low invasivity in this situation
**Polygonum aviculare subsp. depressum*	Prostrate knotweed	Scarce	Low
**Salsola tragus*	Russian thistle	Abundant on sand	Invasive on sand and disturbed areas
**Schismus barbatus*	Mediterranean grass	Widespread	Moderately invasive with little consequence
**Tamarix ramosissima*	Tamarisk	Scarce	Non-invasive in this situation
**Tribulus terrestris*	Puncture vine	Scarce	Low

Sahara mustard *(Brassica tournefortii)* is by far the most aggressive and abundant invasive plant on the Project site. It is diffusely distributed throughout the Study Area on many habitats, and locally abundant throughout the sandier areas of the Project site and along the gen-tie line. Millions of individuals were observed flowering and fruiting during the spring 2013 survey.

Sahara mustard infestation remains the greatest invasive weed risk of the entire site. It is already well established on most of the sandier areas and a large seed bank is certain to exist. Minimal winter rains can germinate multiple leaf rosettes, many of which can bolt and produce seed in a short time. Potential for Sahara mustard to expand its presence across other less sandy areas of the site remains high, especially if aided by soil surface disturbance.

Figure 19 shows the heaviest infestations of Sahara mustard on the site. Although it generally invades sandy areas, the surveyors noticed that it is most abundant along the shallow margins and skirts of the major dune systems on the west portion of the Study Area. It also dominates shallow sand sheets elsewhere, as well as certain sand accumulations adjacent to abandoned agriculture fields.



Sahara Mustard

Sand Dune Margins

Site Access Roads

Inholding

Desert Quartzite Site Boundary

0 500 1,000

Meters

DESERT QUARTZITE SOLAR PROJECT
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Figure 18

Sahara Mustard

(Brassica tournefortii)

Distribution

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It should be noted that Sahara mustard had very little presence on the disturbed and abandoned agriculture fields in the center of the site. This goes against the common association of disturbed areas becoming breeding grounds for weeds. In fact, both of the main agricultural fields seemed to support very few invasive weeds at all.

Control of Sahara mustard remains a challenge. In approximately the last 20 years, the mustard has become so widespread across southern California deserts that aggressive control is seemingly ineffective. Avoidance of disturbance seems the most prudent approach, but it still thrives on undisturbed areas. An Integrated Weed Management Plan will be designed to prevent, as much as possible, the further spread of this weed.

Russian thistle (*Salsola tragus*) was observed mostly on the gen-tie line sand dune areas, with occasional small occurrences across disturbed areas of the site. This plant represents the second most common weed onsite after Sahara mustard. Occasional locally abundant populations are to be expected associated with soil disturbance and loose sand. Russian thistle is known to thrive on disturbed soil, so monitoring and control measures will need to be incorporated into the Integrated Weed Management Plan.

Mediterranean grass (*Schismus barbatus*) is widespread across the site in many habitats but never "abundant." This plant is so widespread across many California deserts that it has become the dominant annual grass in many situations. Although it is very common, it poses only a slight ecological type conversion risk in this locally harsh situation. No control is proposed.

Bermuda grass (*Cynodon dactylon*) was observed in the Desert Dry Wash Woodland along the northern part of the site adjacent to an existing solar facility. Two small patches were seen growing in the shade of ironwoods. They were in robust condition, flowering and fruiting. Bermuda grasses' potential to spread is moderate to high, but would be limited by habitat preferences of reliably moist soil and shade.

Puncture vine (*Tribulus terrestris*) was observed on disturbed areas on the borders of the inholding near the center of the site. Only a couple of individuals were seen, and its potential to become invasive and widespread is low.

Lamb's quarters (*Chenopodium album*) was seen with only a few scattered occurrences on the Project site. Its potential for invasiveness and ecological damage is low.

Nettleleaf goosefoot (*Chenopodium murale*) was seen with only a few scattered occurrences on the Project site. A common agriculture weed, its potential for invasiveness and ecological damage is low.

Prostrate knotweed (*Polygonum aviculare subsp. depressum*) is a common agricultural and ruderal weed. It was seen only once during spring surveys, and is not considered a major invasive threat.

Eucalyptus (*Eucalyptus* sp.) occurs only as a couple of planted individuals on the north margin of the site on the border of an existing solar facility. Its potential for invasiveness is low due to the harsh conditions of the local landscape.

Tamarisk (*Tamarix ramosissima*) occurs as only a couple of dwarfed individuals on the north margin of the site at the border of the existing solar facility. It has a moderate potential to expand but would be limited by the lack of reliable water nearby. It should be removed promptly, in any case.

3.2.5 Inholding (Historical Jojoba Farm)

Although forty-one (41) species of vascular plants were recorded on the inholding during this survey (Appendix F), plant germination across the site was generally very patchy. Most annuals were observed within the row interspace swales where water would collect, but long stretches of the inholding yielded only barren sand. Occasional perennial species were seen, but the majority of vegetation was annual (Photograph 1).

Rows of jojoba (*Simmondsia chinensis*) were planted in a north-south orientation throughout the site and spaced about 4 m apart. These rows are slightly raised to cover the buried three-fourths inch perforated irrigation pipe running their entire length. There is a wellhead and some debris remaining at the northeast corner entrance to the site.

Of the thousands of jojoba (*Simmondsia chinensis*) that were planted across the site about one third are currently surviving without any maintenance. However, the health of the existing plants is diminished; most are dying-back from their center outwards but a few are still flowering and fruiting.

Since abandonment, native vegetation seems to be recovering slowly. Sparse creosote bush (*Larrea tridentata)* can be seen throughout the site and on the surrounding berms. This is probably re-growth from old root crowns, but some smaller new plants have taken hold. The only other common native perennials appearing occasionally are white bursage (*Ambrosia dumosa)* and brittlebrush (*Encelia farinosa)*. Native annual plants recolonizing the site include desert pincushion (*Chaenactis stevioides),* brown-eyed primrose *(Chylismia claviformis),* narrowed-leaved popcorn flower *(Cryptantha angustifolia),* chuckwalla combseed *(Pectocarya heterocarpa),* Harwood's milkvetch *(Astragalus insularis* var. *harwoodii),* dwarf white milkvetch *(A. didymocarpus),* stigose bird's-foot trefoil *(Acmispon strigosus),* and hairy desert sunflower (*Gerea canescens)*.

Non-native annual weeds are not particularly abundant except for common Mediterranean grass (*Schismus barbatus)* (widespread), and occasional Sahara mustard (*Brassica tournefortii)*.

3.3 WILDLIFE SURVEYS

Twenty-two special status wildlife species (not including bat species, which are presented in Section 2.8.4.3) were evaluated for their potential to occur within the Study Area (Table 13). One wildlife species that is federal and state listed as threatened is found near the Study Area, the desert tortoise. Fourteen additional special status wildlife species were detected within or adjacent to the primary Study Area including golden eagle, burrowing owl, prairie falcon, loggerhead shrike, Swainson’s hawk, and Le Conte’s thrasher. Special status species detected within the Study Area or having a moderate or greater potential to occur are discussed further in this section of the report.

All wildlife species observed or detected within the Study Area are listed in Appendix B. Wildlife observed within the Study Area were representative of the eastern Sonoran Desert. Bird species common to the Study Area, listed in order of most-to-least frequently observed during the surveys, included black-throated sparrow (*Amphispiza bilineata*), horned lark (*Eremophila alpestris*), common raven (*Corvus corax*), brewer's sparrow (*Spizella breweri*), white-crowned sparrow (*Zonotrichia leucophrys*), house finch (*Carpodacus mexicanus*), and ash-throated flycatcher (*Myiarchus cinerascens*). Reptile species common to the Study Area, listed in order of most-to-least frequently observed during the surveys, included western whiptail (*Cnemidophorus tigris*), side-blotched lizard (*Uta stansburiana*), zebra-tailed lizard (*Callisaurus draconoides*), desert iguana (*Dipsosaurus dorsalis*), and desert horned lizard (*Phrynosoma platyrhinos*). Small mammals observed during baseline sampling included desert kangaroo rat (*Dipodomys deserti*), Merriam's kangaroo rat (*Dipodomys merriami*), desert woodrat (*Neotoma lepida*), pacific pocket mouse *(Perognathus longimembris)*, pocket mouse (*Chaetodipus spp.)*, southern grasshopper mouse *(Onychomys torridus)*, and round-tailed ground squirrel (*Spermophilus tereticaudus).* The only amphibian with the potential to exist on site is the Couch's spadefoot (*Scaphiopus couchii*). No fish species are likely to inhabit the Study Area or immediately surrounding areas because of the absence of suitable aquatic habitat.

Table 13 Special Status Wildlife Species

Scientific Name	Common Name	Status	Source	Occurrence within Study Area
BIRDS				
Accipiter cooperi	Cooper's hawk	CDFW:SSC IUCN: LC	NEMO	**PRESENT – Foraging** Nesting habitat limited. May be present (foraging) year-round.
Aquila chrysaetos	golden eagle	BLM: Sensitive CDFW:Fully Protected, WL IUCN: LC	NEMO	**PRESENT –10 mile Study Area. Not observed on site-Low Potential** Nesting habitat absent within area, but nests and active territories are potentially located within 10 mile buffer. Foraging potential year-round.
Athene cunicularia	burrowing owl	BLM: Sensitive CDFW: SSC IUCN: LC USFWS:BCC	NEMO	**PRESENT – Likely Resident** Burrowing owl have been observed on the Project site.
Buteo regalis	ferruginous hawk	FWS: FSC, MNBMC; CDFW: WL IUCN: LC USFWS:BCC	NEMO	**PRESENT – Low Potential** Nesting habitat absent. May use site vicinity for overwintering.
Buteo swainsoni	Swainson's hawk	CDFW: Threatened IUCN: LC USFWS:BCC	NEMO	**PRESENT – Foraging/ Migration** Nesting habitat absent. May be present (foraging) during summer and during fall migration.
Chaetura vauxi	Vaux's swift	CDFW: SSC IUCN: LC	CDFW	**PRESENT – Foraging/Migration** Nesting habitat absent. May be present (foraging) during summer and fall prior to migration.
Charadrius alexandrinus nivosus	western snowy plover	ESA: Threatened CDFW: SSC USFWS:BCC	NEMO	**Not observed – Low Potential** May be a rare migrant to the area during winter months.
Circus cyaneus	northern harrier	CDFW: SSC IUCN: LC	NEMO	**PRESENT – Likely Resident** Nesting habitat limited. May use site vicinity for overwintering.
Falco mexicanus	prairie falcon	CDFW: WL IUCN: LC USFWS:BCC	NEMO	**PRESENT – Foraging** Nesting habitat absent from Primary Study Area. May be present (foraging) year-round.
Falco peregrinus anatum	peregrine falcon	ESA: Delisted CESA: Delisted CDFW: FP USFWS:BCC	CDFW	**PRESENT – Foraging** Nesting habitat absent from vicinity of Study Area. May be present (foraging) during migration.
Lanius ludovicianus	loggerhead shrike	CDFW: SSC IUCN: NT USFWS:BCC	NEMO	**PRESENT – Likely Resident** Many individuals observed within the Study Area. Nesting habitat present.
Pyrocephalus rubinus	vermilion flycatcher	CDFW: SSC IUCN: LC	NEMO, USGS	**Not observed - Low Potential** Nesting habitat limited. May be present (foraging) year-round.
Toxostoma bendirei	Bendire's thrasher	BLM: Sensitive CDFW: SSC IUCN: VU USFWS:BCC	NEMO	**Not observed - Low Potential** Nesting habitat present.
Toxostoma crissale	Crissale thrasher	CDFW: SSC IUCN: LC USFWS:BCC	NEMO, USGS	**Not observed - Low Potential** Nesting habitat present.

Scientific Name	Common Name	Status	Source	Occurrence within Study Area
Toxostoma lecontei	Le Conte's thrasher	BLM: Sensitive CDFW: SSC IUCN: LC USFWS:BCC	NEMO, USGS	**PRESENT – Likely Resident** Nesting habitat present.
REPTILES				
Gopherus agassizii	desert tortoise	CDFW: Threatened FWS: Threatened IUCN: VU	NEMO, BLM, USFWS	**PRESENT- Resident (Low numbers)** No live tortoises observed within Study Area. Five carcasses, all old (>>4 years), disarticulated found in Study Area. Study Area is located within BLM Category III desert tortoise habitat. One live desert tortoise was observed within the buffer area during avian surveys. There is no evidence of desert tortoise on the inholding.
Uma scoparia	Mojave Fringe-toed lizard	CDFW: SSC BLM: Sensitive	NEMO, BLM, CDFW	**PRESENT –Resident (High numbers)** Surveys determined that lizards on site are Mojave fringe-toed lizards. There are many fringe-toed in dune areas. No fringe-toed lizards were observed on the inholding.
Uma inornata	Coachella Valley Fringe-toed Lizard	CDFW:Endangered FWS: Threatened BLM:	NEMO, BLM, CDFW	**Not Present** Surveys determined that the only Uma species on site was *Uma scoparia.*
AMPHIBIANS				
Scaphiopus couchii	Couch's Spadefoot	CDFW: SSC BLM: Sensitive	NEMO, BLM	**Not present** Not observed after rain events. Standing water does not last eight days.
MAMMALS[1]				
Taxidea taxus	American badger	CDFW: SSC IUCN: LC	CDFW	**PRESENT-Resident (Low numbers)** No live badgers were seen. Evidence that badgers utlize the Project site.
Vulpes macrotis arsipus	desert kit fox	CDFW: CCR	CDFW	**PRESENT- Resident (Moderate numbers)** Sign observed within the Study Area, generally associated within the lower alluvial fan where soils consist of silt and sand. A burrows with sign within Study Area.

[1] Bat species are listed in Section 3.3.4.3

CDFW - California Department of Fish and Wildlife
SSC - California Species of Special Concern
WL – Watch List
CCR – California Code of Regulations (Title 14, CCR: §460)

IUCN - The World Conservation Union
LC – Least Concern
NT – Near Threatened
VU - Vulnerable

FWS - Fish and Wildlife Service
BCC - Birds of Conservation Concern
BLM- Bureau of Land Management

Cooper's hawk (*Accipiter cooperi*) is a State species of Special Concern and addressed in the NEMO Plan. Cooper's hawk is an uncommon hawk species in the desert regions. This hawk is usually associated with riparian vegetation and open water. It feeds on small birds, small mammals, reptiles and amphibians.

Golden eagle (*Aquila chrysaetos*) is a California fully protected and BLM-sensitive species and is protected by the federal Migratory Bird Treaty Act (MBTA) and Bald and Golden Eagle Protection Act. This large eagle is found throughout the United States typically occurring in open country, prairies, tundra, open coniferous forest and barren areas, especially in hilly or mountainous regions. Within the desert regions, this species usually builds nests on cliff ledges. Breeding in southern California starts in January, nest building and egg laying in February to March, and hatching and raising the young eagles occur from April through June. Once the young eagles are flying on their own, the adult eagles will continue to feed them and teach them to hunt until late November (WRI 2010). Due to the large investment in energy and time that an adult golden eagle is required to provide in raising young, some eagles will forgo a season of reproduction even when food supply is abundant (WRI 2010).

Western burrowing owl (*Athene cunicularia*) is a State Species of Special Concern and addressed in the NEMO Plan. Burrowing owls inhabit open dry grasslands and desert scrubs, and typically nests in mammal burrows although they may use man-made structures including culverts and debris piles. They exhibit strong nest site fidelity. Burrowing owls eat insects, small mammals and reptiles. Burrowing owls can be found from California to Texas and into Mexico. In some case, owls migrate into southern deserts during the winter.

Ferruginous Hawk (*Buteo regalis*) is a federal Species of Concern and addressed in the NEMO Plan. There are no records of this species breeding in California. Ferruginous Hawk prefer desert habitat with large perching structures. They can be found in desert scrub, sagebush flats and open grasslands in the arid regions. They prefer open low vegetation areas for foraging mostly on lagomorphs and rodents.

Swainson's hawk (*Buteo swainsonii*) is a state listed threatened raptor species that breeds in much of western North America. Within California, nesting occurs in the Central Valley, Great Basin and Mojave and Colorado Deserts. Arrival at breeding areas generally occurs from late February to early May depending on geographical characteristics of the breeding area (Woodbridge 2008). Nest sites have not been documented in the Sonoran Desert of California. This species was observed within the study area during migration. Swainson's hawks were documented feeding caterpillars of the Sphinx moth, which were out in large numbers during the survey period.

Vaux's swift (*Chaetura vauxi*) is a State Species of Special Concern. Uncommon in the desert, these birds prefer forested habitats but are found near man made open water sources. They migrate through desert scrub flying over a range of different habitats. They forage mostly on flying insects.

Northern harrier (*Circus cyaneus*) is a State Species of Special Concern and addressed in the NEMO Plan. An uncommon desert resident this bird prefers meadows and open grasslands and is usually associated with wetland/marsh areas. Harriers feed mostly on voles but will also consume small birds, small mammals, reptiles, insects and a variety of water related species.

Prairie falcon (*Falco mexicanus*) is a State Species of Special Concern and addressed in the NEMO Plan. This large falcon typically builds nest sites on cliffs, similar to the golden eagle. In the desert they are found in most vegetation types, although sparse vegetation provides the best foraging habitat. In the Mojave, mean home range size has been found to be approximately 50 to 70 km^2 (Harmata et al. 1978).

Peregrine falcon (*Falco peregrinus anatum*) is a State Fully Protected Species. This large falcon typically builds nest sites on cliffs, similar to the golden eagle and prairie falcon; however, peregrine falcon typically nests near large water bodies. This species primarily breeds in woodland, forest, and coastal habitats (California Department of Fish and Game 2010). Peregrine falcons are aerial predators and target birds of a variety of sizes; they occasionally prey on mammals, insects, and fish (California Department of Fish and Wildlife 2010).

Loggerhead shrike (*Lanius ludovicianus*) is a State Species of Special Concern and a year-round resident in parts of the southern California desert. It typically is found in open habitats with scattered shrubs, trees, posts, fences, utility lines, or other perches. As a predatory bird its diet consists of insects, amphibians, small reptiles, small mammals, and other birds. Shrikes typically build nests one to three meters above the ground depending on the height of the vegetation.

Le Conte's thrasher (*Toxostoma lecontei*) is a State Species of Special Concern and year-round desert resident. These species inhabit various desert scrub and wash habitats and typically breeds in desert areas that support cactus, Mojave yucca (*Yucca schidigera*), Joshua trees (*Yucca brevifolia*), and large thorny shrubs such as *Lycium spp*. This species is distributed from the Mojave Desert east into southern Utah and northern Arizona, and south into northern Mexico.

Desert tortoise (*Gopherus agassizii*) is a federal and state listed threatened species. 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, desert tortoises emerge from over-wintering burrows and typically remain active through fall. Activity does decrease in summer, but tortoises often emerge after summer rain storms. Activity and movement is generally influenced by temperature and precipitation, which correlate with potential food and water resources. Extreme temperatures, both high and low, and periods of drought typically result in reduced tortoise activity (Franks et. al. 2011). Mating occurs both during spring and fall. Tortoises are long-lived and grow slowly, requiring 13 to 20 years to reach sexual maturity [at approximately 180 millimeters (mm) mean carapace length (MCL)]. Eggs are generally laid in friable soil at near burrow entrances between April and June and occasionally September and October. Eggs hatch within three to four months.

Soils must be appropriately soft for digging burrows, but firm enough so that burrows do not collapse. Tortoises typically prefer habitats with abundant annual forbs, grasses and cactus, which constitute its primary food sources.

Desert tortoises occupy home ranges, which are generally defined as the area traversed while carrying out a range of normal activities (e.g., foraging and mating). The size of desert tortoise home ranges can vary with respect to sex, geographic location, substrate, topography, and year depending on climate factors such as rainfall and temperature.

Mojave Fringe-toed lizard (*Uma scoparia*) are a BLM sensitive and California Species of Special Concern and are endemic to southern California deserts, where it is restricted to aeloian sand habitats in the deserts of Los Angeles, Riverside and San Bernardino Counties. Mojave fringe-toed lizard diets consist of insects such as, but not limited to, ants, sand cockroaches, grasshoppers and spiders. Fringe-toed lizards can usually be found burrowed in the sand on the side of the dunes. Windblown sand is required for the lizard life cycle.

American badger (*Taxidea taxus*) is a State Species of Special Concern associated with open grassland and desert communities. This species is associated with dry open forest, shrub, and grassland communities with an adequate burrowing rodent population.

Desert kit fox (*Vulpes macrotis*) is protected by the California Code of Regulations (Title 14, CCR: §460) and Fish and Wildlife Commission Section 4000 as a fur-bearing mammal. Desert kit foxes are fossorial mammals that occur in arid open areas, shrub grassland, and desert ecosystems. Desert kit fox typically consume small rodents, primarily kangaroo rats, rabbits, lizards, insects, and in some cases immature desert tortoises. Dens typically support multiple entrances, but desert kit fox may utilize single burrows for temporary shelter.

3.3.1 Amphibians

3.3.1.1 Couch's Spadefoot

Overall, there were 27 different points that were identified as having standing water at some time on the Project site (Figure 5). Of these spots, two were identified as the most likely to support Couch’s spadefoot listed as a species of concern in California in the event of rains as they were not only the most extant areas for having held water, but because they also exhibited a strong component of dry desert wash woodland plant species.

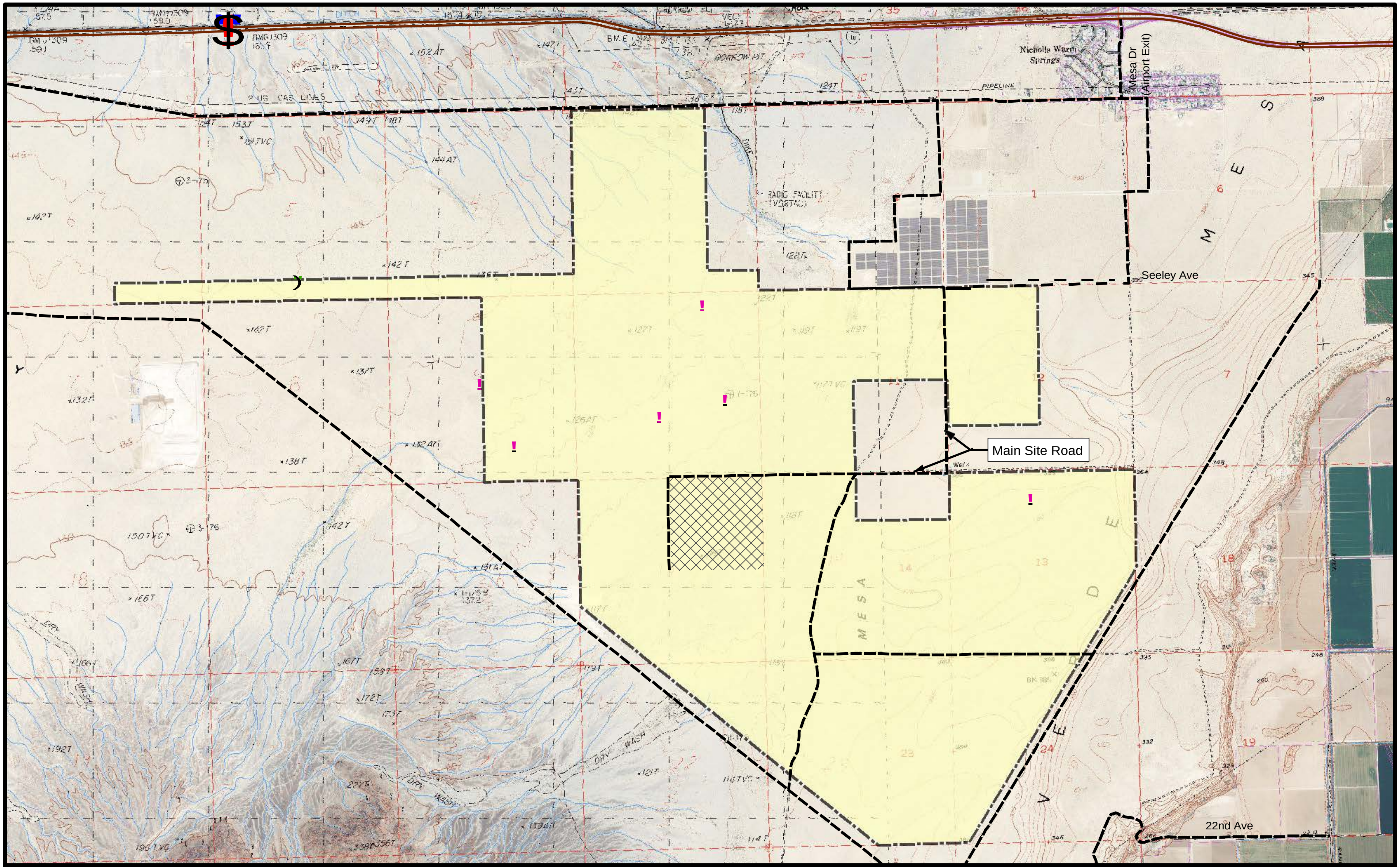
There has been an on-going effort since 2008 to check the Project site after heavy rains to search for ponding water that sustains itself for eight days, which is what is required for the reproduction of spadefoots. No areas held water for eight days.

3.3.2 Reptiles

3.3.2.1 Desert Tortoise

Desert tortoise sign (i.e., live tortoises, active burrows/pallets, and recent scat, and tracks) found in the Study Area were six disarticulated carcasses and a set of tracks (Figure 20). All carcasses were disarticulated and over four years of age. No desert tortoise burrows were detected. A set of tracks was found by Alice Karl, PhD. during the botany surveys on March 22, 2013 traveling north across the dunes. Although the entire Study Area could be considered tortoise habitat, few tortoises would be expected in most of the site because of the poor cover both in and out of the washes and such low species richness and stature that the forage base may be similarly under-developed.

No focused desert tortoise surveys were completed on the inholding. The general habitat and wildlife surveys performed on the inholding, which also included for burrowing owl and plants, did not find any burrows that would be associated with desert tortoise. Since the inholding historically was a farm, the potential for desert tortoise utilizing the inholding is low.



Tortoise Carcass, >4 Years, Disarticulated

Tortoise Track

Site Access Roads

Inholding

Desert Quartzite Site Boundary

0 500 1,000
Meters

DESERT QUARTZITE SOLAR PROJECT
DESERT QUARTZITE, LLC

Figure 19

Desert Tortoise Sign

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3.3.2.2 Mojave Fringe-Toed Lizard and Herpetofaunal

Overall, 3,483 different individual squamates were observed over the span of all surveys undertaken (Table 14), with 98 percent of those sightings lizards. Of the lizard composition, ten different species were recorded with five species totaling over 95 percent of the total animals observed (Table 14). Western whiptail (*Aspidoscelis tigris*) was the most common lizard observed on the site with large numbers of common side-blotched lizard (*Uta stansburiana),* zebra-tailed lizard *(Callisaurus draconoides),* desert iguana *(Dipsosaurus dorsalis),* and Mojave fringe-toed lizard (*Uma scoparia)* was also observed. Six different species of snakes were encountered within the survey period with the majority comprised of the majority comprised of the species sidewinder rattlesnake (*Crotalus cerastes*) (Table 15). Due to the type of sampling methodology, the majority of observations were comprised of diurnal or day active, wide-ranging, foraging squamates.

Using species maps for southern California squamates, there could be two different California Species of Concern present upon the proposed Project site. These two species were the Mojave fringe-toed lizard and Colorado Desert fringe-toed lizard (*Uma notata*). To determine the extent of their presence on the site, waypoints were taken by survey crews upon encountering these species during all surveys (Figure 21).

Overall, members of the Uma species made up seven percent of the total squamates seen by species (Table 15). These individuals were confined to the fine sand or the sandy loam areas that occupy the northwest corner and the gen-tie line area of the Project site (Figure 21). After identifying lizards as members of this genus, 13 individuals (five male and eight females) were collected briefly to identify them down to species level. According to Stebbins and McGinnis (2012), a good method to do this is according to inter- naris scale patterns, where the Mojave will have five scales in a pattern across the snout and the Colorado Desert fringe-toed exhibits a scale pattern of three. All individuals that were scrutinized were identified as Mojave and not Colorado Desert individuals using this method (Photograph 11).

The surveyors determined that the inholding did not have suitable habitat for fringe-toed lizards. No lizards or evidence of lizards utilizing the site were found. After *Uma* protocols were followed, a generic survey was performed to determine all types of herps that were present, as well as 100 percent coverage for the wildlife survey. Both surveys were more than adequate for Uma presences/absences. Fringe-toed lizards were not observed within the inholding during any survey.

Table 14 Lizards Found on Project Site

Species	Aspidoscelis tigris	Uta stansburiana	Callisaurus draconoides	Dipsosaurus dorsalis	Uma scoparia	Phrynosoma platyrhinos calidiarum	Gambelia wislizenii	Urosaurus graciosus	Sceloporus magister	Coleonyx variegatus variegatus	**Total Lizards across the site**
Total Individuals	1,382	805	448	424	241	95	17	8	1	1	**3,422**
Individual species / overall species sightings	40%	23%	13%	12%	7%	3%	0.50%	0.20%	0.02%	0.02%	

Table 15 Snakes Found on Project Site

Species	Crotalus cerastes	Chionactis occipitalis	Masticophis flageiium piceus	Salvadora hexalepis	Pituophis catenifer	Arizona elegans	**Total Snakes across the site**	**Total Squamates across the entire site**
Total Individuals	44	7	6	2	1	1	**61**	**3,483**
Individual species / overall species sightings	1%	0.2%	0.2%	0.05%	0.02%	0.02%		

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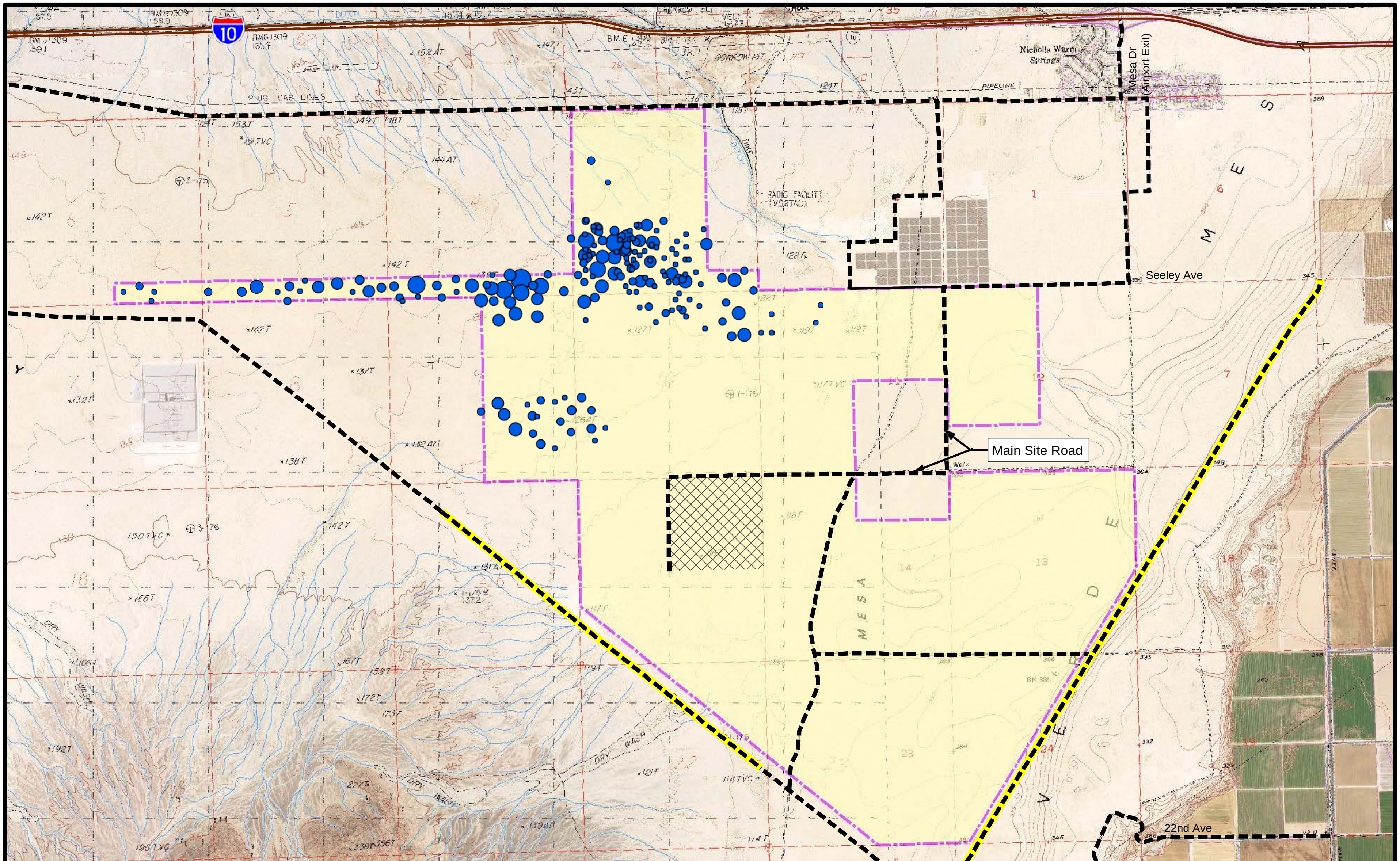


Fringe-toed Lizard Density

- 1
- 5
- 10

- Site Access Road
- Site Access Road (marginal conditions)
- Inholding
- Desert Quartzite Site Boundary

N

0 500 1,000
Meters

DESERT QUARTZITE SOLAR PROJECT
DESERT QUARTZITE, LLC

Figure 20
Mojave Fringe-toed Lizard
(Uma scoparia)
Distribution

Photograph 11 *Uma scoparia* Male, Captured for Identification to the Species Level

3.3.3 Avian

3.3.3.1 Migratory Bird Surveys

A close inspection of the data collected over the course of four seasons to date has revealed two distinct peaks in migration for the area in 2014 (Figure 22). The first is in the spring around March 24, 2014, and the second is in the fall around September 21, 2014. Data collected during the spring of 2013 resulted in fewer observations compared to efforts undertaken during the spring of 2014 and there was no clear peak in 2013. In the fall of 2013 there were two peaks: October 1, 2013 and October 9, 2013. Uncontrollable and variable factors including rainfall rates, temperatures, wind speed and wind direction could have an influence on these results and these peak migratory periods should be considered approximate due to the limited number of survey seasons represented. The greatest numbers of individual species detected at one time during the spring were flocks of unidentified swallows and tree swallows with numbers reaching 1000 and 950 birds respectively on a single day (all in 2014). Large number of turkey vultures (782 in one day for the highest count) and Swainson’s hawks (620 in one day) were observed during fall migration. Totals of each species for each season and year can be found in Table 16.

For the eleven (11) species for which greater than or equal to 100 sightings were made during a particular survey period (excluding detections that did not result in identification to species), first and last observation dates of the species were noted (Table 17).

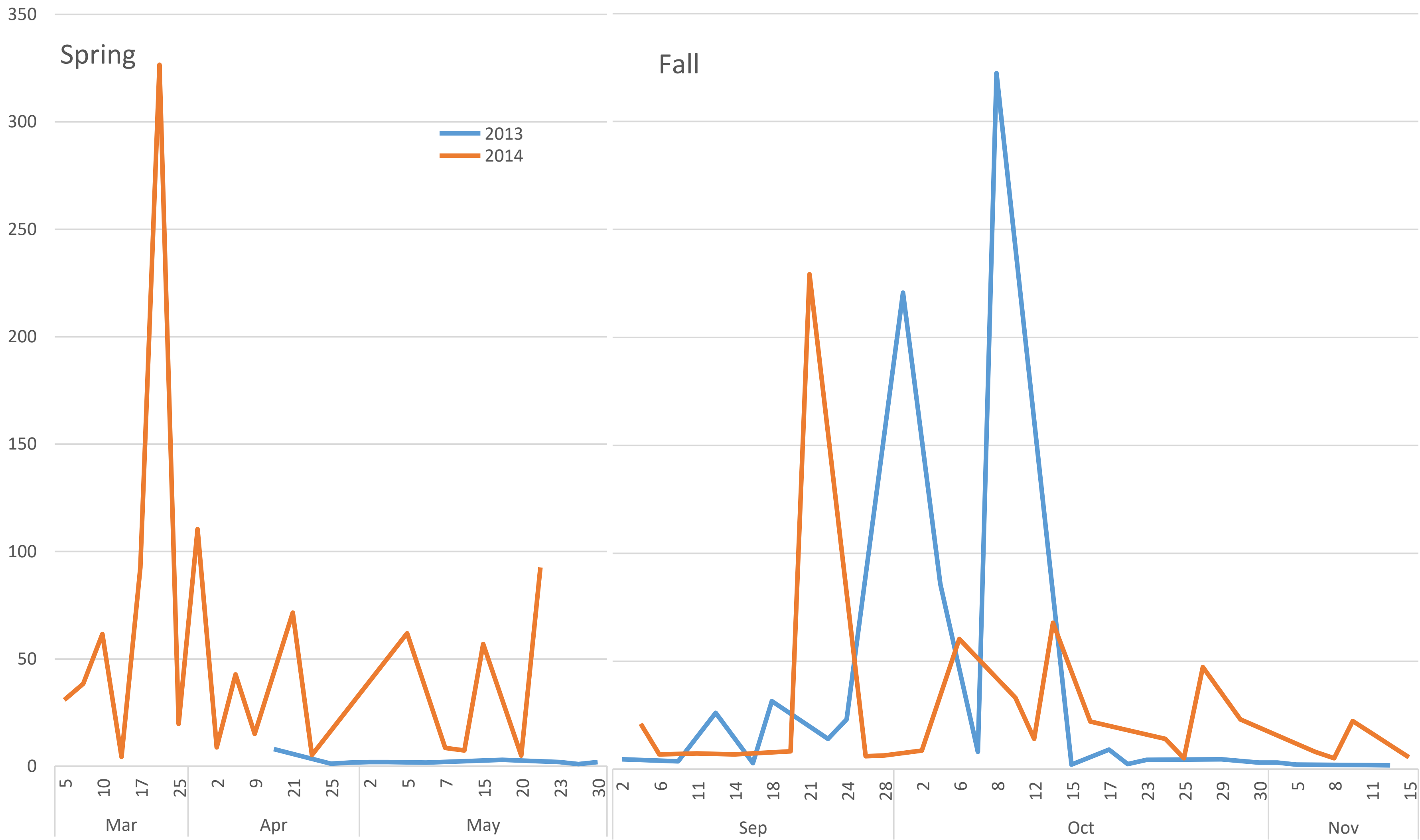


Figure 21. *Average # of Birds Recorded durign Migration Surveys by Date*

Table 16 Total Numbers of Each Species Detected by Season and Year

Common Name	Total # Birds Detected			
	Spring 2013	Fall 2013	Spring 2014	Fall 2014
American Kestrel	2	6	21	13
Ash-throated Flycatcher	1		8	
Barn Swallow	5	729	53	715
Black Phoebe				1
Black-headed Grosbeak			2	
Black-tailed Gnatcatcher			10	25
Black-throated Gray Warbler			1	1
Blue-gray Gnatcatcher			1	11
Brewer's Sparrow		8	7	
Bullock's Oriole			6	1
Cactus Wren			6	6
Cliff Swallow	33	2	7	26
Common Raven	1		27	26
Common Yellowthroat				1
Cooper's Hawk		5	8	1
Costa's Hummingbird			4	
Eurasian Collared-Dove			6	2
Ferruginous Hawk		6	6	
Gambel's Quail			4	24
Gray Flycatcher	1		1	
Great Blue Heron			5	12
Great Egret			4	8
Greater Roadrunner			3	4
Great-tailed Grackle				50
Horned Lark		111		61
House Finch			2	193
House Sparrow				2
House Wren				3
Lazuli Bunting				2
Le Conte’s Thrasher				7
Lesser Goldfinch			1	3
Lesser Nighthawk			3	
Loggerhead Shrike	1		7	16
MacGillivray's Warbler			2	
Mourning Dove	2		45	2
Northern Flicker		1		4
Northern Harrier	2	23	32	3
Northern Rough-winged Swallow	2	11	6	4
Orange-crowned Warbler			1	6
Osprey		3	2	
Phainopepla			6	6
Prairie Falcon		9	10	2

Common Name	Total # Birds Detected			
	Spring 2013	Fall 2013	Spring 2014	Fall 2014
Red-tailed Hawk	6	32	33	14
Red-winged Blackbird			100	
Rock Wren				15
Ruby-crowned Kinglet				3
Sage Sparrow (Unspecified)		1		3
Sandhill Crane			285	
Say's Phoebe		1		17
Sharp-shinned Hawk		5	3	3
Snowy Egret			42	
Swainson's Hawk	3	668	45	14
Tree Swallow	7	3	1618	
Turkey Vulture	22	1695	495	306
Unidentified Blackbird				32
Unidentified Empidonax Flycatcher			1	
Unidentified Hawk		104	82	4
Unidentified Hummingbird		1	9	
Unidentified Larus Gull			5	
Unidentified Sparrow		1	5	3
Unidentified Swallow	7	60	2646	381
Unidentified Warbler			5	7
Vaux's Swift		2	3	11
Verdin			6	23
Violet-green Swallow				154
Warbling Vireo			3	
Western Kingbird			16	
Western Meadowlark				26
Western Tanager			18	
White-crowned Sparrow				21
White-faced Ibis			12	
White-throated Swift	2		16	
White-winged Dove			547	1
Willow Flycatcher				1
Wilson's Warbler			5	4
Yellow Warbler			1	
Yellow-headed Blackbird			56	
Yellow-rumped Warbler		2	34	126

Table 17 Earliest and latest dates for most commonly detected species

Common Name	Spring 2013		Fall 2013		Spring 2014		Fall 2014	
	Earliest Date	Latest Date	Earliest Date	Latest Date	Earliest Date	Latest Date	Earliest Date	Latest Date
Barn Swallow	*18-Apr-13	18-May-13	17-Sep-13	17-Oct-13	21-Apr-14	05-May-14	* 05-Sep-14	15-Oct-14
Horned Lark			12-Sep-13	08-Oct-13			11-Sep-14	10-Nov-14
House Finch					17-Mar-14	25-Mar-14	06-Oct-14	15-Nov-14
Red-winged Blackbird					05-May-14	05-May-14		
Sandhill Crane					6-Mar-14	10-Mar-14		
Swainson's Hawk	02-May-13	28-May-13	17-Sep-13	08-Oct-13	24-Mar-14	15-May-14	* 05-Sep-14	13-Oct-14
Tree Swallow	*18-Apr-13	18-Apr-13	30-Oct-13	30-Oct-13	*05-Mar-14	05-May-14		
Turkey Vulture	*18-Apr-13	23-May-13	*02-Sep-13	*12-Nov-13	*05-Mar-14	*22-May-14	*05-Sep-14	08-Nov-14
Violet-green Swallow							21-Sep-14	9-Oct-14
White-winged Dove					21-Apr-14	*22-May-14	* 05-Sep-14	05-Sep-14
Yellow-rumped Warbler							6-Oct-14	15-Nov-14

*Indicates that this date corresponds to the earliest or latest date (respectively) of surveys for that particular season. In these cases, it is possible that we did not capture the true start or end of migration periods for that species.

3.3.3.2 Line Transect Sampling

A total of 3534 detections were made during the 345 surveys with 17,973 total birds sighted. To maintain consistency with regards to the number of transects sampled per season, we took a random subsample of the data to use in analysis. Fitting a model to estimate density at times also requires use of data truncation. The final subsample contained data from 259 transects, 2253 detections and 16507 birds (Table 18). We used Program Distance (Thomas et al. 2010) to conduct a preliminary analysis and determine a total density of birds on versus off project (Table 18). In every season the control transects had a higher species diversity than transects located on the project footprint, and in all but one season, the density estimate was also higher for those transects in the control areas. The one exception was the Spring of 2014, where the footprint transects had an unusually high density of birds.

Table 18 Analysis of Avian Line Transect Results Spring 2013 – Winter 2014-15.

Season / Year	# Detections	Estimated Density of Birds (Per Ha)		Estimated Density of Clusters (Per Ha)		Expected Cluster Size		Estimated # of Birds		Total # Species	
		Control	Footprint	Control	Footprint	Control	Footprint	Control	Footprint	Control	Footprint
Spring – 2013	119	.30	.18	0.19	0.08	1.62	2.25	2117	348	25	17
Fall – 2013	688	1.39	1.07	0.33	0.25	4.22	4.23	9429	2106	56	43
Winter – 2013-14	460	1.12	0.4	0.31	0.12	3.6	3.3	7614	790	37	21
Spring – 2014	495	0.4	2.18	0.19	0.52	2.12	4.2	2747	4287	47	42
Fall – 2014	211	0.14	0.13	0.07	0.04	2.03	3.22	937	266	18	15
Winter – 2014-15	283	0.2	0.15	0.09	0.07	2.15	2.32	1355	304	19	16

3.3.3.3 Western Burrowing Owl

During fall 2012 and spring 2013, 70 burrowing owl burrows within the Project site ranked Class 1, Class 2 or Class 3. However, Burrowing Owls were only detected at four burrows during breeding season surveys between 2013 and 2014. A single burrow within the 150-meter buffer indicated recent Burrowing Owl occupation/ use. (Table 19 and Figure 23).

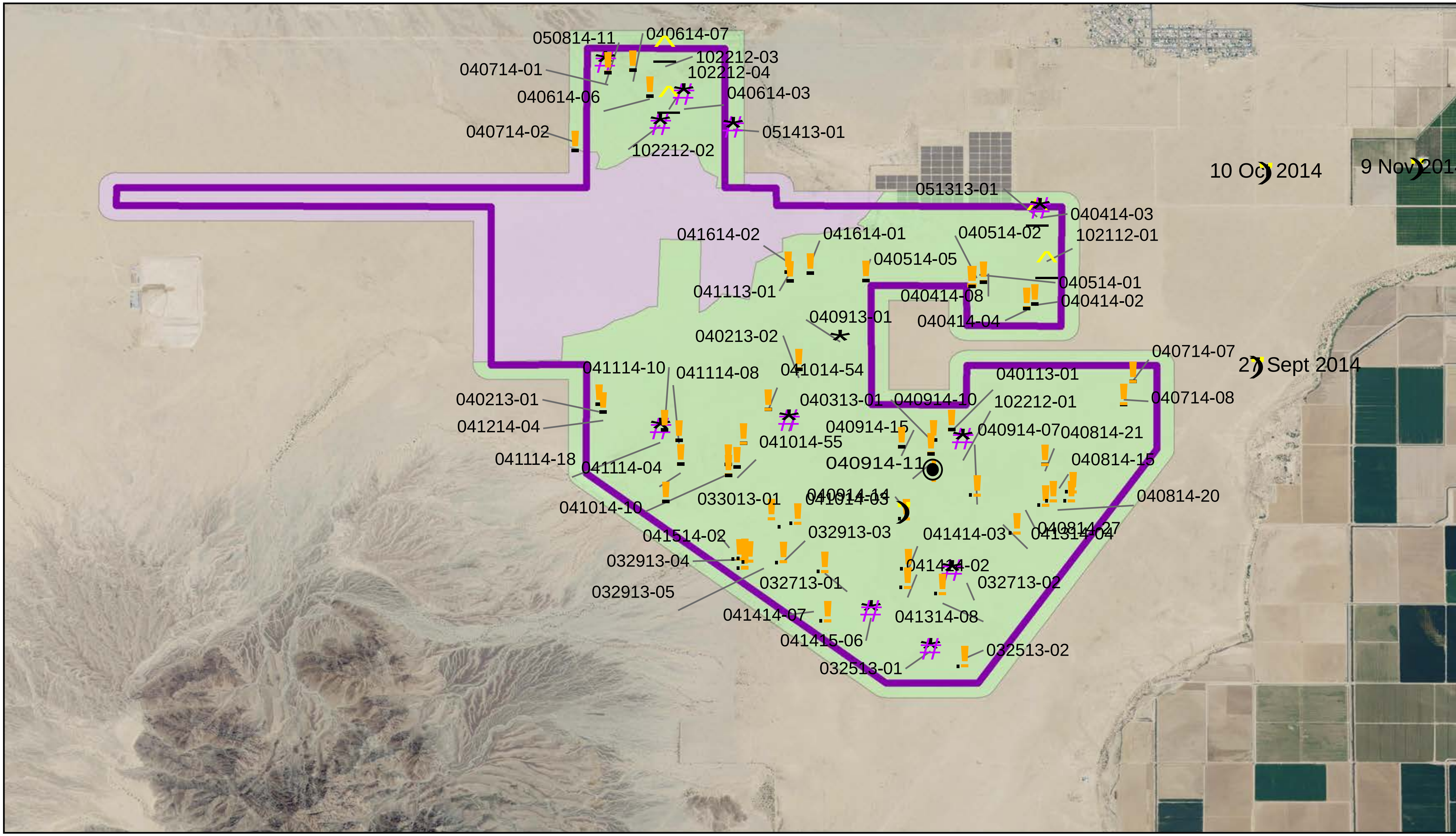
Table 19 Burrowing Owl Phase II Results from Fall 2012 and Spring 2013 and 2014

Waypoint ID	Date	Easting	Northing	Initial Class	Initial Sign
QZBOB-102112-01	10/21/2012	710018	3718263	1	Feathers; Tracks; Live Bird
QZBOB-102212-04	10/22/2012	706779	3719734	1	Feathers; Pellets; Tracks; Whitewash; Live Bird

Waypoint ID	Date	Easting	Northing	Initial Class	Initial Sign
QZBOB-102212-01	10/22/2012	709353	3716229	2	Feathers; Tracks; Whitewash
QZBOB-102212-02	10/22/2012	706710	3719571	2	Feathers; Pellets; Whitewash
QZBOB-102212-03	10/22/2012	706738	3720171	1	Pellets; Whitewash; Live Bird
QZBOB-032513-02	3/25/2013	709413	3714225	3	Whitewash
QZBOB-032513-01	3/25/2013	709118	3714288	2	Pellets; Whitewash
QZBOB-032713-01	3/27/2013	708204	3715061	3	Pellets; Whitewash
QZBOB-032713-02	3/27/2013	709410	3714989	2	Whitewash
QZBOB-032913-05	3/29/2013	707686	3715098	3	Pellets
QZBOB-032913-01	3/29/2013	707729	3715275	3	Pellets; Whitewash
QZBOB-032913-02	3/29/2013	707587	3715092	3	Pellets; Whitewash
QZBOB-032913-03	3/29/2013	707844	3715163	3	Whitewash
QZBOB-032913-04	3/29/2013	707522	3715184	3	Whitewash
QZBOB-033013-01	3/30/2013	707744	3715561	3	Whitewash
QZBOB-033013-03	3/30/2013	706837	3715796	3	Whitewash
QZBOB-033013-02	3/30/2013	707366	3715923	3	Whitewash
QZBOB-040113-01	4/1/2013	709249	3716527	3	Whitewash
QZBOB-040213-02	4/2/2013	707940	3717034	3	Whitewash
QZBOB-040213-01	4/2/2013	706253	3716657	3	Pellets; Whitewash
QZBOB-040313-01	4/3/2013	707869	3716491	2	Pellets; Whitewash
QZBOB-040413-01	4/4/2013	709711	3715680	3	Pellets; Whitewash
QZBOB-040913-01	4/9/2013	708282	3717411	2	Feathers; Pellets; Whitewash
QZBOB-041113-01	4/11/2013	707843	3718107	3	Whitewash
QZBOB-051313-01	5/13/2013	709927	3718713	1	Feathers; Pellets; Tracks; Whitewash; Live Bird
QZBOB-051413-01	5/14/2013	707327	3719545	2	Pellets
QZBOB-040414-03	4/4/2014	709952	3718707	2	Feathers; Pellets; Tracks; Whitewash; Other
QZBOB-040414-02	4/4/2014	709929	3717818	3	Pellets
QZBOB-040414-04	4/4/2014	709861	3717766	3	Whitewash
QZBOB-040414-08	4/4/2014	709525	3718129	3	Whitewash

Waypoint ID	Date	Easting	Northing	Initial Class	Initial Sign
QZBOB-040514-01	4/5/2014	709449	3718117	3	Whitewash; Pellets
QZBOB-040514-02	4/5/2014	709427	3718080	3	Whitewash
QZBOB-040514-05	4/5/2014	708488	3718121	3	Feathers; Whitewash
QZBOB-040614-07	4/6/2014	706469	3720013	3	Feathers; Whitewash
QZBOB-040614-03	4/6/2014	706908	3719741	2	Pellets; Whitewash
QZBOB-040614-06	4/6/2014	706614	3719837	3	Feathers; Whitewash
QZBOB-040714-02	4/7/2014	705989	3719389	3	Pellets; Whitewash
QZBOB-040714-01	4/7/2014	706259	3719971	3	Pellets; Whitewash
QZBOB-040714-07	4/7/2014	710776	3717068	3	Whitewash
QZBOB-040714-08	4/7/2014	710704	3716874	3	Whitewash
QZBOB-040814-21	4/8/2014	710050	3716134	3	Pellets; Whitewash
QZBOB-040814-15	4/8/2014	710176	3715963	3	Whitewash
QZBOB-040814-20	4/8/2014	710164	3715745	3	Whitewash
QZBOB-040814-27	4/8/2014	709893	3715738	3	Whitewash
QZBOB-040914-14	4/9/2014	708881	3715711	3	Pellets; Whitewash
QZBOB-040914-12	4/9/2014	709090	3715939	3	Whitewash
QZBOB-040914-10	4/9/2014	709098	3716406	3	Whitewash
QZBOB-040914-15	4/9/2014	708829	3716265	3	Pellets; Whitewash
QZBOB-040914-07	4/9/2014	709482	3715782	3	Whitewash
QZBOB-040914-11	4/9/2014	709081	3716193	3	Whitewash
QZBOB-041014-09	4/10/2014	707484	3716355	3	Whitewash
QZBOB-041014-03	4/10/2014	707960	3715637	3	Whitewash
QZBOB-041014-55	4/10/2014	707438	3716008	3	Pellets; Whitewash
QZBOB-041014-54	4/10/2014	707688	3716701	3	Feathers
QZBOB-041014-10	4/10/2014	707362	3716048	3	Feathers; Pellets; Whitewash
QZBOB-041114-18	4/11/2014	706779	3716354	2	Pellets; Whitewash
QZBOB-041114-04	4/11/2014	706956	3716052	3	Whitewash
QZBOB-041114-08	4/11/2014	706938	3716348	3	Whitewash
QZBOB-041114-10	4/11/2014	706810	3716464	3	Whitewash
QZBOB-041214-04	4/12/2014	706290	3716568	3	Whitewash

Waypoint ID	Date	Easting	Northing	Initial Class	Initial Sign
QZBOB-041314-04	4/13/2014	709707	3715588	3	Whitewash
QZBOB-041314-08	4/13/2014	709209	3714776	3	Feathers
QZBOB-041414-03	4/14/2014	708913	3715117	3	Pellets; Whitewash
QZBOB-041415-06	4/14/2014	708606	3714616	2	Whitewash
QZBOB-041414-07	4/14/2014	708118	3714668	3	Whitewash
QZBOB-041414-02	4/14/2014	708913	3714829	3	Feathers
QZBOB-041514-02	4/15/2014	707388	3715300	3	Whitewash
QZBOB-041614-02	4/16/2014	707822	3718205	3	Whitewash
QZBOB-041614-01	4/16/2014	708016	3718197	3	
QZBOB-050814-11	5/8/2014	706234	3719976	2	Whitewash



Incidental BUOW Observations

1 = Excellent (BUOW present)

2 - Good (Usable, fresh sign, no BUOW)

3 - Fair (Usable, old sign, no BUOW)

Quartzite Project Boundary

BUOW_Habitat

Including 150-m Buffer

Unsuitable BUOW Habitat

Suitable BUOW Habitat

0 1 2 4 Miles

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Figure 22

BURROWING OWL CLASS 1-3 BURROWS

QUARTZITE SOLAR | RIVERSIDE COUNTY, CALIFORNIA

Phase III Burrowing Owl Survey Results

All three burrows at which live owls were detected in Fall of 2012 were determined to be vacant when Phase III surveys were conducted in the following spring (Table 20).

Table 20 Determination of Burrows Occupied by Burrowing Owls Prior to Breeding Season

Waypoint ID	Phase II Survey Date	Phase II burrow classification	Phase III Survey Date	Phase III burrow classification
QZBOB-102112-01	21 Oct 2012	1	18 May2013	4
QZBOB-102212-04	22 Oct 2012	1	27 May 2013	4
QZBOB-102212-03	22 Oct 2012	1	27 May 2013	4

QZBOB-102112-01 was collapsed and no longer serviceable without re-excavation. QZBOB-102212-04 was an active kit fox (*Vulpes macrotis*) den, and QZBOB-102212-03 appeared to have been re-excavated and potentially occupied by coyote (*Canis latrans*).

These spring 2013 Phase III surveys documented live owls at two additional burrows. One of these burrows was potentially occupied during Phase II surveys (Class 2); the other is believed to have been a previously undocumented rodent burrow (Table 21).

Table 21 Burrows Occupied During Breeding Season

Waypoint ID	Phase II Survey	Phase II burrow classification	Phase III Survey	Phase III burrow classification
QZBOB-051313-01	N.A.	N.A.	13 May 2013	1
QZBOB-040913-01	9 Apr 2013	2	24 May 2013	1

Burrowing owls occupying burrows during the breeding season were monitored in an attempt to determine territorial boundaries and home ranges.

Observations of the burrowing owl pair at QZBOB-051313-01, suggested dependent young were in the burrow on 15 July, although no non-adults were directly observed during a total of more than 15 hours of observation.

Observations of the burrowing owl pair at QZBOB-040913-01 (burrow apparently re-excavated), suggested the breeding attempt was abbreviated by a potential nest predator as the burrow was abandoned between 20 June when a pair was present, and 14 July when no owls were detected. No young-of-year were ever observed at this burrow and adults were not detected away from the burrow on a subsequent follow-up search on 15 July.

There were no nesting attempts by Burrowing Owls during 2014.

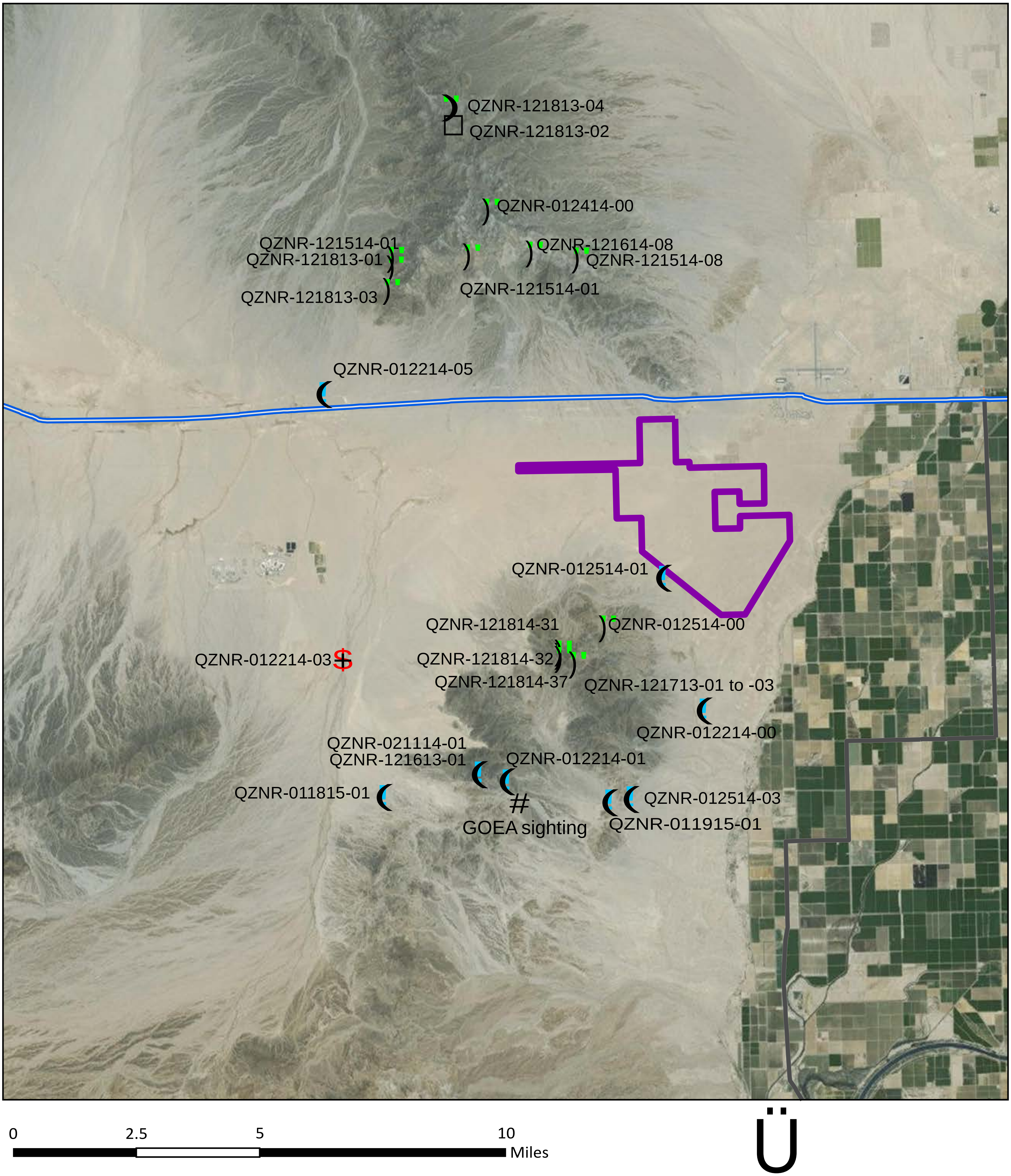
Burrowing owls were incidentally reported in or around the Project site on four (4) occasions from September 27, 2014 to February 6, 2015. Only one of these detections (made during the winter 2015 follow-up visit) was within the Project site

3.3.3.4 Golden Eagle Surveys

In March and April 2013, a total of seventeen black-tailed jackrabbits were detected across the 4,855 acre (19.65 sq km) Project during a 10-meter belt-transect survey of the entire Project. This effort yields an estimation of .0035 black-tailed jack rabbits/acre.

The only golden eagle detection made during the Territory Occupancy Surveys was made on January 21, 2014. An avian biologist detected an adult golden eagle soaring low heading southwest from the QZ_GOEA_OP10. Because this detection occurred during the Phase II visit, a follow-up visit was scheduled. During the follow-up visit on February 11, 2014, no golden eagles were observed in the area. In the vicinity of the eagle sighting, there were two nests observed, one was inactive and the other was an occupied red-tailed hawk nest. No active golden eagle nests were detected within the Study Area. There were no sightings during the 2014-15 surveys.

A total of 26 raptor or raven nests were documented during Golden Eagle Territory Occupancy Surveys (Figure 24). Sixteen of these nests were in cliff or rock outcrop substrates, nine (9) were in power line support structures, and one was located in an ironwood tree (*Olneya tesota*). In 2013-14, species associated with raptor nests included four (4) red-tailed hawks (*Buteo jamaicensis*), two (2) prairie falcons (*Falco mexicanus*), and 12 undetermined species of raptor. The one historic golden eagle territory was occupied by a pair of red-tailed hawks during this breeding season. Seven (7) of the observed nest were active, nine (9) were inactive, and two (2) were active and occupied. In 2014-15, there were two (2) active nests: one (1) red-tailed hawk and one (1) prairie falcon.



NestType

Cliff / Rock outcrop

Power line support structure

Tree

Proposed Solar Farm Footprint

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Figure 23

RAPTOR NESTS DETECTED DURING GOLDEN EAGLE SURVEYS

QUARTZITE SOLAR | RIVERSIDE COUNTY, CALIFORNIA

3.3.3.5 Elf Owl Surveys

Elf owls (*Micrathene whitneyi*) are small cavity nesters typically inhabiting desert areas overgrown with saguaro cacti, and mesquite or deciduous riparian woodlands and adjacent tablelands. They are found in ravines, canyons, plateaus, and on mountain slopes. Most of the Project site and the adjoining buffer zone is comprised of scrubland dominated by creosote bush, and is therefore completely unsuitable for use by elf owls.

A small patch of microphyll woodland (Lower Colorado subdivision of Sonoran desert scrub) of less than one hectare (11 S 0708580 3718750) occurs immediately south of the present solar facility and contains widely scattered ironwood, and blue palo verde trees plus several nonnative trees.

A drainage from McCoy Mountains runs north (11 S 0706925 3720960) to south (11 S 0707924 3719323). Most (97 percent) of the wash is within the one mile Project buffer zone, but it also transects the most northeasterly corner of the Project site. This wash contains approximately 10 hectares of microphyll woodland with scattered ironwood and palo verde trees. It is between 30 to 70 m wide with trees spaced 15 to 60 m apart, and 7 to 9 m tall.

There are a series of braided drainages along the southwestern boundary of the Project site running west to east from the foothills of the Mule Mountains. The largest drainage contains approximately 16 hectares of scattered ironwood and palo verde trees, and runs 1.6 km west (11 S 0705570 3714515) to east (11 S 0707065 3715170) across the buffer zone and ends at the powerline road. The patch is between 50-150 m wide with trees spaced 5 to 30 m apart, 5 to 8 m tall, with an open canopy and little understory.

Scattered patches of honey mesquite occur on the slope between the upland desert scrub of the Palo Verde Mesa and the lower Colorado River floodplain, which contains extensive farmland. Mesquite trees growing along this slope were 3 to 5 m tall and found in thickets 20 to 40 m wide. There were no large trees, e.g., cottonwood (*Populus fremontii*), associated with these areas.

Assessments were made for two nearby areas that fell outside of the one-mile Project buffer zone.

The Mesa Verde housing area was assessed because it superficially resembles certain trailer parks or campgrounds along the lower Colorado River where elf owls have been detected. It consists of trailers and small homes with yards containing native trees including palo verde, mesquite (*Prosopis* sp.), saguaro cactus (*Carnegiea gigantea*, a total of eight individuals) and nonnative columnar cacti and trees including eucalyptus, palms, African sumac (*Rhus lancea*), and pines (*Pinus* sp.). However, no cavities were observed in this area and no cottonwood trees were present.

An area of microphyll woodland north of and adjacent to the I-10 freeway corridor located along Black Rock Road was assessed. This woodland patch is approximately 1.5 km long and 30 to 100 m wide (about 12 hectares). This area contains palo verde and widely scattered ironwood (7 to 11 m tall) and is generally located between a gas station and the truck stop facilities (east end, 11 S 0710795 3721265) and a weigh station (west end, 11 S 0709305 3721290). The woodland is crossed by numerous roads and contains several disturbed areas. Trees also occur on the south side and the center strip of the freeway.

In the surveyors' judgment, none of the habitat patches assessed and discussed above met minimal standards as elf owl nesting habitat. For most patches, this lack of potential was a function of inadequate tree density and/or cavity density, combined with inadequate or marginal patch size. The mesquite patches observed within the buffer zone are much less suitable in terms of patch size and tree density than the mesquite patches within which elf owls sometimes occur along the lower Colorado River. The most promising area for elf owls that was observed occurred outside the buffer zone and adjacent to the interstate, where there were some areas of large, closely spaced palo verde trees, but even here, surveyors determined that the potential for elf owls is very low, and mitigated against further by proximity of multiple disturbances, including the interstate highway itself.

3.3.3.6 Nesting Raptor/Raven Surveys

Nesting raptor/raven surveys were conducted monthly between May 1 and June 1, 2013. This effort focused on the detection of all raptor/raven nests within one mile of the Project site in order to collect baseline data for the following:

- The number and distribution of raptor/raven nests prior to project development; and
- Success rates of raptor/raven nests prior to project development.

All bird nests (including the incidental detection of resident passerine species) were recorded on standardized datasheets. A total of 38 nests were recorded during the two years within the project site and 1-mile buffer (Table 22). Monthly monitoring efforts were completed to update the datasheets to include the development stage and breeding status at each nest. Nests detected in both years were renamed in 2014 to employ a more consistent naming strategy.

Table 22 Bird Nests (Including Raptor/Raven) Detected on the Project Site, Spring 2013 and 2014.

Nest ID	Species	Easting	Northing	Date	Status	# Young
BH0001	RTHA	708278	3718453	2013		
RKR0001/ QZNR-031214-03	RTHA/ UNHA	704893	3716895	4/22/2013/ 5/13/2014	Incubation/ Inactive	
RKR0002/ QZNR-021414-01	CORA/ RTHA	703684	3717850	4/22/2013/ 5/31/2014	Incubation/ Nest Cycle Complete	
RKR0003	AMKE	709754	3714312	4/22/2013	Hatchling/ Nestling	
RKR0004/ QZNR-031214-02	RTHA/ RTHA	706970	3715231	5/9/2013/ 5/13/2014	Fledgling/Nest Cycle Complete	?/ 2
RKR0005	AMKE	711010	3716388	4/22/2013	Hatchling/ Nestling	
RKR0006/ QZNR-031214-08	RTHA/ RTHA	711168	3716543	4/22/2013/ 5/31/2014	Hatchling/ Nestling/ Nest Cycle Complete	?/2
RKR0007	WWDO	712577	3719443	5/3/2013	Nest Building	
RKR0008	NOMO	707682	3714578	5/4/2013	Hatchling/ Nestling	
RKR0009	CACW	707816	3714548	5/4/2013	Hatchling/ Nestling	
RKR0010	MODO	707758	3714628	5/4/2013	Incubation	
RKR0011	MODO	707787	3714549	5/4/2013	Incubation	
RKR0012	LOSH	707969	3720258	4/26/2013	Hatchling/Nestling	
RKR0013	WEKI	710941	3716160	5/9/2013	Nest Building	
RKR0014/ QZNR-031214-01	CORA/ CORA	708293	3714185	5/9/2013/ 5/31/2014	Hatchling/Nestling/ Nest Cycle Complete	

Nest ID	Species	Easting	Northing	Date	Status	# Young
RKR0015	WEKI	712594	3718948	5/15/2013	Incubation	
RKR0016	MODO	712579	3719532	5/15/2013	Incubation	
QZNP-021014-01	LOSH	703,269	3,719,933	2/10/2014	Incubation	
QZNP-021014-03	LCTH	703,187	3,720,192	2/10/2014	Hatchling/ Nestling	2
QZNP-021414-01	LOSH	703,708	3,710,209	4/25/2014	Incubation	
QZNP-030514-01	LCTH	704,408	3,717,229	3/12/2014	Incubation	
QZNP-031214-02	LOSH	704,010	3,716,939	3/12/2014	Hatchling/ Nestling	4
QZNP-031214-03	LOSH	706,044	3,715,983	3/12/2014	Incubation	
QZNP-031214-04	LOSH	708,654	3,712,415	3/12/2014	Incubation	
QZNP-032014-01	NOMO	703,193	3,720,186	3/20/2014	Incubation	
QZNP-040114-01	MODO	704,009	3,716,789	4/1/2014	Incubation	
QZNP-040314-01	CACW	703,152	3,720,310	4/3/2014	Undetermined	
QZNP-040614-01	LOSH	707,180	3,719,804	4/6/2014	Fledgling	
QZNP-041614-01	LOSH	704,413	3,717,316	4/16/2014	Incubation	1
QZNP-042214-01	LOSH	703,267	3,719,924	4/22/2014	Nest Building	
QZNR-031214-04	UNHA	701,352	3,718,549	5/13/2014	Inactive	
QZNR-031214-05	RTHA	700,831	3,718,568	5/13/2014	Nest Cycle Complete	
QZNR-031214-06	CORA	702,793	3,717,202	5/31/2014	Nest Cycle Complete	
QZNR-031214-07	RTHA	709,555	3,713,171	5/31/2014	Nest Cycle Complete	1
QZNR-032624-01	CORA	708,530	3,718,554	5/30/2014	Hatchling/ Nestling	2
QZNR-040314-01	AMKE	711,581	3,717,319	4/3/2014	Incubation	
QZNR-050814-01	AMKE	711,915	3,717,872	5/31/2014	Nest Cycle Complete	2
QZNR-051614	AMKE	705,762	3,716,306	5/31/2014	Undetermined	

3.3.4 Mammals

3.3.4.1 Small Mammal Surveys

Results fpr the small mammal surveys are summarized in Table 23. Pocket mouse (*Chaetodipus* spp.) species numbers were added together due to unreliability of field identification between long-tailed (*C. formosus*) and desert pocket mouse (*C. penicillatus*). In total, seven species were found at the baseline points.

No special status small mammals were trapped during the surveys on the Project site. There is no evidence that any special status small mammals are utilizing the Project site.

Table 23 Baseline Points: Small Mammals, April 2013

Baseline Points	**Common Name**	DQ-01	DQ-02	DQ-03	DQ-04	DQ-05	DQ-06	DQ-07	DQ-08	DQ-09	DQ-10	OS-01	OS-02	Total
Dipodomys merriami	Merriam's kangaroo rat		23	13	43	20	24	1	20	22	23	33	35	**257**
Dipodomys deserti	Desert kangaroo rat	16	5	2	10	5	5	19				4	6	**72**
Perognathus longimembris	Little pocket mouse		6	6	3	19		1			1			**36**
Chaetodipus spp.	Pocket mouse		4	1	2	1	0	2	33	5	1	6	30	**85**
Onychomys torridus	Southern grasshopper mouse					1	1			3	1		1	**7**
Neotoma lepida	Desert woodrat								1	1			1	**3**
Spermophilus tereticaudus	Round-tailed ground squirrel		1		1	1	2			1				**6**
Total Individuals		**16**	**39**	**22**	**59**	**47**	**32**	**23**	**54**	**32**	**26**	**43**	**73**	**466**

3.3.4.2 Desert Kit Foxes

Desert kit fox is protected by the California Code of Regulations (Title 14, CCR: §460) and Fish and Wildlife Commission Section 4000 as a fur-bearing mammal. Desert kit foxes are fossorial mammals that occur in arid open areas, shrub grassland, and desert ecosystems. Desert kit fox typically consume small rodents, primarily kangaroo rats, rabbits, lizards, insects, and in some cases immature desert tortoises. Dens typically support multiple entrances, but desert kit fox may utilize single burrows for temporary shelter.

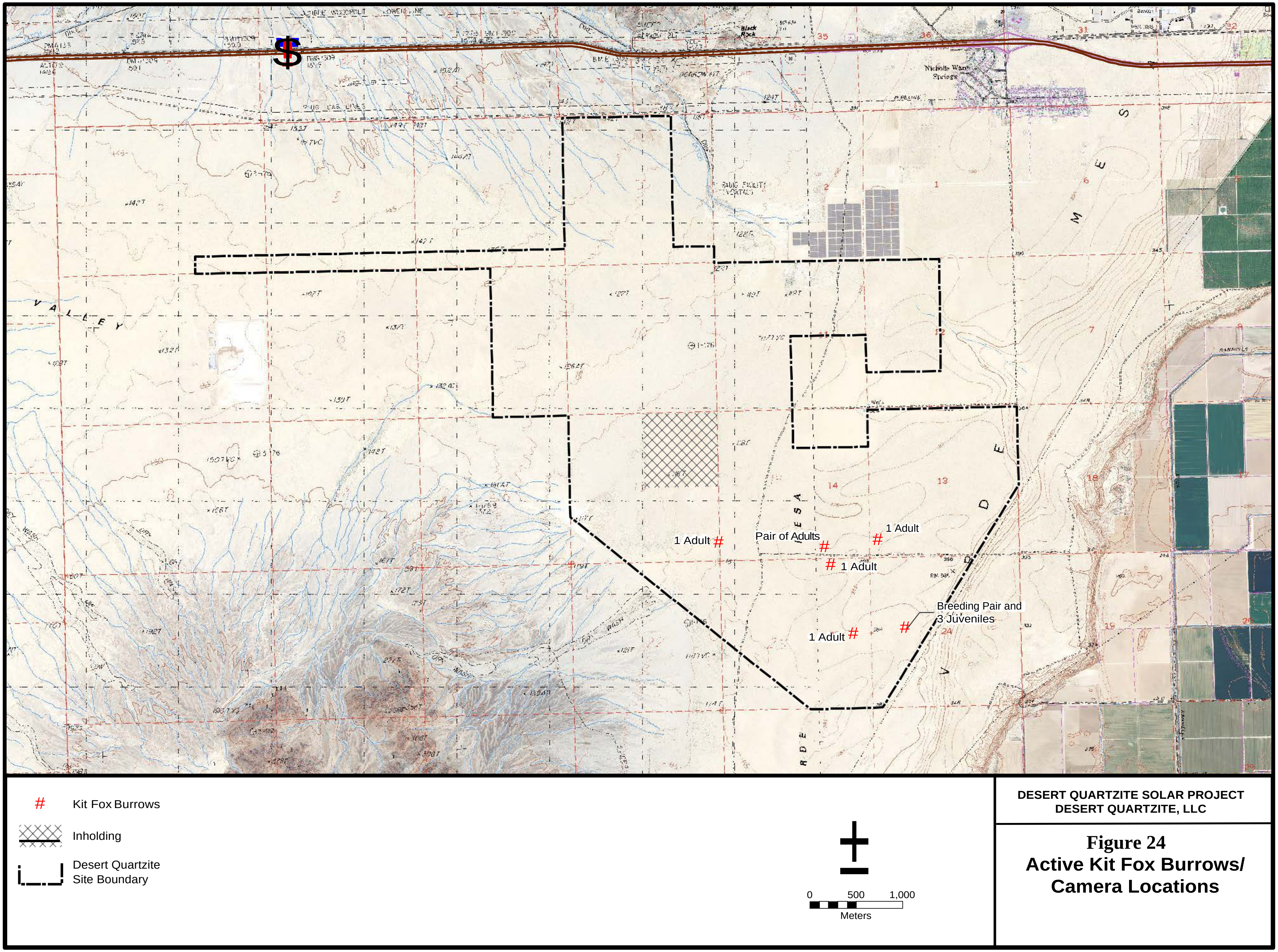
Litters of one to seven young are typically born in February through April (Egoscue 1962; McGrew 1979). This species was detected within the Study Area. Full-coverage burrow surveys revealed 46 canid complexes and 45 single-entrance dens (91 potentially occupied dens/complexes) with some kit fox sign within the Project site. Only 24 of those dens/complexes had signs of recent activity, (i.e., desert kit fox tracks, or scat). Each of these was revisited by an experienced mammal biologist for further inspection of signs of activity. Upon re-inspection, eight dens/complexes were determined to be potentially active, all of which were in the southern portion of the Project site (Figure 25). A camera station was set up at each of the eight dens and run for three consecutive days and nights (Photograph 12). Six of the eight cameras captured images of nine total individual desert kit fox as follows (Table 24):

Table 24 Desert Kit Fox Presence, April 2013

Den Location UTM WGS84	Number of Individuals Photographed	Dates
11 S 707745 3715760	1 Adult	April 29- May 1, 2013.
11 S 709777 3714817	Breeding Pair and 3 Juveniles	April 29- May 1, 2013.
11 S 709201 3714768	1 Adult	April 29- May 1, 2013.
11 S 708974 3715510	1 Adult	April 29- May 1, 2013.
11 S 708873 3715704	Pair of Adults	April 29- May 1, 2013.
11 S 709479 3715780	1 Adult	April 29- May 1, 2013.

3.3.4.3 Bats

Roost surveys were conducted of mines in the mountains adjacent to the Study Area during the day and at night for evidence of bats and guano. Two mines in the southern McCoy Mountains (located approximately 4.4 miles northwest of the Study Area) had previously been identified by Dr. Brown as California leaf-nosed bat maternity colonies and had been gated with bat compatible closures by the Bureau of Land Management in 2011. These mines were monitored on May 8 at dusk by surveyors with night vision equipment to obtain accurate exit and entry counts of bats and acoustic records with additional Anabat detectors. The surveyors kept two counts for at least sixty minutes after the first bat exited of how many bats entered and exited the mines. Video cameras with auxiliary infrared lights were used to remotely



DESERT QUARTZITE SOLAR PROJECT
DESERT QUARTZITE, LLC

Figure 24
Active Kit Fox Burrows/
Camera Locations

Photograph 12 Desert Kit Fox Family Captured on Camera on Project Site, April 29, 2013

monitor mines and to obtain permanent records of exiting bats. During the current survey, pallid bats were observed and recorded at the mines in addition to California leaf-nosed bats. The size and flight pattern of the two species are similar, but the echolocation and social calls are distinctive. The Uvanum Mine (33.64064,-114.82957) is closest to the Study Area, and 33 bats exited and 26 entered the mine in the hour after dark. To the west in another canyon, 71 bats exited and 44 entered the McCoy #3. Non-resident bats may enter a mine to "night-roost", so the exiting and entering bats may not be the same individuals or species.

Using topographic maps and Google Earth images, ground reconnaissance was conducted of possible mine features on the north end of the Mule Mountains (1.8 miles south of the Study Area) and no underground features that could shelter bats were discovered.

The closest known bat colony in the Mule Mountains is the Hodge Mine (a.k.a. Stonehouse, 33.51145,-114.79383) situated 3.4 miles south of the Study Area. This mine contains the largest winter colony of California leaf-nosed bats (*Macrotus californicus*) in the United States, as well as a maternity colony. It is also one of four maternity colonies for the cave myotis (*Myotis velifer*) in California. This mine has been a research site for Dr. Brown since 1976. On the evening of May 9, a net count of 3,348 bats exited from the five portals of the Stonehouse Mine.

At least seven bat species are interpreted as detected acoustically within the Study Area (Table 25). Pallid bat, canyon bat, California and cave myotis, Mexican and pocketed freetailed bats and Western mastiff bats yielded multiple diagnostic call sequences. For 50 kHz Myotis sequences (calls ending at this frequency) two species (*Myotis californicus* and *Myotis yumanensis*) are often not distinguishable. California myotis is far more common in open desert habitats distant from surface water, and these call sequences were interpreted as this species, however they might also have included some Yuma myotis calls. A small sample of 40 kHz Myotis call sequences was obtained at four monitors. In this area cave and Arizona myotis can produce similar calls at this frequency, but given the low likelihood of occurrence of Arizona myotis and the proximity to occupied cave myotis (*Myotis velifer)* roosts, surveyors conclude that these sequences represent the latter species. Four of the acoustically detected species are California State Species of Special Concern: pallid bat (*Antrozous pallidus*), cave myotis, Western mastiff bat *(Eumops perotis*) and pocketed free-tailed bat (*Nyctinomops femorosaccus*). Some additional species have the potential to occur at some time of the year (Table 25). The most likely species is the California leaf-nosed bat that roosts close to the Study Area, and can hunt without emitting echolocation signals, relying solely on vision and prey-produced sounds. In a telemetry study conducted in February 2015, California leaf-nosed bats with transmitters from the Stonehouse Mine foraged over the study area (P. Brown pers. comm). Townsend's big-eared bats (a CDFW candidate for Threatened or Endangered status) emits very faint echolocation signals and is rarely detected acoustically even where it is known to occur. This bat was not detected acoustically, however the project area is within the range of this species.

Table 26 shows acoustic activity by site and night for species and one sonotype or frequency category. Q25 groups non-diagnostic calls from larger mid-frequency bats (19-35 kHz) and is included to show relative activity among sites. Values in the table are counts of minutes per night with activity by a species (Miller 2001). Canyon bats (*Parastrellus hesperus*) and 50 kHz California myotis (*Myotis californicus*) were the most common species detected during echolocation surveys. Over this short sampling interval, higher bat activity (especially pallid bats) occurred at sites with more extensive woody vegetation, notably in the wash immediately east of the Project's north boundary (Site 4), and south of the existing solar installation (Sites 5 and 6). Lower activity was detected at sites with scattered creosote bush and few or no trees (e.g., Site 7).

Table 25 Bat Species Potentially Occurring within Study Area

Family/Scientific Name	Common Name	USFWS	CDFW
Chiroptera	(Bats)		
Phyllostomatidae	(American leaf-nosed bats)		
Macrotus californicus	California leaf-nosed bat	SC	CSC
Vespertilionidae (Vesper bats)			
Myotis yumanensis	Yuma myotis	SC	-
Myotis velifer	**Cave myotis**	SC	CSC
Myotis occultus	Arizona myotis	SC	CSC
Myotis californicus	**California myotis**	-	-
Parastrellus hesperus	**Canyon bat**	-	-
Lasiurus blossevillii	Western Red bat	-	CSC
Lasiurus xanthinus	Western yellow bat	-	-
Lasiurus cinereus	Hoary bat	-	-
Corynorhinus townsendii	Townsend's big-eared bat	SC	CSC
Antrozous pallidus	**Pallid bat**	-	CSC
Molossidae	(Free-tailed bats)		
Tadarida brasiliensis	**Mexican free-tailed bat**	-	-
Nyctinomops femorosaccus	**Pocketed free-tailed bat**	-	CSC
Eumops perotis	**Western mastiff bat**	SC	CSC
USFWS= U.S. Fish and Wildlife Service	CDFW=California Department of Fish and Wildlife		
FSC =Federal Species of Concern	CSC = California Species of Concern		
SC = Former Category 2 candidate			
Bold = Species detected during current survey			
Red = Special status species potentially impacted			

Table 26 Minutes Per Night of Acoustic Activity by Site and Species or Acoustic Category

Map	Night	Pahe	Myca	Myve	Anpa	Tabr	Q25	Nyfe	Eupe	Total
1	5/8/17	6	1							7
1	5/9/17	8	2		2		4	1		17
1	5/10/17	8	2				1			11
2	5/8/17	4						1		5
2	5/9/17	5				2				7
2	5/10/17	3					1			4
3	5/8/17	3	1		1			1		6
3	5/9/17	6	2		1		2			11
3	5/10/17	3	1				2			6
4	5/8/17	30	158		4		5	1		198
4	5/9/17	33	137	1	8		5			184
4	5/10/17	38	167		3		4			212
5	5/8/17	11	27		1		1	2		42
5	5/9/17	6	15	3	2	1	6			33
5	5/10/17	29	22		7	1	4	1		64
6	5/8/17	4	6		2		2			14
6	5/9/17	3	14			1	9	1		28
6	5/10/17	30	13	1	4		5			53
7	5/8/17							1		1
7	5/9/17	1	1			1	1	2	2	8
7	5/10/17									0
8	5/8/17						1			1
8	5/9/17	1	2			1	4			8
8	5/10/17	7	2				1			10
9	5/8/17	1								1
9	5/9/17	8	7				1	1		17
9	5/10/17	6	1				1			8
10	5/8/17	3	1					4	2	10
10	5/9/17	18	7				1	1		27
10	5/10/17	8	7	1	1		1			18
11	5/8/17	2	4					1	2	9
11	5/9/17	9	14			1	2	2		28
11	5/10/17	11	13							24
12	5/8/17		1		1					2
12	5/9/17	1	2				1			4
12	5/10/17	2	1				1			4
	Total	308	631	6	37	8	66	20	6	

(Pahe=*P. hesperus*, Myca=*M. californicus*, Myve=*M. velifer*, Anpa=*A. pallidus*,Tabr=*T. braziliensis*, Nyfe=*N. femorosaccus*, Eupe=*E. perotis*, Q25=non-diagnostic 19-35 kHz sequences).

3.3.5 Other Sensitive Species Noted During Surveys

During various flora and fauna surveys, sign of general species were noted. A species list of general species detected on the site is in Appendix B. American badger (*Taxidea taxus*) was the only additional species of concern associated with the Project.

American badger (*Taxidea taxus*) is a State Species of Special Concern associated with open grassland and desert communities. This species is associated with dry open forest, shrub, and grassland communities with an adequate burrowing rodent population; therefore, this species has high potential to occur within the Study Area. Several badger digs and scat were found on the Study Area, mostly near the southwestern perimeter. This species was not directly observed during the focused surveys or on imagery from camera stations around the site.

4.0 RECOMMENDED PROTECTION MEASURES

The following information is intended to provide the California Environmental Quality Act (CEQA)/National Environmental Policy Act (NEPA) document preparers an outline for general avoidance and minimization measures potentially relevant to the Desert Quartzite Solar Project. The following measures are considered standard practices for large-scale utility projects and are consistent with the *Best Management Practices and Guidance Manual: Desert Renewable Energy Projects* (Renewable Energy Action Team 2010). Due to the initial stage of the Project and thus the lack of specific design and construction details, the following recommendations are non-specific and should be modified, as needed, as the Project progresses.

4.1 GENERAL MEASURES

This section describes a range of design features, construction and operation best management practices (BMPs), and avoidance practices that when implemented as part of Project construction and/or operation, should collectively avoid, reduce or eliminate potential adverse effects to biological resources. Each category of features, practices and plans is described separately below.

<u>Environmental Inspection and Compliance Monitoring Program and Plan</u>

A comprehensive Environmental Inspection and Compliance Monitoring Program and Plan, covering both construction and operation and maintenance (O&M), should be developed. A qualified individual should be designated to serve as the Project Environmental Manager. The Environmental Manager should be responsible for the following tasks.

- Development and implementation of the overall Project compliance program;
- Communication and coordination with the applicable regulatory agencies;
- Ensuring compliance with the various conditions and requirements of permits and approvals;
- Record keeping and reporting required by permits and approvals;
- Ensuring that all applicable environmental plans are up to date;
- Advising management of actual and potential compliance issues; and
- Ensuring that Project planning takes appropriate account of compliance issues in advance.

<u>Construction Related Plans</u>

The following construction-related plans should be developed, as necessary. These plans have specific objectives that would indirectly help reduce potential adverse effects to biological resources.

- Storm Water Pollution Prevention Plan;
- Dust Control Plan;
- Waste Management Plan;
- Spill Prevention Control and Countermeasure Plan;
- Hazardous Materials Management Plan; and

- Fire Prevention Plan.

Construction-Related BMPs

The following general measures should be implemented during construction, which would assist with reducing potential adverse effects to biological resources,

- Construction and O&M activities should be limited to daylight hours to the extent possible;
- Water required for construction purposes should only be stored in closed containers or structures and should be transported throughout the site in enclosed water trucks;
- Water sources (such as wells) should be checked periodically by monitors to ensure they are not creating open water sources through leaking or consistently overfilling trucks;
- All vehicles leaking fuel or other liquids should be immediately removed to the staging area and repaired – all spills should be cleaned up promptly and disposed of correctly;
- All construction activities conducted outside the fenced areas should be monitored by a qualified biological monitor;
- Vegetation removal should be limited to the smallest area necessary;
- Construction traffic should remain on existing roads when possible – new roads, passing areas, and turning areas should be limited to permitted area of direct effect;
- Speed limits on all unpaved areas of the Project site should be a maximum of 15 miles per hour;
- Trash should always be contained within raven-proof receptacles and removed from the site frequently, including trash collected in vehicles in the field;
- No dogs or firearms should be allowed on the Project site during construction or O&M; and
- Plant and wildlife collection by Project staff during construction or operation should be prohibited except as allowed by the Project's permits.

Worker Environmental Awareness Program

A formal Worker Environmental Awareness Program (WEAP) should be completed for every individual working on the Project site. All individuals completing the training should sign an attendance sheet and receive wallet cards and stickers to show they have completed this training. The training should include the photographs of all environmental resources and the following information:

- Discussion of the fragile desert ecosystem, vegetation and wildlife communities within and surrounding the Project site;
- Discussion of rare plant species and other sensitive species found within and surrounding the Project site;
- Desert tortoise ecology, threats, legal protections, permitting, and penalties (including both legal and imposed by Project permits);
- Project-specific protection measures for species;
- Any safety measures personnel should be aware of as it relates to the species or environment on the Project site; and

- Worker responsibilities, communication protocol, and monitor responsibilities, including the authority for monitors to halt Project activities if warranted.

4.2 BOTANICAL RECOMMENDATIONS

4.2.1 Special Status Plant Species

The Vegetation Resources Management Plan (VRMP) will provide details regarding the proposed salvage and transplantation of target species; the VRMP will include the following,

- Distribution of target plants within the Project site;
- Criteria for determining whether an individual plant is appropriate for salvage;
- Equipment and methods for salvage, propagation, transport, and planting;
- Procedures for marking and flagging target plants during preconstruction clearances surveys;
- Storage and/or pre-planting requirements;
- Proposed transplantation sites;
- A requirement for ten years of maintenance of the transplanted individuals, including removal of invasive species and irrigation (if necessary); and
- A requirement for ten years of monitoring to determine the percentage of surviving plants each year and to adjust maintenance activities using an adaptive management approach.

4.2.2 Cactus and Yucca

Cactus and yucca found onsite could be relocated to a nursery for future restoration areas or relocated if adjacent land was purchased for mitigation, these actions would be covered in the VRMP.

4.2.3 Special Status Vegetation Communities

Desert Dry Wash Woodland is considered sensitive by the California Resources Agency and BLM due its limited distribution, value to wildlife, and susceptibility to disturbance (Bureau of Land Management 2002 and Zeiner, et al., 1990). The presence of water at least on a seasonal flow regime is vital for this community to persist. Due to this fact, and that the community covers very little of the Project site, project boundaries could be adjusted to avoid impacts the Desert Dry Wash Woodland and add a distance buffer between this vegetation community and the Project site.

4.2.4 Non-Native and Invasive Species

An IWMP should be prepared to reduce and/or eliminate the propagation and further spread of noxious and invasive weeds within and outside the Project site due to construction, operation and decommissioning of the Project. The objectives of the IWMP would be as follows.

- Identify weed species currently present within the Project components;
- Identify weeds not seen on the Project components that may have the potential to be present in the Project site and have the potential to invade the Project site due to construction activities;

- Identify construction and maintenance activities that may increase the presence of weeds or introduce new weed species on and adjacent to the Project components; and
- Specify steps that should be taken to ensure that the presence of weed populations on and adjacent to the Project components should not increase because of construction activities. These steps should be intended to prevent weeds not currently found on the Project site from becoming established there, and prevent weeds already present on the site from spreading to other areas.

4.3 WILDLIFE RECOMMENDATIONS

4.3.1 Amphibians

It is recommended that Project site be surveyed for ponding after heavy rains until construction to determine if suitable habitat for occupation of amphibians is present.

4.3.2 Reptiles

4.3.2.1 Desert Tortoise

Due to the potential presence of desert tortoise within the Project site, formal consultation between the BLM and USFWS would be necessary. A biological assessment that fully addresses the impacts to desert tortoise would be required to initiate formal consultation. Additionally, an incidental take permit would be required from the California Department of Fish and Wildlife in compliance with the California Endangered Species Act.

The measures described in this section reflect standard requirements and may be incorporated as part of the proposed Project, which would also be included in the biological assessment. The Biological Opinion (BO) would provide specific conditions and requirements that may supersede some of the following measures. A Lead Biologist should be designated for the Project and should be responsible for all aspects of clearance surveys, monitoring, desert tortoise translocation, contacts with agency personnel, reporting, and long-term monitoring and reporting.

Exclusion Fencing

Prior to beginning clearance surveys, desert tortoise exclusion fencing should be constructed in specified areas consistent with clearance survey areas. The Project site should be completely fenced with security and desert tortoise exclusion fencing, including desert tortoise exclusion gates at access points. Fence installation should be monitored as a linear component. Exclusion fencing should be maintained over the course of construction and operations, as necessary.

Preconstruction Clearance Surveys

Clearance surveys should be conducted consistent with the USFWS Desert Tortoise Field Manual and current translocation guidance (United States Fish and Wildlife Service 2009b and 2010a). If a desert tortoise or active burrow is found within a planned area of construction, surveys should stop at that time until the tortoise is translocated in the active season and per the Desert Tortoise Translocation Plan. If two complete passes are completed in a construction area (north-south and east-west) without a desert tortoise being found, construction may commence within that area outside of active season. Fencing should continue to be checked on a daily basis throughout construction.

Translocation

A Desert Tortoise Translocation Plan should be prepared for the Project. The purpose of the plan is to describe the process of translocation, minimize mortality of desert tortoises, and assess the effectiveness of the translocation effort through a long-term monitoring program. Injured tortoises should be transported to a rehabilitation facility approved by the USFWS and CDFW. Tortoises found recently killed should be salvaged and transported to a veterinary pathologist, who is familiar with desert tortoise and approved by the USFWS and CDFW. Procedures for salvaging and transport should generally follow Guidelines for the Field Evaluation of Desert Tortoise Health and Disease (Berry and Christopher 2001). Individuals approved and permitted by the USFWS and CDFW to conduct such assessments should conduct detailed health assessments on all live tortoises following current USFWS guidance. Detailed health assessments should be performed prior to translocation and repeated periodically during long-term monitoring.

Avoidance – Construction

During the construction of linear features (fencing, transmission lines, and access roads), all live tortoises and active burrows should be avoided to the extent possible. All activities should be monitored by qualified biologists. The biological monitor should instruct crews to provide approximately one hour for a live tortoise to leave an active construction area without assistance. If the tortoise does not leave the area on its own, an Authorized Biologist (listed under the BO to handle tortoises) should carefully move the tortoise out of the construction area and into a translocation area pursuant to the conditions of the BO. Biological monitors should flag an avoidance area approximately 20 m from any active burrow to be avoided and construction activities should continue around this avoidance area while a biologist monitors the burrow. If an active burrow cannot be avoided by construction activities, the burrow should be excavated using protocols in USFWS Desert Tortoise Field Manual (United States Fish and Wildlife Service 2009b).

Avoidance – Operations and Maintenance

During the operation phase of the Project, all applicable desert tortoise protection measures identified under construction should be implemented. For example, this may include the need for a biological monitor outside the fenced facility during road, fence and utility maintenance involving ground disturbance, annual WEAP refresher training, actions to take if a tortoise is encountered, etc. Additionally, a biological monitor should be designated and responsible for overseeing compliance with the desert tortoise protection measures. The biological monitor should have a copy of all measures including the BO when work is being conducted on site. The monitor should be on site during all Project maintenance activities to ensure compliance with the desert tortoise measures. The monitor should have the authority to halt all non-emergency activities that are in violation of the measures. Work should proceed only after hazards to desert tortoise are removed, the species is no longer at risk, or the individual has been moved from harm's way by an Authorized Biologist. An annual compliance report should be submitted to the BLM annually.

Common Raven Management Plan

A BBCS should be written that will include the Raven Management Plan, see section 4.5.2 and section 4.5.4.

4.3.2.2 Mojave Fringe-Toed Lizard and Herptofauna

The only listed species found on the Project site was the Mojave fringe-toed lizard. This lizard is found in loose-sand habitats and areas that have loose sand deposits. It is recommended to construct the Project with trying to avoid loose sand areas as much as possible.

4.3.3 Avian

Due to the potential presence of sensitive species on or near the Desert Quartzite project, a Bird and Bat Conservation Strategy (BBCS) should be written for the project. The goal of the BBCS would be to reduce the potential risks for avian and bat mortality potentially resulting from construction and operation of the Project. The objectives of this plan are as follows:

- Identify baseline conditions for raptor and bat species currently present at the Project components;
- Identify construction and operational activities that may increase the potential of adverse effects to these species on and adjacent to the Project components;

- Specify steps that should be taken to avoid, minimize and mitigate any potential adverse effects on these species; and
- Detail long-term monitoring and reporting goals.

Avian survey results will be used in the development of an avian risk characterization (illustrating species use and occurrence within the proposed Project site) as part of the Project Bird and Bat Conservation Strategy (BBCS).

4.3.3.2 Burrowing Owl

The BBCS for the project should include the Burrowing Owl Mitigation Plan. The intent of this plan would be to identify actions that will need to be taken for burrowing owls should they be detected on the Project.

Burrowing Owl site use changes temporally. Survey evidence suggests greater use of the Desert Quartzite footprint by BUOW outside of the breeding season, with only two (2) pairs observed remaining to attempt reproduction in 2013 and none in 2014.

If the intent of surveys is limited to the detection of burrowing owls prior to construction, it is recommended that no further action is taken until the Project nears construction. Phase II and Phase III surveys should be conducted 30-days prior to construction in an effort to confirm BUOW occupancy and give Project managers enough time to respond to findings.

Burrowing Owls Phase II and Phase III surveys should be conducted according to the methods described in, “Burrowing Owl Survey Protocol and Mitigation Guidelines” (Burrowing Owl Consortium, 1993). Burrowing owl surveys should adhere to the frequency and timing described by the “Staff Report on Burrowing Owl Mitigation” (California Department of Fish and Wildlife 2012).

4.3.3.3 Golden Eagles

Given the absence of confirmed Golden Eagle breeding pairs within 10-miles of the project site during our two years of surveys and overall lack of Golden Eagle sightings (with one exception), we do not recommend continuing to survey for Golden Eagles using Territory Occupancy Surveys going forth into the construction phase of the project. We do recommend that Migration Surveys, Line Transect Surveys, and Incidental Observations continue to document the presence of Golden Eagle and other sensitive species during the construction and post-construction phases of the project.

4.3.3.4 Elf Owl

No mitigation or further survey is recommended for this species.

4.3.3.5 Nesting Raptor/Raven

The BBCS will incorporate a Common Raven Management Plan. The primary objective of the raven plan is to protect the juvenile and hatchling desert tortoises from predation by common ravens. This should be accomplished in part by eliminating or minimizing all aspects of human impact that attract ravens (i.e., garbage, surface water, animal and plant waste materials, perching sites, nesting sites, and roosting sites). The secondary objective is to avoid lethal removal of ravens by installing passive bird deterrents. The final objective of this plan is to comply with the regional management actions of the agencies cooperating in the effort to promote tortoise recovery (United States Fish and Wildlife Service 2008b).

4.3.4 Mammals

4.3.4.1 Small Mammals

No special status species were found during the trapping activities, therefore, there are no recommendations.

4.3.4.2 Desert Kit Fox

Six dens were found to be active on the Project site. A Desert Kit Fox Management Plan should be developed, covering avoidance, exclusion and a hazing methodology.

4.3.4.3 Bats

Due to the potential presence of bat species within the Project site, a BBCS should be developed. The goal of the BBCS would be to reduce the potential risks for avian and bat mortality potentially resulting from construction and operation of the Project. The objectives of this plan are as follows:

- Identify baseline conditions for raptor and bat species currently present at the Project components;
- Identify construction and operational activities that may increase the potential of adverse effects to these species on and adjacent to the Project components;
- Specify steps that should be taken to avoid, minimize and mitigate any potential adverse effects on these species; and
- Detail long-term monitoring and reporting goals.

4.4 COMPENSATORY MITIGATION

Consistent with BLM NECO requirements and conditions likely to be imposed on the Project by CDFW and USFWS, areas of desert tortoise habitat should be acquired to partially offset the potential adverse effects of the Project. A Compensatory Mitigation Plan, or Habitat Compensation Plan, would be a valuable tool to document the details of mitigation opportunities. Land acquisition should be considered the first priority; however, it is evident that the land purchase opportunities within the Colorado Desert are limited. Supplemental mitigation actions may need to be considered and approved by the agencies. These actions could be in the form of habitat restoration and enhancement throughout the Colorado Desert. Continued coordination with the BLM, CDFW, and USFWS would be beneficial in identifying all possible compensatory mitigation opportunities as they arise.

5.0 REFERENCES

Berry, K. H and M. M. Christopher

2001 Guidelines for the Field Evaluation of Desert Tortoise Health and Disease. Journal of Wildlife Diseases, 37(3), 2001, pp. 427–450.

Bildstein, K.L, J.P. Smith and R. Yosef

2007 Migration counts and monitoring. *In* D.M. Bird and K.L. Bildstein (eds.). Raptor research and management techniques. Hancock House Publ., Surry, BC.

Bird, D.M., and K.L. Bildstein (eds.).

2007 (Book) Raptor research and management techniques. Hancock House Publishers, Surrey, British Columbia.

Bureau of Land Management

2012b US Department of Interior, Bureau of Land Management, Palm Springs South Coast Field Office Sensitive Plant List: Desert Species.

2009 US Department of Interior, Bureau of Land Management. Survey Protocols required for NEPA/ESA Compliance for BLM Special Status Plant Species. *www.blm.gov/ca/dir/pdfs/2009/im/CAIM2009- 026ATT1.pdf*

2002 US Department of Interior, Bureau of Land Management. Proposed Northern and Eastern Colorado Desert Coordinated Management Plan and Final Environmental Impact Statement (FEIS.) July 2002. *www.blm.gov/ca/st/en/fo/cdd/neco.html*

Bureau of Land Management and California Department of Fish and Game

2002 Final Environmental Impact Statement. Proposed Northern & Eastern Colorado Desert Coordinated Management Plan (NECO). Bureau of Land Management, California Desert, Riverside, CA.

California Department of Fish and Wildlife

2013a California Department of Fish and Wildlife, Natural Diversity Database. April 2013. Special Vascular Plants, Bryophytes, and Lichens List. Quarterly publication. 73 pp.

2013b California Fish and Game Code. http://www.leginfo.ca.gov/cgi-bin/calawquery?codesection=fgc

2009 Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Natural Communities. November 2009. nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=18959

2012 Staff Report on Burrowing Owl Mitigation. Department of Fish and Game. March 7, 2012. http://www.dfg.ca.gov/wildlife/nongame/docs/ BUOWStaffReport.pdf2.

California Burrowing Owl Consortium

1993 Burrowing Owl Survey Protocols and Mitigation Guidelines. Prepared for the California Department of Fish and Game.

California Native Plant Society Electronic Inventory (CNPSEI)

2015 Ripley and Roosevelt Mine 7.5 minute USGS quadrangles.

Consortium of California Herbaria

2012 Consortium of California Herbaria. Jepson Herbarium, UC Berkeley. 10,000m radius search centered on Quartszite project site, queried 29 September 2012 and 2 October 2012. *http://ucjeps.berkeley.edu/consortium/*

Egoscue, H.J.

1962 Ecology and Life History of the Kit Fox in Tooele County, Utah. Ecology, 43(3):481–497.

Franks, B.R., H. W. Avery, and J. R. Spotila

2011 Home range and movement of desert tortoises Gopherus agassizii in the Mojave Desert of California, USA. Endangered Species Research. Vol. 13: 191-201, 2011. Published online March 9.

Harmata, A. R., J. E. Durr, and H. Geduldig.

1978 Home range, activity patterns and habitat use of Prairie Falcons nesting in the Mojave Desert. U.S. Department of the Interior, Bureau of Land Management, Denver Federal Center, Denver, Colorado.

Holland, R.F.

1986 Preliminary Descriptions of the Terrestrial Natural Communities of California. The Resources Agency, Department of Fish and Wildlife, State of California.

Karl, Alice

2012 Personal communication by telephone, 13 October 2012.

McGrew, J.C.

1979. Vulpes macrotis. Mammalian Species 123:1–6.

Pagel, J.E., D.M. Whittington, and G.T. Allen.

2010 Interim Golden Eagle technical guidance: inventory and monitoring protocols; and other recommendations in support of eagle management and permit issuance. Division of Migratory Bird Management, U.S. Fish and Wildlife Service.

Renewable Energy Action Team (California Energy Commission, California Department of Fish and Wildlife, U.S. Department of Interior Bureau of Land Management, and Fish and Wildlife Service)

2010 Best Management Practices and Guidance Manual: Desert Renewable Energy Projects. California Energy Commission, Siting, Transmission and Environmental Protection Division. REAT-1000-2010-009-F.

Rosenberg, D. K., L. A. Trulio, D. H. Catlin, D. Chromczack, J. A. Gervais, N. Ronan, and K.A. Haley.

2007 The ecology of the burrowing owl in California, unpublished report to Bureau of Land Management.

Sawyer, J.O., T. Keeler-Wolf, J.M. Evans

2009 A Manual of California Vegetation, second edition. California Native Plant Society, Sacramento, California.

Stebbins, R.C. and S.M. McGinnis

2012 Amphibians and Reptiles of California.University of California Press, Berkeley, CA. 538 pp.

U. S. Fish and Wildlife Service

2008b Final Environmental Assessment to Implement a Desert Tortoise Recovery Plan Task: Reduce Common Raven Predation on the Desert Tortoise. March 2008.

2009b Desert tortoise field manual.

2010a Revised pre-project survey protocols for the desert tortoise (*Gopherus agassizii*).

Western Regional Climate Center

2013 Blythe CAA Airport, California. Available from: http://www.wrcc.dri.edu/summary/Climsmsca.html.

Wildlife Research Institute, Inc.

2010 Golden eagle surveys surrounding First Solar Stateline project area in San Bernardino County, California and Clark County, Nevada.

Zeiner, D. C., W. F.Laudenslayer, Jr., K. E. Mayer, and M. White, eds.

1990. California's Wildlife. Vol. I-III. California Depart. of Fish and Game, Sacramento, California. California Wildlife Habitat Relation-ship System (CWHRS). *http://www.dfg.ca.gov/biogeodata/cwhr/cawildlife.aspx.* Accessed October 2010

APPENDIX A RAINFALL DATA

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
1983	0.13	0.37	1.75	0.00	0.00	0.00	0.00	2.07	0.88	0.00	0.03	0.73	5.96
1984	0.06	0.00	0.00	0.00	0.02	0.00	2.44	0.11	0.00	0.00	0.10	3.33	6.06
1985	0.27	0.29	0.03	0.06	0.00	0.00	0.00	0.00	1.61	0.90	1.84	0.07	5.07
1986	0.07	0.40	0.19	0.02	0.00	0.00	0.11	0.05	0.90	0.50	0.69	0.75	3.68
1987	0.00	0.03	0.00	0.05	0.00	0.03	1.40	0.00	0.01	0.42	0.71	0.68	3.33
1988	0.42	0.61	0.02	0.98	0.00	0.00	0.00	0.83	0.00	0.07	0.00	0.00	2.93
1989	1.08	0.00	0.06	0.00	0.00	0.00	0.32	0.15	0.01	0.00	0.00	0.00	1.62
1990	0.14	0.01	0.21	0.00	0.02	0.00	0.22	1.47	0.13	0.06	0.00	0.00 z	2.26
1991	0.00 z	0.76	0.00 z	0.00 z	0.00	0.00	0.01	0.28	1.52	0.14	0.04	0.31	3.06
1992	0.78	1.59	2.15	0.28	0.03	0.00	0.00	1.93	0.00	0.20	0.00	2.20	9.16
1993	2.33	2.19	0.17	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.87	0.01	5.62
1994	0.01	0.29	0.68	0.02	0.12	0.00	0.69	0.14	0.00	0.00	0.06	1.23	3.24
1995	2.29	0.00 z	0.49	0.09	0.00 z	0.00	0.05	1.37	0.08	0.00	0.00	0.00	4.37
1996	0.10	0.27	0.09	0.00	0.22	0.00	0.00	0.00	0.85	0.01	0.04	0.01	1.59
1997	0.47	0.00	0.00	0.06	0.00	0.00	0.61	0.03	2.05	0.01	0.03	1.06	4.32
1998	0.28	3.03	1.29	0.01	0.01	0.00	0.05	0.47	0.52	0.04	0.16	0.21	6.07
1999	0.00	0.34	0.00	1.00	0.04	0.00	1.20	0.00	0.74	0.00	0.00	0.00	3.32
2000	0.00	0.08	0.38	0.00	0.00	0.01	0.00	1.03	0.00	0.00	0.00 b	0.00	1.50
2001	0.81	0.67	1.55	0.01	0.00	0.00	0.00	0.00 c	0.00	0.00	0.11	0.03	3.18
2002	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.75	0.04	0.03	0.00	0.86
2003	0.11	1.08	0.28	0.08	0.00	0.00	0.06	0.00	0.07	0.00	0.33	0.00	2.01
2004	0.02	0.57	0.81	0.06	0.00	0.00	0.00	0.02	0.12	1.02	0.31	0.57	3.50
2005	1.55	2.83	0.21	0.00	0.00	0.00	0.00	1.35	0.00	0.85	0.00	0.00	6.79
2006	0.00	0.00	0.25	0.00	0.00	0.20	0.15	1.46	1.44	0.04	0.00	0.00	3.54
2007	0.16	0.07	0.53	0.00	0.00	0.00	0.00	0.00	0.06	0.00	1.11	0.00	1.93
2008	0.77	0.02	0.00	0.00	0.18	0.00	0.27	0.15	0.06	0.00	0.24	0.65	2.34
2009	0.02	0.43	0.00	0.00	0.03	0.01	0.07	0.02	0.03	0.00	0.00	0.85	1.46
2010	2.12	0.90	0.67	0.01	0.00	0.00	0.00	0.03	0.00	0.26	0.00	0.54	4.53
2011	0.00	1.17	0.06	0.00	0.00	0.00	1.64	0.00	0.08	0.12	0.29	0.60	3.96
2012	0.00	0.01	0.19	0.14	0.00	0.00	1.88	1.05	0.07	0.27	0.00	0.86	4.47
2013	0.77	0.01	0.03	0.00 z	0.00 z	0.00 z	0.00 z	0.00 z	0.00 z	0.00 z	0.00 z	0.00 z	0.81

[1] Western Regional Climate Center (2011)
[2] Missing data

APPENDIX B SPECIES DETECTED (NON-AVIAN)

Appendix B: Species Detected-(Non-Avian)-Primary Study Area

Reptiles		
Desert Tortoise	Gopherus agassizii	O,C
California Kingsnake	*Lampropeltis getula californiae*	O
Coachwhip	*Masticophis flagellum*	O
Desert Horned Lizard	*Phrynosoma platyrhinos*	O, S
Desert Iguana	*Dipsosaurus dorsalis*	O, S
Desert Spiny Lizard	*Sceloporus magister*	O
Glossy Snake	*Arizona elegans*	O
Long-nosed Leopard Lizard	*Gambelia wislizenii*	O
Long-tailed Brush Lizard	*Urosaurus graciosus*	O
Mojave Fringe Toed Lizard	*Uma scoparia*	O
Side-blotched Lizard	*Uta stansburiana*	O
Sidewinder	*Crotlus cerastes*	O
Western Banded Gecko	*Coleonyx variegatus variegatus*	O
Western Patch-nosed Snake	*Salvadora hexalepis*	O
Western Shovel-nosed Snake	*Chionactis occipitalis*	O
Western Whiptail	*Cnemidophorus tigris*	O
Zebra-tailed Lizard	*Callisaurus draconoides*	O
Mammals		
Black-tailed Jackrabbit	*Lepus californicus*	O, T, S
Burro Deer	*Odocoileus hemionus eremicus*	O, T, S
California Myotis	*Myotis californicus*	V
Canyon Bat	Parastrellus hesperus	V
Cave Myotis	Myotis velifer	V
Coyote	*Canis latrans*	T, S, B
Desert Cottontail	*Sylvilagus audubonii*	O, T, S, B
Desert Kangaroo Rat	*Diodomys deserti*	O, B
Desert Kit Fox	*Vulpes macrotis arsipus*	B, T, S
Desert Woodrat	*Neotoma lepida*	O, B
Little Pocket Mouse	Perognathus longimembris	O
Long-tailed Pocket Mouse	Chaetodipus spp.	O
Merriam's Kangaroo Rat	*Dipodomys merriami*	O, B
Mexican Free-tailed Bat	Tadarida brasiliensis	V
Pallid Bat	Antrozous pallidus	V
Palm Spring Round-tailed Ground Squirrel	Spermophilus teriticaudus chlorus	O
Pocketed Free-Tailed Bat	Nyctinomops femorosaccus	V
Southern Grasshopper Mouse	Onychomys torridus	O, B
Western Mastiff Bat	Eumops perotiss	V
White-tailed Antelope Ground Squirrel	*Ammospermophilus leucurus*	**O**

0-Observed Directly
B- Burrow
T-Tracks
V- Vocalization
S-Scat
C- Carcass

APPENDIX C SPECIAL STATUS TARGET PLANT SPECIES

Scientific Name **Common Name**	**Status**		**Flowering Period**	**Occurrence on site**
Abronia villosa var. *aurita* chaparral sand-verbena	Global Rank: Federal Listing: State Listing: State Rank: CNPS Rank: NECO:	G5T3T4 none, BLM sensitive none S2 1B.1 not covered	Jan - Sept	Presumed absent; potential habitat present on site but not found during surveys
Acleisanthes longiflora angel trumpets	Global: Federal: State Listing: State Rank: CNPS Rank: NECO:	G5 none none S1 2.3 covered	May	Presumed absent: no suitable habitat onsite (rocky carbonate canyon bottoms).
Astragalus insularis var. *harwoodii* Harwood's milkvetch	Global: Federal Listing: State Listing: State Rank: CNPS Rank: NECO:	G5T3 none none S2 2.2 covered	Jan - May	**PRESENT:** 13,712 individuals estimated on site.
Astragalus lentiginosus var. borreganus Borrego milk-vetch	Global: Federal Listing: State Listing: State Rank: CNPS Rank: NECO:	G5T4T5 none none S3.3 4.3 covered	Feb - May	Presumed absent: potential habitat present on site but not found during surveys
Astragalus lentigunosis var. *coachellae* Coachella valley milk-vetch	Global: Federal Listing: State Listing: State Rank: CNPS: NECO:	G5T2 none; BLM sensitive none S2 1B.2 covered	Feb - May	Presumed absent: potential habitat present on site but not found during surveys

Scientific Name **Common Name**	**Status**		**Flowering Period**	**Occurrence on site**
Astragalus sabulonum gravel milk-vetch	Global: Federal Listing: State Listing: State Rank: CNPS: NECO:	G5 none none S2 2.2 not covered	Feb - July	Presumed absent: potential habitat present on site but not found during surveys
Calliandra eriophylla pink fairy-duster	Global: Federal Listing: State Listing: State Rank: CNPS: NECO:	G5 none none S2S3 2.3 not covered	Jan - Mar	Presumed absent: potential habitat present on site but not found during surveys
Carnegia gigantea saguaro	Global: Federal Listing: State Listing: State Rank: CNPS: NECO:	G5 none none S1 2.2 covered	May - June	Absent: not found during surveys, little potential habitat on site.
Castela emoryi Emory's crucifixion-thorn	Global: Federal Listing: State Listing: State Rank: CNPS: NECO:	G4 none none S2S3 2.3 covered	Apr - Jul	Absent; potential habitat present on site but not found during surveys
Euphorbia abramsiana *=Chamaesyce abramsiana* Abrams' spurge	Global: Federal Listing: State Listing: State Rank: CNPS: NECO:	G4 none none S2S3 2.2 not covered	Sep – Nov	**PRESENT:** appx. 2104 individuals found during Fall 2012 surveys

Scientific Name **Common Name**	**Status**		**Flowering Period**	**Occurrence on site**
Euphorbia parryi *=Chamaesyce parryi* Parry's spurge	Global: Federal Listing: State Listing: State Rank: CNPS: NECO:	G5 none none S1 2.3 not covered	May - June	Presumed absent: potential habitat present on site but not found during surveys
Euphorbia platysperma *=Chamaesyce platysperma* flat-seeded spurge	Global: Federal Listing: State Listing: State Rank: CNPS: NECO:	G3 none; BLM sensitive none S1 1B.2 not covered	Feb - Sep	Presumed absent: potential habitat present on site but not found during surveys
Colubrina californica Las Animas colubrina	Global: Federal Listing: State Listing: State Rank: CNPS: NECO:	G4 none none S2S3.3 2.3 not covered	Apr - Jun	Absent: not found during surveys; no potential habitat on site (rocky wash bottoms & margins)
Coryphantha alversonii foxtail cactus	Global: Federal Listing: State Listing State Rank: CNPS: NECO:	G3 none none S3.2 4.3 covered	Apr - Jun	Absent: potential habitat present on site but not found during surveys
Cryptantha costata ribbed cryptantha	Global: Federal Listing: State Listing State Rank: CNPS: NECO:	G4G5 none none S3.3 4.3 not covered	Jan - May	**PRESENT:** appx. 56,748 individuals estimated on site

Scientific Name **Common Name**	**Status**		**Flowering Period**	**Occurrence on site**
Ditaxis clariana glandular ditaxis	Global: Federal Listing: State Listing: State Rank: CNPS: NECO:	G4G5 none none S1 2.2 covered	Dec - Mar	Presumed absent: potential habitat present on site but not found during surveys
Ditaxis serrata var. *californica* California ditaxis	Global: Federal Listing: State Listing: State Rank: CNPS: NECO:	G5T2T3 none none S2 3.2 covered	Apr - Nov	presumed absent: potential habitat present on site but not found during surveys
Eriastrum harwoodii Harwood's eriastrum	Global: Federal Listing: State Listing: State Rank: CNPS: NECO:	G3 none; BLM sensitive none S3 1B.2 not covered	Mar - May	**PRESENT:** appx. 882 individuals found on site
Funastrum utahense Utah vine milkweed	Global: Federal Listing: State Listing: State Rank: CNPS: NECO:	G4 none none S3.2 4.2 not covered	Apr - Sep	**PRESENT:** 1 individual found on site
Helianthus niveus ssp. *tephrodes* Algodones Dunes sunflower	Global: Federal Listing: State Listing: State Rank: CNPS: NECO:	G4T2 none Endangered S2 1B.2 not covered	Mar - May Oct - Jan	Absent: potential habitat present on site but not found during surveys

Scientific Name **Common Name**	**Status**		**Flowering Period**	**Occurrence on site**
Hymenoxys odorata bitter hymenoxys	Global: Federal Listing: State Listing: State Rank: CNPS: NECO:	G5 none none S2 2 not covered	Feb - Aug	Absent: no suitable habitat on site (moist river margins and benches)
Imperata brevifolia California satintail	Global: Federal Listing: State Listing: State Rank: CNPS: NECO:	G2 none none S2.1 2.1 not covered	Sep - May	Absent: no suitable habitat on site (moist river plains & canal margins)
Koeberlinia spinosa ssp. *tennuispina* Crown-of-Thorns	Global: Federal Listing: State Listing: State Rank: CNPS: NECO:	G4T4 none none S2.2 2.2 covered	Mar - Jul	Absent: potential habitat present on site but not found during surveys
Mammillaria grahamii var. grahamii Graham's fishhook cactus	Global: Federal Listing: State Listing: State Rank: CNPS: NECO:	G4T4 none none S2 2.2 not covered	Apr	Absent: potential habitat present on site but not found during surveys
Mentzelia puberula Darlington's blazing star	Global: Federal Listing: State Listing: State Rank: CNPS: NECO:	G4 none none S2 2.2 not covered	Mar - May	Absent: no potential habitat present on site (rocky limestone and granite slopes)

***Scientific Name* Common Name**	**Status**		**Flowering Period**	**Occurrence on site**
Opuntia wigginsii Wiggins' cholla	Global: Federal Listing: State Listing: State Rank: CNPS: NECO:	G3?Q none none S1? 3.3 covered	Mar - June	Absent: potential habitat occurs on site but not found during surveys. Questionable taxonomic validity.
Penstemon pseudospectabilis ssp. *speudospectabilis* desert beardtongue	Global: Federal Listing: State Listing: State Rank: CNPS: NECO:	G4G5T3T5 none none S3 2.2 not covered	Mar - May	Presumed absent: potential habitat present on site but not found during surveys
Physalis lobata lobed cround cherry	Global: Federal Listing: State Listing: State Rank: CNPS: NECO:	G5 none none S2 2.3 covered	May - Jan	Presumed absent: potential habitat present on site but not found during surveys
Portulaca halimoides desert portulaca	Global: Federal Listing: State Listing: State Rank: CNPS: NECO:	G5 none none S3 4.2 not covered	Sept	Presumed absent: potential habitat present on site but not found during surveys
Proboscidea althaefolia desert unicorn-plant	Global: Federal Listing: State Listing: State Rank: CNPS: NECO:	G5 none none S3.3 4.3 covered	May - Aug	**PRESENT:** appx. 811 individuals estimated during Fall 2012 surveys

Scientific Name **Common Name**	**Status**		**Flowering Period**	**Occurrence on site**
Teucrium cubense ssp. *depressum* dwarf germander	Global: Federal Listing: State Listing: State Rank: CNPS: NECO:	G4G5T3T4 none none S2 2.2 not covered	Mar - Nov	Presumed absent: marginal habitat present on site but not found during surveys
Wislizenia refracta var. *refracta* jackass clover	Global: Federal Listing: State Listing: State Rank: CNPS: NECO:	G5T5? none none S1 2.2 not covered	Apr - Nov	Presumed absent: potential habitat present on site but not found during surveys
Wislizenia refracta var. *palmeri* Palmer's jackass clover	Global: Federal Listing: State Listing: State Rank: CNPS: NECO:	G5T2T4 none none S1 2.2 covered	Jan - Dec	Presumed absent: potential habitat present on site but not found during surveys

APPENDIX D DESERT QUARTZITE AVIAN WORK SUMMARY

Desert Quartzite Avian Work Summary
Spring 2013 – Winter 2015

Prepared for:

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June, 2015

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Appendices

Appendix A. Quartzite Migratory Bird Survey Protocol
Appendix B. Quartzite Avian Line-Transect Protocol
Appendix C. Quartzite Elf Owl Habitat Assessment

1. Overview

Avian Surveys at Quartzite used various sampling methodologies to depict the occurrence and habitat (site) use by birds during all critical life stages. Sampling models and survey techniques were designed to maximize the detection of migratory birds and local residents; including all raptor, shorebird, waterfowl and passerine species. Each sampling methodology was selected to increase the potential for species detection respective to habitat type, and particular attention was focused on the detection of sensitive and/ or listed species.

2. Migratory Bird Surveys

The purpose of the Migratory Bird Surveys was to record observed avian migration and use patterns at, and adjacent to, the Project site. Data on diurnal bird migration will provide information on:

- Seasonal and individual population pulses
- Range of daily behavior and movements
- Flight elevation through and near the Project
- Duration of visitation by migratory birds, including raptors

Survey results will be used in the development of an avian risk characterization (illustrating species use and occurrence within the proposed Project Site) as part of the Project's Bird and Bat Conservation Strategy (BBCS).

2.1 Unlimited Distance Extended Observation Surveys

An avian biologist monitored migration trends following guidance provided by BLM, USFWS, and CDFW, and protocol based on Hawk Migration Association of North America (HMANA) standard field survey techniques. The HMANA protocol, modeled after Cape May Raptor observation methods, is now standard for hawk migration counts (Bird and Bildstein 2007, Bildstein et al. 2007). A survey-specific protocol (Appendix A) was developed based on the above referenced documents.

Two migration points (MP) bisect the proposed Project Site footprint along the central east-west axis, and exhibit near 360 degree views of the distant horizon to maximize visual capture of migrating birds passing over the area (Table 1). After the Fall 2013 season, avian biologists determined that, due to the pattern of migratory movement prevalent in the area, the survey points should be adjusted to maximize visibility of migrating birds to the observer. Beginning during the spring of 2014, MP01 and MP02 were replaced with MP03 and MP04 (Table 1; Figure 1). During peak migration periods during the spring and fall of 2013 and 2014 an avian biologist conducted a survey at each MP, once per week, using unlimited-distance bird migration survey methods.

Table 1. Migration Point Locations

Survey Point	UTM (WGS 84)	
	Easting	Northing
MP01	706914	3717172
MP02	710176	3717195
MP03	712050	3717046
MP04	707330	3720406

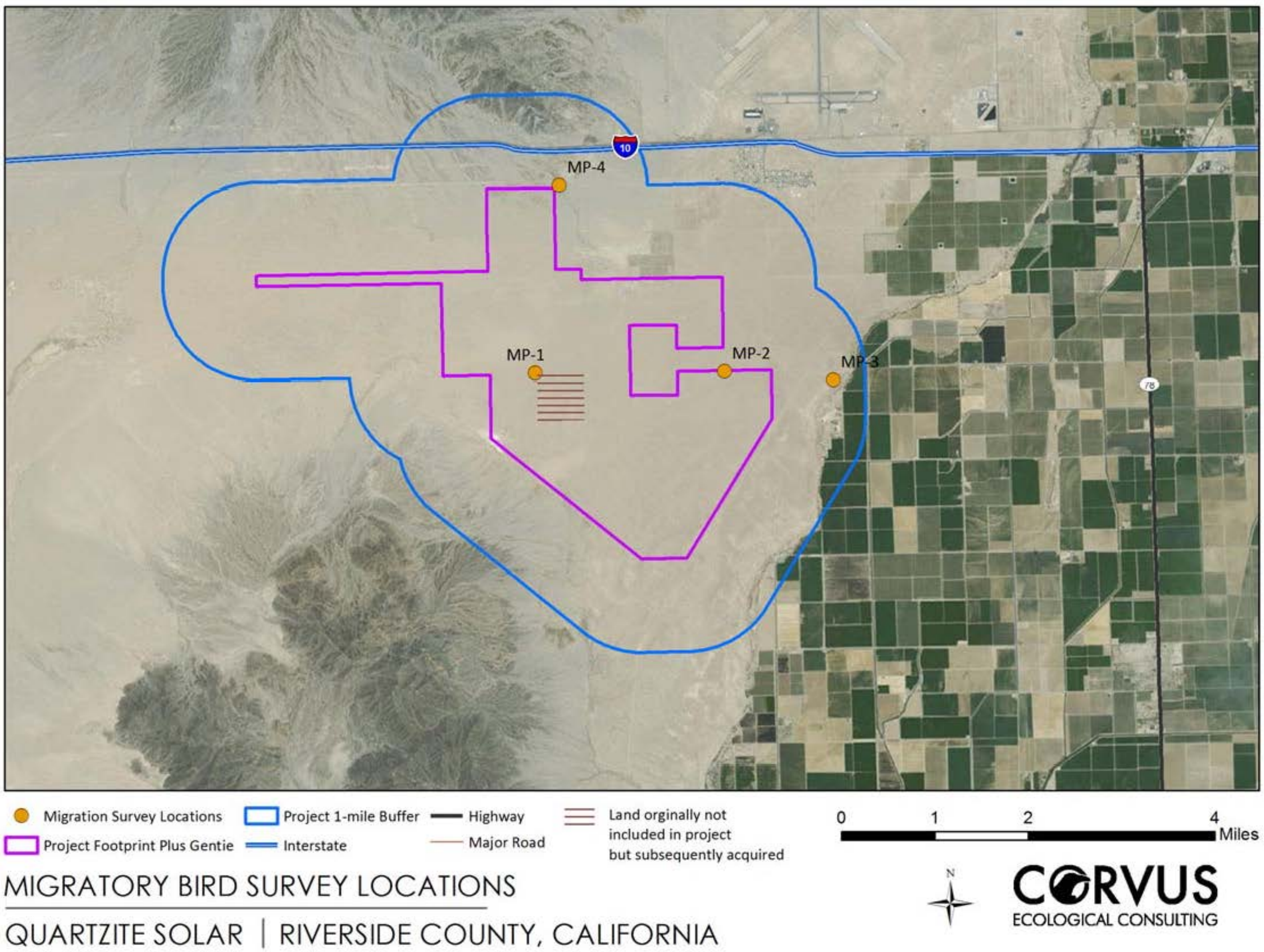

Figure 1. Quartzite Migration Point Locations

Each migration point was visited 6 times between 18 April, 2013 and 18 May, 2013 and 11 times between 2 September 2013 and 12 November 2013. The number of visits was limited during the spring 2013 migration period by delays surrounding agency acceptance of a project-specific Avian Work Plan (Table 2). During the spring of 2014, the new MPs were each visited 11 times between 3 March and 22 May and between 5 September and 15 November.

Table 2. Migration Point Visits -- Spring 2013-Fall 2014

2013			2014		
Point ID	**Visit Date**	**Observer**	**Point ID**	**Visit Date**	**Observer**
MP-1	4/18/2013	J. Yerger	MP-3	3/5/2014	Roger Radd
	4/25/2013	Roger Radd		3/10/2014	Roger Radd
	4/28/2013	Roger Radd		3/17/2014	Roger Radd
	5/3/2013	Roger Radd		3/24/2014	Roger Radd
	5/10/2013	Roger Radd		4/1/2014	Roger Radd
	5/13/2013	Roger Radd		4/1/2014	Roger Radd
	5/23/2013	Roger Radd		4/8/2014	Roger Radd
	5/30/2013	Roger Radd		4/21/2014	Roger Radd
	9/3/2013	Roger Radd		5/5/2014	Roger Radd
	9/11/2013	Roger Radd		5/15/2014	Roger Radd
	9/17/2013	Roger Radd		5/22/2014	Roger Radd
	9/23/2013	Roger Radd		9/5/2014	Erin Lockward
	10/2/2013	Roger Radd		9/11/2014	Erin Lockward
	10/7/2013	Roger Radd		9/21/2014	Erin Lockward
	10/15/2013	Roger Radd		9/27/2014	Erin Lockward
	10/21/2013	Roger Radd		10/2/2014	Erin Lockward
	10/29/2013	Roger Radd		10/9/2014	Erin Lockward
	11/4/2013	Roger Radd		10/13/2014	Brooks Hart
	11/11/2013	Roger Radd		10/23/2014	Erin Lockward
MP-2	4/18/2013	Roger Radd		10/27/2014	Erin Lockward
	4/26/2013	Roger Radd		11/6/2014	Erin Lockward
	5/2/2013	Roger Radd		11/10/2014	Erin Lockward
	5/6/2013	Roger Radd	MP-4	3/6/2014	Roger Radd
	5/11/2013	Roger Radd		3/11/2014	Roger Radd
	5/18/2013	Roger Radd		3/17/2014	Roger Radd
	5/22/2013	Roger Radd		3/25/2014	Roger Radd
	5/28/2013	Roger Radd		4/2/2014	Roger Radd
	9/2/2013	Roger Radd		4/9/2014	Roger Radd
	9/12/2013	Roger Radd		4/22/2014	Roger Radd
	9/18/2013	Roger Radd		5/7/2014	Roger Radd
	9/24/2013	Roger Radd		5/14/2014	Roger Radd

2013			2014		
Point ID	Visit Date	Observer	Point ID	Visit Date	Observer
	10/3/2013	Roger Radd		5/20/2014	Roger Radd
	10/8/2013	Roger Radd		9/6/2014	Erin Lockward
	10/17/2013	Roger Radd		9/14/2014	Erin Lockward
	10/23/2013	Roger Radd		9/18/2014	Erin Lockward
	10/30/2013	Roger Radd		9/28/2014	Erin Lockward
	11/5/2013	Roger Radd		10/6/2014	Erin Lockward
	11/12/2013	Roger Radd		10/12/2014	Erin Lockward
				10/15/2014	Brooks Hart
				10/25/2014	Erin Lockward
				10/29/2014	Brooks Hart
				11/8/2014	Erin Lockward
				11/15/2014	Erin Lockward

2.2 Migration Survey Results to Date

A close inspection of the data collected over the course of four seasons to date has revealed two distinct peaks in migration for the area in 2014 (Figure 2). The first is in the spring around 24 March, and the second is in the fall around 21 September. Data collected during the spring of 2013 resulted in fewer observations compared to efforts undertaken during the spring of 2014 and there was no clear peak in 2013. In fall of 2013 there were two peaks: 1 October and 9 October. Uncontrollable and variable factors including rainfall rates, temperatures, wind speed and wind direction could have an influence on these results and these peak migratory periods should be considered approximate due to the limited number of survey seasons represented.

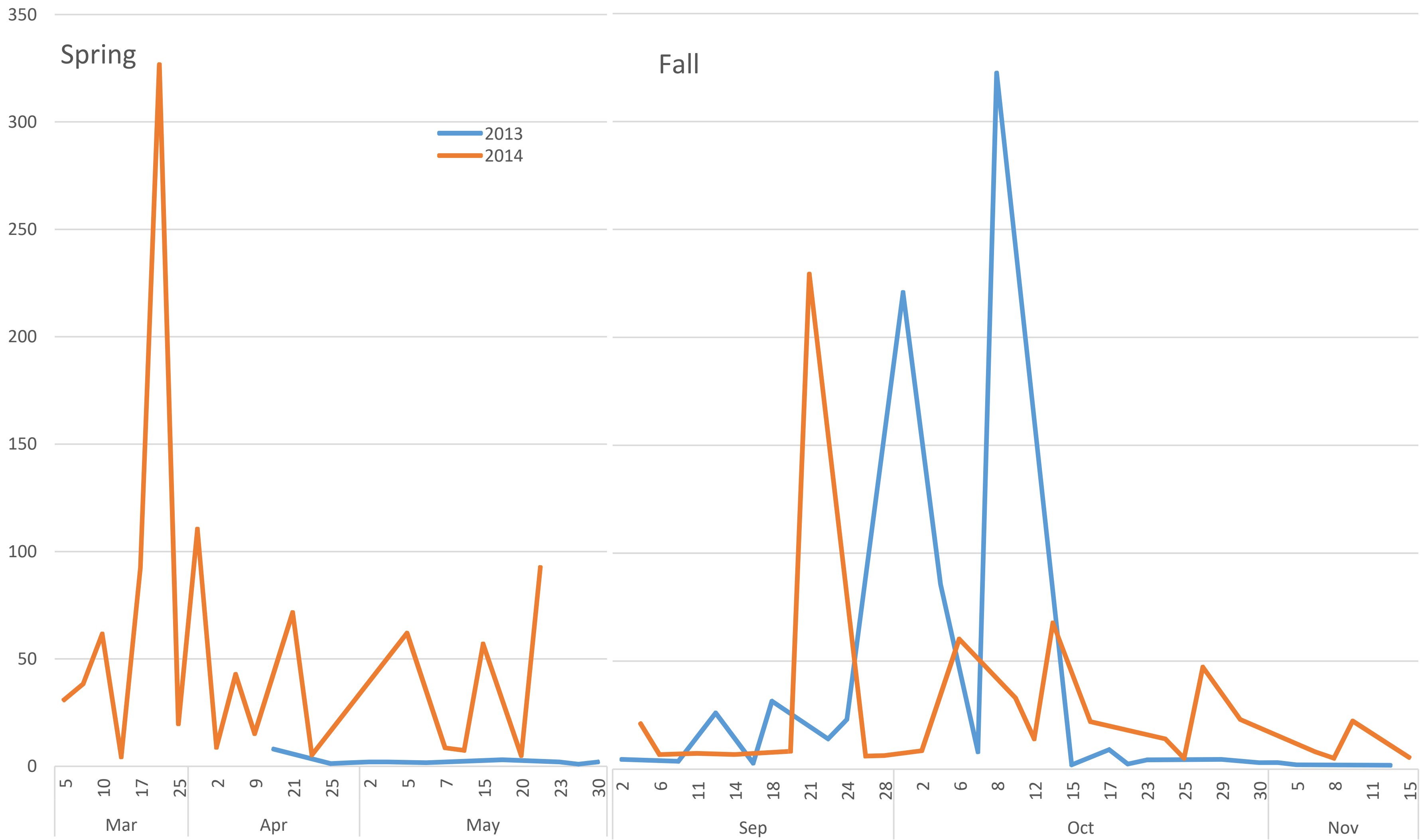

Figure 2. Average # of Birds Recorded durign Migration Surveys by Date

The greatest numbers of individual species detected at one time during the spring were flocks of unidentified swallows and tree swallows with numbers reaching 1000 and 950 birds respectively on a single day (all in 2014). Large number of Turkey Vultures (782 in one day for the highest count) and Swainson's Hawks (620 in one day) were observed during fall migration. Totals of each species for each season and year can be found in Table 3.

For the 7 species for which we detected >=100 individuals during a particular survey period (excluding detections that did not result in identification to species), we also looked at first and last observation dates for those periods (Table 4).

Table 3. Total Numbers of Each Species Detected by Season and Year

Common Name	Total # Birds Detected			
	Spring 2013	Fall 2013	Spring 2014	Fall 2014
American Kestrel	2	6	21	13
Ash-throated Flycatcher	1		8	
Barn Swallow	5	729	53	715
Black Phoebe				1
Black-headed Grosbeak			2	
Black-tailed Gnatcatcher			10	25
Black-throated Gray Warbler			1	1
Blue-gray Gnatcatcher			1	11
Brewer's Sparrow		8	7	
Bullock's Oriole			6	1
Cactus Wren			6	6
Cliff Swallow	33	2	7	26
Common Raven	1		27	26
Common Yellowthroat				1
Cooper's Hawk		5	8	1
Costa's Hummingbird			4	
Eurasian Collared-Dove			6	2
Ferruginous Hawk		6	6	
Gambel's Quail			4	24
Gray Flycatcher	1		1	
Great Blue Heron			5	12
Great Egret			4	8
Greater Roadrunner			3	4
Great-tailed Grackle				50
Horned Lark		111		61
House Finch			2	193
House Sparrow				2
House Wren				3
Lazuli Bunting				2
Le Conte's Thrasher				7
Lesser Goldfinch			1	3
Lesser Nighthawk			3	
Loggerhead Shrike	1		7	16
MacGillivray's Warbler			2	
Mourning Dove	2		45	2

Common Name	Total # Birds Detected			
	Spring 2013	Fall 2013	Spring 2014	Fall 2014
Northern Flicker		1		4
Northern Harrier	2	23	32	3
Northern Rough-winged Swallow	2	11	6	4
Orange-crowned Warbler			1	6
Osprey		3	2	
Phainopepla			6	6
Prairie Falcon		9	10	2
Red-tailed Hawk	6	32	33	14
Red-winged Blackbird			100	
Rock Wren				15
Ruby-crowned Kinglet				3
Sage Sparrow (Unspecified)		1		3
Sandhill Crane			285	
Say's Phoebe		1		17
Sharp-shinned Hawk		5	3	3
Snowy Egret			42	
Swainson's Hawk	3	668	45	14
Tree Swallow	7	3	1618	
Turkey Vulture	22	1695	495	306
Unidentified Blackbird				32
Unidentified Empidonax Flycatcher			1	
Unidentified Hawk		104	82	4
Unidentified Hummingbird		1	9	
Unidentified Larus Gull			5	
Unidentified Sparrow		1	5	3
Unidentified Swallow	7	60	2646	381
Unidentified Warbler			5	7
Vaux's Swift		2	3	11
Verdin			6	23
Violet-green Swallow				154
Warbling Vireo			3	
Western Kingbird			16	
Western Meadowlark				26
Western Tanager			18	
White-crowned Sparrow				21
White-faced Ibis			12	
White-throated Swift	2		16	
White-winged Dove			547	1
Willow Flycatcher				1
Wilson's Warbler			5	4
Yellow Warbler			1	
Yellow-headed Blackbird			56	
Yellow-rumped Warbler		2	34	126

Table 4. Earliest and latest dates for most commonly detected species.

Common Name	Spring 2013		Fall 2013		Spring 2014		Fall 2014	
	Earliest Date	Latest Date	Earliest Date	Latest Date	Earliest Date	Latest Date	Earliest Date	Latest Date
Barn Swallow	*18-Apr-13	18-May-13	17-Sep-13	17-Oct-13	21-Apr-14	05-May-14	* 05-Sep-14	15-Oct-14
Horned Lark			12-Sep-13	08-Oct-13			11-Sep-14	10-Nov-14
Red-winged Blackbird					05-May-14	05-May-14		
Swainson's Hawk	02-May-13	28-May-13	17-Sep-13	08-Oct-13	24-Mar-14	15-May-14	* 05-Sep-14	13-Oct-14
Tree Swallow	*18-Apr-13	18-Apr-13	30-Oct-13	30-Oct-13	*05-Mar-14	05-May-14		
Turkey Vulture	*18-Apr-13	23-May-13	*02-Sep-13	*12-Nov-13	*05-Mar-14	*22-May-14	*05-Sep-14	08-Nov-14
White-winged Dove					21-Apr-14	*22-May-14	* 05-Sep-14	05-Sep-14
Violet-green Swallow							21-Sep-14	9-Oct-14
Yellow-rumped Warbler							6-Oct-14	15-Nov-14

*Indicates that this date corresponds to the earliest or latest date (respectively) of surveys for that particular season. In these cases, it is possible that we did not capture the true start or end of migration periods for that species.

3. Upland Bird Surveys

The purpose of Upland Bird Surveys is to depict avian use patterns at and adjacent to the proposed Project site. Data will provide information on:

- Sedentary and migratory populations
- Species richness (number of different species present)
- Species diversity (species richness combined with species evenness)
- Species use, behavior and movements
- Species distribution across the project

Qualified biologists conducted surveys from the spring of 2013 to the winter of 2014-15, not including the summer months, recording all species observed and documenting their site use. Surveyors followed a sampling model that implemented a line-transect survey methodology. The project-specific survey protocol is available in Appendix B.

Survey results will be used in the development of an avian risk characterization (illustrating species use and occurrence within the proposed Project Site) as part of the Project Bird and Bat Conservation Strategy (BBCS).

3.1. Line Transect Sampling

Line-transect sampling was conducted by traveling a predetermined route and recording all bird detections (visual or aural) on either side of the transect line. The distance a bird was detected from the transect line was estimated and recorded as an absolute measure. The observer scanned the sky as well as the surrounding habitat and recorded bird use and movement data under good weather conditions (i.e., good visibility, no sustained precipitation and average wind speeds less than 15 mph). Each line-transect was surveyed in an effort to capture species occurrences and temporal site use through the spring season. Surveys were timed to capture migrants, breeding birds and local residents.

Recorded information included:

- transect start time
- species identification
- number of birds seen
- flight height
- time of day
- horizontal distance (perpendicular) to line
- bearing from the transect line to the point of detection
- behavior during observation
- transect end time

A project-specific survey protocol was developed to ensure consistent data collection (Appendix B).

A total of eight 2000 meter long transects were established in spring 2013 and 8 more were added in fall of 2013 (Table 5). To facilitate robust data analysis, half (8) of the line-transects were situated within the Project footprint and half were located outside the project area on public lands with similar habitat composition. One transect of each subset samples microphyll woodland. The control to sample ratio is therefore; 1:1. In October of 2014, we were notified to begin surveying the small 162-acre in holding that was previously excluded from surveys (shown in Figure 1). Two shorter (500 m) transects were added in this area.

Table 5. Transect Beginning and End Points (A and B)

Transect ID	Site Name	Start Point		End Point	
		Easting	Northing	Easting	Northing
T1	Project Footprint	707,056	3,718,437	709,056	3,718,464
T2	Project Footprint	706,625	3,718,060	706,666	3,716,060
T3	Project Footprint	708,120	3,717,427	708,120	3,715,427
T4	Project Footprint	709,439	3,716,511	709,494	3,714,512
T5	Project Control	711,338	3,718,342	711,378	3,716,343
T6	Project Control	711,213	3,715,380	709,722	3,714,047
T7	Project Control	709,278	3,713,697	709,344	3,711,698
T8	Project Control	705,184	3,715,178	706,759	3,713,945
T9	Project Footprint	707,892	3,718,197	709,892	3,718,200
T10	Project Footprint	708,539	3,716,485	708,539	3,714,490
T11	Project Footprint	708,886	3,716,512	708,886	3,714,510
T12	Project Footprint	709,888	3,716,943	709,888	3,714,940
T13	Project Control	708,156	3,720,221	710,062	3,719,778
T14	Project Control	702,774	3,720,043	704,686	3,719,486
T15	Project Control	703,314	3,718,563	704,016	3,716,690
T16	Project Control	706,845	3,713,635	708,829	3,713,748
T17	Project Footprint	707,245	3,717,067	707,245	3,716,617
T18	Project Footprint	707,645	3,716,876	707,645	3,716,426

Transects within the project footprint, were aligned to promote continuity with post-construction surveys unimpeded by installed solar panel arrays (Figure 2). While transect locations may not be identical witin the Project footprint post-construction, the same distance (effort) can be covered between the varous phases.

To reduce temporal bias, transects randomized with respect to order performed and also at which end to start for each survey. At least three visits per transect per season were used in analysis (Table 6).

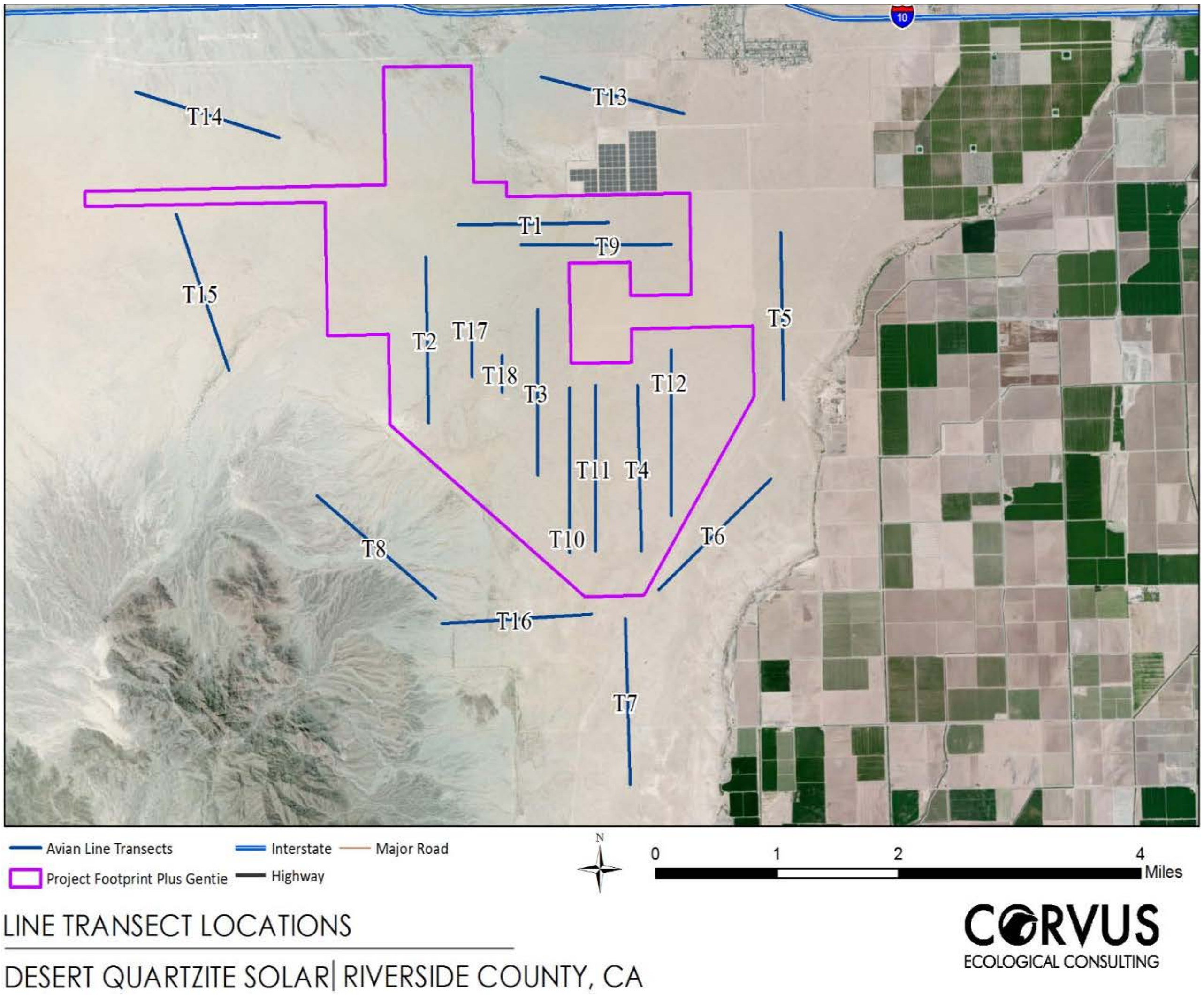

Figure 3. Quartzite Line-transect Locations, Fall 2013 to Winter 2014-15

Table 6. Summary of Line Transect Surveys Conducted April 2013 through February 2015

Transect ID	Start Point	Visit Date	Observer	Start Time	End Time	Start Point	Visit Date	Observer	Start Time	End Time
T1	B	4/18/2013	John Yerger	6:39 AM	7:43 AM	B	3/24/2014	Roger Radd	7:17 AM	8:46 AM
	A	4/28/2013	Roger Radd	6:45 AM	7:40 AM	A	4/21/2014	Roger Radd	7:07 AM	8:36 AM
	B	5/2/2013	Roger Radd	6:16 AM	7:09 AM	B	5/9/2014	Roger Radd	6:06 AM	7:37 AM
	B	9/2/2013	Roger Radd	6:29 AM	7:59 AM	A	9/11/2014	Erin Lockward	6:43 AM	7:07 AM
	A	10/4/2013	Roger Radd	7:12 AM	8:38 AM	B	10/2/2014	Erin Lockward	9:53 AM	10:15 AM
	A	11/7/2013	Roger Radd	6:55 AM	8:47 AM	A	11/6/2014	Erin Lockward	6:25 AM	6:51 AM
	A	12/2/2013	Roger Radd	7:09 AM	8:55 AM	B	12/11/2014	Erin Lockward	8:19 AM	8:56 AM
	B	1/6/2014	Roger Radd	7:07 AM	8:58 AM	A	1/27/2015	Erin Lockward	8:56 AM	9:41 AM
	B	2/3/2014	Roger Radd	7:11 AM	9:09 AM	B	2/5/2015	Erin Lockward	9:41 AM	10:20 AM
T2	A	4/19/2013	John Yerger	6:28 AM	7:32 AM	A	3/26/2014	Roger Radd	7:25 AM	8:43 AM
	A	5/2/2013	Roger Radd	7:25 AM	8:06 AM	B	4/28/2014	Roger Radd	12:13 PM	1:35 PM
	A	5/24/2013	Roger Radd	9:21 AM	10:37 AM	A	5/15/2014	Roger Radd	6:06 AM	7:29 AM
	A	10/2/2013	Roger Radd	7:04 AM	8:36 AM	A	9/12/2014	Erin Lockward	10:40 AM	10:59 AM
	B	10/16/2013	Roger Radd	2:52 PM	4:08 PM	B	10/3/2014	Erin Lockward	8:40 AM	8:58 AM
	A	11/11/2013	Roger Radd	7:22 AM	9:08 AM	A	11/7/2014	Erin Lockward	9:36 AM	10:02 AM
	B	12/3/2013	Roger Radd	10:10 AM	11:52 AM	A	12/6/2014	Erin Lockward	8:05 AM	8:46 AM
	A	1/8/2014	Roger Radd	10:39 AM	12:29 PM	B	1/28/2015	Erin Lockward	10:03 AM	10:47 AM
	A	2/7/2014	Roger Radd	2:06 PM	3:54 PM	A	2/12/2015	Erin Lockward	8:08 AM	8:43 AM
T3	B	4/19/2013	John Yerger	8:21 AM	9:20 AM	A	3/17/2014	Roger Radd	7:44 AM	9:17 AM
	A	4/28/2013	Roger Radd	8:32 AM	9:30 AM	B	5/2/2014	Roger Radd	10:45 AM	12:08 PM
	A	5/23/2013	Roger Radd	6:15 AM	7:22 AM	A	5/9/2014	Roger Radd	9:46 AM	10:52 AM
	A	9/3/2013	Roger Radd	6:23 AM	7:50 AM	A	9/12/2014	Erin Lockward	7:10 AM	7:40 AM
	B	10/10/2013	Roger Radd	1:11 PM	2:28 PM	B	10/3/2014	Erin Lockward	7:38 AM	8:12 AM
	A	11/12/2013	Roger Radd	7:03 AM	8:53 AM	A	11/7/2014	Erin Lockward	8:08 AM	8:32 AM
	B	12/6/2013	Roger Radd	10:43 AM	12:12 PM	A	12/5/2014	Erin Lockward	11:02 AM	11:50 AM
	A	1/7/2014	Roger Radd	7:18 AM	9:08 AM	A	1/20/2015	Erin Lockward	8:03 AM	9:37 AM
	B	2/3/2014	Roger Radd	1:42 PM	3:30 PM	B	2/6/2015	Erin Lockward	7:23 AM	8:07 AM
T4	B	4/22/2013	Roger Radd	9:45 AM	10:48 AM	A	3/25/2014	Roger Radd	7:20 AM	8:48 AM
	B	5/10/2013	Roger Radd	7:12 AM	8:13 AM	A	4/28/2014	Roger Radd	6:52 AM	8:18 AM
	A	5/23/2013	Roger Radd	8:33 AM	9:35 AM	B	5/22/2014	Roger Radd	6:55 AM	8:21 AM
	A	9/13/2013	Roger Radd	6:34 AM	8:24 AM	B	9/11/2014	Erin Lockward	7:38 AM	8:01 AM
	B	10/3/2013	Roger Radd	7:19 AM	9:22 AM	A	10/2/2014	Erin Lockward	9:14 AM	9:36 AM
	A	11/7/2013	Roger Radd	10:14 AM	11:59 AM	B	11/6/2014	Erin Lockward	7:10 AM	7:32 AM
	B	12/2/2013	Roger Radd	1:38 PM	3:24 PM	A	12/12/2014	Erin Lockward	7:18 AM	7:59 AM
	A	1/6/2014	Roger Radd	10:18 AM	12:09 PM	B	1/27/2015	Erin Lockward	11:05 AM	11:47 AM
	B	2/13/2014	Roger Radd	10:57 AM	12:45 PM	A	2/6/2015	Erin Lockward	10:11 AM	10:59 AM
T5	A	4/22/2013	Roger Radd	6:30 AM	7:38 AM	A	3/10/2014	Roger Radd	7:45 AM	9:19 AM
	B	5/3/2013	Roger Radd	6:50 AM	7:56 AM	B	4/23/2014	Roger Radd	7:05 AM	8:30 AM
	B	5/20/2013	Roger Radd	6:22 AM	7:33 AM	A	5/5/2014	Roger Radd	6:48 AM	8:21 AM
	A	9/17/2013	Roger Radd	6:33 AM	8:27 AM	A	9/18/2014	Erin Lockward	10:16 AM	10:38 AM

Transect ID	Start Point	Visit Date	Observer	Start Time	End Time	Start Point	Visit Date	Observer	Start Time	End Time
	B	10/10/2013	Roger Radd	7:02 AM	8:52 AM	A	10/9/2014	Erin Lockward	10:41 AM	11:03 AM
	A	11/4/2013	Roger Radd	6:56 AM	8:50 AM	B	11/8/2014	Erin Lockward	9:02 AM	9:32 AM
	B	12/2/2013	Roger Radd	10:29 AM	12:20 PM	A	12/5/2014	Erin Lockward	9:23 AM	10:18 AM
	A	1/7/2014	Roger Radd	10:39 AM	12:26 PM	B	1/29/2015	Erin Lockward	9:09 AM	9:49 AM
	B	2/4/2014	Roger Radd	2:05 PM	3:53 PM	A	2/3/2015	Erin Lockward	10:04 AM	10:48 AM
T6	B	4/22/2013	Roger Radd	8:15 AM	9:19 AM	A	3/7/2014	Roger Radd	9:28 AM	10:53 AM
	A	5/3/2013	Roger Radd	8:58 AM	9:44 AM	B	4/3/2014	Roger Radd	7:40 AM	9:17 AM
	A	5/20/2013	Roger Radd	8:43 AM	9:50 AM	A	5/8/2014	Roger Radd	6:55 AM	8:27 AM
	A	9/15/2013	Roger Radd	6:40 AM	8:31 AM	B	9/18/2014	Erin Lockward	7:03 AM	8:11 AM
	B	10/7/2013	Roger Radd	7:14 AM	9:01 AM	A	10/9/2014	Erin Lockward	7:08 AM	8:02 AM
	A	11/5/2013	Roger Radd	6:49 AM	8:38 AM	B	11/8/2014	Erin Lockward	6:44 AM	7:13 AM
	B	12/3/2013	Roger Radd	6:55 AM	8:46 AM	B	12/7/2014	Erin Lockward	8:06 AM	8:40 AM
	A	1/8/2014	Roger Radd	7:22 AM	9:13 AM	A	1/25/2015	Erin Lockward	7:50 AM	8:45 AM
	B	2/3/2014	Roger Radd	10:26 AM	12:17 PM	A	2/12/2015	Erin Lockward	10:14 AM	11:03 AM
T7	A	4/26/2013	Roger Radd	6:45 AM	7:35 AM	B	3/19/2014	Roger Radd	12:55 PM	2:06 PM
	B	5/6/2013	Roger Radd	6:50 AM	7:52 AM	A	4/24/2014	Roger Radd	12:03 PM	1:25 PM
	A	5/22/2013	Roger Radd	8:52 AM	9:45 AM	B	5/13/2014	Roger Radd	6:24 AM	7:49 AM
	B	9/15/2013	Roger Radd	9:51 AM	11:26 AM	A	9/20/2014	Erin Lockward	7:07 AM	7:50 AM
	B	10/10/2013	Roger Radd	10:00 AM	11:25 AM	B	10/10/2014	Erin Lockward	8:57 AM	9:33 AM
	A	11/7/2013	Roger Radd	1:34 PM	2:54 PM	A	11/9/2014	Erin Lockward	6:23 AM	6:52 AM
	B	12/3/2013	Roger Radd	1:22 PM	3:02 PM	A	12/7/2014	Erin Lockward	9:22 AM	10:05 AM
	A	1/7/2014	Roger Radd	1:53 PM	3:30 PM	A	1/24/2015	Erin Lockward	9:20 AM	10:12 AM
	B	2/10/2014	Roger Radd	10:16 AM	12:01 PM	A	2/19/2015	Erin Lockward	7:08 AM	7:51 AM
T8	B	4/25/2013	Roger Radd	7:08 AM	8:18 AM	A	3/11/2014	Roger Radd	7:42 AM	9:16 AM
	B	5/4/2013	Roger Radd	6:37 AM	7:42 AM	B	4/23/2014	Roger Radd	12:19 PM	1:37 PM
	A	5/22/2013	Roger Radd	6:24 AM	8:14 AM	A	5/16/2014	Roger Radd	6:27 AM	7:53 AM
	B	9/4/2013	Roger Radd	6:50 AM	8:12 AM	B	9/20/2014	Erin Lockward	9:12 AM	9:44 AM
	A	10/8/2013	Roger Radd	7:19 AM	8:58 AM	A	10/10/2014	Erin Lockward	11:37 AM	11:58 AM
	A	11/6/2013	Roger Radd	7:21 AM	8:58 AM	B	11/9/2014	Erin Lockward	8:32 AM	8:52 AM
	B	12/6/2013	Roger Radd	7:26 AM	9:19 AM	B	12/12/2014	Erin Lockward	9:15 AM	10:07 AM
	A	1/6/2014	Roger Radd	1:56 PM	3:44 PM	A	1/20/2015	Erin Lockward	10:45 AM	11:26 AM
	A	2/4/2014	Roger Radd	10:54 AM	12:46 PM	B	2/5/2015	Erin Lockward	7:40 AM	8:36 AM
T9						B	3/19/2014	Roger Radd	7:29 AM	9:05 AM
						A	4/24/2014	Roger Radd	9:42 AM	11:12 AM
						B	5/14/2014	Roger Radd	5:58 AM	7:17 AM
	B	9/24/2013	Roger Radd	7:04 AM	8:44 AM	A	9/28/2014	Erin Lockward	7:57 AM	8:23 AM
	A	10/21/2013	Roger Radd	7:31 AM	9:21 AM	B	10/25/2014	Erin Lockward	8:34 AM	8:56 AM
	B	11/19/2013	Roger Radd	10:03 AM	11:59 AM	A	11/17/2014	Erin Lockward	8:00 AM	8:19 AM
	A	12/11/2013	Roger Radd	2:10 PM	3:40 PM	A	12/11/2014	Erin Lockward	9:12 AM	9:46 AM
	B	1/15/2014	Roger Radd	7:16 AM	9:07 AM	B	1/27/2015	Erin Lockward	7:56 AM	8:37 AM
	B	2/13/2014	Roger Radd	2:14 PM	4:01 PM	A	2/5/2015	Erin Lockward	10:36 AM	11:18 AM

Transect ID	Start Point	Visit Date	Observer	Start Time	End Time	Start Point	Visit Date	Observer	Start Time	End Time
T10	A	9/23/2013	Roger Radd	6:47 AM	8:21 AM	A	9/27/2014	Erin Lockward	9:39 AM	10:04 AM
	B	10/16/2013	Roger Radd	10:20 AM	11:42 AM	B	10/14/2014	Brooks Hart	8:22 AM	9:02 AM
	A	11/19/2013	Roger Radd	6:58 AM	8:47 AM	A	11/15/2014	Erin Lockward	9:40 AM	9:58 AM
	B	12/9/2013	Roger Radd	7:14 AM	8:55 AM	A	12/11/2014	Erin Lockward	7:00 AM	7:44 AM
	A	1/15/2014	Roger Radd	2:16 PM	4:00 PM	A	1/28/2015	Erin Lockward	11:27 AM	12:02 PM
	B	2/7/2014	Roger Radd	7:26 AM	9:20 AM	B	2/11/2015	Erin Lockward	7:36 AM	8:11 AM
T11						B	3/26/2014	Roger Radd	9:56 AM	11:33 AM
						A	5/2/2014	Roger Radd	6:37 AM	8:09 AM
						B	5/15/2014	Roger Radd	8:27 AM	9:38 AM
	A	9/19/2013	Roger Radd	6:49 AM	8:33 AM	A	9/27/2014	Erin Lockward	7:50 AM	8:07 AM
	B	10/23/2013	Roger Radd	7:28 AM	9:26 AM	B	10/16/2014	Brooks Hart	9:50 AM	10:22 AM
	A	11/21/2013	Roger Radd	10:12 AM	12:02 PM	A	11/15/2014	Erin Lockward	8:10 AM	8:30 AM
	A	12/10/2013	Roger Radd	2:19 PM	3:52 PM	A	12/7/2014	Erin Lockward	10:58 AM	11:42 AM
	A	1/16/2014	Roger Radd	2:07 PM	3:53 PM	B	1/29/2015	Erin Lockward	7:14 AM	7:56 AM
	B	2/4/2014	Roger Radd	7:22 AM	9:16 AM	A	2/10/2015	Erin Lockward	11:23 AM	12:00 PM
T12						B	3/18/2014	Roger Radd	10:20 AM	11:44 AM
						A	4/23/2014	Roger Radd	9:17 AM	10:35 AM
						B	5/8/2014	Roger Radd	8:51 AM	10:09 AM
	B	9/25/2013	Roger Radd	6:52 AM	7:49 AM	A	9/28/2014	Erin Lockward	9:39 AM	10:04 AM
	A	10/17/2013	Roger Radd	7:10 AM	8:56 AM	B	10/25/2014	Erin Lockward	9:56 AM	10:19 AM
	B	11/20/2013	Roger Radd	7:05 AM	8:52 AM	A	11/17/2014	Erin Lockward	6:42 AM	7:08 AM
	A	12/11/2013	Roger Radd	7:06 AM	8:55 AM	A	12/11/2014	Erin Lockward	10:38 AM	11:17 AM
	B	1/16/2014	Roger Radd	7:26 AM	9:17 AM	B	1/28/2015	Erin Lockward	7:54 AM	8:42 AM
	A	2/10/2014	Roger Radd	6:58 AM	8:48 AM	B	2/6/2015	Erin Lockward	9:20 AM	9:58 AM
T13						B	3/6/2014	Roger Radd	6:57 AM	7:44 AM
						B	4/24/2014	Roger Radd	7:11 AM	8:39 AM
						B	5/14/2014	Roger Radd	8:00 AM	9:21 AM
	B	9/25/2013	Roger Radd	10:24 AM	11:26 AM					
	A	10/29/2013	Roger Radd	7:40 AM	9:22 AM					
	B	11/21/2013	Roger Radd	1:11 PM	2:55 PM					
	A	12/10/2013	Roger Radd	7:12 AM	9:12 AM	B	12/5/2014	Erin Lockward	7:33 AM	8:26 AM
	B	1/9/2014	Roger Radd	2:20 PM	4:09 PM	A	1/29/2015	Erin Lockward	10:02 AM	11:41 AM
	B	2/7/2014	Roger Radd	10:37 AM	12:24 PM	B	2/3/2015	Erin Lockward	7:45 AM	8:40 AM
T14						B	3/20/2014	Roger Radd	7:53 AM	9:42 AM
						A	4/22/2014	Roger Radd	6:59 AM	8:36 AM
						B	5/7/2014	Roger Radd	6:41 AM	8:12 AM
	B	9/19/2013	Roger Radd	10:36 AM	11:52 AM					
	A	10/30/2013	Roger Radd	7:44 AM	9:34 AM					
	B	11/19/2013	Roger Radd	2:09 PM	3:37 PM					
	A	12/9/2013	Roger Radd	2:12 PM	3:50 PM	B	12/6/2014	Erin Lockward	9:44 AM	10:42 AM

Transect ID	Start Point	Visit Date	Observer	Start Time	End Time	Start Point	Visit Date	Observer	Start Time	End Time
	B	1/30/2014	Roger Radd	1:30 PM	3:22 PM	A	1/25/2015	Erin Lockward	11:36 AM	12:27 PM
	A	2/10/2014	Roger Radd	2:20 PM	4:07 PM	B	2/10/2015	Erin Lockward	7:45 AM	8:46 AM
T15						B	3/5/2014	Roger Radd	6:54 AM	8:43 AM
						A	4/1/2014	Roger Radd	7:47 AM	9:21 AM
						B	5/20/2014	Roger Radd	6:28 AM	7:37 AM
	B	9/13/2013	Roger Radd	6:33 AM	7:57 AM					
	A	10/16/2013	Roger Radd	7:39 AM	9:07 AM					
	B	11/20/2013	Roger Radd	11:32 AM	1:17 PM					
	A	12/10/2013	Roger Radd	10:57 AM	12:40 PM	A	12/7/2014	Erin Lockward	6:46 AM	7:27 AM
	B	1/15/2014	Roger Radd	10:54 AM	12:44 PM	B	1/25/2015	Erin Lockward	9:52 AM	10:30 AM
	A	2/14/2014	Roger Radd	2:04 PM	3:50 PM	A	2/10/2015	Erin Lockward	10:00 AM	10:36 AM
T16						B	3/17/2014	Roger Radd	7:43 AM	9:17 AM
						A	4/28/2014	Roger Radd	9:22 AM	10:49 AM
						B	5/27/2014	Roger Radd	6:25 AM	7:44 AM
	B	9/18/2013	Roger Radd	6:39 AM	8:27 AM					
	B	10/15/2013	Roger Radd	7:23 AM	9:15 AM					
	A	11/21/2013	Roger Radd	7:17 AM	8:56 AM					
	B	12/11/2013	Roger Radd	10:40 AM	12:26 PM	B	12/12/2014	Erin Lockward	8:33 AM	9:09 AM
	A	1/16/2014	Roger Radd	10:57 AM	12:44 PM	A	1/24/2015	Erin Lockward	7:40 AM	8:18 AM
	A	2/13/2014	Roger Radd	7:00 AM	8:50 AM	B	2/3/2015	Erin Lockward	11:17 AM	12:02 PM
T17	B	12/6/2014	Erin Lockward	7:14 AM	7:26 AM					
	A	1/20/2015	Erin Lockward	9:15 AM	9:25 AM					
	A	2/12/2015	Erin Lockward	7:11 AM	7:30 AM					
T18	A	12/6/2014	Erin Lockward	6:53 AM	7:06 AM					
	A	1/20/2015	Erin Lockward	8:56 AM	9:04 AM					
	A	2/6/2015	Erin Lockward	6:47 AM	6:58 AM					

A total of 3534 detections were made during the 345 surveys with 17,973 total birds sighted. To maintain consistency with regards to the number of transects sampled per season, we took a random subsample of the data to use in analysis. Fitting a model to estimate density at times also requires use of data truncation. The final subsample contained data from 259 transects, 2253 detections and 16507 birds (Table 7). We used Program Distance (Thomas et al. 2010) to conduct a preliminary analysis and determine a total density of birds on versus off project (Table 7).

Table 7. Preliminary Analysis of Avian Line Transect Results Spring 2013 -- Winter 2014-15

Season / Year	# Detections	Estimated Density of Birds (Per Ha)		Estimated Density of Clusters (Per Ha)		Expected Cluster Size		Estimated # of Birds		Total # Species	
		Control	Footprint	Control	Footprint	Control	Footprint	Control	Footprint	Control	Footprint
Spring – 2013	119	.30	.18	0.19	0.08	1.62	2.25	2117	348	25	17
Fall – 2013	688	1.39	1.07	0.33	0.25	4.22	4.23	9429	2106	56	43
Winter – 2013-14	460	1.12	0.4	0.31	0.12	3.6	3.3	7614	790	37	21
Spring – 2014	495	0.4	2.18	0.19	0.52	2.12	4.2	2747	4287	47	42
Fall – 2014	211	0.14	0.13	0.07	0.04	2.03	3.22	937	266	18	15
Winter – 2014-15	283	0.2	0.15	0.09	0.07	2.15	2.32	1355	304	19	16

4. Sensitive Species / Species Specific Surveys

4.1 Burrowing Owl (*Athene cunicularia*) Surveys

Burrowing Owls typically inhabit open areas with scattered vegetation and friable soils, including agricultural areas. The dominant vegetative community within the project site - sparsely-vegetated, upland creosote scrub - provides suitable habitat for Burrowing Owls.

4.1.1 Presence/ Absence Surveys and Assessment of Site Use

Burrowing Owl surveys were conducted across all portions of the project site and within a 150-meter buffer of the proposed Project Site (Figure 4), in an effort to assess occupancy, abundance, site use and distribution. Wildlife crews surveyed the entire proposed project footprint between 22 October 2012 and 15 April 2013, walking belt transects with 10 meter spacing. Surveys within the 150-meter buffer were conducted between 14 and 17 May 2013, by walking straight-line belt transects spaced no more than 30-meters apart, adjusting for vegetation height and density (Rosenberg et al. 2007).

Additional surveys were conducted during the spring of 2014. Burrowing Owls surveys conducted during 2014 followed a project-specific protocol which incorporates agency (*Staff Report on Burrowing Owl Mitigation*; CDFG 2012) and resource-specific guidance *(Burrowing Owl Survey Protocol and Mitigation Guidelines*; CBOC 1993) to achieve management goals and effectively assess potential impacts. This project-specific Burrowing Owl Survey Protocol is included as Appendix C. From April 4th 2014 through April 16th 2014, a Burrowing Owl specific survey crew conducted comprehensive pedestrian belt transects spaced 7-20 meters, within suitable habitat (Figure 4). Follow-up surveys focused at confirming occupancy and determining site use and breeding success were conducted between May 6th and June 12th 2014.

During each of these survey efforts, at the start of each transect and at least every 100 meters, survey crews scanned the entire visible project area for Burrowing Owls using binoculars. Some Burrowing Owls may be detected by their calls, so observers listened for Burrowing Owls while conducting the survey. Care was taken to minimize disturbance near occupied burrows during all seasons and not to “flush” Burrowing Owls from their burrows.

All Burrowing Owl sightings and burrows with Burrowing Owl sign (including: whitewash, tracks, pellets, feathers) were mapped and recorded using standardized data forms that include Pendragon mobile data management software and backup paper data sheets. Any burrow with associated Burrowing Owl sign was ranked by class (1-4) depending on the age and type of sign present. Burrow Class:

- 1=Excellent (Usable burrow with BUOW present)
- 2 = Good (Usable burrow, fresh sign but no BUOW present)
- 3 = Fair (Usable burrow, inactive with old sign, no BUOW present)
- 4 = Poor (Inactive burrow, no BUOW sign)

4.1.2 Burrowing Owl Presence/ Absence Survey Results

During Fall 2012, Spring 2013, and Spring 2014, 70 burrows ranked Class 1, Class 2 and Class 3 were detected within the Project footprint. However, Burrowing Owls were only detected at four burrows during breeding season surveys between 2013 and 2014. A single burrow within the 150-meter buffer indicated recent Burrowing Owl occupation/ use (Table 8 and Figure 4).

Table 8. Burrowing Owl Phase II Results from Fall 2012 and Spring 2013 and 2014

Waypoint ID	Date	Easting	Northing	Initial Class	Initial Sign
QZBOB-102112-01	10/21/2012	710018	3718263	1	Feathers; Tracks; Live Bird
QZBOB-102212-04	10/22/2012	706779	3719734	1	Feathers; Pellets; Tracks; Whitewash; Live Bird
QZBOB-102212-01	10/22/2012	709353	3716229	2	Feathers; Tracks; Whitewash
QZBOB-102212-02	10/22/2012	706710	3719571	2	Feathers; Pellets; Whitewash
QZBOB-102212-03	10/22/2012	706738	3720171	1	Pellets; Whitewash; Live Bird
QZBOB-032513-02	3/25/2013	709413	3714225	3	Whitewash
QZBOB-032513-01	3/25/2013	709118	3714288	2	Pellets; Whitewash
QZBOB-032713-01	3/27/2013	708204	3715061	3	Pellets; Whitewash
QZBOB-032713-02	3/27/2013	709410	3714989	2	Whitewash
QZBOB-032913-05	3/29/2013	707686	3715098	3	Pellets
QZBOB-032913-01	3/29/2013	707729	3715275	3	Pellets; Whitewash
QZBOB-032913-02	3/29/2013	707587	3715092	3	Pellets; Whitewash
QZBOB-032913-03	3/29/2013	707844	3715163	3	Whitewash
QZBOB-032913-04	3/29/2013	707522	3715184	3	Whitewash
QZBOB-033013-01	3/30/2013	707744	3715561	3	Whitewash
QZBOB-033013-03	3/30/2013	706837	3715796	3	Whitewash
QZBOB-033013-02	3/30/2013	707366	3715923	3	Whitewash
QZBOB-040113-01	4/1/2013	709249	3716527	3	Whitewash
QZBOB-040213-02	4/2/2013	707940	3717034	3	Whitewash
QZBOB-040213-01	4/2/2013	706253	3716657	3	Pellets; Whitewash

Waypoint ID	Date	Easting	Northing	Initial Class	Initial Sign
QZBOB-040313-01	4/3/2013	707869	3716491	2	Pellets; Whitewash
QZBOB-040413-01	4/4/2013	709711	3715680	3	Pellets; Whitewash
QZBOB-040913-01	4/9/2013	708282	3717411	2	Feathers; Pellets; Whitewash
QZBOB-041113-01	4/11/2013	707843	3718107	3	Whitewash
QZBOB-051313-01	5/13/2013	709927	3718713	1	Feathers; Pellets; Tracks; Whitewash; Live Bird
QZBOB-051413-01	5/14/2013	707327	3719545	2	Pellets
QZBOB-040414-03	4/4/2014	709952	3718707	2	Feathers; Pellets; Tracks; Whitewash; Other
QZBOB-040414-02	4/4/2014	709929	3717818	3	Pellets
QZBOB-040414-04	4/4/2014	709861	3717766	3	Whitewash
QZBOB-040414-08	4/4/2014	709525	3718129	3	Whitewash
QZBOB-040514-01	4/5/2014	709449	3718117	3	Whitewash; Pellets
QZBOB-040514-02	4/5/2014	709427	3718080	3	Whitewash
QZBOB-040514-05	4/5/2014	708488	3718121	3	Feathers; Whitewash
QZBOB-040614-07	4/6/2014	706469	3720013	3	Feathers; Whitewash
QZBOB-040614-03	4/6/2014	706908	3719741	2	Pellets; Whitewash
QZBOB-040614-06	4/6/2014	706614	3719837	3	Feathers; Whitewash
QZBOB-040714-02	4/7/2014	705989	3719389	3	Pellets; Whitewash
QZBOB-040714-01	4/7/2014	706259	3719971	3	Pellets; Whitewash
QZBOB-040714-07	4/7/2014	710776	3717068	3	Whitewash
QZBOB-040714-08	4/7/2014	710704	3716874	3	Whitewash
QZBOB-040814-21	4/8/2014	710050	3716134	3	Pellets; Whitewash
QZBOB-040814-15	4/8/2014	710176	3715963	3	Whitewash
QZBOB-040814-20	4/8/2014	710164	3715745	3	Whitewash
QZBOB-040814-27	4/8/2014	709893	3715738	3	Whitewash
QZBOB-040914-14	4/9/2014	708881	3715711	3	Pellets; Whitewash
QZBOB-040914-12	4/9/2014	709090	3715939	3	Whitewash
QZBOB-040914-10	4/9/2014	709098	3716406	3	Whitewash
QZBOB-040914-15	4/9/2014	708829	3716265	3	Pellets; Whitewash
QZBOB-040914-07	4/9/2014	709482	3715782	3	Whitewash
QZBOB-040914-11	4/9/2014	709081	3716193	3	Whitewash
QZBOB-041014-09	4/10/2014	707484	3716355	3	Whitewash
QZBOB-041014-03	4/10/2014	707960	3715637	3	Whitewash
QZBOB-041014-55	4/10/2014	707438	3716008	3	Pellets; Whitewash
QZBOB-041014-54	4/10/2014	707688	3716701	3	Feathers
QZBOB-041014-10	4/10/2014	707362	3716048	3	Feathers; Pellets; Whitewash
QZBOB-041114-18	4/11/2014	706779	3716354	2	Pellets; Whitewash
QZBOB-041114-04	4/11/2014	706956	3716052	3	Whitewash
QZBOB-041114-08	4/11/2014	706938	3716348	3	Whitewash

Waypoint ID	Date	Easting	Northing	Initial Class	Initial Sign
QZBOB-041114-10	4/11/2014	706810	3716464	3	Whitewash
QZBOB-041214-04	4/12/2014	706290	3716568	3	Whitewash
QZBOB-041314-04	4/13/2014	709707	3715588	3	Whitewash
QZBOB-041314-08	4/13/2014	709209	3714776	3	Feathers
QZBOB-041414-03	4/14/2014	708913	3715117	3	Pellets; Whitewash
QZBOB-041415-06	4/14/2014	708606	3714616	2	Whitewash
QZBOB-041414-07	4/14/2014	708118	3714668	3	Whitewash
QZBOB-041414-02	4/14/2014	708913	3714829	3	Feathers
QZBOB-041514-02	4/15/2014	707388	3715300	3	Whitewash
QZBOB-041614-02	4/16/2014	707822	3718205	3	Whitewash
QZBOB-041614-01	4/16/2014	708016	3718197	3	
QZBOB-050814-11	5/8/2014	706234	3719976	2	Whitewash

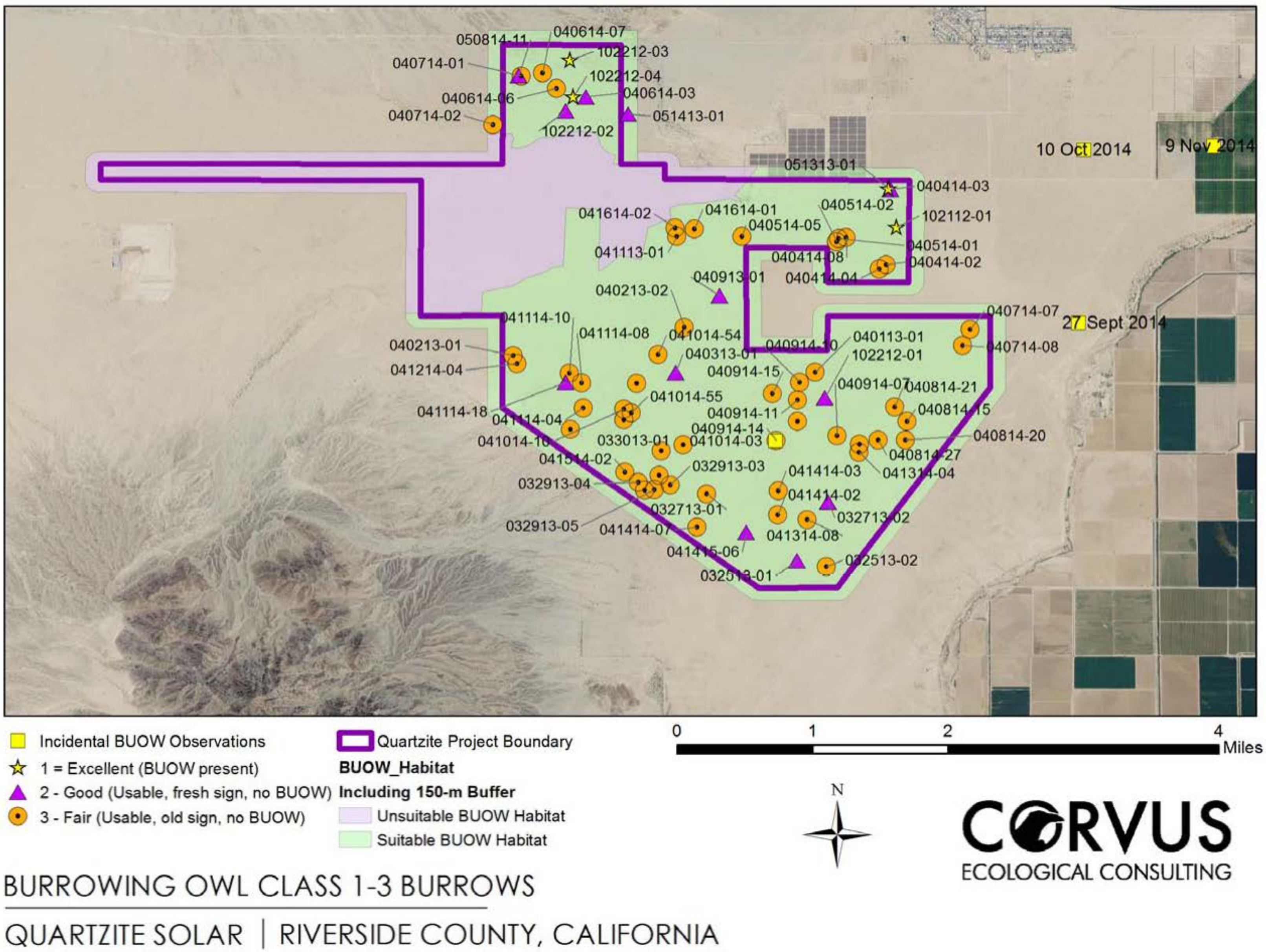

Figure 4. Phase II Class 1-3 Burrows 2014

4.1.3 Assessment of Burrowing Owl Occupancy and Site Use Methods and Results

In addition to comprehensive presence/ absence site surveys and a burrow inventory (Phase II surveys), extended observational monitoring (Phase III) was conducted per the, Staff Report on Burrowing Owl Mitigation (CDFG, 2012). Observational efforts were conducted from as many fixed points as necessary to provide full visual coverage using spotting scopes and binoculars.

Phase III surveys were conducted at every burrow recorded as a Class 1, Class 2 or Class 3 (Table 8). In 2013 these follow-up surveys consisted of 3-hour visits to each burrow that ranked Class 3 or better. In 2014 follow-up surveys followed a modified routine included in the Project-specific protocol (Appendix C). Follow-up visits conducted during 2014 were performed during the intervals: 4-16 April, 6-12 May, 26-28 May and 2 June. During all follow-up efforts, observers recorded each burrow's current status and condition, and visually searched the surrounding area for live owls. In February 2015, biologists re-visited all Class 1 and 2 burrows as well as any locations where adult Burrowing Owls had incidentally been reported.

During the fall 2013, comprehensive site surveys documented live owls at three burrows prior to the breeding season. However, all three of these burrows were determined vacant during follow-up surveys. One previously active burrow was collapsed and no longer serviceable without re-excavation, another was an active kit fox den, and the third appeared to have been re-excavated and potentially occupied by a coyote.

Occupancy use surveys conducted during the breeding season of 2013 documented live owls at 2 burrows. One of these burrows was potentially occupied during Phase II surveys (Class 2), the other was a previously undocumented rodent burrow. Burrowing owls occupying burrows during the breeding season were monitored in an attempt to determine territorial boundaries and home ranges. We did not detect any positive identification of young at either burrow in 2013.

No live burrowing owls were detected during the occupancy use surveys in 2014. A comprehensive chronology of burrow class for burrows initially identified as Class 3 or better can be found in Table 9.

Burrowing owls were incidentally reported in or around the project site on 4 occasions from 27 September 2014 to 6 February 2015. Only 1 of these detections (made during the winter 2015 follow-up visit) was within the project boundary (Figure 4).

Table 9. Comprehensive Chronology of Burrowing Owl Burrows on Quartzite 2013-2014. Observations in gray indicate 2013.

Waypoint ID	Detection Date	Initial Class	Observation Class	Observation Date	# Adults
QZBOB-032513-01	3/25/2013	2	4	5/30/2013	0
			4	4/13/2014	0
QZBOB-032513-02	3/25/2013	3	3	5/30/2013	0
			3	6/21/2013	0
			3	7/14/2013	0
			4	4/13/2014	0
QZBOB-032713-01	3/27/2013	3	3	5/31/2013	0
			3	6/19/2013	0
			2	4/14/2014	0

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Waypoint ID	Detection Date	Initial Class	Observation Class	Observation Date	# Adults
			2	5/9/2014	0
			4	5/27/2014	0
QZBOB-032713-02	3/27/2013	2	3	5/31/2013	0
			3	6/21/2013	0
			3	7/15/2013	0
			4	4/13/2014	0
QZBOB-032913-01	3/29/2013	3	3	5/30/2013	0
			3	6/20/2013	0
			3	7/15/2013	0
			4	4/14/2014	0
			4	5/27/2014	0
QZBOB-032913-02	3/29/2013	3	3	5/30/2013	0
			3	6/20/2013	0
			3	7/12/2013	0
			4	4/15/2014	0
QZBOB-032913-03	3/29/2013	3	3	5/28/2013	0
			3	6/19/2013	0
			3	7/15/2013	0
			4	4/14/2014	0
			3	5/10/2014	0
			4	5/27/2014	0
QZBOB-032913-04	3/29/2013	3	3	5/28/2013	0
			3	6/20/2013	0
			3	7/13/2013	0
			4	4/15/2014	0
			4	5/27/2014	0
QZBOB-032913-05	3/29/2013	3	4	5/28/2013	0
			4	7/12/2013	0
			4	4/14/2014	0
			3	5/27/2014	0
			4	6/2/2014	0
QZBOB-033013-01	3/30/2013	3	4	5/25/2013	0
			3	6/20/2013	0
			3	7/12/2013	0
			3	7/13/2013	0
			4	4/14/2014	0
QZBOB-033013-02	3/30/2013	3	3	5/29/2013	0
			3	6/19/2013	0
			3	7/13/2013	0
QZBOB-033013-03	3/30/2013	3	4	5/29/2013	0
			3	6/19/2013	0
			3	7/12/2013	0
			4	4/11/2014	
QZBOB-040113-01	4/1/2013	3	2	5/29/2013	0
			3	6/21/2013	0

Waypoint ID	Detection Date	Initial Class	Observation Class	Observation Date	# Adults
			3	7/15/2013	0
			3	4/9/2014	0
			3	5/28/2014	0
			4	6/2/2014	0
QZBOB-040213-01	4/2/2013	3	3	5/31/2013	0
			3	6/21/2013	0
			3	7/15/2013	0
			4	4/12/2014	0
QZBOB-040213-02	4/2/2013	3	3	5/31/2013	0
			3	6/20/2013	0
			3	7/13/2013	0
			4	4/10/2014	0
QZBOB-040313-01	4/3/2013	2	3	5/31/2013	0
			3	6/20/2013	0
			3	7/13/2013	0
			4	4/10/2014	0
QZBOB-040413-01	4/4/2013	3	3	5/23/2013	0
			3	6/22/2013	0
			3	7/14/2013	0
QZBOB-040414-02	4/4/2014	3	3	5/6/2014	0
			4	5/28/2014	0
QZBOB-040414-03	4/4/2014	2	2	5/9/2014	0
			4	5/28/2014	0
QZBOB-040414-04	4/4/2014	3	4	5/6/2014	0
			4	5/28/2014	0
QZBOB-040414-08	4/4/2014	3	3	5/6/2014	0
			4	5/28/2014	0
QZBOB-040514-01	4/5/2014	3	3	5/6/2014	0
			4	5/28/2014	0
QZBOB-040514-02	4/5/2014	3	3	5/6/2014	0
			3	5/28/2014	0
			3	6/2/2014	0
QZBOB-040514-05	4/5/2014	3	3	5/9/2014	0
			3	5/28/2014	0
			4	6/2/2014	0
QZBOB-040614-03	4/6/2014	2	2	5/6/2014	0
			3	5/10/2014	0
			3	5/26/2014	0
			4	6/2/2014	0
QZBOB-040614-06	4/6/2014	3	4	5/8/2014	0
			4	5/26/2014	0
QZBOB-040614-07	4/6/2014	3	2	5/6/2014	0
			2	5/6/2014	0
			3	5/8/2014	0
			4	5/26/2014	0

Waypoint ID	Detection Date	Initial Class	Observation Class	Observation Date	# Adults
QZBOB-040714-01	4/7/2014	3	2	5/6/2014	0
			2	5/6/2014	0
			3	5/10/2014	0
			3	5/26/2014	0
			4	6/2/2014	0
QZBOB-040714-02	4/7/2014	3	3	5/6/2014	0
			3	5/6/2014	0
			4	5/26/2014	0
QZBOB-040714-07	4/7/2014	3	4	5/9/2014	0
QZBOB-040714-08	4/7/2014	3	3	5/9/2014	0
			3	5/28/2014	0
			4	6/2/2014	0
QZBOB-040814-15	4/8/2014	3	4	5/28/2014	0
QZBOB-040814-20	4/8/2014	3	4	5/28/2014	0
QZBOB-040814-21	4/8/2014	3	4	5/28/2014	0
QZBOB-040814-27	4/8/2014	3	4	5/28/2014	0
QZBOB-040913-01	4/9/2013	2	1	5/24/2013	2
			1	6/20/2013	1
			2	7/14/2013	0
			3	7/15/2013	0
			3	4/5/2014	0
			3	5/9/2014	0
			4	5/28/2014	0
QZBOB-040914-07	4/9/2014	3	3	5/28/2014	0
			3	6/2/2014	0
QZBOB-040914-10	4/9/2014	3	3	5/28/2014	0
			3	6/2/2014	0
QZBOB-040914-11	4/9/2014	3	4	5/28/2014	0
QZBOB-040914-12	4/9/2014	3	4	5/28/2014	0
QZBOB-040914-14	4/9/2014	3	3	5/28/2014	0
QZBOB-040914-15	4/9/2014	3	3	5/10/2014	0
			4	5/28/2014	0
QZBOB-041014-03	4/10/2014	3	3	5/9/2014	0
			4	5/27/2014	0
QZBOB-041014-09	4/10/2014	3	4	5/9/2014	0
QZBOB-041014-10	4/10/2014	3	4	5/9/2014	0
QZBOB-041014-54	4/10/2014	3	4	5/9/2014	0
QZBOB-041014-55	4/10/2014	3	4	5/9/2014	0
QZBOB-041113-01	4/11/2013	3	4	5/29/2013	0
			3	6/22/2013	0
			3	7/16/2013	0
			3	4/16/2014	0
			3	5/9/2014	0
			4	5/28/2014	0
QZBOB-041114-04	4/11/2014	3	4	5/9/2014	0

Waypoint ID	Detection Date	Initial Class	Observation Class	Observation Date	# Adults
QZBOB-041114-08	4/11/2014	3	3	5/9/2014	0
			4	5/27/2014	0
QZBOB-041114-10	4/11/2014	3	4	5/27/2014	0
QZBOB-041114-18	4/11/2014	2	2	5/9/2014	0
			4	5/27/2014	0
QZBOB-041214-04	4/12/2014	3	4	5/9/2014	0
			4	5/28/2014	0
QZBOB-041314-08	4/13/2014	3	3	5/9/2014	0
		3	4	5/27/2014	0
QZBOB-041414-02	4/14/2014		4	5/9/2014	0
QZBOB-041414-03	4/14/2014	3	4	5/9/2014	0
QZBOB-041414-07	4/14/2014	3	3	5/8/2014	0
QZBOB-041415-06	4/14/2014	2	4	5/27/2014	0
QZBOB-041514-02	4/15/2014	3	3	5/9/2014	0
			4	5/27/2014	0
QZBOB-041614-01	4/16/2014	3	4	5/9/2014	0
			4	5/28/2014	0
QZBOB-041614-02	4/16/2014	3	3	5/9/2014	0
			3	5/28/2014	0
			4	6/2/2014	0
QZBOB-050814-11	5/8/2014	2	3	5/26/2014	0
			3	6/2/2014	0
QZBOB-051313-01	5/13/2013	1	1	5/22/2013	2
			1	5/30/2013	2
			1	6/20/2013	2
			1	7/13/2013	2
			1	7/15/2013	2
			4	4/4/2014	0
			4	5/28/2014	0
QZBOB-051413-01	5/14/2013	2	4	5/31/2013	0
			4	4/6/2014	0
QZBOB-102112-01	10/21/2012	1	4	5/18/2013	0
			3	4/4/2014	0
			3	5/6/2014	0
			3	5/6/2014	0
			3	5/6/2014	0
			3	5/12/2014	0
			4	5/28/2014	0
QZBOB-102212-01	10/22/2012	2	4	5/25/2013	0
			4	4/9/2014	0
QZBOB-102212-02	10/22/2012	2	4	5/27/2013	0
			3	4/6/2014	0
			4	5/6/2014	0
			4	5/26/2014	0
QZBOB-102212-03	10/22/2012	1	4	4/6/2014	0

Waypoint ID	Detection Date	Initial Class	Observation Class	Observation Date	# Adults
QZBOB-102212-04	10/22/2012	1	3	4/6/2014	0
			3	5/6/2014	0
			3	5/26/2014	0

4.1.5 Conclusions and Recommended Actions

Burrowing Owl site use changes temporally. Survey evidence suggests greater use of the Desert Quartzite footprint by BUOW outside of the breeding season, with only 2 pairs observed remaining to attempt reproduction in 2013 and none in 2014.

Although Burrowing Owls exhibit high burrow fidelity, surveys at Desert Quartzite documented dynamic occupancy of burrows in response to changing conditions. If an annual determination of site use and/ or breeding success is intended, Phase II and Phase III surveys should be implemented **annually across the site, beginning every spring**.

If the intent of surveys is limited to the detection of Burrowing Owls prior to construction, it is recommended that no further action is taken until the project nears construction. Phase II and Phase III surveys should be conducted 30-days prior to construction in an effort to confirm BUOW occupancy and give project managers enough time to respond to findings.

Burrowing Owls Phase II and Phase III surveys should be conducted according to the methods described in, “Burrowing Owl Survey Protocol and Mitigation Guidelines” (Burrowing Owl Consortium, 1993). Burrowing owl surveys should adhere to the frequency and timing described by the “Staff Report on Burrowing Owl Mitigation” (CDFW, 2012).

4.2 Golden Eagle (*Aquila chrysaetos*) Surveys

Golden Eagle is the most widely distributed species of eagle. Although they maintain home ranges as large as 80 sq miles in open country across a variety of biomes, including desert-like habitats in the American south-west, Golden Eagle is uncommon in the true deserts.

Agency approval of the Quartzite Avian Work Plan was not granted until after the 2013 Golden Eagle breeding season ended, but in 2013-14 and 2014-15, in addition to Unlimited Distance Extended Observation Surveys (Section 2.1), eagle surveys were conducted in December and January following the Interim Golden Eagle Inventory and Monitoring Protocols; and other recommendations (Pagel *et al.*, 2010 *et seg*.). Surveys for breeding and non-breeding Bald and Golden Eagles were conducted within a 10-mile radius of the Project. Occurrence of non-breeding Golden Eagles within at least 10 miles of the project boundary during the courtship season (*e.g.,* late December through early February) were documented in order to estimate potential project-related impacts to Golden Eagles, including: juveniles, sub-adults, adult floaters, and breeding adults.

No potential Golden Eagle nesting habitat exists within the proposed project footprint. Potential Golden Eagle nesting habitat exists within 10 miles of the project boundary; in the Little Chuckwalla Mountains, the Mule Mountains and the McCoy Mountains. There is one historic nest within the 10-mile buffer.

Historic nest data for the entire region was used to model Golden Eagle habitat and assess the terrain for suitable nest sites within a 10-mile buffer of the proposed project footprint. These data were used to optimally place Observation Points throughout the survey area. Eighteen (18) Observation Points were established in the study area and each was visited twice during the courtship/breeding season (Table 10; Figure 5). In 2014-15, we moved some of the points (renaming them) and replaced some with new locations with the end result being 18 points overall.

Table 10. Golden Eagle Observation Points and Survey Dates

Observation Point	2013/ 2014		2014/ 2015	
	Phase I Survey Date	Phase II Survey Date	Phase I Survey Date	Phase II Survey Date
QZ_GOEA_OP01	12/17/2013	1/25/2014	12/18/2014	1/21/2015
QZ_GOEA_OP02	12/16/2013	1/22/2014	12/17/2014	1/17/2015
QZ_GOEA_OP03	12/16/2013	1/21/2014	Dropped in 2014	
QZ_GOEA_OP04	12/17/2013	1/25/2014	12/17/2014	1/20/2015
QZ_GOEA_OP05	12/16/2013	1/22/2014	12/18/2014	1/18/2015
QZ_GOEA_OP06	12/19/2013	1/23/2014	Dropped in 2014	
QZ_GOEA_OP07	12/18/2013	1/22/2014	12/15/2014	1/20/2015
QZ_GOEA_OP08	12/19/2013	1/24/2014	12/15/2014	1/21/2015
QZ_GOEA_OP09	12/20/2013	1/21/2014	12/18/2015	1/18/2015
QZ_GOEA_OP10	12/16/2013	1/21/2014	12/18/2015	1/19/2015
QZ_GOEA_OP11	12/17/2013	1/25/2014	12/19/2015	1/24/2015
QZ_GOEA_OP12	12/18/2013	1/24/2014	Dropped in 2014	
QZ_GOEA_OP13	12/19/2013	1/24/2014	12/16/2014	1/26/2015
QZ_GOEA_OP14	12/20/2013	1/21/2014		1/19/2015
QZ_GOEA_OP15	12/20/2013	1/22/2014	12/18/2015	1/20/2015
QZ_GOEA_OP16	12/19/2013	1/23/2014	Dropped in 2014	
QZ_GOEA_OP17	12/18/2013	1/23/2014	12/16/2014	1/27/2015
QZ_GOEA_OP20	12/18/2013	1/23/2014	12/16/2014	1/22/2015
QZ_GOEA_OP21			12/16/2014	1/20/2015
QZ_GOEA_OP22			12/16/2014	1/22/2015
QZ_GOEA_OP23			12/17/2014	1/17/2015
QZ_GOEA_OP24			12/19/2014	1/23/2015
QZ_GOEA_OP25			12/15/2014	1/27/2015

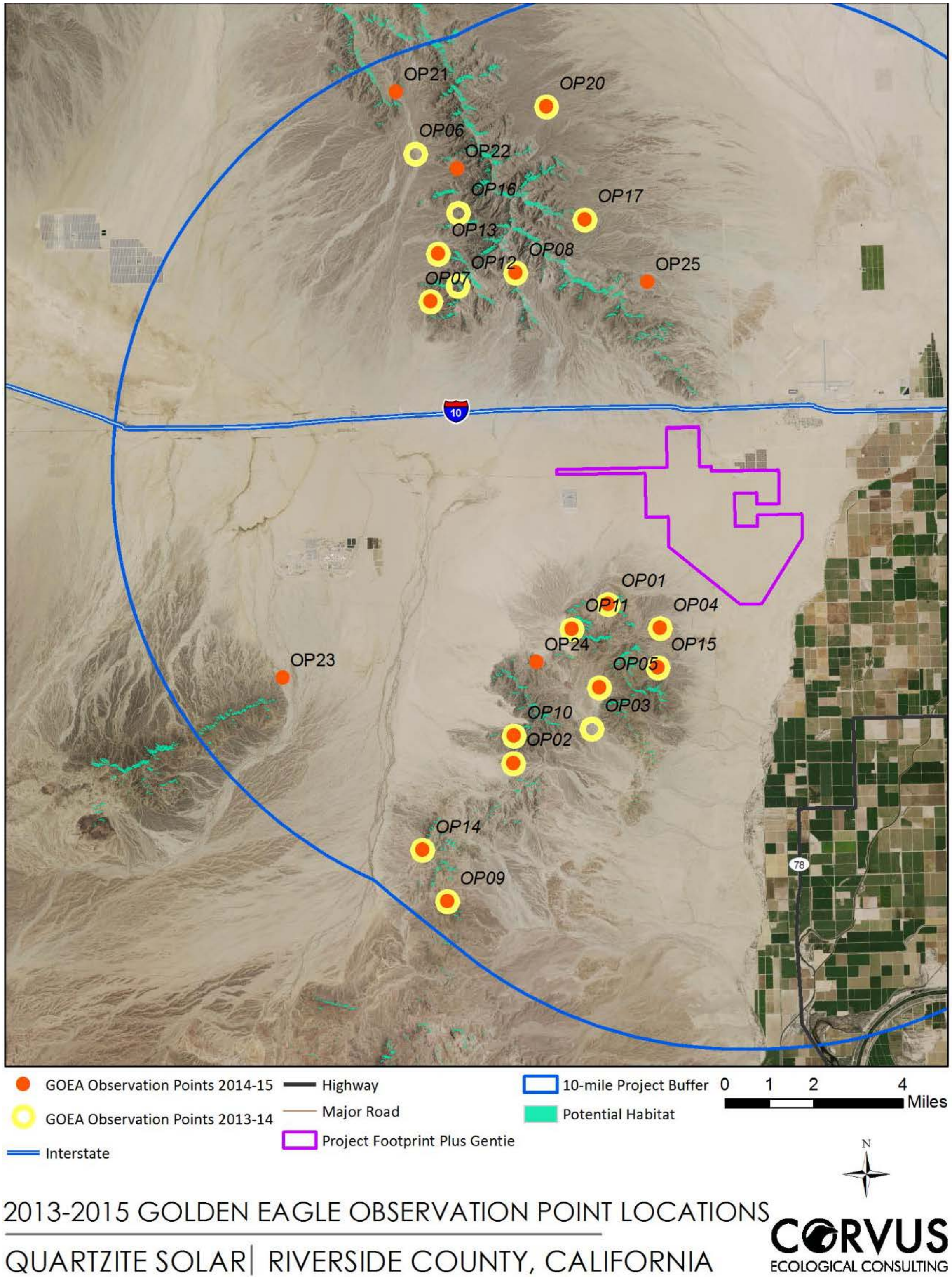

Figure 5. Placement of Golden Eagle Territory Occupancy Survey Observation Points

There have been no (0) Golden Eagle detections during avian-focused surveys, including: Avian Point Counts, Unlimited Distance Extended Observation Surveys and Line Transect surveys. There have been zero (0) reports of incidental sightings of Golden Eagles, which would have been reported on standardized, "General Sensitive Species" data forms that are included as required reporting for all of the various biological resource disciplines.

In March and April 2013, a total of seventeen black-tailed jackrabbits were detected across the 4,855 acre (19.65 sq km) project during a 10-meter belt-transect survey of the entire project. This effort yields an estimation of .0035 black-tailed jack rabbits/ acre.

Black-tailed jackrabbits and cottontail rabbits will be documented using line-transect surveys to estimate population densities within the project area. Small mammal surveys will be conducted across the entire proposed Project Site, using pedestrian transects spaced at 10-meter intervals. Observers will make their best effort to avoid double counting. This survey methodology will assess prey abundance on the project site as forage for Golden Eagles.

Golden Eagle survey data included:

- assign ID #
- record UTM via GPS
- assess any nests for condition (fresh greens, good, fair, old and decrepit)
- record any birds present (species, behavior)

Surveyors will utilize high-powered spotting scopes from the greatest effective distance possible during the breeding season.

4.2.1 Golden Eagle Territory Occupancy Results

The only Golden Eagle detection made during the Territory Occupancy Surveys was made on 21 January 2014. An avian biologist detected an adult Golden Eagle soaring low heading southwest from the QZ_GOEA_OP10. Because this detection occurred during the Phase II visit, a follow-up visit was scheduled. During the follow-up visit on February 11th no Golden Eagles were observed in the area. In the vicinity of the eagle sighting, there were two nests observed, one was inactive and the other was an occupied Red-tailed Hawk nest. No active Golden Eagle nests were detected within the study area. There were no sightings during the 2014-15 surveys.

4.2.2 Raptor Nest Observations During Golden Eagle Territory Occupancy Surveys

A total of 26 raptor or raven nests were documented during Territory Occupancy Surveys (Table 11; Figure 6). Sixteen of these nests were in cliff or rock outcrop substrates, 9 were in power line support structures, and one was located in an ironwood tree (*Olneya tesota*). In 2013-14, species associated with raptor nests included 4 Red-tailed hawks (*Buteo jamaicensis*), 2 Prairie Falcons (*Falco mexicanus*), and 12 undetermined species of raptor. The one historic Golden Eagle territory was occupied by a pair of Red-tailed Hawks during this breeding season. Seven of the observed nest were active, 9 were inactive, and two were active and occupied (Table 11). In 2014-15, there were only 2 active nests: 1 Red-tailed Hawk and 1 Prairie Falcon.

Table 11. Raptor Nests Observed During Territory Occupancy Surveys

Nest ID	Nest Type	Nest Height (m)	Aspect	Date	Time	Species	Condition	Activity	Breeding Status	Comments
QZNR-011815-01	Power line support structure	15	N/A	18-Jan-15	6:53 AM	RTHA	Fair	Occupied	Undetermined	There were two RTHA, one sitting in nest, and 1 on pole next to nest. Nest doesn't look complete, but they weren't actively building. At 4pm, there were 0 hawks on the nest.
				19-Jan-15	9:02 AM	UNHA	Fair	Inactive	Inactive / Unoccupied	No activity seen today
QZNR-011915-01	Power line support structure	20	N/A	19-Jan-15	5:14 PM	UNHA	Poor	Inactive	Inactive / Unoccupied	
QZNR-012214-00	Power line support structure	6	E	22-Jan-14	1:38 PM	RTHA	Good	Active	Courtship / copulation	
QZNR-012214-01	Power line support structure	22	N/A	22-Jan-14	9:30 AM	RTHA	Good	Occupied	Nest Building	2 RTHA PRESENT ON POWERLINE SUPPORT STURCTURE
				19-Jan-15	5:14 PM	UNHA	Poor	Inactive	Inactive / Unoccupied	
QZNR-012214-03	Tree	22	NE	22-Jan-14	12:15 PM	UNHA	Good	Active	Undetermined	
QZNR-012214-05	Power line support structure	22	N/A	22-Jan-14	12:30 AM	RTHA	Good	Active	Undetermined	RTHA PRESENT
QZNR-012414-00	Cliff / Rock outcrop	75	NE	24-Jan-14	2:32 PM	RTHA	Good	Active	Courtship / copulation	Previously known as GOEA nest McCoy1
				16-Dec-14	10:40 AM	UNHA	Good	Inactive	Inactive / Unoccupied	

Nest ID	Nest Type	Nest Height (m)	Aspect	Date	Time	Species	Condition	Activity	Breeding Status	Comments
QZNR-012414-01	Cliff / Rock outcrop	75	N	24-Jan-14	11:50 AM	UNHA	Good	Inactive	Inactive	
				15-Dec-14	12:10 PM	NONE		Inactive	Destroyed / Does Not Exist	Could not located a nest in vicinity of coordinates.
QZNR-012514-00	Cliff / Rock outcrop	75	N	25-Jan-14	9:00 AM	UNHA	Good	Inactive	Inactive	
QZNR-012514-01	Power line support structure	22	N/A	25-Jan-14	3:00 PM	UNHA	Good	Active	Undetermined	
				20-Jan-15	5:43 PM	UNHA	Fair	Inactive	Inactive / Unoccupied	Looks to be falling apart a bit.
QZNR-012514-03	Power line support structure	22	N/A	25-Jan-14	3:30 AM	UNHA	Good	Active	Undetermined	
				19-Jan-15	5:21 PM	UNHA	Good	Inactive	Inactive / Unoccupied	
QZNR-021114-01	Power line support structure	25	S	11-Feb-14	4:16 PM	UNHA	Good	Inactive	Inactive	Power line adjacent to Bradshaw Trail.
QZNR-121514-01	Cliff / Rock outcrop	20	N	15-Dec-14	3:00 PM	UNHA	Good	Inactive	Inactive / Unoccupied	Scrape with lots of whitewash
QZNR-121514-08	Cliff / Rock outcrop	60	NE	15-Dec-14	2:32 PM	UNHA	Good	Inactive	Inactive / Unoccupied	
QZNR-121613-01	Power line support structure	22	N/A	16-Dec-13	8:30 AM	UNHA	Good	Inactive	Inactive	
				17-Jan-15	1:00 PM	UNHA	Good	Inactive	Inactive / Unoccupied	
QZNR-121613-01	Power line support structure	22	N/A	19-Jan-15	1:50 PM	UNHA	Good	Inactive	Inactive / Unoccupied	RTHA spotted close and were seen roosting on power pole to the west on this same line, but no activity here.
QZNR-121614-08	Cliff / Rock outcrop	80	NE	16-Dec-14	8:59 AM	UNHA	Fair	Inactive	Inactive / Unoccupied	
QZNR-121713-01	Cliff / Rock outcrop	518	N	17-Dec-13		UNHA	Good	Inactive	Inactive	Large stick nest in good condition

Nest ID	Nest Type	Nest Height (m)	Aspect	Date	Time	Species	Condition	Activity	Breeding Status	Comments
				25-Jan-14	9:00 AM	UNHA	Good	Inactive	Inactive	
				17-Dec-14	11:37 AM	UNHA	Good	Inactive	Inactive / Unoccupied	Whitewash around, no new sign
				20-Jan-15	12:15 PM	UNHA	Good	Inactive	Inactive / Unoccupied	There were 2 rtha in the area, 1 perched on cliff above for quite some time, but neither visited this nest.
QZNR-121713-02	Cliff / Rock outcrop	689	W	17-Dec-13	11:20 AM	UNHA	Good	Inactive	Inactive	
				17-Dec-14	12:52 PM	UNHA	Fair	Inactive	Inactive / Unoccupied	
				20-Jan-15	1:37 PM	UNHA	Poor	Inactive	Inactive / Unoccupied	This nest is in poor shape, looks to be sliding of its perch
QZNR-121713-03	Cliff / Rock outcrop	685	NW	17-Dec-13	11:25 AM	UNHA	Fair	Inactive	Inactive	Old stick nest, compacted adjacent to QZNR-121713-02 and is likely replacement/alternate
				25-Jan-14	11:47 AM	PRFA	Good	Active	Courtship / copulation	
				20-Jan-15	1:38 PM	UNHA	Good	Inactive	Inactive / Unoccupied	There were 2 rtha in area perched on cliff above, but neither visited this nest and it doesn't look worked on this year. Of the three here, this seems most likely to me
QZNR-121813-01	Cliff / Rock outcrop	22	NW	18-Dec-13		PRFA	Good	Occupied	Undetermined	
				22-Jan-14	1:15 PM	PRFA	Good	Occupied	Undetermined	

Nest ID	Nest Type	Nest Height (m)	Aspect	Date	Time	Species	Condition	Activity	Breeding Status	Comments
				24-Jan-14	4:00 PM	PRFA	Good	Occupied	Undetermined	
				15-Dec-14	1:50 PM	UNHA	Good	Inactive	Inactive / Unoccupied	Lots of old whitewash below nest, sticks oxidized
				20-Jan-15	11:15 PM	PRFA	Good	Active		
QZNR-121813-02	Cliff / Rock outcrop	660	N	18-Dec-13	1:30 PM	UNHA	Good	Inactive	Inactive	K10D
QZNR-121813-03	Cliff / Rock outcrop	22	N	18-Dec-13	1:45 PM	UNHA	Good	Inactive	Inactive	POSSIBLE ALTERNATE PRFA NEST
				20-Jan-15	11:00 PM	UNHA	Good	Inactive	Inactive / Unoccupied	prairie falcon seen at adjacent nest site. Multiple PRFA nesting opportunities in the area, too early to know which nest will be selected for 2015 breeding attempt.
QZNR-121813-04	Cliff / Rock outcrop	514	N	18-Dec-13	1:30 PM	UNHA	Good	Inactive	Inactive	K10D
QZNR-121814-31	outcrop	460	N	18-Dec-14	2:34 PM	UNHA	Good	Inactive	Inactive / Unoccupied	Good structure. 2 photos taken
QZNR-121814-32	Cliff / Rock outcrop	350	NE	18-Dec-14	3:00 PM	UNHA	Good	Inactive	Inactive / Unoccupied	
QZNR-121814-37	Cliff / Rock outcrop	35	N	18-Dec-14	4:15 PM	UNHA	Good	Inactive	Inactive / Unoccupied	Stick nest.

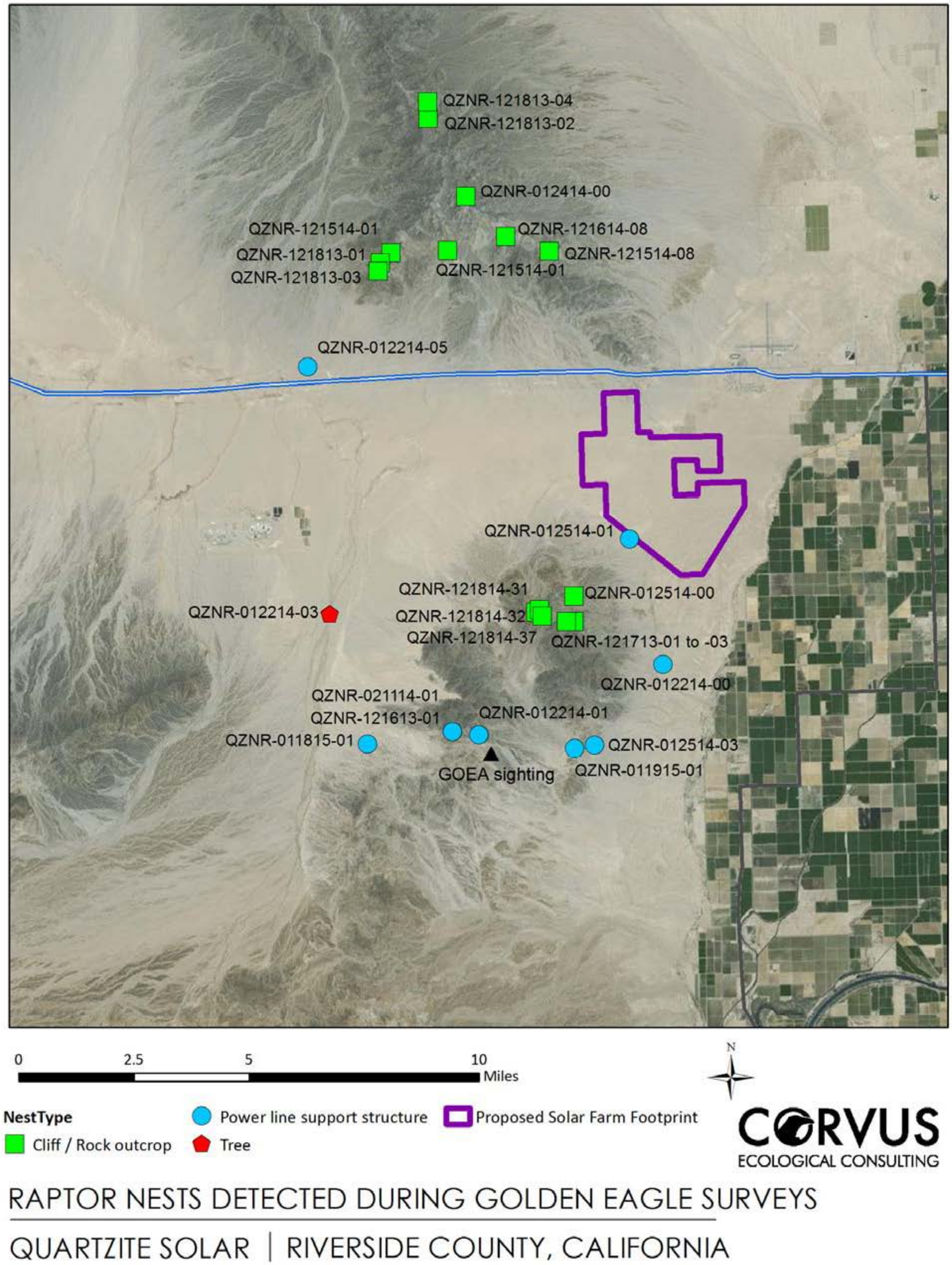

Figure 6. Raptor Nests Detected During Golden Eagle Surveys

5. Nesting Raptor / Raven Surveys

Nesting raptor/ Raven surveys were conducted monthly between 1 May and 1 June. This effort focused on the detection of all raptor/ Raven nests within 1-mile of the proposed project footprint in order to collect baseline data on:

- The number and distribution of raptor/ Raven nests prior to project development.
- Success rates of raptor/ Raven nests prior to project development.

All bird nests (including the incidental detection of resident passerine species) were mapped and recorded on standardized data sheets (Table 12). Monthly monitoring efforts updated development stage and breeding status at each raptor/ Raven nest.

Table 12. Bird Nests (including raptor/raven) detected on Quartzite Project, Spring 2013 and 2014. Nests detected in both years were renamed in 2014 to employ a more consistent naming strategy.

Nest ID	Species	Easting	Northing	Date	Status	# Young
BH0001	RTHA	708278	3718453	2013		
RKR0001/ QZNR-031214-03	RTHA/ UNHA	704893	3716895	4/22/2013/ 5/13/2014	Incubation**/** Inactive	
RKR0002/ QZNR-021414-01	CORA/ RTHA	703684	3717850	4/22/2013/ 5/31/2014	Incubation**/** Nest Cycle Complete	
RKR0003	AMKE	709754	3714312	4/22/2013	Hatchling/ Nestling	
RKR0004/ QZNR-031214-02	RTHA/ RTHA	706970	3715231	5/9/2013/ 5/13/2014	Fledgling**/**Nest Cycle Complete	?/ 2
RKR0005	AMKE	711010	3716388	4/22/2013	Hatchling/ Nestling	
RKR0006/ QZNR-031214-08	RTHA/ RTHA	711168	3716543	4/22/2013/ 5/31/2014	Hatchling/ Nestling**/** Nest Cycle Complete	?/2
RKR0007	WWDO	712577	3719443	5/3/2013	Nest Building	
RKR0008	NOMO	707682	3714578	5/4/2013	Hatchling/ Nestling	
RKR0009	CACW	707816	3714548	5/4/2013	Hatchling/ Nestling	
RKR0010	MODO	707758	3714628	5/4/2013	Incubation	
RKR0011	MODO	707787	3714549	5/4/2013	Incubation	
RKR0012	LOSH	707969	3720258	4/26/2013	Hatchling/Nest ling	
RKR0013	WEKI	710941	3716160	5/9/2013	Nest Building	

Nest ID	Species	Easting	Northing	Date	Status	# Young
RKR0014/ QZNR-031214-01	CORA/ CORA	708293	3714185	5/9/2013/ 5/31/2014	Hatchling/Nestling/ Nest Cycle Complete	
RKR0015	WEKI	712594	3718948	5/15/2013	Incubation	
RKR0016	MODO	712579	3719532	5/15/2013	Incubation	
QXNP-042214-01	LOSH	703,267	3,719,924	4/22/2014	Nest Building	
QZNP-021014-01	LOSH	703,269	3,719,933	2/10/2014	Incubation	
QZNP-021014-03	LCTH	703,187	3,720,192	2/10/2014	Hatchling/ Nestling	2
QZNP-021414-01	LOSH	703,708	3,710,209	4/25/2014	Incubation	
QZNP-030514-01	LCTH	704,408	3,717,229	3/12/2014	Incubation	
QZNP-031214-02	LOSH	704,010	3,716,939	3/12/2014	Hatchling/ Nestling	4
QZNP-031214-03	LOSH	706,044	3,715,983	3/12/2014	Incubation	
QZNP-031214-04	LOSH	708,654	3,712,415	3/12/2014	Incubation	
QZNP-032014-01	NOMO	703,193	3,720,186	3/20/2014	Incubation	
QZNP-040114-01	MODO	704,009	3,716,789	4/1/2014	Incubation	
QZNP-040314-01	CACW	703,152	3,720,310	4/3/2014	Undetermined	
QZNP-040614-01	LOSH	707,180	3,719,804	4/6/2014	Fledgling	
QZNP-041614-01	LOSH	704,413	3,717,316	4/16/2014	Incubation	1
QZNP-042214-01	LOSH	703,267	3,719,924	4/22/2014	Nest Building	
QZNR-031214-04	UNHA	701,352	3,718,549	5/13/2014	Inactive	
QZNR-031214-05	RTHA	700,831	3,718,568	5/13/2014	Nest Cycle Complete	
QZNR-031214-06	CORA	702,793	3,717,202	5/31/2014	Nest Cycle Complete	
QZNR-031214-07	RTHA	709,555	3,713,171	5/31/2014	Nest Cycle Complete	1
QZNR-032624-01	CORA	708,530	3,718,554	5/30/2014	Hatchling/ Nestling	2
QZNR-040314-01	AMKE	711,581	3,717,319	4/3/2014	Incubation	
QZNR-050814-01	AMKE	711,915	3,717,872	5/31/2014	Nest Cycle Complete	2
QZNR-051614	AMKE	705,762	3,716,306	5/31/2014	Undetermined	

6. Avian Results Analysis and Reporting

Overall 101 species have been detected on or near the Desert Quartzite solar project (Table 13). Eleven species have been found nesting, 46 have been detected in the winter months (December through February), 76 have been detected in the Spring (March through May), and 76 in the Fall (September through November).

Table 13. Comprehensive List of Species Detected Incidentally or during avian-focused surveys on the Desert Quartzite Solar Project.

Species Code	Species Common Name	Species Scientific Name	Nesting	Winter	Spring	Fall
AMKE	American Kestrel	*Falco sparverius*	TRUE	TRUE	TRUE	TRUE
ANHU	Anna's Hummingbird	*Calypte anna*	FALSE	TRUE	FALSE	FALSE
ATFL	Ash-throated Flycatcher	*Myiarchus cinerascens*	FALSE	FALSE	TRUE	FALSE
AWPE	American White Pelican	*Pelecanus erythrorhynchos*	FALSE	FALSE	FALSE	TRUE
BANS	Bank Swallow	*Riparia riparia*	FALSE	FALSE	FALSE	TRUE
BARS	Barn Swallow	*Hirundo rustica*	FALSE	FALSE	TRUE	TRUE
BEWR	Bewick's Wren	*Thryomanes bewickii*	FALSE	TRUE	FALSE	FALSE
BGGN	Blue-gray Gnatcatcher	*Polioptila caerulea*	FALSE	TRUE	TRUE	TRUE
BHCO	Brown-headed Cowbird	*Molothrus ater*	FALSE	FALSE	TRUE	FALSE
BHGR	Black-headed Grosbeak	*Pheucticus melanocephalus*	FALSE	FALSE	TRUE	FALSE
BLPH	Black Phoebe	*Sayornis nigricans*	FALSE	FALSE	TRUE	TRUE
BRBL	Brewer's Blackbird	*Euphagus cyanocephalus*	FALSE	FALSE	FALSE	TRUE
BRSP	Brewer's Sparrow	*Spizella breweri*	FALSE	FALSE	TRUE	TRUE
BTGN	Black-tailed Gnatcatcher	*Polioptila melanura*	FALSE	TRUE	TRUE	TRUE
BTSP	Black-throated Sparrow	*Amphispiza bilineata*	FALSE	TRUE	TRUE	FALSE
BTYW	Black-throated Gray Warbler	*Setophaga nigrescens*	FALSE	FALSE	TRUE	TRUE
BUOR	Bullock's Oriole	*Icterus bullockii*	FALSE	FALSE	TRUE	TRUE
BUOW	Burrowing Owl	*Athene cunicularia*	TRUE	TRUE	TRUE	TRUE
CACW	Cactus Wren	*Campylorhynchus brunneicapillus*	TRUE	TRUE	TRUE	TRUE
CANG	Canada Goose	*Branta canadensis*	FALSE	FALSE	FALSE	TRUE
CHSP	Chipping Sparrow	*Spizella passerina*	FALSE	FALSE	TRUE	TRUE
CLSW	Cliff Swallow	*Petrochelidon pyrrhonota*	FALSE	FALSE	TRUE	TRUE
COHA	Cooper's Hawk	*Accipiter cooperii*	FALSE	TRUE	TRUE	TRUE
COHU	Costa's Hummingbird	*Calypte costae*	FALSE	TRUE	TRUE	FALSE
COME	Common Merganser	*Mergus merganser*	FALSE	FALSE	TRUE	FALSE
COPO	Common Poorwill	*Phalaenoptilus nuttallii*	FALSE	FALSE	TRUE	TRUE
CORA	Common Raven	*Corvus corax*	TRUE	TRUE	TRUE	TRUE
COYE	Common Yellowthroat	*Geothlypis trichas*	FALSE	FALSE	FALSE	TRUE
DEJU	Dark-eyed Junco	*Junco hyemalis*	FALSE	TRUE	FALSE	FALSE
EUCD	Eurasian Collared-Dove	*Streptopelia decaocto*	FALSE	TRUE	TRUE	TRUE
EUST	European Starling	*Sturnus vulgaris*	FALSE	TRUE	FALSE	TRUE
FEHA	Ferruginous Hawk	*Buteo regalis*	FALSE	TRUE	TRUE	TRUE
GAQU	Gambel's Quail	*Callipepla gambelii*	FALSE	TRUE	TRUE	TRUE

Species Code	Species Common Name	Species Scientific Name	Nesting	Winter	Spring	Fall
GBHE	Great Blue Heron	*Ardea herodias*	FALSE	FALSE	TRUE	TRUE
GHOW	Great Horned Owl	*Bubo virginianus*	FALSE	TRUE	FALSE	TRUE
GOEA	Golden Eagle	*Aquila chrysaetos*	TRUE	TRUE	TRUE	FALSE
GREG	Great Egret	*Ardea alba*	FALSE	FALSE	TRUE	TRUE
GRFL	Gray Flycatcher	*Empidonax wrightii*	FALSE	FALSE	TRUE	FALSE
GRRO	Greater Roadrunner	*Geococcyx californianus*	FALSE	FALSE	TRUE	TRUE
GTGR	Great-tailed Grackle	*Quiscalus mexicanus*	FALSE	TRUE	TRUE	TRUE
HOFI	House Finch	*Haemorhous mexicanus*	FALSE	TRUE	TRUE	TRUE
HOLA	Horned Lark	*Eremophila alpestris*	FALSE	TRUE	TRUE	TRUE
HOSP	House Sparrow	*Passer domesticus*	FALSE	FALSE	FALSE	TRUE
HOWR	House Wren	*Troglodytes aedon*	FALSE	FALSE	FALSE	TRUE
KILL	Killdeer	*Charadrius vociferus*	FALSE	FALSE	FALSE	TRUE
LARB	Lark Bunting	*Calamospiza melanocorys*	FALSE	FALSE	TRUE	FALSE
LAZB	Lazuli Bunting	*Passerina amoena*	FALSE	FALSE	FALSE	TRUE
LCTH	Le Conte's Thrasher	*Toxostoma lecontei*	TRUE	TRUE	TRUE	TRUE
LEGO	Lesser Goldfinch	*Spinus psaltria*	FALSE	FALSE	TRUE	TRUE
LENI	Lesser Nighthawk	*Chordeiles acutipennis*	FALSE	FALSE	TRUE	TRUE
LEOW	Long-eared Owl	*Asio otus*	FALSE	TRUE	FALSE	FALSE
LOSH	Loggerhead Shrike	*Lanius ludovicianus*	TRUE	TRUE	TRUE	TRUE
MERL	Merlin	*Falco columbarius*	FALSE	FALSE	FALSE	TRUE
MGWA	MacGillivray's Warbler	*Geothlypis tolmiei*	FALSE	FALSE	TRUE	TRUE
MOBL	Mountain Bluebird	*Sialia currucoides*	FALSE	TRUE	FALSE	FALSE
MODO	Mourning Dove	*Zenaida macroura*	TRUE	TRUE	TRUE	TRUE
MOPL	Mountain Plover	*Charadrius montanus*	FALSE	FALSE	FALSE	TRUE
NAWA	Nashville Warbler	*Oreothlypis ruficapilla*	FALSE	FALSE	FALSE	TRUE
NOFL	Northern Flicker	*Colaptes auratus*	FALSE	TRUE	FALSE	TRUE
NOHA	Northern Harrier	*Circus cyaneus*	FALSE	TRUE	TRUE	TRUE
NOMO	Northern Mockingbird	*Mimus polyglottos*	TRUE	FALSE	TRUE	TRUE
NRWS	Northern Rough-winged Swallow	*Stelgidopteryx serripennis*	FALSE	FALSE	TRUE	TRUE
OCWA	Orange-crowned Warbler	*Oreothlypis celata*	FALSE	FALSE	TRUE	TRUE
OSPR	Osprey	*Pandion haliaetus*	FALSE	FALSE	TRUE	TRUE
PHAI	Phainopepla	*Phainopepla nitens*	FALSE	FALSE	TRUE	TRUE
PRFA	Prairie Falcon	*Falco mexicanus*	TRUE	TRUE	TRUE	TRUE
RCKI	Ruby-crowned Kinglet	*Regulus calendula*	FALSE	TRUE	FALSE	TRUE
ROPI	Rock Pigeon	*Columba livia*	FALSE	TRUE	TRUE	TRUE
ROWR	Rock Wren	*Salpinctes obsoletus*	FALSE	TRUE	TRUE	TRUE
RTHA	Red-tailed Hawk	*Buteo jamaicensis*	TRUE	TRUE	TRUE	TRUE
RWBL	Red-winged Blackbird	*Agelaius phoeniceus*	FALSE	TRUE	TRUE	TRUE
SACR	Sandhill Crane	*Grus canadensis*	FALSE	FALSE	TRUE	FALSE

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Species Code	Species Common Name	Species Scientific Name	Nesting	Winter	Spring	Fall
SAGS	Sage Sparrow (Unspecified)	*Artemisiospiza nevadensis/bell*	FALSE	TRUE	TRUE	TRUE
SAPH	Say's Phoebe	*Sayornis saya*	FALSE	TRUE	TRUE	TRUE
SATH	Sage Thrasher	*Oreoscoptes montanus*	FALSE	TRUE	TRUE	FALSE
SAVS	Savannah Sparrow	*Passerculus sandwichensis*	FALSE	FALSE	FALSE	TRUE
SEOW	Short-eared Owl	*Asio flammeus*	FALSE	TRUE	FALSE	TRUE
SNEG	Snowy Egret	*Egretta thula*	FALSE	FALSE	TRUE	FALSE
SSHA	Sharp-shinned Hawk	*Accipiter striatus*	FALSE	TRUE	TRUE	TRUE
SUTA	Summer Tanager	*Piranga rubra*	FALSE	TRUE	FALSE	FALSE
SWHA	Swainson's Hawk	*Buteo swainsoni*	FALSE	FALSE	TRUE	TRUE
TRES	Tree Swallow	*Tachycineta bicolor*	FALSE	TRUE	TRUE	TRUE
TUVU	Turkey Vulture	*Cathartes aura*	FALSE	TRUE	TRUE	TRUE
VASW	Vaux's Swift	*Chaetura vauxi*	FALSE	FALSE	TRUE	TRUE
VERD	Verdin	*Auriparus flaviceps*	FALSE	TRUE	TRUE	TRUE
VESP	Vesper Sparrow	*Pooecetes gramineus*	FALSE	FALSE	TRUE	TRUE
VGSW	Violet-green Swallow	*Tachycineta thalassina*	FALSE	FALSE	TRUE	TRUE
WAVI	Warbling Vireo	*Vireo gilvus*	FALSE	FALSE	TRUE	FALSE
WCSP	White-crowned Sparrow	*Zonotrichia leucophrys*	FALSE	TRUE	TRUE	TRUE
WEKI	Western Kingbird	*Tyrannus verticalis*	FALSE	FALSE	TRUE	FALSE
WEME	Western Meadowlark	*Sturnella neglecta*	FALSE	FALSE	TRUE	TRUE
WETA	Western Tanager	*Piranga ludoviciana*	FALSE	FALSE	TRUE	FALSE
WEWP	Western Wood-Pewee	*Contopus sordidulus*	FALSE	FALSE	TRUE	FALSE
WFIB	White-faced Ibis	*Plegadis chihi*	FALSE	FALSE	TRUE	TRUE
WIFL	Willow Flycatcher	*Empidonax traillii*	FALSE	FALSE	FALSE	TRUE
WIWA	Wilson's Warbler	*Cardellina pusilla*	FALSE	FALSE	TRUE	TRUE
WTSW	White-throated Swift	*Aeronautes saxatalis*	FALSE	TRUE	TRUE	FALSE
WWDO	White-winged Dove	*Zenaida asiatica*	FALSE	FALSE	TRUE	TRUE
YEWA	Yellow Warbler	*Setophaga petechia*	FALSE	FALSE	TRUE	FALSE
YHBL	Yellow-headed Blackbird	*Xanthocephalus xanthocephalus*	FALSE	FALSE	TRUE	FALSE
YRWA	Yellow-rumped Warbler	*Setophaga coronata*	FALSE	TRUE	TRUE	TRUE

7. References Cited

Bildstein, K.L., J.P. Smith, and R. Yosef. 2007. Migration counts and monitoring. Pp. 101-115 *in* D.M. Bird and K.L. Bildstein (eds.), Raptor research and management techniques. Hancock House Publishers, Surrey, British Columbia.

Bird, D.M., and K.L. Bildstein (eds.). 2007. (Book) Raptor research and management techniques. Hancock House Publishers, Surrey, British Columbia.

California Burrowing Owl Consortium. 1993. Burrowing Owl Survey Protocol and Mitigation Guidelines. April 1993. https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=83842. Last accessed 23 June 2015.

California Department of Fish and Game. 2012. Staff Report on Burrowing Owl Mitigation. March 7, 2012. https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=83843. Last accessed 23 June 2015.

Pagel, J.E., D.M. Whittington, and G.T. Allen. 2010. Interim Golden Eagle Inventory and Monitoring Protocols; and Other Recommendations. USFWS.

Rosenberg, D. K., L. A. Trulio, D. Catlin, D. Chromczak, J. A. Gervais, N. Ronan, and K. A. Haley. 2007. Ecology of the burrowing owl in California: a synthesis of demographic and space use studies. Report to Bureau of Land Management.

Thomas, L., S.T. Buckland, E.A. Rexstad, J. L. Laake, S. Strindberg, S. L. Hedley, J. R.B. Bishop, T. A. Marques, and K. P. Burnham. 2010. Distance software: design and analysis of distance sampling surveys for estimating population size. Journal of Applied Ecology 47: 5-14. DOI: 10.1111/j.1365-2664.2009.01737.x

Appendix A.

Quartzite Migratory Bird Survey Protocol

Prepared for
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1030 Nevada Street, Suite 201
Redlands, CA 92374

Prepared By:
***Corvus* Ecological Consulting, LLC**
7810 Highway 89, Suite 270
Flagstaff, AZ 86004

CORVUS
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April, 2013

I. Equipment:

Binoculars (8-10X)
Spotting Scope (30X or greater)
GPS
Kestrel (thermometer/ anemometer)
Clipboard
Quartzite Migratory Bird Survey Data Sheet (s)
Pen (permanent ink)
Time-keeper (e.g. watch or cell phone)
Compass

II. Migration Survey Point Explanation

The purpose of these surveys is to record the passage of birds migrating over the Desert Quartzite Solar Project (Project) and depict their activity during transit.

- Migration surveys are conducted weekly from each observation survey point from 15 March through 31 May (spring migration) and from 1 September through 15 November(fall migration).

The two Migration survey Points (MP01 and MP02) are strategically located to bisect the Project footprint along the central east-west axis, 3.25 km apart, and are situated with near 360 degree views of the distant horizon to maximize visual capture of migrating birds as they pass over the area.

Survey Point	UTM (WGS 84)	
MP01	706914	3717172
MP02	710176	3717195

Flapping flight is energetically expensive and therefore migratory flights are strongly correlated with advantageous weather conditions. Many birds (especially raptors) select the warmest part of the day for migratory movement. Because the Project topography is generally flat and lacking in features likely to generate orographic lift;

- Migration point surveys will be conducted from 10 a.m. through 3 p.m. when thermal lift is greatest.
- Infinite distance visual surveys

A portion of the Project avian community is resident (non-migratory). Residents and some migrants (e.g. soaring raptors) can be expected to circulate and have the potential to be tallied more than once. To reduce the influence of resident birds on the survey data;

- Birds will only be recorded as they pass the axis line and not on subsequent returns. (See IV. Migration Survey Procedures.)

III. Data Sheet Explanation:

Surveyors will use the Quartzite Migratory Bird Survey Data Sheet to record;

A. Daily Information

- Observer: First initial of the first name followed by entire last name. Example, John Doe is recorded as: J. DOE
- Date: (DD Mmm YYYY): e.g. 15 Apr 2013
- Location: Quartzite
- Point ID: Unique identifier for the survey point (MP01 or MP02)

B. Environmental Observations

Weather data is collected for correlation of migration activity with environmental conditions.

- Start Time: 10 a.m.
- Time**:** Start of hourly weather interval
- Precipitation (Yes or No)
- Visibility (in kilometers): Estimate of how far the observer can see across the landscape. Use visible landmarks to aid in this determination.
- Wind Speed (Average MPH): Record the Average Wind Speed in miles per hour. A Kestrel (or similar measuring tool) should be used to record current wind conditions.
    i. First, determine the direction from which the wind is blowing. Position the anemometer in a location that is free from wind obstruction (clear from the leeward side of a tree, shrub or vehicle; top of a wash bank rather than a drainage bottom).
    ii. Hold the anemometer above head height and turn it on. Scroll to the device's "average" setting and allow it to record for two minutes. **NOTE: These devices will begin to average the wind speed from the second they are turned on and therefore they should be in position to record accurate conditions from the moment they are turned on until the moment the value is captured*.
- Wind Direction (8-point cardinal): Direction from which the wind is emanating (e.g. SW)
- Temperature (ºC): *Temp (ºC)* = Record the Temperature in degrees Celsius.
    i. Hold the Kestrel or thermometer in a shaded location, approximately three-feet above the ground surface.
    ii. Allow the temperature reading to stabilize before recording the value. With a digital thermometer (such as a Kestrel) this point can be determined by the appearance of an unchanged value for 20 seconds or when the value suddenly

changes direction from which it was adjusting, such as when the value increases after a consistent downward adjustment.

- Cloud cover (%): Visually estimate the amount of the sky covered by cloud

C. Bird Observations

1. Time: Timestamp at which a bird crosses the east-west axis
2. Species Code: 4-letter Alpha code (Institute for Bird Populations 2012; http://www.birdpop.org/DownloadDocuments/Alpha_codes_eng.pdf)
3. Number of Individuals: The number of birds (of the same species) detected passing over the axis and not returning. If birds are obviously grouped together, record the number of individuals in the same-species group. If birds are separated by enough space to warrant recording significantly different distances, flight heights or behaviors for each, record those birds on separate lines (e.g. write CLSW in "Species code" on three different lines if there are three Cliff Swallows detected at three completely different height codes).
4. Flight Direction: (8-point cardinal): Direction in which the bird is flying away from the observer and travelling across the Project (e.g. NW).
5. Distance from Observer: Record (in meters) the distance of each bird from the observation point as it crosses the axis.
6. Flight Height: Record the **lowest flight height observed** with one of the following codes:

- 1 = 0-4m (height of a PV Panel)
- 2 = 4-10m (height of a 3-storey building)
- 3= 10-50m (height of a transmission tower)
- 4=50m+ (higher than a transmission tower)

7. Behavior: Record the **behavior best characterizing use of the Project area** with one of the following codes;

- F=Foraging
- FA= Flapping
- SO=Soaring
- GL=Gliding
- S=Singing
- C=Calling
- O=Other

8. Age Class: Record A=Adult or I=Immature for raptors

IV. Migration Survey Procedures:

1. Fatigue: Fatigue lowers data resolution – observers should consider chairs, umbrellas, sunglasses and other tools to reduce fatigue. Scan using binoculars, switching to a scope only if necessary to complete an identification.

2. Data collection: It is better to be conservative with identifications and estimations than inaccurate.

- **Counting**. Flocking birds should be counted directly (1,2,3…) when possible or estimated in groups (5,10,15 …). Errors increase as in parallel with the multiple used - use the lowest practical multiple when estimating bird numbers.
- **Double-Counting**: Care must be taken to avoid double-counting. The goal of these surveys is to account for individuals of a given species no more than one time during the migration survey period. Some birds may be expected to be residents with territories that encompass the survey point. For example, a Red-tailed Hawk may be foraging over the area even as others are passing through, so the surveyor should attempt to exclude repeat tallies of such (and all other) non-migrants.

3. UN-codes: Infinite distance visual surveys rely on surveyors competently combining subtle clues such as silhouetted profile, wing beat rate, and flight pattern to accurately identify distant birds under less than ideal lighting conditions. Recognizing that not all birds can be identified to species under all conditions at all distances, the Alpha abbreviations contain UN-codes;

Alpha	Bird Group
UNBI	Unidentified Bird
UNEM	Unidentified Empidonax Flycatcher
UNGU	Unidentified Gull
UNHA	Unidentified Hawk
UNHU	Unidentified Hummingbird
UNWA	Unidentified Warbler

- Use UN- codes to record birds to the highest resolution possible

Additional Observations. There may be additional bird sightings that observers wish to record that can provide benefit to the project but are not relevant to the particular survey, e.g. breeding or wintering bird observations. These observations should be recorded and passed along to the Avian Lead to assist with the depiction of avian breeding or distributional data within the Project area. To be of maximum value, each observation should include UTMs, a date and timestamp, and thorough details.

If surveyors have any questions about this protocol, please ask them *before* conducting the survey!

Appendix B

Quartzite Avian Line-Transect Survey Protocol

Prepared for
IRONWOOD CONSULTING INC.
1030 Nevada Street, Suite 201
Redlands, CA 92373

Prepared By:
***Corvus* Ecological Consulting, LLC**
7810 Highway 89, Suite 270
Flagstaff, AZ 86004

March, 2013

Materials/ Supplies:

Binoculars
GPS
Kestrel (thermometer/ anemometer)
Rangefinder
Clipboard
Data Sheet(s)
Notepad (for recording personal notes not relevant to data sheets)
Pen (permanent ink)
Watch or other portable clock (e.g. cell phone)
Compass

Line-Transect Explanation

- Check your GPS settings to insure that the Map Datum is "WGS 84;" that the Compass Heading > North Reference is set to, "Magnetic;" and that "Metric" is the selected unit of measurement for "distance/speed."
- Line-transect will be 2000 meters in length, with a starting point and ending point (Fig. 1).

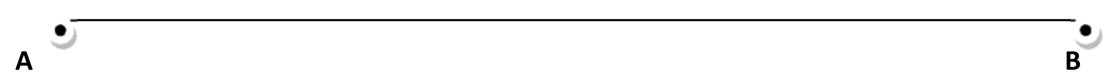

Figure 1.0. Line-transect route, 2000 meters long from point A to point B.

- Surveyors will begin the route from either point. For each line, point A should be used as a starting point 50% of the occasions it is surveyed, point B serving as starting point the other 50% of occasions it is surveyed.
- Surveyors will record distance (in meters) to each bird detected, measuring distance perpendicular (90°) to the line. Birds will not be recorded more than 90° from the line before the starting point or after the ending point. [See Methods/ Procedures for details.]
- ***Please be sure to read this entire document prior to starting your first survey***.

Data Sheet Explanation:

Surveyors will use the Quartzite Avian Line-Transect Data Sheet.

1. Line-Transect Data Sheet fields:

    a. Complete the data sheet header including: Observer name, Date, Location, Transect ID, Starting point (circle A or B), Start time, and weather data prior to beginning a point count.

    b. <u>Observer(s) names</u>: First initial of first name followed by entire last name. Example, John Doe is recorded as: J. DOE

    c. <u>Date:</u> In DD MMM YYYY format. For example: 02 MAR 2011

d. Site Name: Locations to include: Project Footprint (within the proposed project boundary) or Project Control (outside of the proposed Project Footprint).

e. Transect ID: Unique identifier for the transect.

f. WGS 84, UTM: Provide the UTM coordinates for the starting location (A or B).

To Record Start Times and Weather Data: The purpose of collecting weather data is to provide support that environmental conditions are conducive to performing an avian line-transect survey. If conditions cause the observer to feel that results of a survey would be biased due to poor weather, the survey should be postponed until weather conditions improve. Some examples of weather conditions that are grounds for postponement include: average wind speeds greater than 15 miles per hour, visibility 2.0 miles or less, heavy rain/ fog or extreme temperatures.

2. *Record the start time*.
   i. The start time should represent the moment when observers initiate a search effort exclusive to the "transect" being surveyed; i.e. after initial information is recorded in the header of the data sheet, immediately before beginning to search for birds.
3. *Precip (Y/N)* = Precipitation, "Yes" or "No" for the entire survey period.
4. *Visibility (Miles)* = Estimate of how far the observer can see (in miles) across the landscape. Use visible landmarks to aid in this determination.
5. *Wind (AVG MPH)* = Record the Average Wind Speed in miles per hour. A Kestrel (or similar measuring tool) should be used to record current wind conditions.
   i. First, determine the direction from which the wind is blowing. Position the anemometer in a location that is free from wind obstruction (clear from the leeward side of a tree, shrub or vehicle; top of a wash bank rather than a drainage bottom).
   ii. Hold the anemometer above head height and turn it on. Scroll to the device's "average" setting and allow it to record for two minutes. **NOTE: These devices will begin to average the wind speed from the second they are turned on and therefore they should be in position to record accurate conditions from the moment they are turned on until the moment the value is captured*.
6. *Temp (°C)* = Record the Temperature in degrees Celsius.
   i. Hold the Kestrel or thermometer in a shaded location, approximately three-feet above the ground surface.
   ii. Allow the temperature reading to stabilize before recording the value. With a digital thermometer (such as a Kestrel) this point can be determined by the appearance of an unchanged value for 20 seconds or when the value suddenly changes direction from which it was adjusting, such as when the value increases after a consistent downward adjustment.
6. *Cloud Cover (%)* = A visual estimation which determines the percentage of visible sky that is covered by clouds.

- Recording Data

A. *Species code*: This is a bird's standardized four letter code. Appendix A contains the project related short list of codes for easy reference, if any are missing please reference: http://www.birdpop.org/DownloadDocuments/Alpha_codes_eng.pdf

B. *Detection type* (A, V): How the bird was **initially** detected; A = Audio and V = Visual. **NOTE: these codes are listed at the bottom of the data sheet.*

C. *Flight height (1, 2, 3 or 4)*: Record **lowest flight height observed** as one of the following numbers (1 through 4): 1 = 0-4m (height of a tall PV panel), 2 = 4-10m (height of a three-story building), 3 = 10-50m (height to top of transmission tower), 4 = 50m+ (higher than top of transmission tower). **NOTE: these codes are listed at the bottom of the data sheet.*

F. *Number (#) of individuals*: the number of birds detected (of the same species). If birds are obviously grouped together, record the number of individuals in the same-species group. If birds are separated by enough space to warrant recording significantly different distances for each, or if birds are located in significantly different directions, record those birds on separate lines (e.g. you can write BTSP in "Species code" on three different lines if there are three Black-throated Sparrows detected in three completely different directions; for each BTSP you would write "1" under "# of individuals.") **Important note:** Do not count eggs or young birds that are not yet independent from their parents as "individuals."

G. *Radial distance (meters)*: perpendicular (90°) distance from the transect, in meters. If distance cannot be accurately recorded at 90° from the line-transect: record a straight line distance from the observer to the bird, AND record the size of the angle formed between the straight line to the bird and the line-transect itself. (*This is recorded in the column "Bearing (degrees)" – see below.*) **Important note:** If recording a single distance for a "cluster" of the same species, use the estimated distance to the *center of the cluster*. These are "unlimited distance surveys" and there is no limit to the perpendicular distance which detections may be made.

H. *Bearing (degrees)*: if the distance recorded to the bird(s) is made at a 90° angle, leave this field blank. Generally, this will be the case. However, if the surveyor finds it necessary to record a straight line distance to the bird - for example if writing furiously after encountering a flock of birds, or if a large obstruction such as a tree blocks the view at 90° - use this column to record the size of the angle (in degrees) formed where the surveyor is the axis, the line-transect is the adjacent side of the angle, and the straight line between the surveyor and the bird is the hypotenuse side of the angle. (The "opposite" side, which is situated 90° from the line-transect, can then be automatically calculated during data analysis.)

I. *Behavior code*: See Appendix B for a complete explanation of each behavior code. Multiple codes can be used, separated by commas (for example: C, S), but please list the *initial* behavior code first. **NOTE: these codes are listed with brief definitions at the bottom of the data sheet.*

J. *Comments*: Observers may enter comments that they feel are relevant to any detection. It is a good idea to enter a comment such as "no data" if observers did not have a detection on the line-transect so that data checkers can keep track of progress and know that there is not data missing. If an individual bird is counted as an "incidental" and recorded again during the station survey, a comment should be made indicating such. **Note**: Any incidental sightings should be entered into pendragon, not on the transect data form.

Line-Transect Survey Methods/ Procedures:

Once observers/ surveyors are within 200 meters of a start point they should record the initial data found in the header of the data sheet, except for Start Time. Start Time should be recorded when the surveyor arrives at the beginning of the line-transect, immediately before beginning to survey the transect.

Access the starting point and record any incidental (I) sightings while in route into pendragon. Because line-transect surveys tend to generate many more detections than a traditional point-count or point-transect, and therefore take longer to conduct, incidental sightings should be limited to noteworthy detections. Examples include: a new species for the project site list; a species not likely to be encountered again during the particular line-transect survey; a bird exhibiting breeding behavior; or any other reason the surveyor feels it necessary to document a particular incidental sighting as “data.”

Once at the starting point for the line-transect, begin the count period by recording the Start Time. Birds that flush from the line-transect during approach should be included in the survey period and documented by recording the distance to the bird’s initial position, prior to flushing. Detections should include a value for: “Species code,” “Detection type,” “Flight height,” “Number (#) of individuals,” “Radial distance,” “Bearing,” and “Behavior code” (if applicable). Observers should travel slowly or stop occasionally along the line to listen for vocalizations and to search dense areas of cover. Try to move as quietly as possible to maximize aural detections. A relatively constant pace should be maintained, but take the time needed to confidently identify every bird detected. Don’t forget to scan the sky as well as the surrounding habitat, to maximize probability of detection for all upland species (especially raptors).

Once a line-transect has been completed, observers should record “End time”. The surveyor should then access the next line-transect as soon as possible, if surveying a second transect that day. Any bird detection made after the “End time” has been recorded at the ending point should be recorded as an incidental detection in pendragon (even if surveyor is still at the ending point). Bird detections made between transects are recorded as incidental sightings, as well.

Care must be taken to avoid double-counting. The goal is to account for individuals of a given species no more than one time during the line-transect survey period; the exception to this rule being “incidental” detections. A bird recorded as an incidental may be recorded again during the official line-transect survey, but observers should provide a comment that indicates as much. It is important to separate incidental sightings from transect sightings for the purpose of data analysis but it is also important that we account for as many species/ individuals as possible during each survey. Once an observer has traveled more than 200 meters from the last station they should take final weather data and record any final comments on the data sheet.

There may be additional bird sightings that observers wish to record that can provide benefit to the project but are not relevant to the particular survey. Additional sighting should be recorded in the Incidental pendragon form, where they may provide beneficial migratory or distributional data.

Quartzite Avian Line-Transect Survey Protocol - Appendix B:
Species Codes

Desert Sunlight Bird List

AMERICAN AVOCET	AMAV	GRAY FLYCATCHER	GRFL	ROCK WREN	ROWR
AMERICAN KESTREL	AMKE	GREAT BLUE HERON	GBHE	SAGE SPARROW	SAGS*
AMERICAN ROBIN	AMRO	GREAT EGRET	GREG	SAGE THRASHER	SATH
AMERICAN WHITE PELICAN	AWPE	GREAT HORNED OWL	GHOW	SAVANNAH SPARROW	SAVS*
ANNA'S HUMMINGBIRD	ANHU	GREATER ROADRUNNER	GRRO	SAY'S PHOEBE	SAPH
ASH-THROATED FLYCATCHER	ATFL	GREAT-TAILED GRACKLE	GTGR	SHARP-SHINNED HAWK	SSHA
BARN OWL	BANO*	GREEN-TAILED TOWHEE	GTTO	SHORT-EARED OWL	SEOW
BARN SWALLOW	BARS*	HORNED LARK	HOLA	SNOWY EGRET	SNEG
BENDIRE'S THRASHER	BETH**	HOUSE FINCH	HOFI	SPOTTED TOWHEE	SPTO
BLACK PHOEBE	BLPH	HOUSE SPARROW	HOSP	SWAINSON'S HAWK	SWHA
BLACK-CROWNED NIGHT HERON	BCNH	HOUSE WREN	HOWR	TOWNSEND'S WARBLER	TOWA
BLACK-NECKED STILT	BNST	KENTUCKY WARBLER	KEWA	TREE SWALLOW	TRES*
BLACK-TAILED GNATCATCHER	BTGN	KILLDEER	KILL	TURKEY VULTURE	TUVU
BLACK-THROATED GRAY WARBLER	BTYW*	LARK BUNTING	LARB	UNIDENTIFIED BIRD	UNBI
BLACK-THROATED SPARROW	BTSP	LARK SPARROW	LASP	UNIDENTIFIED EMPIDONAX	UNEM
BLUE-GRAY GNATCATCHER	BGGN	LAZULI BUNTING	LAZB*	UNIDENTIFIED GULL	UNGU
BREWER'S BLACKBIRD	BRBL	LE CONTE'S THRASHER	LCTH	UNIDENTIFIED HAWK	UNHA
BREWER'S SPARROW	BRSP	LESSER GOLDFINCH	LEGO	UNIDENTIFIED HUMMINGBIRD	UNHU
BROWN-HEADED COWBIRD	BHCO	LESSER NIGHTHAWK	LENI	UNIDENTIFIED SWALLOW	UNSW
BULLOCK'S ORIOLE	BUOR	LINCOLN'S SPARROW	LISP	UNIDENTIFIED WARBLER	UNWA
BURROWING OWL	BUOW	LOGGERHEAD SHRIKE	LOSH	VAUX'S SWIFT	VASW
CACTUS WREN	CACW*	MERLIN	MERL	VERDIN	VERD
CATTLE EGRET	CAEG	MOUNTAIN BLUEBIRD	MOBL	VIOLET-GREEN SWALLOW	VGSW
CEDAR WAXWING	CEDW*	MOURNING DOVE	MODO	WESTERN BLUEBIRD	WEBL
CHIPPING SPARROW	CHSP	NORTHERN FLICKER	NOFL	WESTERN KINGBIRD	WEKI

CLIFF SWALLOW	CLSW	NORTHERN HARRIER	NOHA	WESTERN MEADOWLARK	WEME
COMMON POORWILL	COPO	NORTHERN MOCKINGBIRD	NOMO	WESTERN SCRUB-JAY	WESJ
COMMON RAVEN	CORA	NORTHERN PARULA	NOPA	WESTERN TANAGER	WETA
COMMON YELLOWTHROAT	COYE	NORTHERN ROUGH-WINGED SWALLOW	NRWS	WHITE-CROWNED SPARROW	WCSP
COOPER'S HAWK	COHA	ORANGE-CROWNED WARBLER	OCWA	WHITE-FACED IBIS	WFIB
COSTA'S HUMMINGBIRD	COHU	OSPREY	OSPR	WHITE-THROATED SPARROW	WTSP
DARK-EYED JUNCO	DEJU	PEREGRINE FALCON	PEFA	WHITE-THROATED SWIFT	WTSW
EUROPEAN STARLING	EUST	PHAINOPEPLA	PHAI	WILSON'S WARBLER	WIWA
FERRUGINOUS HAWK	FEHA	PRAIRIE FALCON	PRFA	YELLOW-HEADED BLACKBIRD	YHBA
FRANKLIN'S GULL	FRGU	PURPLE MARTIN	PUMA**	YELLOW-RUMPED WARBLER	YRWA
GAMBEL'S QUAIL	GAQU	RED-TAILED HAWK	RTHA	YELLOW WARBLER	YWAR*
GOLDEN EAGLE	GOEA**	ROCK PIGEON	ROPI		

*four letter codes that are not 'first order' due to conflict. **birds known to occur, or that may potentially occur, that were not from Desert Sunlight Surveys

If there is a code missing from the list, please refer to: http://www.birdpop.org/DownloadDocuments/Alpha_codes_eng.pdf for the four letter code.

Quartzite Avian Line-Transect Survey Protocol - Appendix C:

Behavior Codes

The following is a detailed explanation of all possible behavior codes, some of them were taken from the Cornell Lab of Ornithology's "eBird" protocol. These codes are fairly standard across many Breeding Bird Atlases and other breeding bird surveys. Each code represents a Confirmed, Probable or Possible breeding record (You do NOT need to record anything other than the two-letter code on your data sheet! This is information is presented for reference only.)

NY = Confirmed--Nest with Young -- Nest with young seen or heard.
NE = Confirmed--Nest with Eggs -- Nest with eggs.
ON = Confirmed--Occupied Nest -- Occupied nest presumed by parent entering and remaining, exchanging incubation duties, etc.
FL = Confirmed--Recently Fledged young -- Recently fledged or downy young observed while still dependent upon adults.
FY = Confirmed--Feeding Young -- Adult feeding young that have left the nest, but are not yet flying and independent (should not be used with raptors, terns, and other species that may move many miles from the nest site).
CS = Confirmed--Carrying Fecal Sac -- Adult carrying fecal sac.
CF = Confirmed--Carrying Food -- Adult carrying food for young (should not be used for corvids, raptors, terns, and certain other species that regularly carry food for courtship or other purposes).
DD = Confirmed--Distraction Display -- Distraction display, including feigning injury.

NB = Confirmed/Probable--Nest Building -- Nest building at apparent nest site (should not be used for certain wrens, and other species that build dummy nests).
CN = Confirmed/Probable--Carrying Nesting Material -- Adult carrying nesting material; nest site not seen.
T = Probable--Territory held for 7+ days -- Territorial behavior or singing male present at the same location 7+ days apart.
CO = Probable--Courtship, Display or Copulation -- Courtship or copulation observed, including displays and courtship feeding.
N = Probable--Visiting probable Nest site -- Visiting repeatedly probable nest site (primarily hole nesters).
A = Probable--Agitated behavior -- Agitated behavior or anxiety calls from an adult (ex. "pishing" and strong tape responses).
PA = Possible--Pair in suitable habitat -- Pair observed in suitable breeding habitat within breeding season.

The following are behavior codes included on the data sheet.

S = Singing	**C** = Calling
P = Perched	**FO** = Flyover
F = Foraging	**O** = Other (explain: wing noise, drumming, etc),

Quartzite Avian Line-Transect Survey Protocol - Appendix D:

Assumptions Of Line Distance Sampling

Both line-transects and point-transects, as well as point-counts that record distances as data, are all classified as various types of "distance sampling" (Buckland et al. 1993, Rosenstock et al. 2002). Line-transects are a form of "Line distance sampling." It is important that surveyors make every effort to avoid violating each of the three main assumptions of line distance sampling:

1) Birds on the line are detected with certainty. Observers should travel slowly or stop occasionally along the line to listen for vocalizations and to search dense areas of cover. Try to move as quietly as possible to maximize aural detections. Conduct the survey such that you are reasonably sure to detect all birds with a distance of "0 meters."
2) Birds are detected before evasive movement is triggered by the observer. This sampling method obtains an instantaneous "snapshot" of birds around the line. However, some species may take evasive actions and move some distance before being detected by the observer (e.g. quail); some species such as ravens may even be attracted to the observer! We should do our best as observers to keep our senses sharp and try to make those detections before the birds change positions.
3) Distances are estimated or measured accurately. Angles in particular must be measured accurately if taking a radial distance and bearing to a bird, rather than measuring from 90°. Using rangefinders for measuring distance and a good compass for measuring angles are the surest ways to eliminate error.

There are other minor assumptions, but these are the most important. Naturally, it is also critical that observers be competent in identifying birds by sight and sound, and well-trained in the survey methods.

One quick side note is that line-transects work very well in areas where surveyors do not need to focus as much on their footing. This sampling method does not work very well in steep or broken terrain…

Finally: if you have any questions about this protocol, please ask before beginning any surveys!

REFERENCES:

Buckland, S.T., Anderson, D.R., Burnham, K.P. and Laake, J.L. 1993. Distance Sampling: Estimating Abundance of Biological Populations. Chapman and Hall, London. 446pp.

Rosenstock, S.S., Anderson, D.R., Giesen, K.M., Leukering, T. and Carter, M.F. 2002. Landbird Counting Techniques: Current Practices and an Alternative. Auk 119(1): 46-53.

APPENDIX E QUARTZITE FALL 2012 AND SPRING 2013 PLANT LIST

Appendix E Quartzite Fall 2012 and Spring 2013 Plant List

Scientific Name	Family	Abundance
Abronia villosa	Nyctaginaceae	Common
Achyronchia cooperi	Caryophyllaceae	Occasional
Acmispon strigosus	Fabaceae	Common
Allionia incarnata	Nyctaginaceae	Occasional
Ambrosia dumosa	Asteraceae	Common
Ambrosia salsola	Asteraceae	Scarce
Aristida adscensionis	Poaceae	Occasional
Aristida oligantha	Poaceae	Scarce
Asclepias subulata	Apocynaceae	Scarce
Astragalus aridus	Fabaceae	Locally common
Astragalus didymocarpus	Fabaceae	Occasional
Astragalus insularis var. harwoodii	Fabaceae	Locally common
Astragalus nuttallianus var. imperfectus	Fabaceae	Locally abundant
Atriplex canescens	Chenopodiaceae	Scarce
Atriplex polycarpa	Chenopodiaceae	Scarce
Baileya pauciradiata	Asteraceae	Occasional
Bebbia juncea	Asteraceae	Scarce
Boerhavia triquetra var. intermedia	Nyctaginaceae	Locally common
Boerhavia wrightii	Nyctaginaceae	Common
Bouteloua aristidoides	Poaceae	Occasional
Bouteloua barbata	Poaceae	Occasional
**Brassica tournefortii*	Brassicaceae	Common / Locally abundant
Calocoseris wrightii	Asteraceae	Occasional
Caulanthus lasiophyllus	Brassicaceae	Occasional
Chaenactis carphoclinia	Asteraceae	Occasional
Chaenactis stevioides	Asteraceae	Abundant
**Chenopodium album*	Chenopodiaceae	Scarce

Scientific Name	Family	Abundance
**Chenopodium murale*	Chenopodiaceae	Scarce
Chorizanthe brevicornu	Polygonaceae	Occasional
Chorizanthe corrugata	Polygonaceae	Occasional
Chorizanthe rigida	Polygonaceae	Occasional
Chylismia brevipes	Onagraceae	Scarce
Chylismia claviformis ssp. aurantiaca	Onagraceae	Common
Croton californicus	Euphorbiaceae	Scarce
Cryptantha angustifolia	Boraginaceae	Abundant
Cryptantha costata	Boraginaceae	Occasional
Cryptantha maritima	Boraginaceae	Occasional
Cryptantha micrantha	Boraginaceae	Occasional
Cryptantha nevadensis	Boraginaceae	Scarce
Cryptantha pterocarya var. pterocarya	Boraginaceae	Scarce
Cylindropuntia echinocarpa	Cactaceae	Scarce
**Cynodon dactylon*	Poaceae	Scarce
Dalea mollis	Fabaceae	Occasional
Dalea mollissima	Fabaceae	Occasional
Dicoria canescens	Asteraceae	Occasional
Ditaxis neomexicana	Euphorbiaceae	Scarce
Dithyrea californica	Brassicaceae	Occasional
Encelia farinosa	Asteraceae	Scarce
Encelia frutescens	Asteraceae	Scace
Eremalche exilis	Malvaceae	Occasional
Eremalche rotundifolia	Malvaceae	Scarce
Eremothera boothii	Onagraceae	Occasional
Eriastrum harwoodii	Polemoniaceae	Scarce
Eriogonum inflatum	Polygonaceae	Scarce

Appendix E: Quartzite Fall 2012 and Spring 2013 Plant List

Scientific Name	Family	Abundance
Eriogonum pusillum	Polygonaceae	Scarce
Eriogonum reniforme	Polygonaceae	Scarce
Eriogonum thomasii	Polygonaceae	Occasional
Eriogonum trichopes	Polygonaceae	Occasional
Erodium texanum	Geraniaceae	Common
Eschscholzia minutiflora	Papaveraceae	Scarce
Eschscholzia parishii	Papaveraceae	Scarce
**Eucalyptus sp.*	Myrtaceae	Scarce
Euphorbia abramsiana	Euphorbiaceae	Scarce
Euphorbia micromera	Euphorbiaceae	Common
Euphorbia polycarpa	Euphorbiaceae	Common
Euphorbia setiloba	Euphorbiaceae	Occasional
Ferocactus cylindraceus	Cactaceae	Scarce
Funastrum cynanchoides	Apocynaceae	Scarce
Funastrum hirtellum	Apocynaceae	Scarce
Funastrum utahense	Apocynaceae	Scarce
Geraea canescens	Asteraceae	Common
Hesperocallis undulata	Agavaceae	Common
Hilaria rigida	Poaceae	Locally common
Kallstroemia californica	Zygophyllaceae	Common / Locally abundant
Krameria bicolor	Krameriaceae	Occasional
Larrea tridentata	Zygophyllaceae	Common / Dominant shrub
Langloisia setosissima ssp. setosissima	Polemoniaceae	Scarce
Lepidium lasiocarpum var. lasiocarpum	Brassicaceae	Common
Loeseliastrum schottii	Polemoniaceae	Occasional
Lupinus arizonicus	Fabaceae	Scarce
Malacothrix glabrata	Asteraceae	Occasional

Appendix E: Quartzite Fall 2012 and Spring 2013 Plant List

Scientific Name	Family	Abundance
Mammillaria tetrancistra	Cactaceae	Scarce
Marina parryi	Fabaceae	Occasional
Mentzelia albicaulis	Loasaceae	Occasional
Mentzelia longiloba	Loasaceae	Occasional
Monoptilon bellioides	Asteraceae	Occasional
Nama demissum	Boraginaceae	Scarce
Oenothera deltoides	Onagraceae	Common / Locally abundant
Oenothera primiveris	Onagraceae	Scarce
Oligomeris linifolia	Resedaceae	Occasional
Olneya tesota	Fabaceae	Scarce
Palafoxia arida	Asteraceae	Occasional
Parkinsonia florida	Fabaceae	Scarce
Pectis papposa	Asteraceae	Common / Locally abundant
Pectocarya heterocarpa	Boraginaceae	Common
Pectocarya platycarpa	Boraginaceae	Common
Pectocarya recurvata	Boraginaceae	Scarce
Perityle emoryi	Asteraceae	Scarce
Phacelia crenulata var. ambigua	Boraginaceae	Occasional
Phacelia crenulata var. crenulata	Boraginaceae	Occasional
Phacelia crenulata var minutiflora	Boraginaceae	Occasional
Phacelia ivesiana	Boraginaceae	Scarce
Plagiobothrys jonesii	Boraginaceae	Scarce
Plantago ovata	Plantaginaceae	Common
Probiscidea althaeifolia	Martyniaceae	Occasional
Prenanthella exigua	Asteraceae	Scarce
**Polygonum aviculare subsp. depressum*	Polygonaceae	Scarce
Prosopis glandulosa	Fabaceae	Scarce

Scientific Name	Family	Abundance
Psathyrotes ramosissima	Asteraceae	Scarce
Psorothamnus emoryi	Fabaceae	Occasional
Rafinesquia neomexicana	Asteraceae	Common
**Salsola tragus*	Chenopodiaceae	Occasional / Locally abundant
**Schismus barbatus*	Poaceae	Common, widespread
Sphaeralcea angustifolia	Malvaceae	Scarce
Stephanomeria exigua	Asteraceae	Occasional
Stephanomeria pauciflora	Asteraceae	Occasional
Stillingia spinulosa	Euphorbiaceae	Scarce
Stipa hymenoides	Poaceae	Occasional
Streptanthella longirostris	Brassicaceae	Occasional
**Tamarix ramosissima*	Tamaricaceae	Scarce
Tidestromia suffruticosa var. oblongifolia	Amaranthaceae	Scarce
Tiquilia palmeri	Boraginaceae	Scarce
Tiquilia plicata	Boraginaceae	Locally common
**Tribulus terrestris*	Zygophyllaceae	Scarce

All nomenclature conforms to Baldwin, 2012: The Jepson Manual, 2nd edition.

*denotes non-native taxa

APPENDIX F DESERT QUARTZITE INHOLDING PLANT REPORT

DRAFT

Spring 2015 Rare Plant Survey
DESERT QUARTZITE SOLAR PROJECT
PRIVATE LAND STUDY AREA
RIVERSIDE COUNTY, CALIFORNIA

Prepared for
DESERT QUARTZITE, LLC
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June 2015

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Appendix 1: Quartzite Private Lands Plant List: March 2015

1.0 INTRODUCTION

1.1 PURPOSE

Desert Quartzite, LLC, has requested special status plant surveys across the 160-acre abandoned jojoba farm, a privately held property located in the center of the larger Desert Quartzite project site. The private land was excluded from the full coverage plant surveys in 2012 and 2013 because it was not then considered a part of the project. This parcel is now included as part of the larger project, triggering the need for additional botany surveys.

Full coverage special status plant surveys were conducted across the site from March 10 through12, 2015. This survey's objectives, methodologies, and target plants are identical to the original plant surveys of 2012 and 2013, and were designed and timed to conform to current plant survey protocols (BLM 2009 and CDFG 2009).

1.2 SITE LOCATION

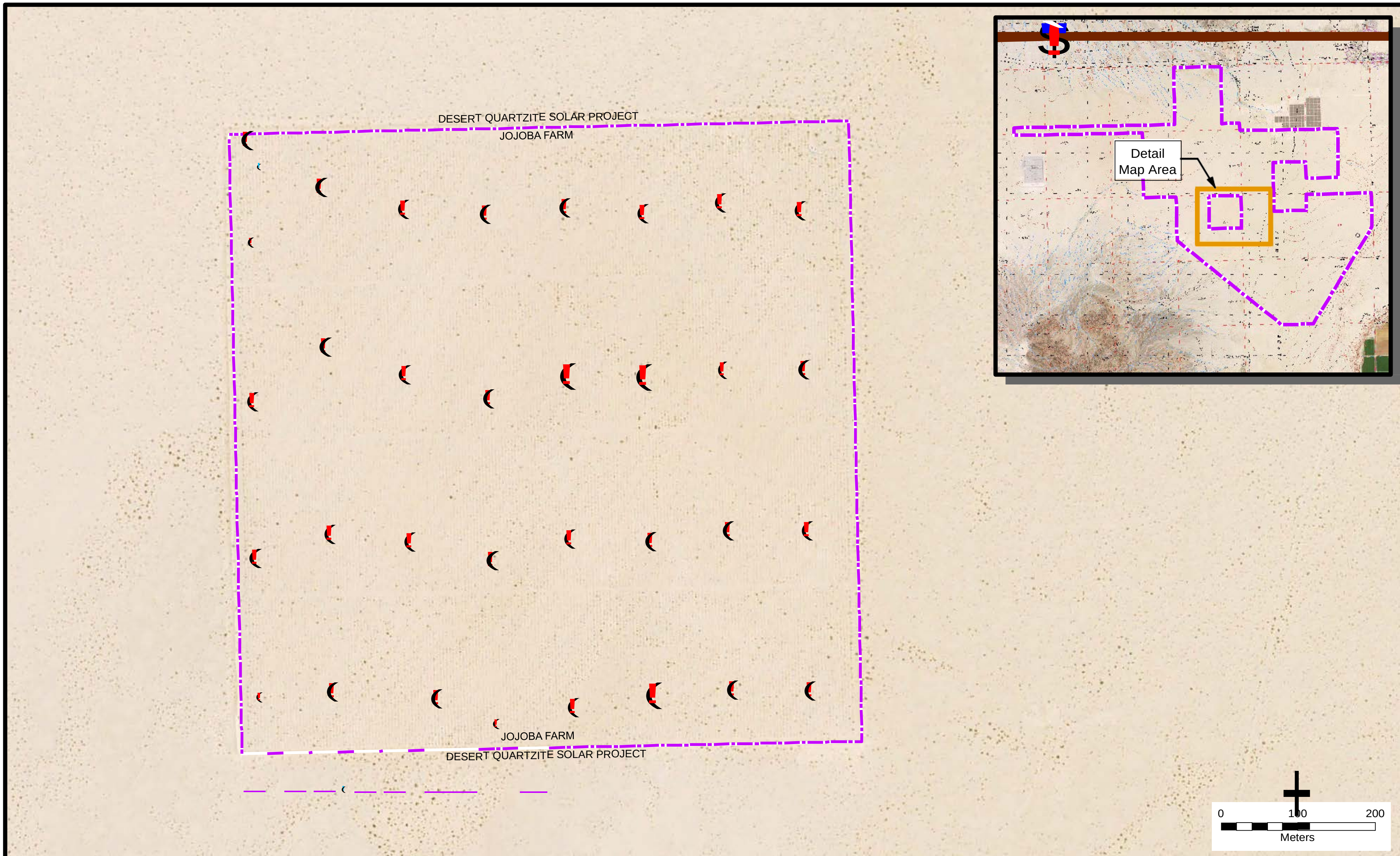
The Desert Quartzite Solar Project Private Land (Project) site is located on privately owned fallow farmland in unincorporated eastern Riverside County, California (Figure 1). The 160-acre private parcel is surrounded by the proposed Desert Quartzite Solar Project which is on lands managed by the Bureau of Land Management (BLM). This 160-acre parcel was originally excluded from the biological surveys that took place in 2008 and 2012 on the surrounding BLM lands. The Project Study Area (as defined in Section 1.3) is situated south of Interstate 10, approximately ten miles west of the City of Blythe. Elevations range from 370 feet (113 meters) above mean sea level (amsl) in the center of the site to over 410 feet (125 meters) amsl on the berm that surrounds the private land. The site is found on the Roosevelt mine and Ripley U.S. Geological Survey 7.5 minute quadrangles. The Project Study Area is located on the Palo Verde Mesa. The site is not located within any Desert Wildlife Management Area (DWMA) or Critical Habitat Unit (CHU).

1.3 PROPOSED PROJECT

The Project components are described in general terms below and are referring to the entire Desert Quartzite Solar Project including the Private Land Study Area (Figure 2). The entire Desert Quartzite Solar Project would include the Solar Facility (where the electrical power will be generated) and a 220-kilovolt (kV) transmission line (gen-tie Line) and the private lands being evaluated in this document. The Solar Facility would consist of several main components, all located within the Desert Quartzite Solar Project security fencing and permanent desert tortoise fencing:

- Main Generation Area - PV arrays, combining switchgear, overhead lines, and access corridors;
- Operations and Maintenance (O&M) Facility;
- On-site substation; and
- Site Security, Fencing, and Lighting.

The Desert Quartzite Solar Project would interconnect with the regional transmission system via a 220-kV single-circuit gen-tie Line that would exit the western portion of the Solar Farm site and follow a 160-foot-wide transmission right of way (ROW) to the planned Southern California Edison (SCE) Colorado River Substation located approximately one mile west of the proposed Quartzite Solar site western boundary.



Species

Ribbed Cryptantha

Harwood's Milkvetch

Plant Density

1 - 10

10 -100

100 - 1,000

1,000 - 5,000

5,000 - 12,200

Desert Quartzite Site Boundary

Note:

Dot size does not represent Area of Occurrence

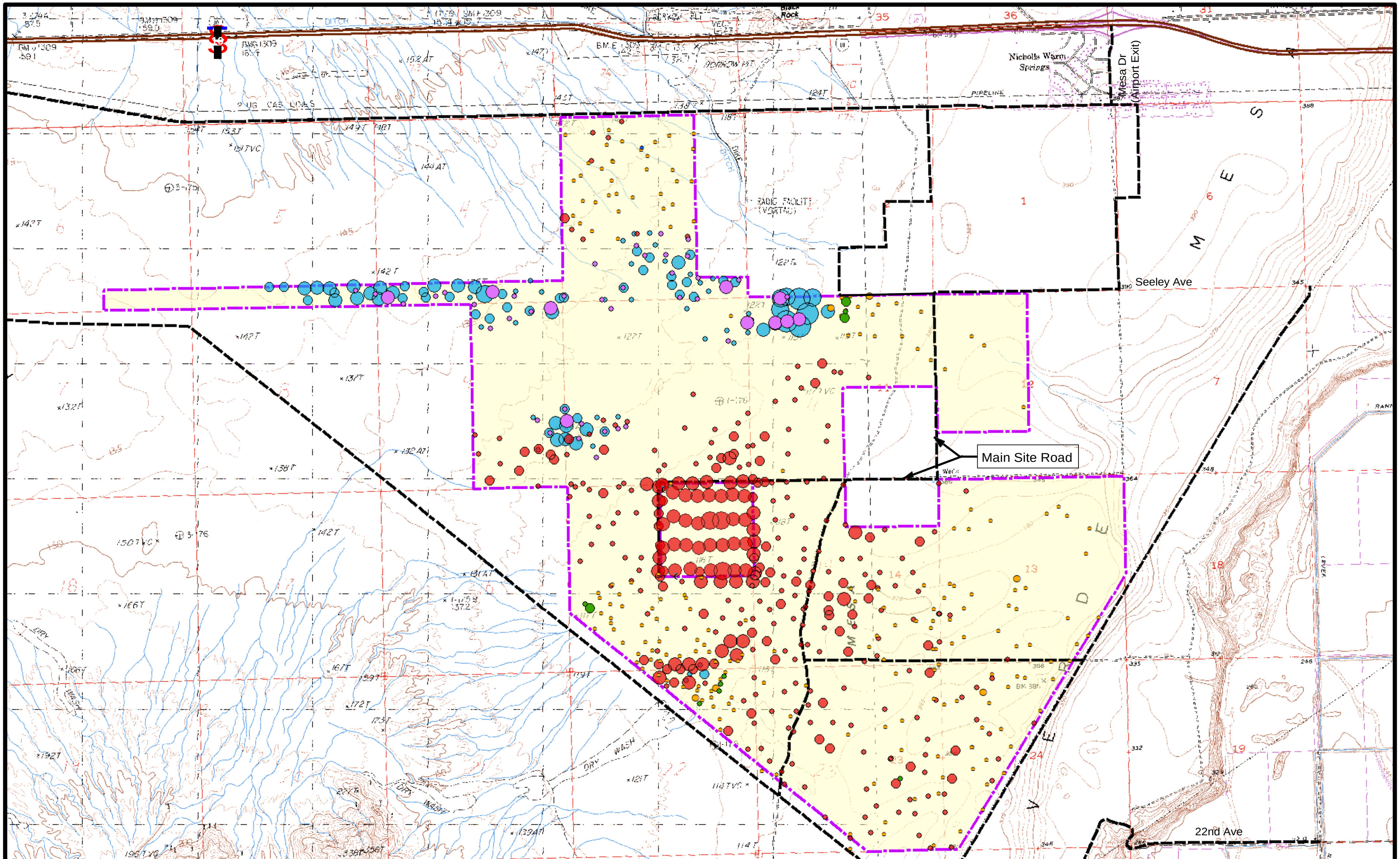
DESERT QUARTZITE SOLAR PROJECT
DESERT QUARTZITE, LLC

Figure 1

Private Land Spring 2015
Rare Plant Survey

#300 P:\GIS\Ironwood\Shared\Projects\Projects\Quartzite\ArcGIS project files\Plants_Jojoba.mxd 4/30/2015

P:\GIS\Ironwood\Shared\Projects\Projects\Quartzite\ArcGIS project files\Plants_Combined_20150430.mxd



Species
- Harwood's Eriastrum
- Ribbed Cryptantha
- Adam's Prostrate Spurge
- Desert Devil's Claw
- Harwood's Milkvetch
- Utah Vine Milkweed

Plant Density
- 1 - 10
- 10 -100
- 100 - 1,000
- 1,000 - 5,000
- 5,000 - 12,200

Site Access Roads

Desert Quartzite Site Boundary

Note:
Dot size does not represent Area of Occurrence

0 500 1,000
Meters

DESERT QUARTZITE SOLAR PROJECT
DESERT QUARTZITE, LLC

Figure 2

Combined Rare Plants Map

1.4 STUDY AREA

For the purpose of this report, the Study Area is defined by the area of private land subjected to biological resource assessment including vegetation community mapping, soils mapping, and habitat assessments for special status species. The Study Area is a historical jojoba farm that is a square 160-acre parcel situated within diffuse creosote bush scrub (Photograph 1). Presumably it was constructed in the late 1970s to early 1980s, and abandoned within 10 years thereafter. The entire site was either chained or bulldozed, and is surrounded on all sides by bulldozed berms about 4 to 5 ft. high. Soil is soft decomposed granitic sand with occasional patches of gravel and larger cobbles. There is a good access road around the inner perimeter of the berms on all four sides.

Photograph 1: View of Jojoba Farm from top of southern berm, looking north

Rows of jojoba (*Simmondsia chinensis*) were planted in a north-south orientation throughout the site and spaced about 4 meters (m) apart. These rows are slightly raised to cover the buried three-fourths inch perforated irrigation pipe running their entire length. There is a wellhead and some debris remaining at the northeast corner entrance to the site.

Thousands of jojoba were planted across the site, and about one third are currently surviving today without any maintenance. However, the health of the existing plants is diminished; most are dying-back from their center outwards but a few are still flowering and fruiting.

Since abandonment, native vegetation seems to be recovering slowly. Sparse creosote bush (*Larrea tridentata)* can be seen throughout the site and on the surrounding berms. This is probably re-growth from old root crowns, but some smaller new plants have taken hold. The only other common native perennials appearing occasionally are white bursage (*Ambrosia dumosa)* and brittlebrush (*Encelia farinosa)*. Native annual plants recolonizing the site include desert pincushion (*Chaenactis stevioides),* brown-eyed primrose *(Chylismia claviformis),* narrowed-leaved popcorn flower *(Cryptantha angustifolia),* chuckwalla combseed *(Pectocarya heterocarpa),* Harwood's milkvetch *(Astragalus insularis* var. *harwoodii),* dwarf white milkvetch *(A. didymocarpus),* stigose bird's-foot trefoil *(Acmispon strigosus),* and hairy desert sunflower (*Gerea canescens).*

Non-native annual weeds are not particularly abundant except for common Mediterranean grass (*Schismus barbatus)* (widespread), and occasional Sahara mustard (*Brassica tournefortii).*

2.0 METHODS

2.1 SURVEY TIMING

This survey was conducted during the optimal season for positive identification of all target plants, as well as justifiable on-site conditions for finding target plants.

A cursory site check was performed by Michael Honer on February 24, 2015. Many common annuals and one target plant were observed leafing-out at that time. It was decided that survey timing should be in mid-March to catch most of the target plants in optimal identifiable condition. During the survey of March 10-12, the soil was still quite moist at a depth of about 3 inches.

Reference population checks were performed for the three special status species with the highest probability of encounter during the survey: *Astragalus insularis* var. *harwoodii*, *Cryptantha costata*, and *Eriastrum harwoodii*. All three of these plants were relocated off-site from populations found during the spring 2013 surveys, and observed in flowering and/or fruiting condition on March 10, 2015.

Although most of California remains in a state of extreme historical drought, actual rainfall on the Quartzite project area from fall 2014 through spring 2015 was only slightly below average (Table 1).

Table 1: Blythe Rainfall: October 2014-March 2015

Station ID	Location	OCT 2014	NOV 2014	DEC 2014	JAN 2015	FEB 2015	MAR 2015
BLH	Blythe	0.03	0	0.78	0.57	0.04	1.02

Notes:

Precipitation in inches
Source: National Weather Service California Nevada River Forecast Center Lower Colorado Region;
Station: Blythe, http://www.cnrfc.noaa.gov/monthly_precip.php

2.2 SURVEYOR QUALIFICATIONS

Three surveyors, Michael Honer, Brian Sandstrom, and Kelsi Black, performed this survey. All had all participated in the fall 2012 and spring 2013 Quartzite rare plant surveys, and are experienced in identification of all the target plants, as well as extensive knowledge of western Sonoran desert plants.

2.3 SURVEY INTENSITY

This survey provided 100 percent coverage of the entire jojoba farm site, including the surrounding berms. Transects were walked slowly along the jojoba rows in North-South and South-North directions, at a spacing of less than 10 m between surveyors. This was appropriate spacing for detecting any special status plants, no matter how small or cryptic.

3.0 RESULTS

3.1 FLORISTIC SUMMARY

Forty-one (41) species of vascular plants were recorded on the jojoba farm site during this survey (Appendix 1). Plant germination across the site was generally very patchy. Most annuals were observed within the row interspace swales where water would collect, but long stretches of the farm yielded only barren sand. Occasional perennial species were seen, but the majority of vegetation was annual (Photograph 2).

Photograph 2: Typical annual plant distribution seen on interspace swales

3.2 SPECIAL STATUS PLANTS FOUND

3.2.1 Astragalus insularis var. *harwoodii*

CNPS RPR 4 (Plants of Limited Distribution - A Watch List) Approximately 12,658 individuals

Astragalus insularis var. *harwoodii* was distributed widely across the entire jojoba farm site, including the peripheral berms (Figure 1). There was no particular pattern of distribution; these plants could be found against the irrigation berms or within the interspaces. When found, they were usually in patches of 2 to 30 individuals, most often accompanied by other flowering native annuals.

This distribution of *Astragalus* on the jojoba farm mirrors our observations from the spring 2013 surveys. Populations of this plant tend to concentrate against hills, berms, and other obstructions that interrupt the smooth laminar flow of the prevailing winds. Most likely, the puffy swollen fruits get swept-along by wind and dropped whenever there is an obstacle such as a berm.

The jojoba farm is a regular grid of shallow mounds and berms, providing excellent micro-breaks in the flow of wind. Thus there are many opportunities for *Astragalus* seedpods to drop and accumulate anywhere within the farm, leading to the large numbers of individuals counted during this survey.

The linear distribution of A. insularis var. hardwoodii. waypoints as depicted on Figure 2 is an artifact of the mapping protocol. Actual distribution of this plant was patchy, and evenly dispersed across the whole farm with no evident pattern visually observed.

3.2.2 Cryptantha costata

CNPS RPR 4: 2 individuals

Only two individuals of *Cryptantha costata* were found during this survey. Both of these appear to be waifs and it is unlikely that they will promote establishment of larger populations on the jojoba farm. This occurrence is insignificant when compared to the approximately 56,000 individuals found on deeper sandy areas of the solar site and T-line in spring 2013.

3.2.3 Other Target Plants

No other target plants were found during this survey. Ironwood looked carefully for any occurrences of *Eriastrum harwoodii* (CNPS RPR 1B.2), but none were found. This plant is restricted to deeper sand dunes around the NW corner of the site and along the T-line. Appropriate habitat within the jojoba farm was not present.

The only other target plants potentially surviving on the jojoba farm could be *Proboscidea altheifolia* (RPR 4.3) and *Euphobria abramsiana* (RPR 2B.2), but both of these plants usually leaf and flower in the fall after summer monsoons. Neither of these plants have particularly high status ranking (CNPS 2015), and any additional discoveries of these would be relatively insignificant in light of widely scattered documentation from the fall 2012 plant surveys.

4.0 REFERENCES

US Department of Interior

2009 Survey Protocols Required for NEPA/ESA Compliance for BLM Special Status Plant Species. *www.blm.gov/ca/dir/pdfs/2009/im/CAIM2009-026ATT1.pdf*

California Department of Department of Fish and Game

2009 Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Natural Communities. November 2009. *nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=18959*

California Native Plant Society

2015 Rare Plant Program. 2015. Inventory of Rare and Endangered Plants (online edition, v8-02). California Native Plant Society, Sacramento, CA. Website *http://www.rareplants.cnps.org* [accessed 21 March 2015].

APPENDIX 1: QUARTZITE PRIVATE LAND PLANT LIST: March 2015

QUARTZITE PRIVATE LAND PLANT LIST March 2015	
Scientific name	**Abundance**
Abronia villosa	scarce
Acmispon strigosus	occasional
Allionia incarnata	scarce
Ambrosia dumosa	scarce
Aristida adscensionis	scarce
Astragalus didymocarpus	scarce
Astragalus insularis* var. *harwoodii	abundant
Brassica tournefortii	occasional
Calicoseris wrightii	scarce
Chaenactis carpholclinia	scarce
Chaenactis stevioides	occasional
Chorizanthe rigida	scarce
Chylismia claviformis	occasional
Cryptantha angustifolia	common
Cryptantha costata	scarce
Cryptantha maritima	occasional
Dithyrea californica	scarce
Encelia farinosa	scarce
Eremalche rotundifolia	scarce
Eriogonum tricopes	scarce
Erodium texanum	scarce
Gerea canescens	occasional
Hesperocallis undulata	scarce
Hilaria rigida	scarce
Larrea tridentata	occasional
Lepidium lasiocarpum	occasional
Mentzelia longiloba	scarce
Oenothera deltoides	scarce
Palafoxia arida	occasional

QUARTZITE PRIVATE LAND PLANT LIST **March 2015**	
Pectocarya heterocarpa	common
Pectocarya platycarpa	occasional
Phacelia ambigua	scarce
Plantago ovata	occasional
Prosopis glandulosa	scarce
Rafinesquia neomexicana	scarce
Schismus barbatus	abundant
Simmonsdia chinensis	common
Sonchus oleraceus	scarce
Stephanomeria exigua	scarce
Streptanthella longirostris	occasional
Tiquilia plicata	occasional

APPENDIX G QUARTZITE PRIVATE LANDS PRELIM. BIOLOGICAL ASSESSMENT

Draft

Preliminary Biological Reconnaissance Assessment
Desert Quartzite Solar Project
Private Land Study Area
Riverside County, California

Prepared for:

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December 2014

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SUMMARY

The Desert Quartzite Solar Project Private Land (Project) Study Area is primarily fallow jojoba farmland that currently supports Sonoran Creosote Bush Scrub.

One federal- and state-listed (threatened) species is likely to inhabit the Study Area, the desert tortoise. Several other special status plant and wildlife species may also occur within the Study Area. Focused surveys are recommended for:

- Desert tortoise;
- Mojave fringe-toed lizard;
- burrowing owl;
- Other special status wildlife species (pallid San Diego pocket mouse, prairie falcon, mountain lion, loggerhead shrike, Colorado Valley woodrat, burro deer, vermillion flycatcher, American badger, desert kit fox, and LeConte's thrasher); and
- Special status plant species (desert unicorn-plant, Harwood's milkvetch, Emory's crucifixion-thorn, Abrams' spurge, Las Animas colubrine, foxtail cactus, glandular ditaxis, and Wiggins' cholla).

1.0 INTRODUCTION

1.1 SITE LOCATION

The Desert Quartzite Solar Project Private Land (Project) site is located on privately owned fallow farmland in unincorporated eastern Riverside County, California (Figure 1). The 160-acre private parcel is surrounded by the proposed Desert Quartzite Solar Project which is on lands managed by the Bureau of Land Management (BLM). This 160-acre parcel was originally excluded from the biological surveys that took place in 2008 and 2012 on the surrounding BLM lands. The Project Study Area (as defined in Section 1.3) is situated south of Interstate 10, approximately ten miles west of the City of Blythe. Elevations range from 370 feet (113 meters) above mean sea level (amsl) in the center of the site to over 410 feet (125 meters) amsl on the berm that surrounds the private land. The site is found on the Roosevelt mine and Ripley U.S. Geological Survey 7.5 minute quadrangles. The Project Study Area is located on the Palo Verde Mesa. The site is not located within any Desert Wildlife Management Area (DWMA) or Critical Habitat Unit (CHU).

1.2 PROPOSED PROJECT

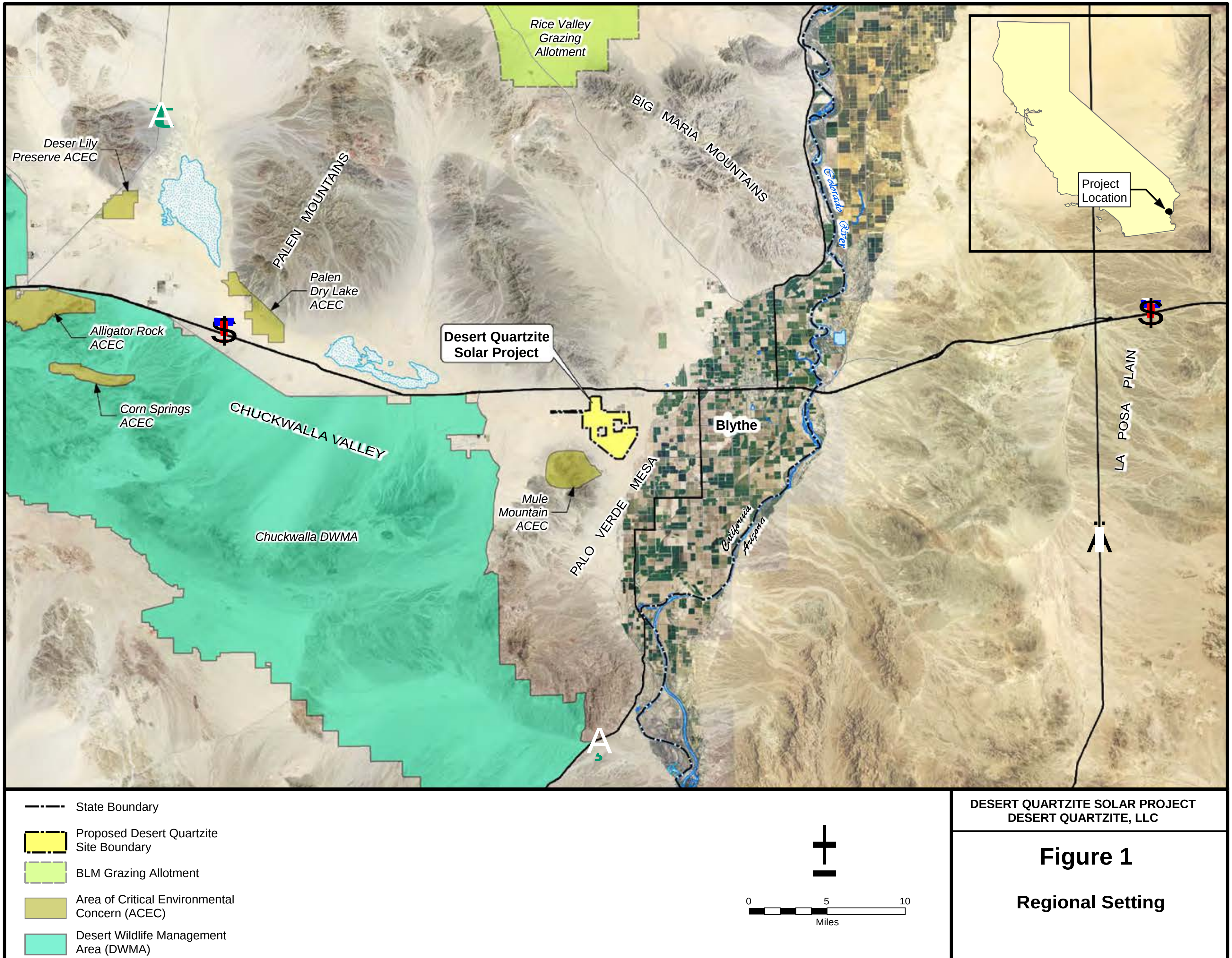
The Project components are described in general terms below and are referring to the entire Desert Quartzite Solar Project including the Private Land Study Area (Figure 2). The entire Desert Quartzite Solar Project would include the Solar Facility (where the electrical power will be generated) and a 220-kilovolt (kV) transmission line (gen-tie Line) and the private lands being evaluated in this document. The Solar Facility would consist of several main components, all located within the Desert Quartzite Solar Project security fencing and permanent desert tortoise fencing:

- Main Generation Area - PV arrays, combining switchgear, overhead lines, and access corridors;
- Operations and Maintenance (O&M) Facility;
- On-site substation; and
- Site Security, Fencing, and Lighting.

The Desert Quartzite Solar Project would interconnect with the regional transmission system via a 220-kV single-circuit gen-tie Line that would exit the western portion of the Solar Farm site and follow a 160-foot-wide transmission right of way (ROW) to the planned Southern California Edison (SCE) Colorado River Substation located approximately one mile west of the proposed Quartzite Solar site western boundary.

1.3 STUDY AREA

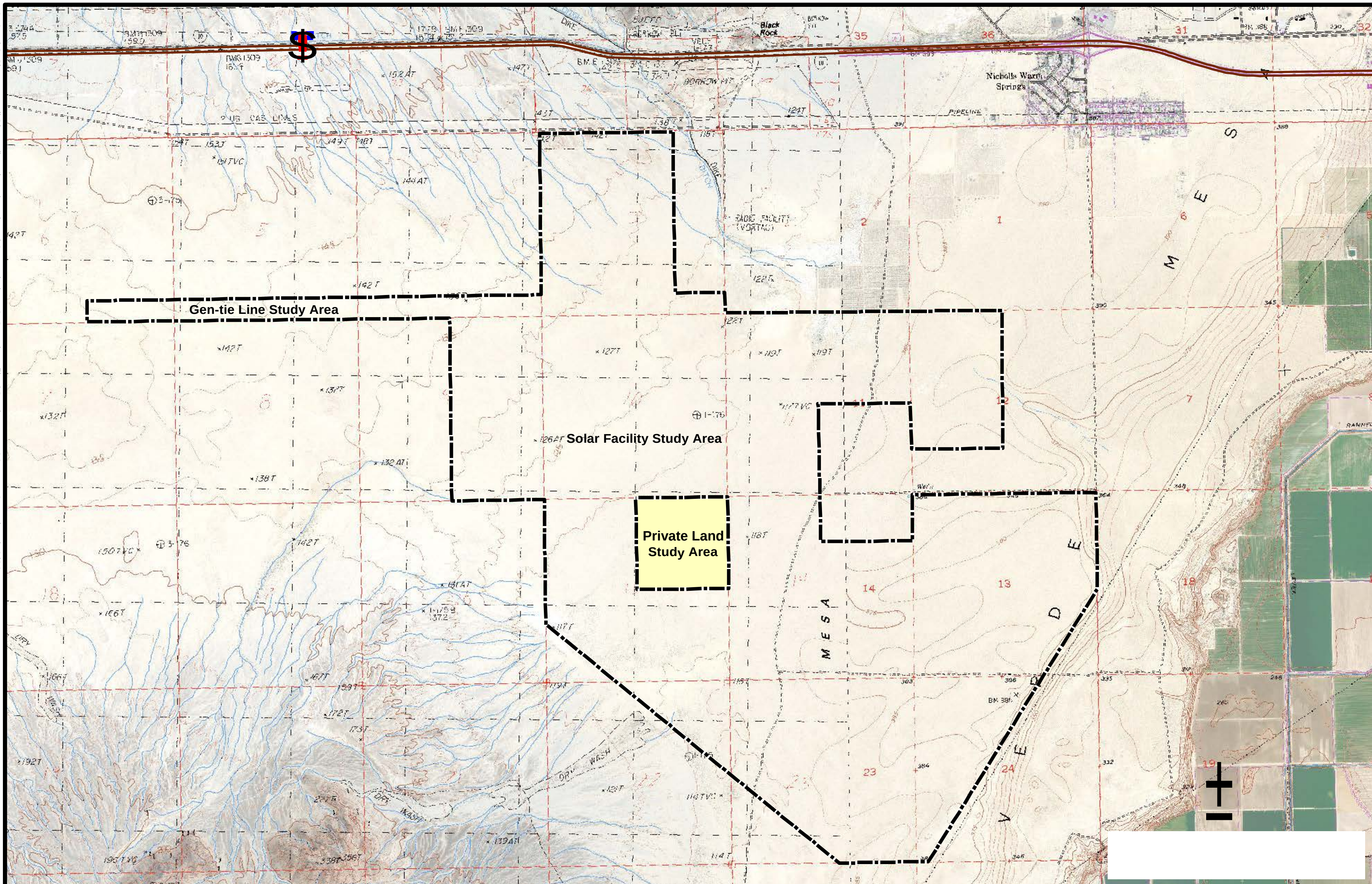
For the purpose of this report, the Study Area is defined by the area of private land subjected to biological resource assessment including vegetation community mapping, soils mapping, and habitat assessments for special status species. The Study Area is approximately 160 acres in size and is surrounded by and is a part of the proposed, Desert Quartzite Solar Project and gen-tie line corridor (Figure 2).



DESERT QUARTZITE SOLAR PROJECT
DESERT QUARTZITE, LLC

Figure 1

Regional Setting



Desert Quartzite Site Boundary

Private Land Study Area

DESERT QUARTZITE SOLAR PROJECT
DESERT QUARTZITE, LLC

Figure 2

Study Area

2.0 METHODS

2.1 LITERATURE SEARCH

Prior to conducting the preliminary survey, a biological resources literature search was performed. This included researching information from regional documents such as the Northern and Eastern Colorado Coordinated Management Plan and Final Environmental Impact Statement (NECO, BLM 2002) and the Biological Opinion that addresses NECO (USFWS 2005). A search of the California Department of Fish and Wildlife's (CDFW) *California Natural Diversity Data Base* (CNDDB) was conducted to determine special status species that have been documented in the project region.

It should be noted that although this parcel is on private land and not necessarily under BLM jurisdiction, all BLM protocols are being followed so that the surveys with this parcel are consistent with the rest of the Quartzite Solar Project.

Using this information and observations from the survey, a list of special status plant and wildlife species that have the potential to occur at the site was generated. For the purposes of this assessment, special status species are defined as plants or wildlife that:

- Have been designated as either rare, threatened, or endangered by CDFW or the U.S. Fish and Wildlife Service (USFWS), and are protected under either the California or Federal Endangered Species Act (ESA);
- Are candidate species or species proposed for listing under these same acts; or
- Are covered species under NECO and the Study Area is located within the species' range per maps in NECO Appendix A [3-5, 3-6(a-f), and 3-7(a-d)].

2.2 PRELIMINARY MAPPING

A large-scale aerial photograph of the Private Land Study Area was created and used to preliminarily map vegetation communities, soil substrates, and other areas of interest during the survey. Such areas included those that appeared to have unique plant assemblages or areas of interest under NECO. The preliminary mapping effort allowed surveyors to focus on areas most likely to support special status species and habitats, while characterizing each type of vegetation community and soil substrate. Soil data was initially obtained from the Natural Resources Conservation Service (NRCS) Web Soil Survey and incorporated into Geographic Information Systems (GIS). The Private Land Study Area was most recently used as farmland, so there was an expectation that soil substrates may differ from what the NRCS Web Soil Survey suggested.

2.3 PRELIMINARY SURVEY

A survey was conducted on November 3-4, 2014 by Audrey Johnson and Ryan Layden, biologists of Ironwood Consulting, Inc. Ten meter line transect surveys were conducted across the entire site. The area surrounding the Study Area was previously surveyed for the larger proposed project therefore no buffer area was surveyed around the Study Area. The following information was collected during the survey:

- Preliminary characterization of plant communities;
- Preliminary mapping of surface soil substrates; and
- Preliminary assessment of special status species potential for occurrence.

Focused surveys for special status species were not conducted during the preliminary survey.

3.0 RESULTS

3.1 GENERAL

Weather conditions during the survey are shown on Table 1.

Table 1 Weather Conditions during Surveys

Date	Temperature (°F)	Cloud Cover	Wind Speed (mph)
11/3/2014	71-85	0%	10-15
11/4/2014	64-82	0%	25-30

The Private site has no discernable slope but has a general southeast-facing aspect. There is a 3-10 ft high berm that surrounds the entire Study Area (Appendix A; Photo 1). Human-induced land disturbances appear to be associated with agricultural practices, linear utilities construction, and trash dumping. Appendix A presents photos of the Study Area taken during the survey.

3.2 SOILS

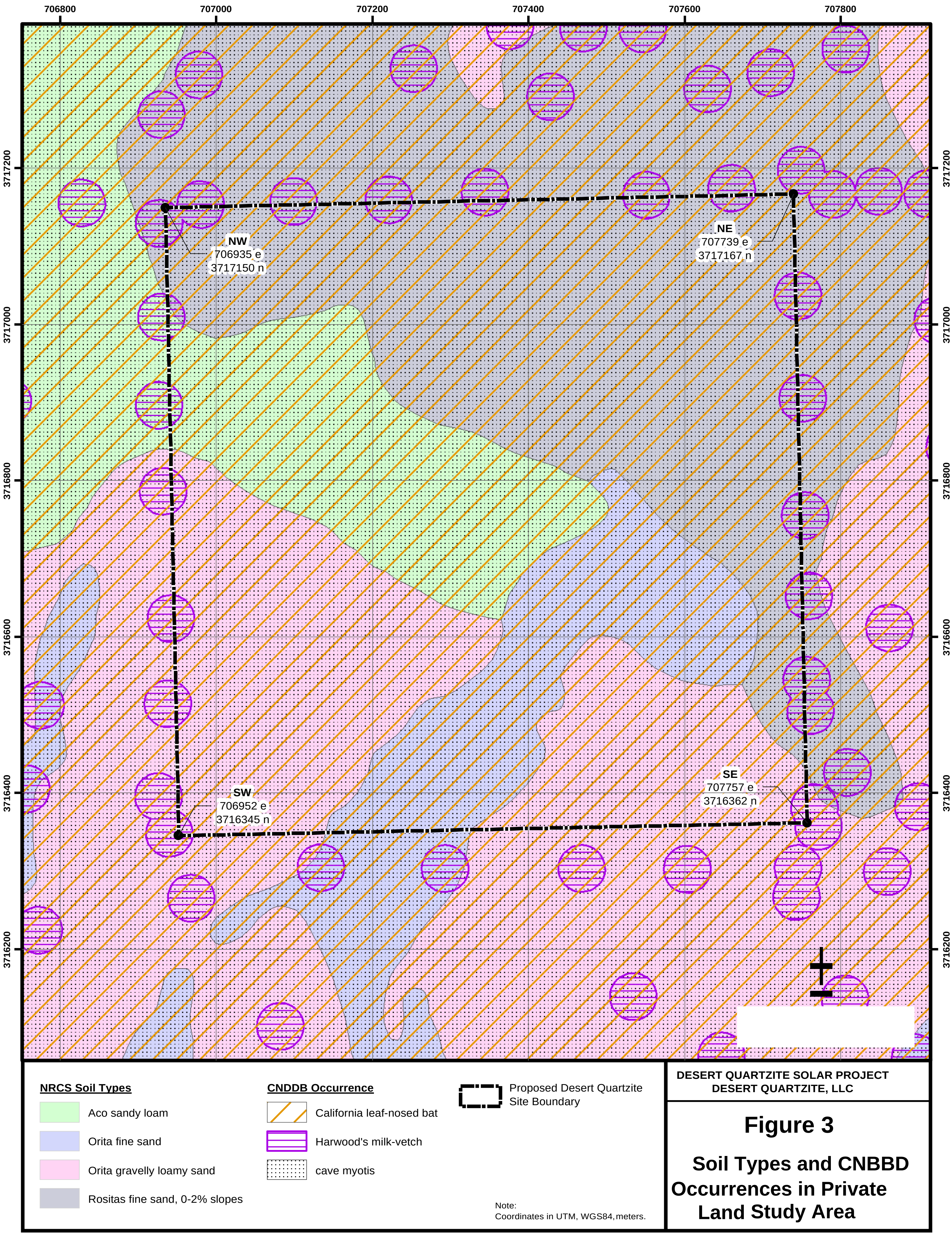
Soils within the Study Area are dominated by gravely sands with small localized patches of finer sand (Appendix A; Photo 5). The Natural Resources Conservation Service (NRCS) Web Survey contained soil type data for the Study Area (Figure 3) but this site, being previously farmed, had very little variation in soil type across the site.

3.3 VEGETATION COMMUNIES

The Study Area supports two vegetation communities: previously farmed Jojoba farmland and Sonoran Creosote Bush Scrub [Holland 1986; analogous to Creosote Bush-White Bursage Series (Sawyer and Keeler-Wolf 1995)]. The majority of the vegetation coverage on the Study Area is jojoba and the rest is Sonoran Creosote Bush Scrub (SCBS). The SCBS on-site is dominated by creosote bush (*Larrea tridentata*) and white bursage (*Ambrosia dumosa*). Most of the on-site vegetation is growing in rows and follows the previous layout of the jojoba farm (See Appendix A; photo 2). Few plants grow outside of these set rows of jojoba and creosote.

3.4 WILDLIFE COMMUNITIES

Wildlife species inhabiting the Project Study Area are expected to be typical of those species found in surrounding undisturbed areas in the region. During the preliminary surveys canid and burrowing owl sign was found. Seven canid burrows (one with burrowing owl sign) and two groups of canid scat were recorded (Appendix A; Photo 4).



DESERT QUARTZITE SOLAR PROJECT
DESERT QUARTZITE, LLC

Figure 3

Soil Types and CNBBD Occurrences in Private Land Study Area

#192 P:\GIS\Ironwood\Shared\Projects\Projects\Quartzite\ArcGIS project files\160_Area.mxd 10/28/2014

Species associated with water are unlikely to inhabit the Study Area due to the lack of suitable aquatic habitat. Reptiles that are likely to inhabit the Study Area include desert tortoise (*Gopherus agassizii* – discussed further in Section 3.5.2), Mojave fringe-toed lizard (*Uma scoparia* – discussed further in Section 3.5.2), desert iguana (*Dipsosaurus dorsalis*), zebra-tailed lizard (*Callisaurus draconoides*), long-nosed leopard lizard (*Gambelia wislizenii*), side-blotched lizard (*Uta stansburiana*), western whiptail (*Cnemidophorus tigris*), coachwhip (*Masticophis flagellum*), gopher snake (*Pituophis melanoleucus*), and Mojave rattlesnake (*Crotalus scutulatus*). Bird species may include burrowing owl, (*Athene cinicularia)*, turkey vulture (*Cathartes aura*), red-tailed hawk (*Buteo jamaicensis*), American kestrel (*Falco sparverius*), California quail (*Callipepla californica*), mourning dove (*Zenaida macroura*), greater roadrunner (*Geococcyx californianus*), horned lark (*Eremophila alpestris*), common raven (*Corvus corax*), ash-throated flycatcher (*Myiarchus cinerascens*), black-throated sparrow (*Amphispiza bilineata*), and white-crowned sparrow (*Zonotrichia leucophrys*). Mammals likely to inhabit the Study Area include white-tailed antelope ground squirrel (*Ammospermophilus leucurus*), pocket mouse (*Perognathus* sp.), deer mouse (*Peromyscus maniculatus*), kangaroo rat (*Dipodomys* sp.), coyote (*Canis latrans*), black-tailed jackrabbit (*Lepus californicus*), desert kit fox (*Vulpes macrotis*), American badger (*Taxidea taxis*) and desert cottontail (*Sylvilagus audubonii*).

3.5 SPECIAL STATUS SPECIES

Eighty-one special status species (twenty-two plants and fifty-nine animals) have been documented in the vicinity (approximately 5 miles) of the Study Area and/or are species covered in NECO. Species covered in NECO having specific ranges or habitat requirements not found on or adjacent to the Study Area are considered to be absent and not discussed in this report. The potential for occurrence for each plant or wildlife species was assessed and defined using the following criteria listed in Table 2.

Table 2 Potential for Occurrence Definitions

Potential for Occurrence	Definition
Present	Species was observed within the boundaries of the Study Area at the time of this survey, or a survey within the past two years.
High	Both a historical record exists of the species within the boundaries of the Study Area or its immediate vicinity (approximately 5 miles) **and** the environmental conditions (including soil and elevation factors) associated with the species are found at the Study Area.
Moderate	Either a historical record exists of the species within the immediate vicinity of the Study Area (approximately 5 miles) **or** the environmental conditions (including vegetation, soil and elevation factors) associated with species are found at the Study Area.
Low	No records exist of the species occurring within the Study Area or its immediate vicinity (approximately 5 miles) **and/or** the environmental conditions (including vegetation, soil type and elevation factors) associated with species presence are marginal on the Study Area.
Absent	Species was not observed during focused surveys conducted at an appropriate time, **or** the species is restricted to specific habitats or geographical locations not found on or adjacent to the Study Area.

3.5.1 Special Status Plant Species

No federal- or state-listed (endangered or threatened) plant species have been recorded near the Study Area. Twenty-two special status plant species have been recorded in the vicinity of the Study Area (CNDDB 2014) and/or are NECO-covered species with range maps that encompass the Study Area (BLM 2002). All of these species are presented in Table 3, along with their status, flowering period, and potential to occur. Each species with a moderate or greater potential for occurrence is discussed in detail below.

Table 3 Special Status Plant Species

Scientific Name **Common Name**	**Status**		**Flowering Period**	**Potential for Occurrence**
Acleisanthes longiflora Angel trumpets	Federal: State: CRPR: NECO:	None none 2B.3 covered	May	Absent: no suitable habitat on-site (rocky carbonate canyon bottoms).
Astragalus insularis var. *harwoodii* Harwood's milkvetch	Federal: State: CRPR: NECO:	none none 2B.3 covered	Jan - May	Moderate
Astragalus lentiginosus var. borreganus Borrego milkvetch	Federal: State: CRPR: NECO:	none none 4.3 covered	Feb - May	Low
Astragalus sabulonum gravel milkvetch	Federal: State: CRPR NECO:	None None 2B.2 not covered	Feb-July	Moderate
Carnegiea gigantean saguaro	Federal: State: CRPR NECO:	None None 2B.2 covered	May-June	Low
Castela emoryi Emory's crucifixion-thorn	Federal: State: CRPR: NECO:	none none 2B.2 covered	Apr - Jul	Moderate
Chamaesyce abramsiana Abrams' spurge	Federal: State: CNPS: NECO:	none none 2B.2 not covered	Sep – Nov	High
Colubrina californica Las Animas colubrina	Federal: State: CNPS: NECO:	none none 2B.3 not covered	Apr - Jun	Moderate
Coryphantha alversonii foxtail cactus	Federal: State: CNPS: NECO:	none none 4.3 covered	Apr - Jun	Moderate
Cryptantha costata ribbed cryptantha	Federal: State: CRPR: NECO:	None None 4.3 not covered	Jan-May	High
Cryptantha holoptera Winged cryptantha	Federal: State: CRPR: NECO:	None None 4.3 covered	Mar-April	Moderate
Ditaxis claryana glandular ditaxis	Federal: State: CNPS: NECO:	none none 2B.2 covered	Oct - Mar	Moderate
Eriastrum harwoodii Harwood's eriastrum	Federal: State: CRPR: NECO:	None None 1B.2 not covered	Mar-May	High

Scientific Name **Common Name**	Status		Flowering Period	Potential for Occurrence
Funustrum utahense Utah vine milkweed	Federal: State: CRPR: NECO:	None None 4.2 not covered	Apr-Sep	High
Hymenoxys odorata Bitter hymenoxys	Federal: State: CRPR: NECO:	None None 2B.1 not covered	Feb-Aug	Absent: no suitable habitat on site (moist river margins and benches)
Imperata brevifolia California satintail	Federal: State: CRPR: NECO:	None None 2B.1 not covered	Sep-May	Absent: no suitable habitat on site (moist river plains & canal margins)
Mentzelia puberula Darlington's blazing star	Federal: State: CRPR: NECO:	None None 2B.2 not covered	Mar-May	Absent: no potential habitat present on site (rocky limestone and granite slopes)
Opuntia wigginsii Wiggins' cholla	Federal: State: CNPS: NECO:	none none 3.3 covered	Mar-June	Moderate
Panicum hirticaule ssp. hirticaule roughstalk witchgrass	Federal: State: CNPS: NECO:	None None 2B.1 not covered	Aug-Dec	Moderate
Penstemon pseudospectabilis ssp. pseudospectabilis desert beardtongue	Federal: State: CNPS: NECO	None None 2B.2 not covered	Mar-May	Moderate
Proboscidea althaefolia desert unicorn-plant	Federal: State: CNPS: NECO:	none none 4.3 covered	May - Aug	High
Teucrium cubense ssp. depressum Dwarf germrander	Federal: State: CNPS: NECO:	None None 2B.2 not covered	Mar-Nov	Low

California Rare Plant Ranking (CRPR) designations:
1A: Presumed extirpated in California and either rare or extinct elsewhere.
1B: Rare and Endangered in California and elsewhere.
2A: Presumed extirpated in California, but more common elsewhere.
2B: Rare or Endangered in California, but more common elsewhere.
3: Plants for which we need more information-Review list
4: Plants of limited distribution-Watch list.

Threat Code Extensions:
.1: Seriously threatened in California
.2: Moderately threatened in California
.3: Not very endangered in California

Northern and Eastern Colorado Desert Coordinated Management Plan (NECO) designations
Covered: Species is listed as covered in NECO
Not covered: Species is not listed as covered in NECO
Other sources: CNDDB search for Roosevelt Mine, Ripley, McCoy Wash, McCoy Peak, Blythe, Blythe NE, Thumb Peak, Mule Wash and Palo Verde 7.5 minute USGS quadrangles

Astragalus insularis var. *harwoodii* (Harwood's milkvetch) is a CNPS List 2.2 annual herb belonging to the Fabaceae family. It is historically known to occur in desert dunes and Mojavean and Sonoran desert scrub at elevations ranging from 0 to 2,300 feet (0 to 710 meters) amsl. These environmental conditions occur on-site and Harwood's milkvetch was detected during the 2013 rare plant surveys performed for the BLM land portion of the Desert Quartzite Solar Project. For this reason, this species has a high potential to occur on-site.

Astragalus sabulonum (gravel milkvetch) is a CRPR list 2B.2 annual herb belonging to the Fabaceae family. It is historically known to occur in desert dunes, Mojavean and Sonoran desert scrub usually in sandy soils at elevations ranging from 0 to 656 feet (0-200 meters) amsl. These environmental conditions occur on-site. The CNDDB lists an occurrence in the Roosevelt Mine quad, however, gravel milkvetch was not detected during the 2013 rare plant surveys for the BLM land portion of the DQSP. For these reasons, this species has a moderate potential to occur.

Castela emoryi (crucifixion thorn) is a CNPS List 2.3 perennial deciduous shrub belonging to the Simaroubaceae (quassia) family. It is historically known to occur in Mojavean desert scrub, playas, and gravelly Sonoran desert scrubs at elevations ranging from 300 to 2,200 feet (90 to 670 meters) amsl. These environmental conditions occur within the Study Area and the nearest record of crucifixion thorn is greater than 5 miles from the Study Area. For these reasons, this species has a moderate potential to occur.

Chamaesyce abramsiana (Abrams' spurge) is a CNPS List 2.2 annual herb belonging to the Euphorbiaceae (spurge) family. It is historically known to occur in Mojavean desert scrub, playas, and sandy Sonoran desert scrubs at elevations ranging from sea level to 3,000 feet (0 to 915 meters) amsl. These environmental conditions occur within the Study Area Abrams' spurge was detected during the 2013 rare plant surveys for the DQSP. For these reasons, this species has a high potential to occur.

Colubrina californica (Las Animas colubrine) is a CNPS List 2.3 perennial deciduous shrub belonging to the Rhamnaceae (Buckthorn) family. It is historically known to occur in both Mojavean and Sonoran desert scrub at elevations ranging from 0 to 3,200 feet (0 to 1,000 meters) amsl. These environmental conditions occur within the Study Area and the nearest record of Las Animas colubrine is greater than 5 miles from the Study Area. For these reasons, this species has a moderate potential to occur.

Coryphantha alversonii (foxtail cactus) is a CNPS List 4.3 stem succulent belonging to the Cactaceae (cactus) family. It is historically known to occur in Mojavean desert scrub and sandy or rocky (usually granitic) Sonoran desert scrub at elevations ranging from 246 to 5,000 feet (75 to 1525 meters) amsl. These environmental conditions occur within the Study Area and the nearest record of foxtail cactus is greater than 5 miles from the Study Area. For these reasons, this species has a moderate potential to occur.

*Cryptantha costata (*ribbed cryptantha) is a CRPR list 4.3 annual herb belonging to the Boraginaceae family. It is historically known to occur in desert dunes, Mojavean and Sonoran desert scrub in sandy soils at elevations ranging from 0 to 1,640 feet (0-500 meters) amsl. Ribbed cryptantha was detected during rare plant surveys performed for the BLM land portion of the Desert Quartzite Solar Project. For these reason, this species has a high potential to occur on-site.

Cryptantha holoptera (winged cryptantha) is CRPR list 4.3 annual herb belonging to the Boraginaceae family. It is historically known to occur in Mojavean and Sonoran desert scrub at elevations ranging from 330 to 5,544 feet (100-1690 meters) amsl. These environmental conditions occur on-site but winged cryptantha was not detected during rare plant surveys performed for the BLM land portion of the DQSP. For this reason, this plant has a moderate potential to occur on-site.

Ditaxis claryana (glandular ditaxis) is a CNPS List 2.2 perennial herb belonging to the Euphorbiaceae (spurge) family. It is historically known to occur in Mojavean desert scrub and sandy Sonoran desert scrub at elevations ranging from 0 to 1,500 feet (0 to 465 meters) amsl. These environmental conditions occur within the Study Area and the nearest record of glandular ditaxis is greater than 5 miles from the Study Area. For these reasons, this species has a moderate potential to occur.

*Eriastrum harwoodii (*Harwood's eriastrum) is a CRPR list 1B.2 annual herb belonging to the Polemoniaceae family. It is historically known to occur in desert dunes, at elevations ranging from 410 to 3,000 feet (125-915 meters) amsl. Harwood's eriastrum was detected during rare plant surveys performed for the BLM land portion of the DQSP. For this reason, this plant has a moderate potential to occur on-site.

Funustrum utahense (Utah vine milkweed) is a CRPR list 4.2 perrenial herb belonging to the Apocynaceae family. It is historically known to occur in Mojavean and Sonoran desert scrub in sandy or gravelly soils, at elevations ranging from 330 to 4,708 feet (100-1,436 meters) amsl. These environmental conditions occur on-site and one occurrence of Utah vine milkweed was detected during rare plant surveys performed for the BLM land portion of the DQSP near the northern most border. For this reason, this plant has a high potential to occur on-site.

Opuntia wigginsii (Wiggins' cholla) is a CNPS List 3.3 stem succulent belonging to the Cactaceae (cactus) family. It is historically known to occur in sandy Sonoran desert scrub at elevations ranging from 98 to 2,900 feet (30 to 885 meters) amsl. These environmental conditions occur within the Study Area and the nearest record of Wiggins' cholla is greater than 5 miles from the Study Area. For these reasons, this species has a moderate potential to occur.

Panicum hirticaule ssp. hirticaule (roughstalk witch grass) is a CNPS List 2B.1 annual herb belonging to the Poaceae family. It is historically known to occur in desert dunes, Joshua tree woodland, Mojavean and Sonoran desert scrub at elevations ranging from 148 to 4,314 feet (45 to 1,315 meters) amsl. These environmental conditions occur within the Study Area and there is a record of roughstalk witch grass in the Roosevelt Mine Quadrangle. For these reasons, this species has a moderate potential to occur.

3.5.2 Special Status Wildlife Species

The federal and state listed desert tortoise is the only listed species that has historically been found near the Project site. Fifty-eight additional special status wildlife species have been recorded in the vicinity of the Study Area (CNDDB 2014) and/or are mentioned in NECO with range maps that encompass the Study Area (BLM 2002). All of these species are presented on Table 4, along with their status and potential to occur within the Study Area. Each species with a moderate or greater potential for occurrence is discussed in detail below.

Table 4 Special Status Wildlife Species

Scientific Name **Common Name**	**Status**		**Potential for Occurrence**
Gopherus agassizii desert tortoise	Federal: State: NECO:	threatened threatened covered	Moderate
Incilius alvarius Sonoran desert toad	Federal: State: NECO:	None SSC Not covered	Low
Coccyzus americanus occidentalis western yellow-billed cuckoo	Federal: State: NECO:	candidate endangered not covered	Absent
Melanerpes uropygialis Gila woodpecker	Federal: State: NECO:	none endangered covered	Absent
Antrozous pallidus pallid bat (roosting)	Federal: State: NECO:	none SSC covered	Low
Ardea alba *Great egret*	Federal: State: NECO:	none none not covered	Low

Scientific Name **Common Name**	**Status**		**Potential for Occurrence**
Ardea herodias *Great blue heron*	Federal: State: NECO:	none none not covered	Low
Aquila chysaetos Golden eagle	Federal: State: NECO:	none FP; WL covered	Low
Athene cunicularia burrowing owl	Federal: State: NECO:	none SSC covered	Present
Chaetodipus fallax pallidus pallid San Diego pocket mouse	Federal: State: NECO:	none SSC not covered	Moderate
Colaptes chrysoides gilded flicker	Federal: State: NECO:	none endangered not covered	Low
Corynorhinus townsendii Townsend's big-eared bat (roosting)	Federal: State: NECO:	none SSC covered	Low
Setophaga petechia yellow warbler	Federal: State: NECO:	none SSC covered	Low
Empidonax traillii willow flycatcher	Federal: State: NECO:	none endangered covered	Low
Empidonax traillii extimus southwestern willow flycatcher	Federal: State: NECO:	endangered endangered covered	Low
Eumops perotis californicus western mastiff bat (roosting)	Federal: State: NECO:	none SSC covered	Low
Falco columbarius merlin	Federal: State: NECO:	none WL none	Moderate
Falco mexicanus prairie falcon	Federal: State: NECO:	none SSC covered	Moderate
Felis concolor mountain lion (foraging)	Federal: State: NECO:	none none covered	Moderate
Icteria virens Yellow-breasted chat	Federal: State: NECO:	none SSC not covered	Moderate
Ixobrychus exilis least bittern	Federal: State: NECO:	none SSC not covered	Low
Lanius ludovicianus loggerhead shrike	Federal: State: NECO:	none SSC not covered	Moderate
Lasiurus cinereus hoary bat (roosting)	Federal: State: NECO:	none none covered	Moderate
Macrotus californicus California leaf-nosed bat (roosting)	Federal: State: NECO:	none SSC covered	Moderate
Melozone aberti Abert's towhee	Federal: State: NECO:	none none covered	Low

Scientific Name **Common Name**	**Status**		**Potential for Occurrence**
Myiarchus tyrannulus Brown-crested flycatcher	Federal: State: NECO	none WL covered	Low
Myotis velifer cave myotis (roosting)	Federal: State: NECO:	none SSC covered	Low
Myotis occultus occult little brown bat, Arizona myotis (roosting)	Federal: State: NECO:	none SSC covered	Low
Nycticorax nycticorax *Black-crowned night heron*	Federal: State: NECO:	none none not covered	Low
Nyctinomops femorosacca pocketed free tail bat (roosting)	Federal: State: NECO:	none none covered	Low
Neotoma albigula venusta Colorado Valley woodrat	Federal: State: NECO:	none none covered	Moderate
Odocoileus hemionus eremicus burro deer	Federal: State: NECO:	none none covered	Moderate
Ovis Canadensis nelsoni Nelson’s bighorn sheep	Federal: State: NECO:	none none covered	Low
Oreothlypis luciae *Lucy’s warbler*	Federal: State: NECO:	none SSC not covered	Low
Pelecanus erythrorhynchos *American white pelican*	Federal: State: NECO:	none SSC not covered	Low
Piranga flava *Hepatic tanager*	Federal: State: NECO:	none WL not covered	Low
Piranga rubra *Summer tanager*	Federal: State: NECO:	none SSC not covered	Low
Poloiptila melanura *Black-tailed gnatcatcher*	Federal: State: NECO:	none none not covered	High
Pyrocephalus rubinus vermillion flycatcher	Federal: State: NECO:	none SSC covered	High
Rallus longirostris yumanensis *Yuma clapper rail*	Federal: State: NECO:	endangered threatened not covered	Low
Sauromalus ater chuckwalla	Federal: State: NECO:	none none covered	Low
Scaphiopus couchii Couch’s spadefoot toad	Federal: State: NECO:	none SSC covered	Low
Setophaga petechial sonorana *Sonoran yellow warbler*	Federal: State: NECO:	none SSC covered	Low
Sigmodon arizonae plenus Colorado River cotton rat	Federal: State: NECO:	none SSC not covered	Low

Scientific Name **Common Name**	**Status**		**Potential for Occurrence**
Spizella breweri *Brewer's sparrow*	Federal: State: NECO:	none none not covered	Low
Spizella passerine *Chipping sparrow*	Federal: State: NECO:	none none not covered	Low
Taxidea taxus American badger	Federal: State: NECO:	none SSC not covered	Moderate
Vulpes macrotis desert kit fox	Federal: State: NECO:	none covered not covered	High
Toxostoma crissale Crissal thrasher	Federal: State: NECO:	none SSC covered	Low
Toxostoma lecontei LeConte's thrasher	Federal: State: NECO:	none SSC covered	Moderate
Uma notata Colorado Desert fringe-toed lizard	Federal: State: NECO:	none SSC covered	Low
Uma scoparia Mojave fringe-toed lizard	Federal: State: NECO:	none SSC covered	High
Xanthocephalus xanthocephalus *yellow-headed blackbird*	Federal: State: NECO:	none SSC not covered	Low
Charadrius montanus mountain plover	Federal: State: NECO:	candidate SSC covered	Absent
Micrathene whitneyi elf owl	Federal: State: NECO:	none endangered covered	Low
Vireo bellii arizonae Arizona bell's vireo	Federal: State: NECO:	none endangered not covered	Low
Sigmodon hispidus eremicus Yuma hispid cotton rat	Federal: State: NECO:	none SSC not covered	Low
Lasiurus xanthinus western yellow bat	Federal: State: NECO:	none SSC not covered	Moderate
Myotis yumanensis Yuma myotis	Federal: State: NECO:	none SSC not covered	Moderate

California Department of Fish and Wildlife (CDFW/State) designation:
FP: Fully Protected: This classification was the State of California's initial effort to identify and provide additional protection to those animals that were rare or faced possible extinction. Lists were created for fish, amphibians and reptiles, birds and mammals. Most of the species on these lists have subsequently been listed under the state and/or federal endangered species acts.
SSC: Species of Special Concern - extirpated from the State, or in its primary seasonal or breeding role; federal-listed, but not state-listed, threatened or endangered; meets the state definition of threatened or endangered but has not formally been listed; experiencing, or formerly experienced, serious (noncyclical) population declines or range retractions (not reversed) that, if continued or resumed, could qualify it for State threatened or endangered status; has naturally small populations exhibiting high susceptibility to risk from any factor(s), which could lead to declines that would qualify it for State threatened or endangered status
WL: Watch List: The Department of Fish and Wildlife maintains a list consisting of taxa that were previously designated as "Species of Special Concern" but no longer merit that status, or which do not yet meet SSC criteria, but for which there is concern and a need for additional information to clarify status

Scientific Name **Common Name**	**Status**	**Potential for Occurrence**
Northern and Eastern Colorado Desert Coordinated Management Plan (NECO) designations Covered: Species is listed as covered in NECO Not covered: Species is not listed as covered in NECO Other sources: CNDDB and CNPSEI for Roosevelt Mine, Ripley, McCoy Wash, McCoy Peak, McCoy Spring, Hopkins Well, Wiley Well, Thumb Peak, and Palo Verde 7.5 minute USGS quadrangles		

Gopherus agassizii (desert tortoise) is a federal and state-listed threatened species, and is one of the species of primary focus in NECO. This species occurs in desert scrub, desert wash and Joshua tree habitats with appropriate soils for burrowing, and prefers areas of creosote scrub with abundant annual wildflowers. Desert tortoises have been found in areas surrounding the site, not on-site, but the environment on-site is fallow jojoba farmland, therefore it is only moderately likely that this species inhabits the BLM portion of the site at low densities.

Athene cunicularia (western burrowing owl) is a SSC and NECO-covered species and is protected by the federal Migratory Bird Treaty Act. A burrow complex containing a pellet and feather was present on-site at UTM Zone 11 E707492/N3716604 (see Appendix A, Photo 4) during the preliminary survey. No individual owls were observed. This species is considered to be present on the site.

Ten bat species *Antrozous pallidus* (pallid bat), *Corynorhinus townsendii* (Townsend's big-eared bat), *Eumops perotis californicus* (western mastiff bat), *Lasiurus cinereus* (hoary bat), *Lasiurus xanthinus* (western yellow bat), *Macrotus californicus* (California leaf-nosed bat), *Myotis velifer* (Cave myotis), *Myotis occultus* (Occult little brown bat or Arizona myotis), *Myotis yumanensis* (Yuma myotis) and *Nyctinomops femorosacca* (pocketed free tail bat) are California Species of Special Concern (SSC) species that inhabit desert scrub and woodland habitats often containing rocky areas, caves, mines, and buildings for roosting. Pallid bats roost in small rocks on the ground. The Study Area does not support suitable roosting habitat for this species; however, suitable habitat occurs within the rocky foothills of the Mule Mountains located less than one mile to the southwest. Desert dry wash (microphyll) woodland areas have been documented as important habitat to several bat species (Brown 2010). Hoary bats will roost in palo verde trees and ironwoods. During the warmer months, California leaf-nosed bats night roost in ironwood trees between foraging bouts. Desert dry wash woodland vegetation attracts foraging bats due to increased insect concentration. This is especially true for California leaf-nosed bats and pallid bats (both State Species of Special Concern) that feed on large arthropods which they glean off of the foliage. Desert Dry Wash Woodland (112 acres) was identified nearby the Study Area on the BLM lands portion of the proposed Desert Quartzite Solar Project. Bat surveys were conducted in the Spring of 2013 for the BLM lands portion of the proposed Desert Quartzite Solar Project and included the Study Area. Based on habitat characteristics and location of previous records, California leaf-nosed bats and hoary bats have a moderate potential to roost and forage within the Study Area. The other bat species are not expected to roost and have a low potential for foraging within the Study Area. The method used to perform the focused bat surveys for the DQSP covered this location.

Chaetodipus fallax pallidus (pallid San Diego pocket mouse) is a SSC typically found in open, sandy areas. This species is nocturnal, emerging from burrows at night to forage. Diet typically consists of seeds and may also include smaller portions of green vegetation and insects. Habitat for this species occurs on the site and the nearest record is located 9.5 miles southwest of the site. For these reasons, the pallid San Diego pocket mouse has a moderate potential to occur on the site.

*Falco columbarius (*merlin) is a CDFW Watch List species that can be found in woodland, farmland and nearby rivers. This species may utilize the Study Area for foraging or nest near the site. Although there is no nesting habitat present on-site there is a moderate potential for this species to forage at the site.

Falco mexicanus (prairie falcon) is a SSC and NECO-covered species that nests on cliffs in rocky areas. This species may forage at the site, but is unlikely to nest on or near the site. Nest sites of prairie falcon are typically found on cliffs and are legally protected. Although no nesting habitat is present, there is a moderate potential for this species to forage at the site.

Felis concolor (mountain lion) is a NECO-covered species that is known to inhabit the low mountains and use the desert dry wash woodlands in the Project vicinity as movement corridors. Appropriate movement corridor habitat for this species is found on the BLM lands at the proposed Desert Quartzite Solar Project site. Although no documented records of this species were found during the literature review, it has a moderate potential to utilize the nearby site for foraging or movement.

Icteria virens (yellow-breasted chat) is a CDFW SSC that can be found in abandoned farmland and low bushy shrubs. This species may utilize the Study Area for foraging or nest on the site during summer or migration therefore there is a moderate potential for this species to exist at the site.

Lanius ludovicianus (loggerhead shrike) is a SSC bird species. It is a year-round resident in parts of the Southern California desert. As a predatory bird its diet consists of insects, amphibians, small reptiles, small mammals, and birds. Habitat for this species occurs on the site and the nearest record is greater than 5 miles from the site. For these reasons, the loggerhead shrike has a moderate potential to occur on the site.

Neotoma albigula venusta (Colorado Valley woodrat) is a NECO-covered species that inhabits low-lying desert areas and is closely associated with beavertail cactus (*Opuntia* sp.) and mesquite (*Prosopis* sp.). Because the site supports appropriate habitat for this species and records of the species are found approximately ten miles from the site, this species has been assigned a moderate potential to occur on the site.

Odocoileus hemionus eremicus (burro deer) is a NECO-covered species that is known to inhabit desert dry wash woodlands in the project vicinity and likely also uses these areas as movement corridors. Appropriate habitat for this species is found at the nearby DQSP site in the large washes that support these habitats. Although no records of this species are found for the site, it has a moderate potential to utilize the surrounding area for foraging or movement.

Polioptila melanura (black-tailed gnatcatcher) is listed on CDFW's Special Animals List (tracked by CNDDB) and can be found in arid deserts year round. This non-migratory species may utilize the Study Area for foraging or breeding therefore there is a high potential for this species to exist on the site.

Pyrocephalus rubinus (vermillion flycatcher) is a SSC and NECO-covered bird species. It typically occurs in desert scrub, cultivated lands, and riparian woodlands. Its diet consists mainly of insects. During nesting, it generally inhabits desert riparian areas next to irrigated fields, irrigation ditches, pastures, other open areas. It can be found nesting in cottonwood, willow, mesquite, and other large desert riparian trees. Habitat for this species occurs on the surrounding DQSP site within the desert dry wash woodland and the nearest record is less than 5 miles east of the site. For these reasons, the Vermillion flycatcher has a high potential to occur on the site.

Taxidea taxus (American badger) is a SSC species that may occur throughout the Californian desert region. It requires friable soils for building burrows and sufficient rodent population. Habitat for this species occurs on the Study Area and the nearest record is greater than 5 miles south of the Study Area. For these reasons, the American badger has a moderate potential to occur on the Study Area.

Vulpes macrotis (desert kit fox) is protected by the California Code of Regulations (Title 14, CCR: §460) and Fish and Wildlife Commission Section 4000 as a fur-bearing mammal. Desert kit foxes are fossorial mammals that occur in arid open areas, shrub grassland, and desert ecosystems. Desert kit fox typically consume small rodents, primarily kangaroo rats, rabbits, lizards, insects, and in some cases immature desert tortoises. Dens typically support multiple entrances, but desert kit fox may utilize single burrows for temporary shelter. During the preliminary survey multiple burrows were recorded on-site and have the potential to provide shelter for desert kit fox. Also, desert kit fox have been recorded as occupying the surrounding BLM lands on the larger Desert Quartzite Solar Farm footprint, therefore this species has a high potential to occur on the site.

Toxostoma lecontei (Le Conte's thrasher) is a SSC species, covered under NECO. This species breeds in desert areas that support cactus, Mojave yucca (*Yucca schidigera*), Joshua trees (*Yucca brevifolia*), and large thorny shrubs such as Lycium species. Habitat for this species occurs on the Study Area, however no records were found near the Study Area. For these reasons, the Le Conte's thrasher has a moderate potential to occur on the Study Area.

Uma scoparia (Mojave fringe-toed lizard) is a SSC and NECO-covered reptile species. This species is typically restricted to aeolian (wind-blown) sand dune habitat, including adjacent sandy washes and stabilized dunes. Recent records of this species occur adjacent to the Study Area (CNDDB 2014). Based on existing records of this species nearby and likelihood of suitable aeolian sand deposits, there is a moderate potential for this species to occur within the Private Land Study Area.

3.6 SENSITIVE HABITATS

Sensitive habitats mentioned in this report include:

- Areas of Critical Environmental Concern (ACECs), Desert Wildlife Management Areas (DWMAs), BLM wilderness areas, or other special designations by the BLM;
- Plant communities rare or declining and of concern to agencies or local jurisdictions;
- Wildlife movement corridors; and
- Wetlands or other potentially jurisdictional waters.

The Mule Mountain ACEC is located less than one mile west of the Private Land Study Area. The Chuckwalla DWMA for desert tortoise is located approximately twenty miles west of the Study Area. The Burro Habitat Management Area (HMA) is located approximately five miles south of the Study Area.

The surrounding BLM lands portion of the proposed Desert Quartzite Solar Project contain two main wash systems: one originating in the northwest from the McCoy Mountains and the other originating in the southwest from the Mule Mountains. These washes are not contiguous with navigable, interstate, or relatively permanent waters; therefore, they do not appear to be subject to the jurisdiction of the U.S. Army

Corps of Engineers (USACE) or Regional Water Quality Control Board (RWQCB). Neither drainage currently or has historically crossed the Study Area.

4.0 CONCLUSIONS AND RECOMMENDATIONS

This section summarizes those biological resources within the Study Area for which further surveys or permitting may be required, and recommendations for meeting the requirements for these resources.

4.1 SPECIAL STATUS SPECIES

One threatened species, desert tortoise, has a moderate potential to exist within the Study Area. One special status wildlife species, burrowing owl, was determined to be present within the Study Area. Fourteen special status animals (pallid San Diego pocket mouse, merlin, prairie falcon, mountain lion, yellow-breasted chat, loggerhead shrike, Colorado Valley woodrat, burro deer, black-tailed gnatcatcher, vermillion flycatcher, American badger, kit fox, LeConte’s thrasher, and Mojave fringe-toed lizard) have a moderate or high potential to inhabit the Desert Quartzite Private Land Study Area along with ten additional bat species.

Fifteen special status plants (Harwood’s milkvetch, gravel milkvetch Emory's crucifixion-thorn, Abrams' spurge, Las Animas colubrine, foxtail cactus, ribbed cryptantha, winged cryptantha, glandular ditaxis, Harwood’s eriastrum, Utah vine milkweed, Wiggins' cholla, roughstalk witchgrass, desert beardtongue, desert unicorn plant) have a moderate or high potential to inhabit the Study Area.

4.2 FOCUSED STUDIES

Additional focused surveys are recommended for the Desert Quartzite Private Land Project and discussed individually below. It is recommended that all other special status species be searched for and recorded during these focused surveys.

Desert Tortoise

It is recommended that focused surveys for desert tortoise be conducted according to the USFWS 2010 protocol. These surveys would focus on determining the relative abundance and distribution of desert tortoise within the Study Area. However, if the impacts to this Study Area is considered with the larger project, then this Study Area may not require a protocol survey, since presence of desert tortoise is known on the BLM portion of Quartzite Project. The Private Study Land Area should be part of all pre-construction surveys required for the Quartzite project.

Western Burrowing Owl

It is recommended that surveys for the presence of western burrowing owls be performed. Survey should follow the California Department of Fish and Wildlife Staff Report of Burrowing Owl Mitigation date

March 7, 2012. However, if the impacts to this Study Area is considered with the larger project, then this Study Area may not require a separate survey, since presence of burrowing owl is known on this site and the BLM portion of the Quartzite Project. The Private Study Land Area should be part of all pre-construction surveys required for the Quartzite project.

Mojave Fringe-toed Lizard

A formal survey protocol has not been established for Mojave fringe-toed lizard; however, because it is a SSC and NECO-covered species, it is recommended that surveys be performed. Survey methods should be developed through coordination with CDFW.

Special Status Plant Surveys

Focused surveys for special status plant species are recommended. The survey should follow the *Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Natural Communities* (CDFG 2009), *Survey Protocols Required for NEPA/ESA Compliance for BLM Special Status Plant Species* (BLM 2009), and *Guidelines for Conducting and Reporting Botanical Inventories for Federally Listed, Proposed and Candidate Plants* (USFWS 2000).

Other Special Status Wildlife Surveys

The thirteen remaining special status wildlife species (pallid San Diego pocket mouse, merlin, prairie falcon, mountain lion, yellow-breasted chat, loggerhead shrike, Colorado Valley woodrat, burro deer, black-tailed gnatcatcher, vermillion flycatcher, American badger, kit fox, and LeConte’s thrasher) with potential to occur may require separate surveys or they be combined with the surveys required for the BLM portion of the Quartzite Solar Project.

5.0 REFERENCES

Brown, Patricia Ph.D. (Brown-Berry Biological Consulting)
2010 Letter Report: Initial Bat Habitat Survey for Desert Sunlight Solar Farm.

Bureau of Land Management (BLM) and U.S. Fish and Wildlife Service (USFWS)
2009 Survey Protocols Required for NEPA/ESA Compliance for BLM Special Status Plant Species.

2002 Proposed Northern and Eastern Colorado Desert Coordinated Management Plan and Final Environmental Impact Statement (FEIS.) July 2002.

California Department of Fish and Wildlife (CDFW)
2009 Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Natural Communities. November 24, 2009.

2012 Staff Report on Burrowing Owl Mitigation. State of California Natural Resources Agency. California Department of Fish and Wildlife. March 7, 2012.

California Native Plant Society Electronic Inventory (CNPSEI)
2013 Roosevelt Mine, Ripley, McCoy Wash, McCoy Peak, McCoy Spring, Hopkins Well, Wiley Well, Thumb Peak, and Palo Verde 7.5 minute USGS quadrangles

California Natural Diversity Data Base (CNDDB)
2014 Roosevelt Mine, Ripley, McCoy Wash, McCoy Peak, McCoy Spring, Hopkins Well, Wiley Well, Thumb Peak, and Palo Verde 7.5 minute USGS quadrangles

Hickman, J. (ed.)
1993 *The Jepson Manual: Higher Plants of California*. University of California Press, Berkeley, California.

Holland, R.F.
1986 Preliminary Descriptions of the Terrestrial Natural Communities of California. The Resources Agency, Department of Fish and Game, State of California.

IUCN, Conservation International, and NatureServe
2006 Global Amphibian Assessment. www.globalamphibians.org, version 1.1. Downloaded on 15 October 2006.

Massar, Mark (Bureau of Land Management)
2008 Personal communication regarding Couch's spadefoot toad in the region of the proposed project. 2008.

Munz, P.A.
1974 *A Flora of Southern California*. University of California Press, Berkeley, California.

Sawyer, J.O., Jr. and T. Keeler-Wolf.
1995 *A Manual of California Vegetation*. California Native Plant Society, Sacramento, California.

Soil Survey Staff, Natural Resources Conservation Service, United States Department of Agriculture
2014 Web Soil Survey. Available online at http://websoilsurvey.nrcs.usda.gov/ accessed 11/20/2014.

U. S. Fish and Wildlife Service (USFWS)

2010 Preparing for Any Action that may occur within the Range of the Mojave *Desert Tortoise (Gopherus agassizii*)*. 2010 Field Season.*

2008 Draft Revised Recovery Plan for the Mojave Population of the Desert Tortoise (*Gopherus agassizii*). August 1.

2005 Biological Opinion for the California Desert Conservation Area Plan [Desert Tortoise] (6840 CA 930(P)) (1-8-04-F-43R). March 31, 2005.

2000 Guidelines for Conducting and Reporting Botanical Inventories for Federally Listed, Proposed and Candidate Plants.

Appendix A

Site Photos

Photo 1 – Berm surrounding Private Land Study Area.

Photo 2 –Fallow jojoba farmland with Sonoran creosote bush scrub


Photo 3 – Representative rows of jojoba and Sonoran creosote bush scrub with gravelly sand.

Photo 4 – Burrow utilized by burrowing owl.

Photo 5 – Representative jojoba and Sonoran creosote bush scrub with fine sand.

Photo 6 – Trash dumping on the Private Land Study Area.

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MEMORANDUM

DATE: June 29, 2017

TO: Roy Skinner, Desert Quartzite, LLC

FROM: Kurt Flaig, WEST, Inc.

RE: *Eriastrum harwoodii* Survey Results for the Desert Quartzite Solar Project, Riverside County, CA

Desert Quartzite, LLC (Desert Quartzite) is currently considering a site for potential solar energy development in eastern Riverside County, California, referred to as the Desert Quartzite Solar Project (Project; Figure 1). The Project site occurs primarily on lands managed and administered by the Bureau of Land Management (BLM). Western EcoSystems Technology, Inc. (WEST) was contracted by Desert Quartzite to conduct a species-specific survey for Harwood's eriastrum (*Eriastrum hardwoodii*). This memorandum describes the methods and results of the survey.

Site Description

The Project site is located south of Interstate 10, approximately ten miles west of the City of Blythe (Figure 1). The site occurs on the Ripley and Roosevelt Mine U.S. Geological Survey 7.5 minute quadrangles. Three natural vegetation communities were documented in the Project site by Ironwood Consulting Inc. (Ironwood 2016), including Sonoran Desert scrub, sand dunes, and dry desert wash woodland. Sonoran Desert scrub, dominated by creosote bush (*Larrea tridentata*) and burro bush (*Ambrosia dumosa*), occupies the majority of the site (98%; Ironwood 2016).

Plant Species Information

Harwood's eriastrum is an annual herb that flowers from March through June. It is a BLM sensitive species with a State Rank of 2 (Imperiled in California) and a California Native Plant society (CNPS) Rank of 1B.2 (Rare, threatened, or endangered in California and elsewhere). Harwood's eriastrum is a California endemic that typically occurs in desert sand dunes at elevations between 125 to 915 meters (410 to 3,000 feet; CNPS 2017). It is known from three California counties including Riverside, San Bernardino, and San Diego (CNPS 2017).

Methods

Prior to the May 2017 survey for Harwood's eriastrum conducted by WEST, surveys for the eriastrum (and five additional special status plant species) had been conducted by Ironwood within the Desert Quartzite Project area in March 2013 and 2015. Ironwood detected multiple occurrences of Harwood's eriastrum within two general locations within the Project area, both of which occurred in stabilized sand dune vegetation communities (Figure 2). While 2013 and 2015 overall represented slightly above average rainfall years (4.11 inches and 3.96 inches, respectively) for the Blythe area, localized winter rainfall from December 2016 through the end of February 2017 (3.94 inches) alone exceeded the average annual rainfall (3.82 inches) for the area (Weather Underground 2017, U.S. Climate Data 2017). As a result of the much higher than average rainfall during the 2016/2017 winter, the BLM requested that an additional species-specific survey for Harwood's eriastrum be conducted within the Project site in the spring of 2017. Per BLM request, the spring 2017 survey area did not include areas containing previously documented occurrences of the eriastrum and did not include stabilized sand dune communities previously mapped and surveyed by Ironwood (Figure 2). Additionally, the BLM specified that the 2017 survey only be conducted in suitable habitat for Harwood's eriastrum found elsewhere in the Project site.

In response to the requirements defined above, the methods used by WEST for the survey during May 2017 involved a two-tiered approach, in which the two surveyors walked transects at approximately 60 m spacing to detect suitable habitat for Harwood's eriastrum, and, if suitable habitat was encountered, the surveyors narrowed the survey spacing to a width of less than 10 m to detect any occurring plants. Suitable habitat was defined as any sand dune, regardless of size, depth, and species composition. Prior to commencing the May 2017 survey, the two surveyors visited known occurrences of Harwood's eriastrum (detected by Ironwood in 2013 and 2015) in several locations within the Project site to become more familiar with the species and its current phenology, to assess suitable habitat within the Project site, and to observe associate species and their current phenologies.

The survey was conducted from May 9-14, 2017 by Kurt Flaig and Gregory Johnson (see qualifications in Appendix A). The lead botanist (Kurt Flaig) has conducted numerous rare plant surveys in the deserts of California and has a working knowledge of the genus *Eriastrum* based on surveys in the Mojave Desert in California. Survey timing occurred towards the latter part of the known flowering period for the eriastrum (March through June), but the region had experienced a wetter than average winter/spring and numerous Harwood's eriastrum individuals were observed in flower on site at the time of the survey. Furthermore, the BLM requested and approved that the surveys be conducted during this time.

Results

<u>Observations of Sand Dune Habitat in Previously-documented Harwood eriastrum Occurrences</u>

Populations of Harwood's eriastrum in the Project site documented by Ironwood in March 2013 and 2015 occur in sand dune vegetation communities. WEST surveyors visited several of these occurrences prior to commencing the May 2017 survey and were able to observe over 100 individuals of the eriastrum. A majority of these individuals had senesced but a small percentage was still flowering at the time of the survey. The stabilized and partially stabilized sand dunes upon which the Ironwood occurrences were found are large in size, forming dune complexes comprising tens of acres. The dominant species was the perennial bunchgrass big galleta grass (*Hilaria rigida*), for which the herbaceous alliance found on the dunes is named (*Pleuraphis* [*Hilaria*] *rigida* Herbaceous Alliance [Sawyer et al. 2009]). Commonly occurring species included creosote bush (*Larrea tridentata*), desert sand verbena (*Abronia villosa*), many-flowered mentzelia (*Mentzelia longiloba*), desert lantern (*Oenothera deltoides*), desert wire lettuce (*Stephanomeria pauciflora*), and desert lily (*Hesperocallis undulata*). Russian thistle (*Salsola tragus*), an invasive annual herb, was also common at these occurrences. The majority of desert sand verbena, many-flowered mentzelia, and desert wire lettuce individuals observed within the sand dunes during the survey were still flowering.

WEST surveyors found sand dune habitat meeting the description above in only three locations within the Project site (Figure 2). No *Eriastrum harwoodii* was observed at any of these locations. All three of the sites occurred immediately adjacent to large tracts of land that had been cleared (i.e., graded) within the last eight years based on review of Google Earth Pro imagery. As such, it appears that the observed sand dunes have formed more recently from wind-deposited sand and dust particles from the adjacent clearings and that Harwood's eriastrum has not had a sufficient time opportunity to become established. WEST surveyors observed and surveyed numerous small patches of accumulated sand. Typically these areas did not support Harwood's eriastrum associate species and were not mapped as potential habitat (although they were surveyed).

Harwood's eriastrum found during the May 2017 Survey

WEST surveyors detected *Eriastrum harwoodii* in two locations within the Project site that were not identified during the 2013 and 2015 Ironwood surveys (Figure 2), with a total of seventy-four individuals found. One individual was encountered at a location in the central portion of the Project site (Figure 2). It was situated in a small sand deposit (approximately 1.9 m^2 [20 ft^2] in area) on the downwind side of a creosote bush, within a sparsely-vegetated Sonoran Desert scrub vegetation community. Although they comprised very low vegetative cover, dominant associate species included creosote bush, desert Indianwheat (*Plantago ovata*), common Mediterranean grass (*Schismus barbatus*), and desert sunflower (*Geraea canescens*). With the exception of creosote bush, none of the associate species observed at the known occurrences within the Project site were found at this location. The lone individual of *Eriastrum harwoodii* detected at this occurrence was located approximately 0.8 km (0.5 mile) south and east of two large sand dune complexes with known occurrences of the species (Figure 2). Although the site didn't appear to represent quality suitable habitat for the species, it is possible that some seed, blown in from the large occurrences located nearby, had managed to germinate in the small sand drift. The two surveyors observed hundreds of such drifts throughout the Project site with no eriastrum present.

The second occurrence of *Eriastrum harwoodii* detected within the Project site was located in the northwest portion of the site, near the west end of the transmission line corridor and existing substation (Figure 2). The area contained previously documented occurrences of the eriastrum and, as such, did not require surveying in 2017 per the methods established with the BLM. WEST surveyors entered the area to observe previously mapped plants and encountered additional plants at a distance far enough (110 m [360 ft]) from previously mapped occurrences to warrant additional mapping. Thus, WEST surveyed the area as suitable habitat for the eriastrum (i.e., large sand dune complexes). Surveyors documented 73 individuals of the erisatrum in this area, all of which occurred on sand dunes (Figure 2). Associate species composition was similar to that found in the other previously documented occurrences observed by WEST on site with the addition of Indianwheat and narrow leaved cryptantha (*Cryptantha* *angustifolia*), which were both common. All Harwood's eriastrum individuals observed at this occurrence had senesced, but some dried corollas were still apparent.

Photographs of the two Harwood's eriastrum occurrences documented by WEST and of Harwood's eriastrum individuals observed in flower and post-flowering within the Desert Quartzite Project site are provided (Photographs 1-4).

REFERENCES

California Native Plant Society [CNPS], Rare Plant Program. 2017. Inventory of Rare and Endangered Plants of California (online edition, v8-03 0.39). Website http://www.rareplants.cnps.org [accessed 02 May 2017).

Sawyer, J.O., T. Keeler-Wolf, and J.M. Evans. 2009. A Manual of California Vegetation, second edition. California Native Plant Society. Sacramento, California.

Weather Underground. 2017. Weather History for Blythe, CA. Website http://www.wunderground.com [accessed on 07 June 2017).

U.S. Climate Data. 2017. US Climate Data (online version 2.2). Website http://www.usclimatedata.com [accessed 07 June 2017].

Attachments:
Figure 1. Desert Quartzite Solar Project site location map
Figure 2. Desert Quartzite rare plant survey report results figure.
Photograph 1. Harwood's eriastrum occurrence in the central portion of the Project site.
Photograph 2. Harwood's eriastrum occurrence in the northwest portion of the Project site.
Photograph 3. Harwood's eriastrum in flower.
Photograph 4. Harwood's eriastrum post-anthesis.
Appendix A. Surveyor qualifications.

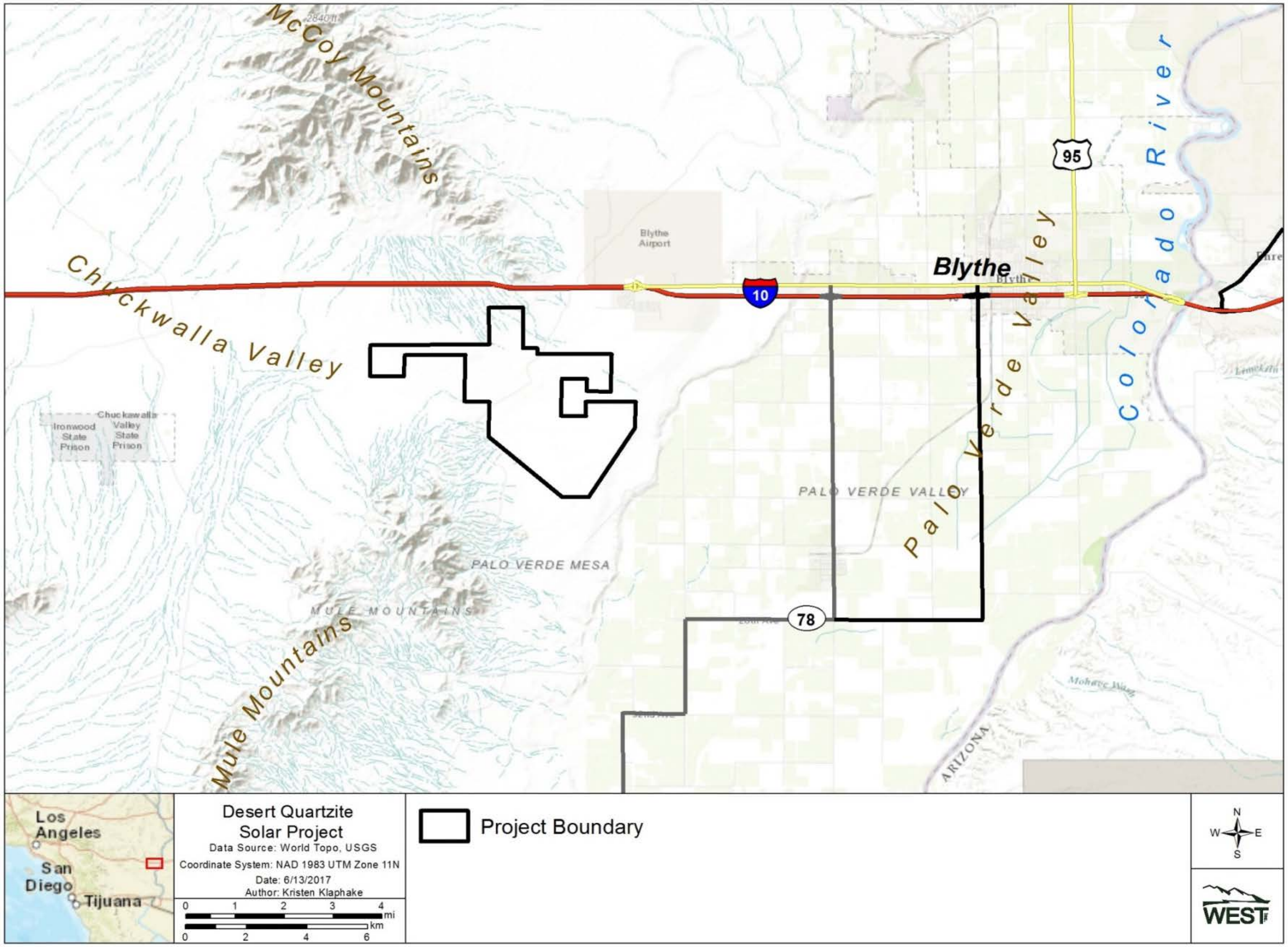

Figure 1. Desert Quartzite Solar Project site location map.

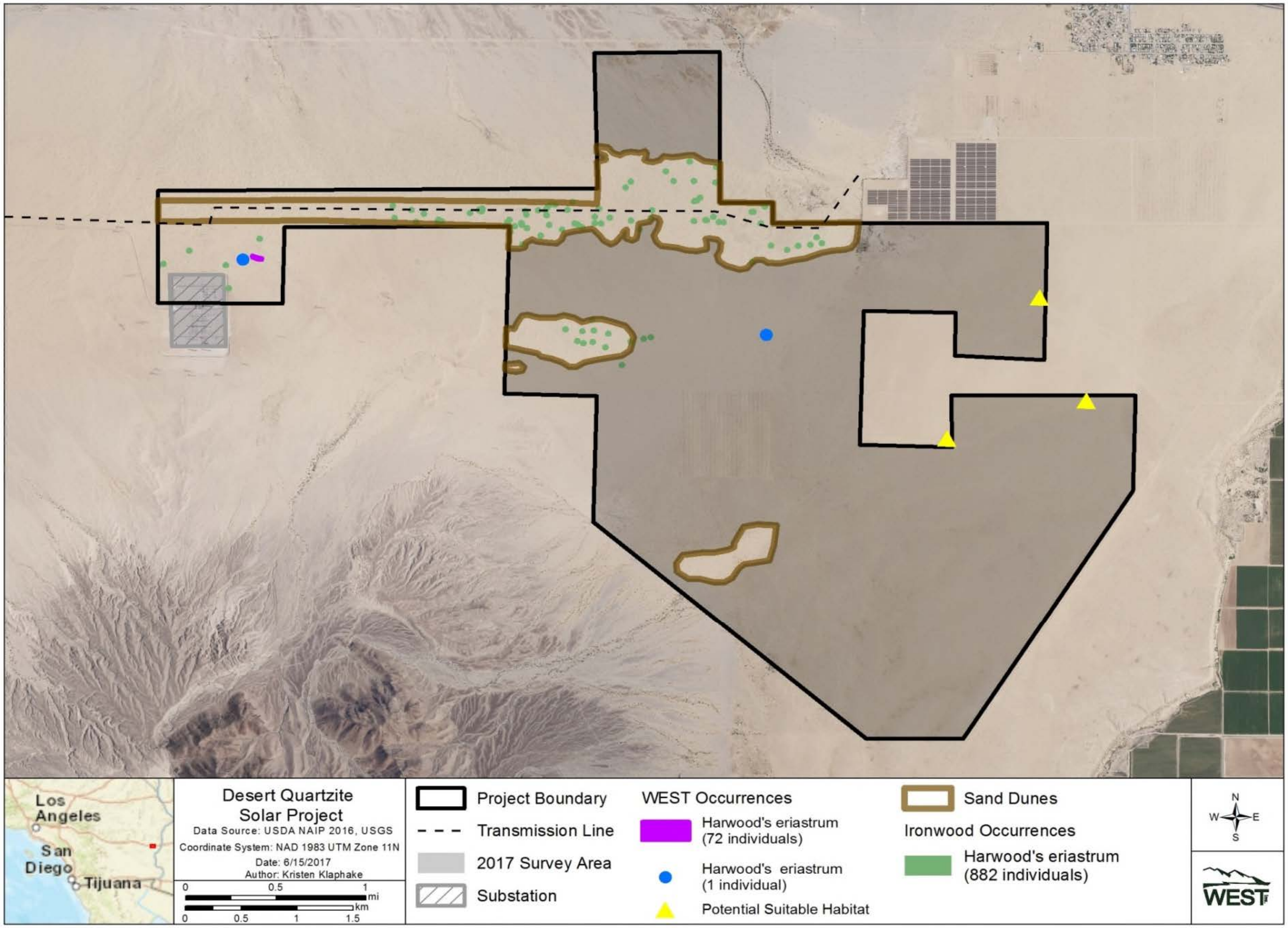

Figure 2. Desert Quartzite *Eriastrum harwoodii* occurrences documented by WEST (2017) and Ironwood (2013 and 2015).

Photograph 1: Harwood's eriastrum occurrence (one individual) in small sand drift adjacent to creosote bush.

Photograph 2: Harwood's eriastrum occurrence (73 individuals) near substation and transmission line corridor; photograph shows sand dune habitat.

Photograph 3: Harwood’s eriastrum in flower; photograph taken at occurrence mapped by Ironwood.

Photograph 4: Harwood’s eriastrum post-anthesis; photograph taken at occurrence mapped by Ironwood.

Appendix A. Surveyor Qualifications

Kurt F. Flaig, *Plant Ecologist*

PROFESSIONAL EXPERIENCE

2004-Present	*Plant Ecologist,* Western EcoSystems Technology, Inc., Cheyenne, Wyoming
2001-2003	*Plant Ecologist,* H.T. Harvey & Associates, San Jose, California
2000-2001	*Range Technician,* Colorado State Cooperative Extension Program and Division of Wildlife, Weston, Colorado
2000-2001	*Natural Resource Technician,* Center for Ecological Management of Military Lands, Fort Collins Colorado
1999-2000	*Biological Science Technician,* U.S. Forest Service, Canyon Lakes District, Fort Collins, Colorado
1998-1999	*Range Technician,* Colorado State Cooperative Extension Program, Fort Collins, Colorado and Y-Cross Ranch, Horse Creek, Wyoming
1996-1999	*Graduate Research Assistant,* Department of Rangeland Ecosystem Science, Fort Collins, Colorado and Fort Richardson, Alaska

EDUCATION

M.S.
Colorado State University
Fort Collins, Colorado
1999
Range Ecology

B.S.
Colorado State University
Fort Collins, Colorado
1995
Natural Resource Management

B.A.
Florida Atlantic University
Boca Raton, Florida
1989
Political Science

SCIENTIFIC ORGANIZATION MEMBERSHIPS

California Native Plant Society

Colorado Native Plant Society

Wyoming Native Plant Society

Society of Wetland Scientists

SPECIALTY AREAS

Rare Plants: Kurt has been conducting rare plant assessments and surveys for county, state, BLM, and USFS sensitive species, and ESA listed species since 2001. This experience includes evaluating project impacts to rare plant species and communities, and designing and implementing mitigation measures to address such impacts. Kurt has detected numerous occurrences of special-status plant species, including federally threatened and endangered species, in the western U.S. This experience includes locating occurrences in Arizona, California, Colorado, Idaho, Kansas, Montana, Nebraska, New Mexico, North Dakota, South Dakota, Utah, Washington, and Wyoming.

Wetlands: Kurt has 15 years of experience in conducting wetland delineations throughout the western U.S. He has prepared and assisted clients in preparing USACE Section 404 permits, California Department of Fish and Game Streambed Alteration Agreements, and in complying with various states' waters regulatory requirements. Kurt has designed wetland mitigation sites and conducted extensive mitigation monitoring. He also has formal training and considerable experience in conducting wetland functional assessments.

Vegetation Classification, Mapping and Monitoring: Kurt has extensive experience in the classification and mapping of vegetation in a variety of community and ecosystem types throughout the western U.S. This includes detailed descriptions of habitats and identification of component flora. Kurt has over 15 years of experience in conducting vegetation monitoring in systems ranging from shortgrass and coastal prairies to mixed coniferous forest and coastal salt marsh. This experience includes baseline studies and short- and long-term monitoring studies for projects involving range inventories, grassland restoration, wetland/riparian restoration and mitigation, and soil erosion analysis. Kurt is proficient in the utilization of numerous sampling methods.

Technical Report Preparation: Kurt is an accomplished technical writer and editor. He provides expertise in the preparation of various NEPA related documents, including Environmental Impacts Statements, Biological Assessments, Biological Evaluations, and Habitat Conservation Plans, and has authored numerous technical reports and documents.

ADDITIONAL TRAINING & CERTIFICATION

WAFWA Lesser Prairie Chicken Vegetation Monitoring Training, 2014

Wyoming Reclamation and Restoration Center Workshop, 2012

Functional Assessment of Colorado Wetlands (FACWet) Methodology Training, 2009

Biological Assessment/Biological Evaluation Preparation Training, 2008, USFS

Advanced Hydric Soils Course, 2005, Wetland Training Institute (CA)

Wetland Delineation Course, 2003, Wetland Training Institute (CA)

California Native Plant Society Rapid Assessment Course for Vegetation Mapping, 2001

EIR/EIS Preparation and Review, 2001, University of California Davis Extension

Wetland Regulations, 2001, University of California Davis Extension

RELATIVE PROJECT EXPERIENCE*

Alta Infill / Pinyon Pines Post-construction Restoration Monitoring (2015, 2016) – Kern County, California
Conducted two consecutive years of reclamation vegetation monitoring in which all plant species encountered were identified and percent cover estimates were provided.

Wildflower Green Renewable Energy Project (2010, 2011) – Los Angeles County, California
Conducted rare plant surveys for the following species: round-leaved filaree, golden goodmania, Coulter's goldfields, Pierson's morning glory, Barstow woolly sunflower, and pale-yellow layia. Identified, mapped, and described vegetation communities within the project area. Identified potential jurisdictional wetlands and other waters of the U.S., and CDFG jurisdictional streams.

Rising Tree Wind Energy Project (2010, 2011) – Kern County, California
Conducted rare plant surveys for the following species: alkali mariposa-lily, white pygmy-poppy, Mojave spineflower, white-bracted spineflower, desert cymopterus, Bakersfield cactus, Barstow woolly sunflower, Red Rock poppy, short-joint beavertail, and golden goodmania.

Mojave Solar Energy Project (2010) – Kern County, California
Conducted rare plant surveys for the following species: alkali mariposa-lily, white pygmy-poppy, Mojave spineflower, white-bracted spineflower, desert cymopterus, Barstow woolly sunflower, Red Rock poppy, short-joint beavertail, and golden goodmania. Identified potential jurisdictional wetlands and other waters of the U.S., and CDFG jurisdictional streams.

Buckeye Solar Resource Project (2010) – Maricopa County, Arizona
Conducted a native plants and noxious weed inventory using a systematic sampling design. Identified potential jurisdictional wetlands and other waters of the U.S.

Sidewinder Wind Energy Project (2008) – San Bernardino County, California
Conducted rare plant surveys for the following species: Lane Mountain milkvetch, desert cymopterus, Barstow woolly sunflower, Mojave monkeyflower, short-joint beavertail. Identified potential jurisdictional wetlands and other waters of the U.S., and CDFG jurisdictional streams.

White Hills Wind Energy Project (2008) – Mohave County, Arizona
Conducted rare plant species surveys for the following species: Las Vegas bearpoppy, clustered barrel cactus, silverleaf sunray, and Navajo bridge cactus. Designed and conducted a systematic sampling method to inventory salvage restricted, protected native plant species within the project area. Identified potential jurisdictional wetlands and other waters of the U.S.

PPM Dry Lake Wind Energy Project (2006) – Navajo County, Arizona
Conducted rare plant species surveys for the following species: roundleaf errazurizia, paper-spined cactus, and Peebles Navajo cactus. Identified potential jurisdictional wetlands and other waters of the U.S.

Hoover's woolly-star (Eriastrum hooveri) Survey (2003) – Los Angeles County and Kern County, California
Collected extent and distribution data for Hoover's woolly-star at various locations in the Antelope Valley in support of its proposed delisting as a Federal-threatened species by the USFWS (for H.T. Harvey & Associates).

***In addition to the regional projects identified above, Kurt has conducted numerous other rare plant surveys throughout the western U.S., including surveys in Colorado, Idaho, Kansas, Montana, Nebraska, New Mexico, North Dakota, South Dakota, Utah, Washington, and Wyoming.**

Gregory D. Johnson, *Research Biologist*

EDUCATION

M.S.
University of Wyoming
Laramie, Wyoming
1987
Zoology and Physiology

B.S.
University of Wyoming
Laramie, Wyoming
1983
Wildlife Conservation and Management

CERTIFICATIONS

Certified Senior Ecologist, Ecological Society of America

Certified Wildlife Biologist, The Wildlife Society

Professional Wetland Scientist, Society of Wetland Scientists

Professional Experience

1991-Present	Research Biologist, Western EcoSystems Technology, Inc., Cheyenne, Wyoming
1987-1991	*Study Director/Project Manager*, Wildlife International, Easton, Maryland
1985-1987	*Research Assistant,* University of Wyoming, Laramie, Wyoming
1984-1986	*Teaching Assistant,* University of Wyoming, Laramie, Wyoming
1984	*Wildlife Technician,* U.S. Forest Service, Laramie, Wyoming
1983	*Wildlife Technician,* University of Wyoming, Laramie, Wyoming

Professional Summary

Greg Johnson has been an Ecologist and Project Manager for WEST since 1991. He received a B.S. degree in Wildlife Conservation and Management and a M.S. degree in Zoology and Physiology from the University of Wyoming. He has over 30 years of consulting experience in wildlife and ecological studies. He is a Certified Wildlife Biologist through The Wildlife Society, a Professional Wetland Scientist through the Society of Wetland Scientists, and a certified Senior Ecologist through the Ecological Society of America. His specialty areas include wildlife research with an emphasis on contaminants and wind power development; endangered species; wetland delineation, mitigation, and functional value assessment; and vegetation sampling. He is the author/coauthor of 49 professional journal articles, book chapters or peer reviewed proceedings papers and is an author/coauthor of 61 presentations at scientific meetings.

Relevant Work Experience

Mr. Johnson has extensive experience sampling vegetation. He prepared a weed management plan and collected quantitative data on weed cover to establish baseline conditions prior to implementing the plan for a reservoir project in CO. He collected transect data on willows and alders along 7.5 miles of stream south of Rawlins, WY to establish baseline conditions of woody riparian habitats used for mitigation purposes. He has collected quantitative plot and transect data on over 60 created and restored wetlands. In 1995 and 1996, he monitored success of reclamation of the 41-mile Wasatch Sour Gas Gathering System pipeline on the Utah/Wyoming border through quantifying vegetation species composition and % cover. He has identified wetland plants on over 100 project sites while conducting wetland delineations. In the summer of 1984, he collected quantitative vegetation data on an elk winter range in southern WY. In the summers of 1979-82, he was employed by the USDA Agricultural Research Service, where he collected extensive vegetation data on reclaimed mined lands in southeast WY. He has mapped vegetation, described vegetation types, and prepared the vegetation portion of numerous EIS's, EA's, and BA's. He has also conducted numerous searches for rare and sensitive plant species prior to construction activities in Wyoming, Idaho, Colorado, Oregon, Washington and California.

He has been certified as a Professional Wetland Scientist (PWS) by the Society of Wetland Scientists since 1997. He is formally trained in wetland delineations, wetland construction and restoration, and wetland plant identification. He has 23 years of wetland experience and has delineated over 5,000 acres of wetland using the Corps of Engineers 1987 manual on over 100 project sites. He was selected by the Corps of Engineers to peer review the Great Plains Region and Western Mountains, Valleys and Coast Region regional supplements to the 1987 Corps of Engineers wetland delineation manual. He has selected numerous wetland mitigation sites and assisted engineers with designs of created wetlands for mitigation purposes. He has quantitatively assessed the functions and values of impacted wetlands as well as wetlands created for mitigation purposes to ensure that proposed wetland mitigation plans will result in created wetlands that completely replace the functions and values of impacted wetlands. He has also monitored the success of over 75 created wetlands using quantitative line transect and plot methods to measure vegetative composition and success.

Rare Plant Survey Experience:

2017 Proposed Quartzsite Solar Energy Project, Riverside County, California.
Species: Harwood's eriastrum (*Eriastrum harwoodii*)

2014 U.S. Highway 14 reconstruction project, Sheridan County, Wyoming.
Species: 59 species of U.S. Forest Service and Wyoming Natural Diversity database sensitive species.

2013 Highway 130 roadside hazard tree clearing project, Carbon County, Wyoming.
Species: 53 species of U.S. Forest Service sensitive species.

2013 Confidential Pipeline, Laramie and Platte Counties,Wyoming
Species: Ute Ladies Tresses (*Spiranthes diluvialis*) and Colorado butterfly plant (*Gaura neomexicana* ssp. *coloradensis*)

2012 Cheyenne Prairie Generating Station Pipeline, Laramie County, Wyoming
Species: Colorado butterfly plant (*Gaura neomexicana* ssp. *coloradensis*)

2006 Wyoming State Highway 150 Reconstruction Project, Campbell County, Wyoming
Species: Ute Ladies Tresses (*Spiranthes diluvialis*)

2006 Lance Creek East Highway Reconstruction Project, Niobrara County, Wyoming
Species: Ute Ladies Tresses (*Spiranthes diluvialis*)

2005 Entrega Gas Pipeline Project, Carbon County, Wyoming
Species: Nelson's milkvetch (*Astragalus nelsonianus*), Gibben's penstemon (*Penstemon gibbensii*)

2004 Reuter-Hess Reservoir Project, Parker, Colorado
Species: Carrionflower (*Smilax lasioneura*) and American black currant (*Ribes americanum*). Located over 40 currant and over 300 carrionflower plants for transplant from the reservoir site.

2004 Entrega Gas Pipeline Project, Rio Blanco and Moffat Counties, Colorado
Species: debris milkvetch (*Astragalus detritalis*), narrow-stem gilia (*Gilia stenothysra*), Rollins cryptanth (*Oreocarya rollinsii*)

2004 City of Cheyenne Belvoir Ranch Landfill and Access Road, Laramie County, Wyoming
Species: Ute Ladies Tresses (*Spiranthes diluvialis*) and Colorado butterfly plant (*Gaura neomexicana* ssp. *coloradensis*)

2004 Bear Creek Bridge replacement project, Goshen County, Wyoming
Species: Ute Ladies Tresses (*Spiranthes diluvialis*) and Colorado butterfly plant (*Gaura neomexicana* ssp. *coloradensis*)

2004 Happy Jack Road Reconstruction Project, Laramie County, Wyoming
Species: Ute Ladies Tresses (*Spiranthes diluvialis*) and Colorado butterfly plant (*Gaura neomexicana* ssp. *coloradensis*)

2004 Basin - Greybull Highway Reconstruction Project, Bighorn County, Wyoming
Species: Ute Ladies Tresses (*Spiranthes diluvialis*)

2004 Farson-Lander Highway Reconstruction Project, Sweetwater County, Wyoming
Species: Ute Ladies Tresses (*Spiranthes diluvialis*)

2003 Casper East I-25 Reconstruction Project, Natrona County, Wyoming
Species: Ute Ladies Tresses (*Spiranthes diluvialis*)

2003 Evanston South Highway Reconstruction Project, Uinta County, Wyoming
Species: Ute Ladies Tresses (*Spiranthes diluvialis*)

2003 Henry's Fork Bridge replacement Project, Uinta County, Wyoming
Species: Ute Ladies Tresses (*Spiranthes diluvialis*)

2003 Wild Horse Wind Development Project, Kittitas County, Washington.
Species: Tall agoseris (*Agoseris elata*), Pasque flower (*Anemone nuttalliana*), Palouse milk-vetch (*Astragalus arrectus*), Columbia milk-vetch (*Astragalus columbianus*), Pauper milk-vetch (*Astragalus misellus* var. *pauper*), Dwarf evening-primrose (*Camissonia pygmaea*), Naked-stemmed evening primrose (*Camissonia scapoidea*), Bristle-flowered collomia (*Collomia macrocalyx*), Golden corydalis (*Corydalis aurea*), Beaked cryptantha (*Cryptantha rostellata*), Shining flatsedge (*Cyperus bipartitus*), Wenatchee larkspur (*Delphinium viridescens*), White eatonella (*Eatonella nivea*), Basalt daisy (*Erigeron basalticus*), Piper's daisy (*Erigeron piperianus*), Sagebrush stickseed (*Hackelia hispida* var. *disjuncta*), Longsepal globemallow (*Iliamna longisepala*), Hoover's desert-parsley (*Lomatium tuberosum*), Suksdorf's monkey-flower (*Mimulus suksdorfii*), Coyote tobacco (*Nicotiana attenuata*), Cespitose evening-primrose (*Oenothera cespitosa* ssp.*cespitosa*), Hedgehog cactus (*Pediocactus simpsonii* var. *robustior*), Brewer's cliff-brake (*Pellaea breweri*), Fuzzytongue penstemon (*Penstemon eriantherus* var.*whitedii*), Least phacelia (*Phacelia minutissima*), Sticky goldenweed (*Pyrrocoma hirta* var. *sonchifolia*), Seely's silene (*Silene seelyi*), Ute ladies'-tresses (*Spiranthes diluvialis*), and Hoover's tauschia (*Tauschia hooveri*).

2002 Crystal Canyon Pipeline Project, Laramie County, Wyoming
Species: Ute Ladies Tresses (*Spiranthes diluvialis*) and Colorado butterfly plant (*Gaura neomexicana* ssp. *coloradensis*)

2002 Harriman Road Interchange, Interstate 80, Laramie County, Wyoming
Species: Ute Ladies Tresses (*Spiranthes diluvialis*) and Colorado butterfly plant (*Gaura neomexicana* ssp. *coloradensis*)

2002 Dubois - Moran Junction Highway Reconstruction project, Fremont County, Wyo.
Species: Pink agoseris (*Agoseris lackschewitzii*), Teton wire-lettuce (*Stephanoneria fluminea*).

2001 Unnamed tributary to Lone Tree Creek, Albany County, Wyoming, Prestridge Stock Reservoir Project
Species: Ute Ladies Tresses (*Spiranthes diluvialis*) and Colorado butterfly plant (*Gaura neomexicana* ssp. *coloradensis*)

2001 South Fork of Crow Creek, Laramie County, Wyoming, City of Cheyenne Diversion Dam Rehabilitation Project
Species: Ute Ladies Tresses (*Spiranthes diluvialis*) and Colorado butterfly plant (*Gaura neomexicana* ssp. *coloradensis*)

2001 City of Cheyenne water line crossing of the South Fork of Crow Creek
Species: Ute Ladies Tresses (*Spiranthes diluvialis*) and Colorado butterfly plant (*Gaura neomexicana* ssp. *coloradensis*)

2000 & 2001 Seminoe Dam Road improvement project, Carbon County, Wyo.
Species: blowout penstemon (*Penstemon haydenii*)

2000 22 abandoned bentonite mines, Crook and Weston counties, Wyo.
Species: water-thread pondweed (*Potamogeton diversifolius*), slender bulrush (*Scirpus heterochaetus*), matted broom-spurge (*Euphorbia serpens*), spring forget-me-not (*Myosotis verna*), small-flowered flame-flower (*Talinum parviflorum*), prairie three-awn (*Aristida oligantha*), roundleaf water-hyssop (*Bacopa rotundifolia*), Texas spreading loeflingia (*Loeflingia squarrosa* var. *texana*)

2000 Sand mining operation, BP Amoco Soda Lake Remediation site, Casper, Wyo.
Species: blowout penstemon (*Penstemon haydenii*)

1999 Snow Sail project, Teton County, Wyoming
Species: Soft aster (*Aster mollis*), Boreal draba (*Draba borealis*), Narrowleaf goldenweed *(Haplopappus macronema* var. *linearis)*, Payson's bladderpod *(Lesquerella paysonii)*

1999 Haul Road construction project, Hanna, Wyoming

Species: bun milk-vetch (*Astragalus simplicifolius*), bedstraw milkweed (*Asclepias subverticillata*)

1998 Sinks Canyon Highway Reconstruction Project, Fremont County, Wyo.
Species: Fremont bladderpod (*Lesquerella fremontii*), Beaver Rim phlox (*Phlox pungens*), Rocky Mountain twinpod (*Physaria saximontana* var *saximontana*), Barneby's clover (*Trifolium barnebyi*)

1998 Dubois - Moran Junction Highway Reconstruction project, Fremont County, Wyo.
Species: Wyoming Tansymustard *(Descurainia torulosa)*, Sweet-flowered Rock Jasmine *(Androsace chamaejasme)*, Upward-lobe Moonwort *(Botrychium ascendens)*, Seaside Sedge (*Carex incurviformis*), Narrowleaf Goldenweed (*Haplopappus macronema*)

1997 Proposed campground site, Bighorn National Forest, Wyo.
Species: limestone columbine *(Aquilegia jonsii)*, northern arnica *(Arnica lonchophylla)*, soft aster *(Aster mollis)*, balsamroot *(Balsamorhiza X tomentosa)*, moonwort *(Botrychium lunaria)*, livid sedge *(Carex livida)*, northern single-spike sedge *(Carex scirpoidea)*, conimitella *(Conimetella williamsii)*, Williams waterparsnip *(Cymopterus williamsii)*, yellow ladyslipper *(Cypripedium calceolus)*, mountain ladyslipper *(Cypripedium montanum)*, giant helleborine *(Epipactis gigantea)*, rough fescue *(Festuca hallii)*, broad-leaved twayblade *(Listera convallaroides)*, marsh muhly *(Muhlenbergia glomerata)*, Kotzebue's grass of parnassus *(Parnasia kotzebuei)*, mountain lousewort *(Pedicularis pulchella)*, Cary beardtongue *(Penstemon caryii)*, Pacific bluegrass *(Poa gracillima)*, greenland primrose *(Primula egaliksensis)*, nagoonberry *(Rubus acaulis)*, Hapeman's saxifrage *(Sullivantea hapmanii)*

1997 Three abandoned uranium mines, Gas Hills in Fremont County, Wyo.
Species: cedar rim thistle (*Cirsium aridum*), contracted Indian ricegrass (*Oryzopsis contracta*), Payson beardtongue (*Penstemon paysoniorum*), bun milk-vetch (*Astragalus simplicifolius*), Nelson's milkvetch (*Astragalus nelsonianus* a.k.a. *Astragalus pectinatus* var. *platyphyllus*)

1995 Five abandoned uranium mines, Gas Hills in Fremont County, Wyo.
Species: cedar rim thistle (*Cirsium aridum*), contracted Indian ricegrass (*Oryzopsis contracta*), Beaver Rim phlox (*Phlox pungens*), meadow pussytoes (*Antennaria arcuata*), Payson beardtongue (*Penstemon paysoniorum*), wild yellowcress (*Rorippa truncata*), Brandegee's Jacob's-ladder (*Polemonium brandegei*), swamp willow-herb (*Epilobium palustre* var *palustre*), bun milk-vetch (*Astragalus simplicifolius*), Nelson's milkvetch (*Astragalus nelsonianus* a.k.a. *Astragalus pectinatus* var. *platyphyllus*)

1995 One abandoned bentonite mine, Crook County, Wyo.
Species: Texas spreading loeflingia (*Loeflingia squarrosa* var. *texana*)

1995 Proposed Tribal Casino, Klamath Basin, Oregon

Species: Applegate's milk-vetch (*Astragalus applegatei*), Pumice grape-fern (*Botrychium pumicola*), long-bearded mariposa-lily (*Calochortus longebarbatus* var. *longebarbatus*), pygmy monkeyflower (*Mimulus pygmaeus*), red-root yampah (*Perideridia erythrorhiza*), Columbia cress (*Rorippa columbiae*)

1995 Two proposed reservoir sites, Park County, Wyo.
Species: sand dropseed (*Sporobolus cryptandrus*), persistant sepal yellowcress (*Rorippa calycina*)

1994 Five abandoned coal mine sites near Hanna, Wyo.
Species: bun milk-vetch (*Astragalus simplicifolius*), bedstraw milkweed (*Asclepias subverticillata*

United States Department of the Interior
U.S. FISH AND WILDLIFE SERVICE
Ecological Services
Carlsbad Fish and Wildlife Office
2177 Salk Avenue, Suite 250
Carlsbad, California 92008

In Reply Refer To:
FWS-ERIV-12B0378-19F0134

April 12, 2019
Sent by Email

Memorandum

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

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

Subject: Section 7 Biological Opinion on the Desert Quartzite Solar Project, Riverside County, California

This memorandum transmits the U.S. Fish and Wildlife Service's (Service) biological opinion regarding the construction, operation, maintenance, and decommissioning of the proposed Desert Quartzite Solar Project (Project) in Riverside County, California, and its effects on the federally threatened Mojave population segment of desert tortoise (*Gopherus agassizii*) in accordance with section 7 of the Endangered Species Act of 1973 (Act), as amended (16 U.S.C. 1531 *et seq*.). Designated critical habitat for desert tortoise does not occur in the action area. Your request for formal consultation dated October 25, 2018, was also received on October 25, 2018. First Solar is the non-Federal applicant for a Bureau of Land Management (BLM) right-of-way (ROW) authorization for the Project.

Your agency has determined the Project may affect, but is not likely to adversely affect Yuma Ridgway's rail (*Rallus obsoletus yumanensis* [formally known as Yuma clapper rail, *Rallus longirostris yumanensis]*), southwestern willow flycatcher (*Empidonax traillii extimus*), least Bell's vireo (*Vireo bellii pusillus*) and the western distinct population segment (DPS) of the yellow-billed cuckoo (*Coccyzus americanus*).

We do not anticipate adverse impacts to these species breeding activities with implementation of the Project since individuals will be migrating through the action area between their wintering and breeding areas. These species do not breed or winter within the Project area because suitable breeding habitat is not present. Therefore, adverse effects would result from collision with Project features such as solar panels, power lines, and fences. Based on the limited number of mortalities found at other utility-scale solar facilities in the Mojave Desert, collision effects at a single project would be unlikely to occur or would be considered a discountable effect. The information we have available to date indicates that individuals of listed birds have indeed died as a result of interactions with solar facilities. However, when we attempted to evaluate the risk of collision at specific renewable energy projects, we determined the risk to individual birds was unquantifiably low and therefore discountable when considered at a project level. However, the documented patterns of mortality to Yuma Ridgway's rail and willow flycatcher (subspecies undetermined) from energy infrastructure in the California desert (Service 2013-2015, unpubl. data), and the additive risk of multiple hazards posed by energy-related infrastructure development on a California Desert Conservation Area (CDCA) Plan level, are not discountable and should be addressed at a programmatic scale in a way that provides consistency across different projects. As a result, the Service and BLM committed to work together to develop options that provide better project-by-project consistency in monitoring bird mortalities, including incidental take of listed birds, and can be applied under the CDCA Plan and the Act (Service 2017b).

Until a programmatic approach is developed, we will continue to evaluate this risk on a case-by-case basis and to provide site-specific recommendations to avoid adverse effects to avian species. Based on the information that is available to us at this time, we concur with your determination that the Project is not likely to adversely affect Yuma Ridgway's rail, least Bell's vireo, southwestern willow flycatcher, or the yellow-billed cuckoo. Designated critical habitat for these species does not occur in the Project area; therefore, no effects to designated critical habitat are anticipated.

This biological opinion is based on information provided in the following documents and communications that follow: (1) the Bureau of Land Management (BLM) Draft Plan Amendment/Environmental Impact Statement/Environmental Impact Report for the Desert Quartzite Solar Project (BLM 2018, hereinafter draft EIS/EIR); (2) the Draft Biological Assessment for the Desert Quartzite Solar Project (West 2018, hereinafter BA); (3) the Biological Resources Technical Report, Desert Quartzite Solar Project (Ironwood 2014, hereinafter BRTR), (4) written, telephone, and electronic mail correspondence received during the consultation time period; and (5) pertinent literature contained in our files. The project file for this consultation is located at the Carlsbad Fish and Wildlife Office.

Consultation History

Between May 2012 and January 2019, staff from the Palm Springs Fish and Wildlife Office (PSFWO) worked with the BLM, First Solar, and staff from the California Department of Fish and Wildlife (CDFW) to clarify the Project Description, Project build-out scenarios, effects to desert tortoise, effects to listed birds, and avoidance and minimization measures. Efforts to clarify these issues included conducting site visits and meetings, assessing baseline conditions, and providing comments on the draft BA.

BIOLOGICAL OPINION

DESCRIPTION OF THE PROPOSED ACTION

The information below provides a summary of the proposed action. Refer to the BA and draft EIS/EIR for a more detailed description of Project activities.

The proposed action is the BLM's issuance of a ROW grant that will authorize First Solar (Applicant) to construct, operate, maintain, and decommission a 450 megawatt solar photovoltaic (PV) facility and construct 3.94 miles (mi) of a 230-kilovolt (kV) electrical transmission line (generation interconnection or gen-tie) that would occupy a land area of 2,831 acres (ac) (Table 1, Figure 1), including 2,671 ac on BLM land and 160 ac on private land. This action is referred to as the Resource Avoidance Alternative in the draft EIS/EIR. The gen-tie line location was realigned after the draft EIS/EIR was published to resolve a potential conflict with the proposed Ten West Link Transmission Line alignment. The realignment resulted in a reduction in the length of the gen-tie from 4.18 mi to 3.94 mi.

The initial Project application was filed before June 30, 2009, prior to the adoption of the Solar Programmatic Environmental Impact Statement for Solar Energy Development in Six Southwestern States (Western Solar Plan) in 2013 or the Desert Renewable Energy Conservation Plan (DRECP) land use plan amendment in 2016. Therefore, this Project is being processed under the CDCA land use plan decisions in place prior to the adoption of the Western Solar Plan or DRECP land use plan amendment. As such, in addition to the decision on the ROW application, the BLM is also considering associated amendments to the CDCA Plan to accommodate the proposed action. The plan amendment decisions considered are:

1. The CDCA Plan would be amended to identify the Project's development footprint as suitable for the proposed type of solar energy use.

2. The CDCA Plan would be amended to authorize a portion of the gen-tie corridor that is located outside of BLM's Utility Corridor K and Section 368 Federal Energy Corridor 30-52.

The Project is located in Riverside County south of Interstate 10 (I-10) approximately 25 mi west of the City of Blythe. Surrounding features include the Mule Mountains to the west, agricultural lands to the east, a small (200 ac) solar PV facility to the north and open space to the south. The Project site is bounded on its northern, southwestern, and southeastern sides by existing linear infrastructure, including transmission lines, pipelines, communications lines, and access roads.

Table 1: Project Feature Vegetation Acreage Impacts (From Table 1 in the BA [West 2018] as revised by First Solar based on a new gen-tie alignment in April 2019).

Project Related Facilities	Size or Number of Components	Desert wash woodland (ac)	Sonoran creosote bush scrub (ac)	Stabilized sand dune (ac)	Total Acres
Facilities Inside Perimeter Fence and Post-Construction ROW					
Solar Facility Inside Perimeter Fence	17.8 miles of security fence	0	2,694.36	3.64	***2,698***
Facilities Outside Perimeter Fence and Post-Construction ROW					
Gen-Tie Access Road	3.94 miles long by 140 feet wide	0	35.96	30.85	*66.81*
Communication Line	1.2 miles long by 20 feet wide	0.48	2.51	0.63	*3.62*
Subtotal		***0.48***	***38.47***	***31.48***	***70.43***
Facilities Outside Perimeter Fence, Temporary ROW for Construction					
Temporary Construction Staging Areas	2	0	37	0	*37*
Primary External Access Road	30' wide x 2,400 linear feet	0.57	0.70	0.36	*1.63*
Secondary External Access Road	20' wide x 12,099 linear feet	0	2.92	0	*2.92*
Gen-Tie Structure Sites	31, at 200' x 200' maximum	0	8.26	5.97	*14.23*
Gen-Tie Spur Roads	20' wide, aggregate total of 2,058 linear feet	0	0.17	0.30	*0.47*
Gen-Tie Pulling Sites	8, at 100' x 400'	0	1.84	1.84	*3.68*
Temporary Office Trailer Associated w/Gen-Tie Construction	1, at 200' x 200'	0	0.46	0	*0.46*
Laydown Area Associated w/Gen-Tie Construction	1, at 400' x 400'	0	0.86	0.98	*1.84*
Subtotal		***0.57***	***52.21***	***9.45***	***62.23***
Total Project Area		**1.05**	**2,785**	**44.57**	**2,831**

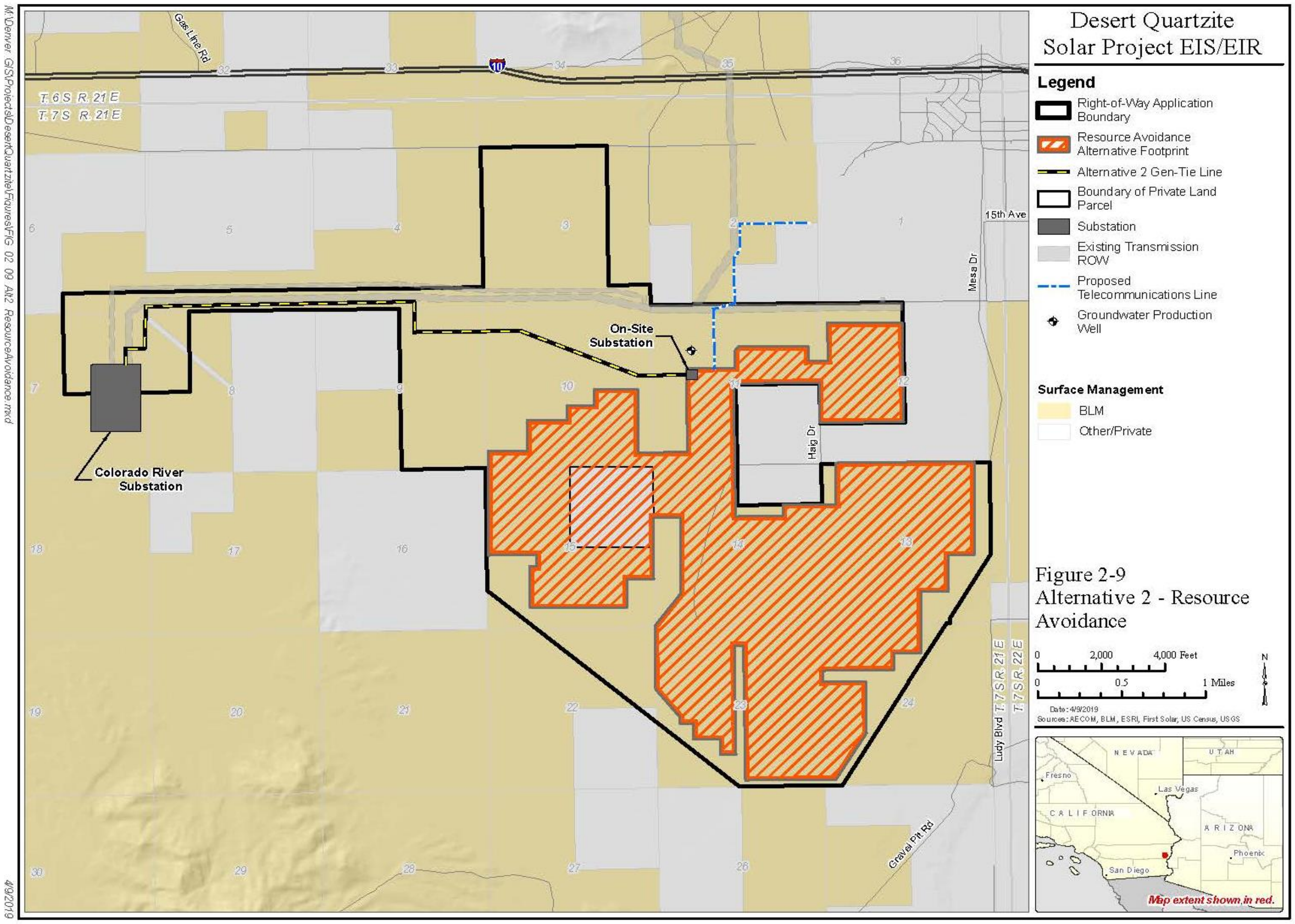

Figure 1. Desert Quartzite Solar Project (from draft EIS/EIR, Figure 2-9).

The Project is expected to be constructed over a 25- to 48-month period, beginning in late 2019. The Project will occur over several phases, including pre-construction, construction, operations and maintenance, and decommissioning. After the preconstruction surveys, construction mobilization, and site preparation are completed, construction of the solar facility and gen-tie line will begin. During Project construction, the workforce is expected to average approximately 450 employees over the 25- to 48-month construction period, with a peak workforce of approximately 810 employees. Commercial operation is anticipated to begin in mid-2022.

<u>Pre-construction</u>

Pre-construction activities will include installation of desert tortoise exclusionary fencing and conducting pre-construction clearance surveys for desert tortoise and other sensitive species; clearing and grading of access roads, construction laydown, and parking areas; and setting up offices and site services. Desert tortoise exclusionary fencing and pre-construction clearance surveys will meet the standards established by the Service in the Desert Tortoise Field Manual (Service 2009). Pre-construction activities will also include relocation of any desert tortoises discovered in the Project boundary using procedures that will be outlined in the Desert Tortoise Translocation Plan (Translocation Plan). Details concerning the translocation of tortoises from the Project site will be provided in the Translocation Plan.

Construction

The solar facility (i.e., all facilities inside of the perimeter fence) would consist of construction of multiple blocks of solar PV panels mounted on fixed tilt or tracking systems and associated equipment, a project substation, an energy storage system, and a facilities building. A permanent perimeter fence with desert tortoise exclusion fencing will be constructed around the solar facility, which will occupy an area of approximately 2,698 ac (Table 1). Other onsite features include construction of meteorological stations, anemometer towers, and a guard shack.

Infrastructure outside of the solar facility perimeter fence (offsite facilities) include the construction of a 3.94-mile 230 kV gen-tie line, access roads, spur roads, pull sites, and laydown areas. Interconnection to the California Independent System Operator Grid will be via the Southern California Edison (SCE) operated transmission system at the Colorado River Substation.

Surface vegetation will be removed from portions of the 2,831-ac Project boundary in a staged fashion so that vegetation would not be removed until the onset of a given construction phase. Within the solar facility, vegetation would be mowed or disked under, mulched or composted, and retained to assist in erosion control and limit waste disposal. In some areas, native vegetation may be harvested for replanting to augment soil stabilization. Plant root systems would be left in place to provide soil stability except where grading and trenching are required for placement of solar module foundations, underground electric lines, inverter and transformer pads, road and access ways, and other facilities or as otherwise required to establish surface topography for drainage. To prevent impacting sensitive vegetation resources, the vegetation clearance will be conducted in accordance with procedures outlined in the Project's Vegetation Resource Management Plan, which will be developed in coordination with the BLM per conservation measure 12 below. This plan will provide guidelines for mitigating impacts to rare plants and other sensitive vegetation resources.

Graded, graveled, all-weather roads will be required in selected locations on the Project site during construction to bring equipment and materials from the staging areas to the construction work areas. These roads, which include approximately 1.2 mi of solar facility access roads that would be stabilized with gravel and approximately 112.9 mi of solar facility access roads that would be compacted native soil material, will be maintained for the 30-year life of the Project. All-weather access roads will also be installed outside of perimeter fencing for secondary access and 100-foot (ft) long spur roads will be installed off 16th Avenue to access the Project's gen-tie poles. Improvements to 16th Avenue may be required to preserve existing uses of the road. For a more detailed project description, refer to the BA (West 2018).

Operations and Maintenance

Following completion of Project construction, operation and maintenance (O&M) of the solar facilities and associated gen-tie line will commence and is anticipated to continue for the 30-year life of the project. Within the fenced area, project O&M activities will generally include road maintenance; vegetation restoration and management; scheduled maintenance of inverters, transformers, and other electrical equipment; and occasional replacement of faulty modules or other site electrical equipment. The access roads will be regularly inspected, and any degradation due to weather or wear and tear will be repaired. The desert tortoise exclusionary fencing located at the base of or outside the Project's perimeter fence will be regularly inspected (see below for a description of inspections), and any compromised areas of the fence will be repaired within 48 hours of discovery. Dust palliatives will be applied on dirt access roads as necessary once every 2 to 5 years. Washing of solar panels is expected to occur up to twice per year over the planned 30-year operation of the Project. Panel damage can generally be detected remotely and repaired as needed. If damaged modules are discovered during panel washing, they will be replaced as needed as well.

Five full-time workers, including O&M and security personnel, would staff the Project during its O&M phase. Staff would access the Project site from I-10 to Route 78 south via Exit 236, and then west on 16th Avenue/Seeley Avenue to the site access gate. These staff would account for up to five round trips per day. Up to 10 deliveries per day are expected during the O&M phase.

Outside of the fenced area, O&M activities will be conducted within the 140-ft gen-tie ROW. Routine activities associated with the gen-tie line and access road will include repair or replacement of equipment damaged by wind, dust, or accident; access road grading and repairs to drainage structures to maintain a drivable surface; and repair of the perimeter security fence and desert tortoise exclusion fence. These activities are expected to occur throughout the year, as needed. O&M activities will be performed using existing Project roads.

Decommissioning

The planned operational life of the proposed Project is 30 years. BLM requires that a Decommissioning and Reclamation Plan be prepared and put into effect when permanent closure of the facility occurs. BLM will review and approve the Decommissioning and Reclamation Plan prior to the permanent closure and decommissioning of the facility. The procedures provided in the Decommissioning Plan would be developed to ensure compliance with applicable laws and regulations, and to ensure public health, safety, and protection of the environment. The Decommissioning Plan would be submitted to the BLM for review and approval prior to a planned closure. When the BLM begins to consider decommissioning, they would contact the Service to determine if additional consultation, pursuant to section 7(a)(2) of the Act, would be appropriate. Consequently, we will not analyze the potential effects of decommissioning on the desert tortoise in this biological opinion.

Desert Tortoise Translocation
The Applicant will develop a final Translocation Plan that requires approval by the Service and CDFW prior to the initiation of any ground-disturbing construction activities. The Translocation Plan will incorporate the Service's draft desert tortoise translocation guidance (Service 2017c), as appropriate for the Project, and will include detailed descriptions of how and where tortoises found on the Project site and along the security fence and gen-tie lines will be translocated. The Translocation Plan will include maps identifying the recipient sites, a description of how disease prevalence of resident tortoises at the recipient sites will be documented, and how translocated tortoises will be monitored.

A translocated tortoise is defined as any desert tortoise that has been moved more than 984 ft from a project's action area to an offsite recipient site. Tortoises that are repositioned a few feet out of immediate harm's way are not considered translocated (Service 2017c). If translocation is necessary, health assessments must be performed on desert tortoises in the recipient populations, according to the most recent protocols, prior to translocating tortoise into these areas (see health assessment protocols, Service 2017c or most recent version available). Additional health assessments of the recipient and control tortoises (if warranted), not including collection of biological samples if previously collected within 1 year, should occur during the same season as the translocation. These initial health assessments will serve as the baseline condition to compare post-translocation assessments.

Conservation Measures (CM)
The Project includes conservation measures that will be implemented to avoid, minimize, and offset potential adverse effects to the desert tortoise. These measures were developed in coordination with the BLM, CDFW, and Applicant and will be implemented by the BLM and Applicant as part of the proposed action.

CM 1. BLM Environmental Compliance Manager: The BLM Environmental Compliance Manager (ECM) will oversee the implementation of all Project desert tortoise conservation measures, work directly with the Authorized Biologist, and retain the authority to halt any site mobilization, ground disturbance, grading, boring, trenching and operation activity that is in violation of the conservation measures, or if a desert tortoise wanders into a work site area. The ECM will be responsible for facilitating implementation of the environmental conditions of the Project plans and approvals and for coordinating compliance with the Service, where required.

CM 2. Authorized Biologist Qualifications: The Project Applicant will assign at least one desert tortoise Authorized Biologist(s) to the Project. The Applicant will submit a résumé for each proposed Authorized Biologist, with at least three references and contact information, to the BLM authorized officer for confirmation that applicant meets the minimum qualifications. The Authorized Biologist(s) must meet the following minimum qualifications:

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

b. Thorough and current knowledge of desert tortoise behavior, natural history, ecology, and physiology, and demonstrate substantial field experience and training to safely and successfully conduct their required duties.

c. Three years of experience in field biology.

d. Have at least 1 year of field experience with biological resources found in or near the Project area.

e. Meet the Service's current Authorized Biologist qualifications criteria (Service 2009), demonstrate familiarity with protocols and guidelines for the desert tortoise, and be approved by the Service.

f. Possess a California Endangered Species Act (CESA) Memorandum of Understanding pursuant to California Fish and Game Code §2081(a) for desert tortoise.

CM 3. Authorized Biologist Responsibilities: Authorized Biologists for the Project will be responsible for knowing the latest information on Service protocols and guidelines for the desert tortoise and have the knowledge and experience to conduct all of the activities listed in section 3.1 of the Service's Desert Tortoise Field Manual (Service 2009). The Authorized Biologist will meet Service qualification requirements and will ensure proper implementation of conservation measures outlined in this biological opinion. If any desert tortoise is to be captured, relocated, or otherwise handled, the Project Applicant will submit the names and qualifications of proposed Authorized Biologists to the Service, CDFW, and BLM for review no less than 30 days prior to the beginning of any ground-disturbing activities implemented during any phase of the Project. Replacement Authorized Biologists will also require agency approval. Authorized Biologists will also serve as mentors to train Desert Tortoise Monitors and should approve Monitors to conduct specific activities based on the Monitor's demonstrated skills, knowledge, and qualifications. Direct supervision is always required for field and clearance surveys; direct supervision means that the Authorized Biologist has direct voice and sight contact with the Desert Tortoise Monitor. An Authorized Biologist is responsible for the outcome of all desert tortoise related activities for which the project is approved, including errors committed by Desert Tortoise Monitors. Authorized Biologists must also be able to perform the following duties:

a. Perform a basic assessment of the physical condition of desert tortoises (e.g., identify basic clinical signs of potential upper respiratory tract disease).

b. Maintain approved biosecurity protocols when working with desert tortoises, avoid cross-contamination of supplies and of desert tortoise individuals, and disinfect all sampling gear.

c. Move desert tortoises away from situations where they are in danger of injury or death.

d. Translocate desert tortoises prior to implementation of a project.
e. Successfully rehydrate desert tortoises, if necessary.

The Authorized Biologist(s) will submit a completed copy of the Desert Tortoise Authorized Biologist Qualifications Form to the BLM ECM for review no less than 30 days prior to the beginning of any activity that could cause take of a desert tortoise in accordance with Section 7(o)(2) of the Act. A copy of the form can be found in section 3.1 of the Service's (2009) Desert Tortoise Field Manual, available on the Internet at *https://www.fws.gov/nevada/desert_tortoise/documents/field_manual/Desert-Tortoise-Field-Manual.pdf*.

The Project Applicant will ensure that an Authorized Biologist and Desert Tortoise Monitors, if necessary, will be on site during all Project construction, decommissioning, and other Project activities that could result in take of a desert tortoise. The Authorized Biologist and Desert Tortoise Monitors will have the authority to halt any site mobilization, ground disturbance, grading, boring, trenching, and operation activity that is in violation of the conservation measures or Project minimization measures, or if a desert tortoise wanders into a work site area. If a tortoise enters an active work area, it will be given up to 30 minutes to move on their own accord, at which point the Authorized Biologist will move the animal from harm's way in a manner consistent with handling guidelines (Service 2009) and the approved project Desert Tortoise Translocation Plan. If the Authorized Biologist is unavailable for direct consultation, the Desert Tortoise Monitor will act on behalf of the Authorized Biologist. Work will proceed when the tortoise is out of harm's way.

The Authorized Biologist will document any incident occurring during Project activities that is in non-compliance with the conservation measures stated in this biological opinion. The Authorized Biologist and BLM ECM will ensure that actions are implemented by appropriate staff (e.g., Desert Tortoise Monitors) to correct any non-compliance issue. The Authorized Biologist or Desert Tortoise Monitor will document all corrective actions. The following incidents will require immediate cessation of the Project activities causing the incident:

a. Imminent threat of injury or death to a desert tortoise.

b. Unauthorized handling of a desert tortoise, regardless of intent.

c. Operation of construction equipment or vehicles outside of areas secured with desert tortoise fencing without a Desert Tortoise Monitor present, except on designated roads.

d. Conducting any construction activity without an Authorized Biologist or Desert Tortoise Monitor present where one is required.

CM 4. Desert Tortoise Monitor Responsibilities: Desert Tortoise Monitor(s) designated for the Project will have a solid understanding of the conservation measures in this biological opinion and Service guidelines on desert tortoise surveys and handling procedures. Desert Tortoise Monitors will assist the Authorized Biologist in conducting surveys and in monitoring site construction mobilization activities, construction related ground disturbance, grading, boring or trenching as necessary. Monitors assist Authorized Biologists during surveys and serve as apprentices to acquire experience. Monitors may not conduct field or clearance surveys or other specialized duties of the Authorized Biologist unless directly supervised by an Authorized Biologist; "directly supervised" means the Authorized Biologist has direct voice and sight contact with the Monitor.

CM 5. Desert Tortoise Translocation Plan: Before the BLM issues a Notice to Proceed, the Project Applicant will develop a final Mojave Desert Tortoise Translocation Plan (Translocation Plan) that follows the Service's most recent translocation guidance and requires approval by the BLM, Service, and CDFW. The Translocation Plan is a document that provides specific details of the proposed translocations and post-translocation monitoring, per the Service's Translocation of Mojave Desert Tortoises from Project Sites: Plan Development Guidance (Service 2017c).

CM 6. Desert Tortoise Exclusionary Fencing: In areas where protocol and clearance surveys are required, prior to construction or commencement of any long-term activity that is likely to adversely affect desert tortoises, desert tortoise exclusion fencing will be installed around the perimeter of the Project's activity footprint, excluding the gen-tie line, in accordance with the Desert Tortoise Field Manual (Service 2009) or most up-to-date Service protocol. Temporary exclusionary fencing may be installed for specific construction activities that do not require permanent desert tortoise exclusion. During fence construction and for a minimum of 1 year after the fence is completely installed, the Authorized Biologist or Desert Tortoise Monitor will monitor the fence perimeter to ensure desert tortoise are not stranded along the fence. Monitoring of the fence line will be conducted when temperatures reach and exceed 95 degrees Fahrenheit.

The exclusionary fence will incorporate shade structures spaced at a minimum 1,000 ft apart. Shade structures will be built with polyvinyl chloride (PVC) pipe or other material durable enough to last for the life of the project. Cardboard concrete forms should not be used. Each shade structure will consist of a 6-ft length piece of 12-inch (in) pipe split down the middle covered with 3-4 in of soil and rocks to insulate the interior of the structure. Shade structures will be checked after each rainfall to ensure they are clear of debris and functional.

The main and emergency entrances to the Project will be fitted with a cattle guard, gate, or other appropriate device to prevent the entry of tortoises. The cattle guards will be positioned at the perimeter, such that they are connected to the tortoise exclusion fence, to ensure that there are no gaps that would allow access to the facility by tortoises. The fence installation will be monitored by the Authorized Biologist or Desert Tortoise Monitor, under supervision from the Authorized Biologist, who will ensure stipulations provided in the Service's (2009, Chapter 8) guidance for tortoise exclusionary fencing are met. Throughout the construction phase, the tortoise exclusionary fence will be checked regularly and immediately after major rainfall events to ensure its integrity. Repairs will be made within 48 hours of discovery to prevent a tortoise from entering the site. If a tortoise is encountered along the inside or outside of the fence, protocols outlined in the approved Translocation Plan will be followed. Shade structures will be placed at regular intervals along the inside and outside of the tortoise fencing to provide shelter for tortoises that encounter the fence. Shelters on the inside of the fence will be removed after clearance surveys are performed.

CM 7. Desert Tortoise Clearance Survey: After the pre-construction survey has been completed and following installation of exclusionary fencing, the Project applicant will ensure that clearance surveys for tortoises are conducted within the perimeter of the exclusionary fence by the Authorized Biologist and Desert Tortoise Monitors under their supervision. The surveys will be conducted in accordance with stipulations in the Service's (2009, Chapter 6) guidance, which include conducting pedestrian belt transects at a maximum of 16-ft spacing, using tighter spacing in areas of dense vegetation, and conducting at least two consecutive perpendicular passes without finding a large desert tortoise (greater than 180 millimeter [mm] midline carapace length [MCL]) or new active sign, at which time the area is considered cleared and construction may commence. If any tortoises are found during the clearance survey, the Authorized Biologist will translocate the tortoise in accordance with the Translocation Plan.

CM 8. Monitoring of Project Activities in Unfenced Areas: To avoid or minimize the potential for take of desert tortoises along the gen-tie line or any other Project elements that are unfenced, the Project applicant will ensure that the Authorized Biologist or Desert Tortoise Monitors under their supervision perform daily monitoring of Project activities that involve the use of heavy equipment or vehicles during construction and O&M phases of the Project. This will include monitoring of the installation of the permanent tortoise exclusionary fence. For any Project activity that occurs outside of the exclusionary fence, the following measures will be implemented:

a. No more than 30 days prior to the planned activity, the Project applicant will ensure that a desert tortoise survey be conducted in the work area and all signs of desert tortoise mapped.

b. Desert Tortoise Monitors will be onsite during construction and O&M activities to ensure that tortoises and tortoise burrows outside of the exclusionary fence are avoided.

c. Vehicles parked in desert tortoise habitat will be inspected immediately prior to being moved. If a tortoise is found beneath a vehicle, it will be given up to 30 minutes to move of its own accord. If it does not, the Authorized Biologist will move the animal from harm's way following the handling guidelines outlined in the Service's Desert Tortoise Field Manual (2009).

d. Identified desert tortoise burrows that cannot be avoided in work areas will be excavated prior to initiating construction activities. The burrow excavation will be performed by the Authorized Biologist using hand tools to determine if it is occupied by a tortoise or contains eggs. Burrows of other species will also be inspected and if the Authorized Biologist determines it could hide a tortoise, it will be excavated.

CM 9. Worker Environmental Awareness Program: All personnel involved with any phase of the Project will receive Worker Environmental Awareness Program training prior to initiation of activities. This training will be presented so that all personnel have an equal opportunity to understand all written and spoken material. The Worker Environmental Awareness Program will cover the entire project area, for all phases of the project, for the life of the project and must meet the approval of the BLM, Service, and CDFW prior to being implemented. The program will include information concerning:

a. The biology and ecology of special-status species (including but not limited to desert tortoise, Mojave fringe-toed lizard, endangered or threatened birds, migratory birds, and other special status species).

b. Desert tortoise conservation measures and legal protections.

c. The definition of "take" and associated penalties.

d. Information on the legal protections for protected resources and the penalties for violation of Federal and State laws for non-compliance.

e. Specific conservation measures for avoiding and minimizing effects during all project phases, including but not limited to resources buffers, waste management, speed limits, etc.

f. Reporting requirements and measures to follow if protected resources are encountered, including potential work stoppage and requirement for notification of the Authorized Biologist.

g. Reporting procedures to be implemented in case of encounters with desert tortoise and other special status species, or non-compliance with project-related stipulations.

h. The biology and distribution of common ravens, how their populations have increased significantly due to human subsidies, how their predation has affected desert tortoise populations, and measures to reduce human subsidies during Project activities.

i. Other potential subsidized predators and avian scavengers.

j. Project-specific measures pertaining to discouraging raven presence.

k. Responsibilities of workers and biologists.

l. Reporting procedures to be implemented for documenting raven and other subsidized predator occurrences, including nest locations, instances of scavenging of roadkill or other animal carcasses in the Project site and immediate vicinity, or non-compliance with Project-related stipulations.

m. Identification of common weeds and measures to prevent the spread of invasive weeds.

CM 10. Raven Management Plan: The Project applicant will develop and implement a Raven Management Plan to address activities that may occur during the pre-construction, construction, and O&M phases of the Project that may attract common ravens (*Corvus corax*), a nuisance species that is a subsidized predator of desert tortoises and other sensitive species in the Project vicinity. The measures contained in the Raven Management Plan will be designed to:

a. Identify conditions associated with the Project that might provide raven subsidies or attractants.

b. Describe management practices to avoid or minimize conditions that might increase raven numbers and predatory activities.

c. Describe control practices for ravens.

d. Address monitoring during construction and for the life of the Project, and discuss reporting requirements.

The Project applicant will submit payment to the Project sub-account of the Renewable Energy Action Team (REAT) Account held by the National Fish and

Wildlife Foundation (NFWF) to support the Service's Regional Raven Management Program. The one-time fee will be as described in the cost allocation methodology or more current guidance as provided by the Service or CDFW. The contribution to the regional raven management plan will be $105 per acre impacted.

CM 11. Integrated Weed Management Plan: The Project applicant will develop and implement an Integrated Weed Management Plan that describes measures to prevent, mitigate, and control the establishment and spread of weeds during all phases of the Project. The Integrated Weed Management Plan will provide descriptions of the types and distribution of weeds in the Project area, assess risk of weed establishment and spread based on species occurrences and Project activities, and outline effective control measures and monitoring efforts to reduce their establishment and spread, which also will be described in the Worker Environmental Awareness Program.

CM 12. Vegetation Resources Management Plan: The Project applicant will develop and implement a Vegetation Resource Management Plan that provides guidance and describes protocols for the salvage, propagation, and transplantation of sensitive plant species during implementation of the Project. The Vegetation Resource Management Plan will include descriptions of sensitive plant species within the Project site; criteria for determining whether an individual plant is appropriate for salvage and transport to a local nursery or transplanted in an adjacent mitigation area identified by a qualified botanist; a description of the equipment and methods for salvage, propagation, transport, and planting; procedures for marking and flagging sensitive plants during preconstruction clearance surveys; requirements for storage and/or pre-planting; descriptions of proposed transplantation sites identified by a qualified botanist that is approved by the BLM; and guidance for monitoring, maintaining, and reporting the success of transplanted plants.

CM 13. Habitat Restoration Plan: The Project applicant will develop and implement a Habitat Restoration Plan that describes the baseline vegetation conditions on the Project, including natural vegetation communities, regulatory and biological considerations related to their restoration and revegetation, and methods to be implemented in restoring areas disturbed by Project activities. The Habitat Restoration Plan will provide guidance for mitigating Project impacts to vegetation resources and implementing a successful restoration program with the goal of returning areas disturbed by Project activities to pre-project conditions. The Habitat Restoration Plan will complement the Integrated Weed Management Plan and Vegetation Resource Management Plan, and will describe measures that will be implemented to restore native vegetation communities following disturbance by Project activities. The Project will avoid jurisdictional drainages as much as practicable and therefore no restoration of these areas likely will be required.

However, if drainages are to be impacted, construction and restoration will be in accordance with a Lake and Streambed Alteration agreement issued by CDFW. The success of the Habitat Restoration Plan will be achieved through consideration of and coordination with the Integrated Weed Management Plan and Vegetation Resource Management Plan, as success of the Habitat Restoration Plan will only be achieved by ensuring the natural vegetation communities being restored do not contain invasive, nonnative weeds and contain salvaged plants and propagules from special status plants.

CM 14. Offsite Desert Tortoise Habitat Acquisition Plan: To fully mitigate for habitat loss and potential take of desert tortoise in compliance with the California Endangered Species Act (CESA) of 1970, the Project applicant will provide compensatory mitigation at a 1:1 ratio for impacts to approximately 2,831 ac (final Project area) within the proposed project boundary. For the purposes of this measure, the Project area means all lands directly disturbed in the construction and operation of the Project, including all linear features, as well as undeveloped areas inside the Project's boundaries that will no longer provide viable long-term habitat for the desert tortoise.

To satisfy this measure, the Project Applicant will acquire, protect and transfer one acre of desert tortoise habitat for every acre of habitat within the final Project footprint, and provide associated funding for the acquired lands. In lieu of directly acquiring conservation lands, the Project Applicant may satisfy the requirements of this measure by depositing funds into the REAT Account established with the NFWF. The compensation lands selected for acquisition in fee title or in easement will be within the Chuckwalla Critical Habitat Unit or, if sufficient land is unavailable, in other locations within the Colorado Desert Recovery Unit. All acquired compensation lands must be located outside of a Development Focus Area as defined under the DRECP. Proposed conservation acquisitions must be approved by the BLM, Service, and CDFW.

Selection criteria for compensation lands include the following:

a. Located within the Colorado Desert Recovery Unit.

b. Located outside of a Development Focus Area near larger blocks of lands that are either already protected or planned for protection.

c. Connected to lands with Mojave desert tortoise habitat equal to or better quality than the Project site, ideally with populations that are stable, recovering, or likely to recover.

d. No history of intensive recreational use or other disturbance that might make habitat recovery and restoration infeasible.

e. Low densities of invasive species.

For additional criteria and details on criteria for compensation lands, see mitigation measure WIL-4 in the draft EIS/EIR.

CM 15. Biomonitoring of Construction, Operation, and Decommissioning Activities: The Project Applicant will develop and implement a Biological Resources Mitigation and Monitoring Plan that summarizes requirements for complying with measures, stipulations, and other Project requirements contained in the this biological opinion, the Project's EIS/EIR, Project plans, or other documents that pertain to avoiding, minimizing, or mitigating impacts to desert tortoises and other sensitive species during all phases of the Project. The Biological Resources Mitigation and Monitoring Plan will be reviewed and approved by the BLM, Service, and CDFW.

CM 16. Speed Limits and Traffic Regulations: Vehicular traffic during Project construction, O&M, and decommissioning shall be confined to existing designated routes of travel to and from the Project site; cross-country vehicle and equipment use outside designated work areas shall be prohibited. To minimize the likelihood for vehicle strikes of tortoises and other species during construction, a speed limit of 25 miles per hour (mph) will be established for travel on all Project access roads cleared by desert tortoise protocol surveys. Roads not cleared by protocol surveys will be limited to 15 mph. Signs will be posted at appropriate locations (e.g., at Arizona crossings of drainages or other likely crossing points) to remind drivers to be aware of the potential for desert tortoise and other wildlife moving across the roadways.

CM 17. Procedures for Avoiding Wildlife Pitfalls: The Project Applicant will ensure that trenches, bores, and other excavations outside of fenced areas shall be managed according to the following options: sloped at a 3:1 ratio at the ends or provided with escape ramps as wildlife exit points; covered completely to prevent wildlife access; or fully enclosed with desert tortoise exclusion fencing. An Authorized Biologist or Desert Tortoise Monitor will inspect all excavations that are not within desert tortoise exclusion fencing on a regular basis (several times per work day) and immediately prior to filling of the excavation. If project personnel discover a desert tortoise in an open trench, the Authorized Biologist will move it to a safe location as described in the Translocation Plan.

CM 18. Limit Disturbance Areas: The Project Applicant will confine all construction activities, project vehicles, and equipment within the delineated boundaries of construction areas that have been cleared of desert tortoises. The Project Applicant will confine all work areas to the smallest practical area, considering topography, placement of facilities, location of sensitive resources, public health and safety, and other limiting factors. The Project Applicant will use previously disturbed areas to the extent feasible. Existing roads will be used wherever possible to avoid unnecessary impacts. New and existing roads that are planned for either construction or widening will not extend beyond the planned impact area and will minimize surface disturbance in native habitats, where practical. Road construction and improvements will be in accordance with BLM, Riverside County Fire Department, and Riverside County Transportation Department standards.

CM 19. Procedures for Erosion Control: Standard erosion control measures will be implemented for all phases of the Project 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 cannot be washed back into the stream. All disturbed soils and roads within the Project site will be stabilized through the use of gravel, compaction, water, approved dust palliatives, or other approved methods to reduce erosion potential, both during and following construction. Areas of disturbed soils (access and staging areas) with slopes toward a drainage shall be stabilized to reduce erosion potential.

CM 20. Hazardous Material Management: 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 Project Applicant will design and implement the Project's Hazardous Materials Management Plan, detailing how hazardous spills will be immediately reported, cleaned up, and the contaminated soil properly disposed of at a licensed facility. Servicing of construction equipment will take place only at a designated area. Service and maintenance vehicles will carry a bucket, shovel, and pads to absorb leaks or spills.

CM 21. Trash Management: All garbage associated with all phases of the Project will be contained in wildlife-proof containers to prevent the introduction of food resources that could potentially attract or support ravens, coyotes, and other predators or scavengers. Secure, wildlife-proof self-closing waste bins will be used for all organic waste. To reduce the possibility of ravens or other scavengers from ripping into bags and exposing the garbage, plastic bags containing garbage will not be left out for pickup. All such waste material must be in secure waste bins or dumpsters at all times.

CM 22. Road-killed Animal Management and Desert Tortoise Injury and Mortality: The Project Applicant will dispose of any animal roadkill carcasses on the Project site and along access roads as encountered. Because predators are capable of locating and then excavating buried remains, roadkill carcasses will be deposited into predator-proof trash bins or by another secure method until proper disposal is undertaken.

a. All inadvertent deaths of special status species and desert tortoise will be reported to the appropriate Project representative, including road kill. If a desert tortoise is found as a road mortality, BLM, the Service, and CDFW will be notified verbally and in writing within 48 hours of discovery. Species name, physical characteristics of the animal (sex, age class, length, weight), and other pertinent information will be noted and reported. Injured animals will be reported to CDFW or the Service, and the Project Applicant will follow instructions that are provided by CDFW or the Service. If CDFW or the Service cannot be immediately reached, the animal should be taken to a veterinary hospital.

CM 23. Procedures for Water Application for Dust Control: The Project Applicant will ensure water is applied to the construction area, dirt roads, trenches, spoil piles, and other areas where ground disturbance has taken place to minimize dust emissions and topsoil erosion, and to ensure that water does not pool or pond for more than 20 minutes, reducing the potential to attract common ravens.

CM 24. Monitoring and Reporting Schedule: Encounters with desert tortoises will be immediately reported to an Authorized Biologist or Desert Tortoise Monitor. The Authorized Biologist will maintain a record of all desert tortoises encountered during construction and decommissioning activities. Information recorded for each desert tortoise will include the following: the location; date of observation; general condition of health and apparent injuries and state of healing; location of damaged area of fence; if moved, location moved from and location moved to and whether the desert tortoise voided its bladder; and diagnostic markings (i.e., identification numbers or marked lateral scutes).

a. The Project Applicant will provide monthly reports to the BLM, the Service, and CDFW throughout the construction and decommissioning phases that summarize the implementation of Project measures pertaining to desert tortoise management. The reports will be prepared by the Authorized Biologist.

b. The Project Applicant will provide annual reports to the BLM, the Service, and CDFW throughout the construction and decommissioning phases, and 1 calendar year following completion of construction and decommissioning, that summarize the implementation of Project measures pertaining to desert tortoise management. The reports will be prepared by the Authorized Biologist.

Action Area

The implementing regulations to section 7(a)(2) of the Act describe the action area as 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 1998). 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 Project will directly impact approximately 2,831 ac of desert tortoise habitat. For the purposes of this biological opinion, the Project is defined as the area inside and outside of the permanent fence line that will be disturbed due to construction and O&M activities of the solar facility and linear facilities (access roads, utility corridor, and gen-tie line; see Table 1). Along with the linear facilities outside the solar facility, the action area also includes a surrounding distance of up to 984 feet outside of the Project boundary where any tortoises will be moved out of harm's way to avoid injury from construction or O&M-related activities. Since regional desert tortoise augmentation sites have not been identified for the Colorado Desert Recovery Unit (Service 2017c), to accommodate the potential translocation of desert tortoise from the Desert Quartzite Project site, the action area also includes the Desert Sunlight solar project's recipient (translocation) site, which includes 4,612 ac of lands managed by the BLM (Ironwood 2011). Finally, the action area encompasses conservation areas that will be acquired and potentially restored or enhanced as needed to offset the destruction of desert tortoise habitat resulting from construction and O&M of the Project. The acquisition, potential restoration or enhancement, management, and monitoring of these conservation areas are expected to have only beneficial effects to tortoises. The particular locations of these conservation areas have not yet been identified, but approximately 2,831 ac will be acquired within the desert tortoise Chuckwalla Critical Habitat Unit or, if sufficient land is unavailable there, in other locations within the desert tortoise Colorado Desert Recovery Unit (see CM-14 above).

ANALYTICAL FRAMEWORK FOR THE SECTION 7(A)(2) DETERMINATIONS

Jeopardy Determination

Section 7(a)(2) of the 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 species, the factors responsible for that condition, and its survival and recovery needs; (2) the Environmental Baseline, which analyzes the condition of the species in the action area, the factors responsible for that condition, and the relationship of the action area to the survival and recovery of the species; (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 species; and (4) the Cumulative Effects, which evaluate the effects of future, non-Federal activities in the action area on the species.

As such, in accordance with policy and regulation, the jeopardy determination is made by evaluating the aforementioned components 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 species in the wild by reducing the reproduction, numbers, and distribution. Desert tortoise designated critical habitat does not occur in the action area so no adverse modification to desert tortoise designated critical habitat is expected to occur with implementation of the proposed action.

STATUS OF THE SPECIES AND CRITICAL HABITAT

The following summarizes information about the desert tortoise that was discussed in detail in the Service’s Programmatic Biological Opinion for Activities in the California Desert Conservation Area (Service 2017a). Please refer to that document as well as the revised recovery plan (Service 2011) and our 5-year review (Service 2010) for additional detailed information about these topics and the species’ description, life history, and habitat affinities.

The Service listed the desert tortoise as threatened in 1990 (Service 1990) and the threats described in the listing rule and both recovery plans (Service 1994, 2011) continue to affect the species. The most apparent threats to the desert tortoise are those that result in mortality and permanent habitat loss across large areas, such as urbanization and large-scale renewable energy projects, and those that fragment and degrade habitats, such as proliferation of roads and highways, off-highway vehicle activity, and habitat degradation caused by nonnative invasive plant species. The desert tortoise requires 13 to 20 years to reach sexual maturity, has low reproductive rates during a long period of reproductive potential, and individuals experience relatively high mortality early in life (Service 2011).

Reproduction, Numbers, and Distribution

Reproduction

Desert tortoise reproduction is influenced by a number of factors, some of which include the number of reproducing females across the range, home range size and location, and resource availability and quality (Service 2011, Sieg *et al.* 2015). Female tortoises typically lay fewer eggs per clutch but produce multiple clutches per reproductive season, April through July (Lovich *et al.* 2015). Periods of increased rainfall, such as in El Nino years, can result in an increase in annual plant forage biomass resulting in an increase in annual egg production (Lovich *et al.* 2015). Young desert tortoises rely upon high-quality, low-fiber plants (e.g., native annual plants) with nutrient levels not found in the invasive nonnative plants that have increased in abundance across its range (Oftedal *et al.* 2002; Tracy *et al.* 2004). Compromised nutrition of young desert tortoises likely represents an effective reduction in recruitment by reducing the number of animals that reach adulthood (Drake *et al.* 2016). Consequently, the reproductive capacity of the desert tortoise may be compromised to some degree by the abundance and distribution of invasive weeds across its range; the continued increase in human access across the desert likely continues to facilitate the spread of nonnative plants and further affect the reproductive capacity of the desert tortoise.

Numbers

Range-wide monitoring, initiated in 2001 by the Service, is the first comprehensive attempt to determine the number of individuals, or densities of desert tortoises, in conservation areas across their range. The Desert Tortoise Recovery Office (Service 2015) used annual density estimates obtained from this sampling effort to evaluate range-wide trends in the density of desert tortoises over time. This analysis indicates that densities in the Northeastern Mojave Recovery Unit have increased since 2004, with the increase apparently resulting from increased survival of adults and sub-adults moving into the adult size class. The analysis also indicates the populations in the other four recovery units are declining. Desert tortoise densities in the Joshua Tree and Piute Valley conservation areas within the Colorado Desert Recovery Unit seem to be increasing, although densities in the recovery unit as a whole continue to decline.

Distribution

In the 5-year review, the Service (2010) concluded the distribution of the desert tortoise has not changed substantially since the publication of the original recovery plan in 1994 in terms of the overall extent of its range. However, desert tortoises have been removed from several thousand acres because of solar development and military activities, and large parts of suitable habitat within this range have been converted to other uses that no longer support desert tortoise. For example, urban development around desert cities, such as Las Vegas, Barstow, and Lancaster, has contributed to habitat loss throughout the range and desert tortoises have been essentially removed from the 18,197-acre southern expansion area at the Fort Irwin National Training Center (Service 2014). The development of large solar facilities has also reduced the amount of habitat available to desert tortoises. No solar facilities have been developed within desert tortoise conservation areas, such as Desert Wildlife Management Areas (DWMA), although such projects have occurred in areas that the Service considers important linkages between conservation areas, e.g., Desert Sunlight Solar Farm Project near Desert Center, California (Service 2012a).

Status of Critical Habitat

The Service designated about 6.5 million ac of critical habitat for the desert tortoise in portions of California, Nevada, Arizona, and Utah. The physical or biological features which constitute desert tortoise critical habitat include the following: (1) sufficient space to support viable populations within each of the recovery units and to provide for movement, dispersal, and gene flow; (2) sufficient quality and quantity of forage species and the proper soil conditions to provide for the growth of these species; (3) suitable substrates for burrowing, nesting, and overwintering; (4) burrows, caliche caves, and other shelter sites; (4) sufficient vegetation for shelter from temperature extremes and predators; and (5) habitat protected from disturbance and human-caused mortality.

Summary

To summarize the range-wide condition of the desert tortoise, threats continue to adversely affect the species across the range, populations are in decline in four of the five recovery units, and while the distribution boundary has not changed, suitable habitat within that boundary has been reduced. The Service's goal to recover and delist the desert tortoise (Service 2011) is challenged by a number of factors but loss of suitable habitat that supports resource needs is one of the primary impediments to achieve recovery of desert tortoise, specifically the stated recovery action to protect existing populations and habitat (Service 2011).

In our 5-year review we recommended the status of the desert tortoise as a threatened species be maintained since the threats identified in the original listing rule continue to affect the species, with invasive species, wildfire, and renewable energy development coming to the forefront as important factors in habitat loss and conversion of suitable habitat to unsuitable (Service 2010). Since the completion of our 5-year review, we have issued several biological opinions that affect large areas of desert tortoise habitat because of numerous proposals to develop renewable energy within its range. In aggregate across the range of the desert tortoise, these projects will result in an overall loss of approximately 43,920 ac of habitat. We also predicted that the project areas supported up to 3,721 desert tortoises. Since 2017, 583 desert tortoises have been observed during construction of projects; most of these individuals were translocated from work areas, although some desert tortoises have been killed (Service 2017a). This trend of converting habitat into areas that are unsuitable for desert tortoise continues, constricting the species into a smaller portion of its range and further fragmenting habitat suitable for feeding, breeding, and sheltering.

Recovery

The revised recovery plan for the desert tortoise (Service 2011) lists three objectives and associated criteria to achieve delisting. The first objective is to maintain self-sustaining populations of desert tortoises within each recovery unit into the future, using the criterion of increasing rates of population change (λ) for desert tortoises (i.e., $\lambda > 1$) over at least 25 years (i.e., a single generation). This criterion is measured by extensive, range-wide monitoring across conservation areas within each recovery unit, and by direct monitoring and estimation of vital rates (recruitment, survival) from demographic study areas within each recovery unit. The second objective addresses the distribution of desert tortoises, with the goal of maintaining well-distributed populations of desert tortoises throughout each recovery unit. The criterion used to achieve this objective is an increasing distribution of desert tortoises throughout each conservation area over at least 25 years. The third objective is to ensure that habitat within each recovery unit is protected and managed to support long-term viability of desert tortoise populations. The criterion used to achieve this objective is to maintain no net loss in the quantity of desert tortoise habitat within each conservation area until population viability is ensured.

The revised recovery plan (Service 2011) also recommends connecting blocks of desert tortoise habitat, such as critical habitat units and other important areas to maintain gene flow between populations. Linkages defined using least-cost path analysis (Averill-Murray *et al.* 2013) illustrate a minimum connection of habitat for desert tortoises between blocks of core habitat and represent priority areas for conservation of population connectivity.

As indicated above, only one recovery unit, the Northeastern Mojave Recovery Unit, has demonstrated increased densities of desert tortoise since 2004, with the increase apparently resulting from increased survival of adults and more sub-adults moving into the adult size class. Desert tortoise populations in the other four recovery units are declining. Challenges to desert tortoise recovery include understanding why these populations are in decline and how ongoing threats, and the synergies of those threats, affect our ability to recover the species.

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 that are contemporaneous with the consultation in progress.

The Project area is within the Colorado Desert Recovery Unit and is located on the Palo Verde Mesa between the Mule Mountains to the west and agricultural lands to the east, south of I-10 and approximately 25 mi west of the City of Blythe. The Project site is located outside the boundaries of any Area of Critical Environmental Concern (ACEC), DWMA, BLM wilderness area, or designated critical habitat for desert tortoise. The Chuckwalla DWMA for desert tortoise is located approximately twenty miles west of the Project site. The Project area is mostly flat, with elevations ranging from about 320 ft. to 475 ft.

Desert tortoises are affected to some extent by several access roads, agricultural operations, invasive nonnative plants, and potentially by predation from common ravens foraging, nesting, and roosting along existing transmission lines within the action area and elsewhere in the vicinity. Predation from coyotes is also potentially high due to a coyote population subsidized by the agricultural operations to the east of the Project. Ongoing land uses covered under previously issued biological opinions (see below) have allowed for additional take of tortoises and degradation of tortoise habitat in or near the Project area.

Past Consultations within the Action Area

The Service issued a programmatic biological opinion evaluating the effects of BLM's CDCA Plan Amendment for BLM's Northern and Eastern Colorado Desert (NECO) Plan (BLM 2002) on desert tortoise and its critical habitat on June 17, 2002, and as amended, on March 31, 2005, and November 30, 2007 (Service 2005, 2007). We found the BLM's plan guidance was not likely to jeopardize the continued existence of desert tortoise or adversely modify critical habitat. The programmatic biological opinion exempted take of desert tortoise for casual uses (e.g., recreation, mining, and 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.

The Service issued five biological opinions exempting take of several species, including the desert tortoise, associated with transmission and gen-tie lines. These include the Blythe Energy line in 2005, the Desert Southwest line in 2006, the Devers to Palo Verde 2 Line in 2011, and 230-kV monopole transmission lines associated with the Blythe (2010) and McCoy (2013) solar plants located north of I-10. While issuance of biological opinions for these linear features has allowed or may allow for additional take of desert tortoises and degradation of habitat in the Project area, these biological opinions also included avoidance, minimization, and conservation measures that largely maintained the environmental baseline of the species.

The Service issued a programmatic biological opinion to BLM on July 20, 2012, regarding the landscape level effects of designating Solar Energy Zones (SEZs) and amending land use plans in six southwestern States (Arizona, California, Colorado, Nevada, New Mexico, and Utah) (Service 2012b). The Riverside East SEZ is the largest of the proposed SEZs in the six-State action area**,** with a total developable area of 147,910 ac. The Project is located within this Riverside East SEZ.

The Service issued a programmatic biological opinion evaluating the effects of the land use plan amendment for the DRECP on the desert tortoise and its critical habitat (Service 2016). The goal of the DRECP is to conserve and manage plant and wildlife communities in the desert regions of California while facilitating the timely permitting of compatible renewable energy projects within BLM-designated Development Focus Areas (DFAs). The DFAs are located in areas that have lower potential to support desert tortoises (Nussear *et al.* 2009). The DRECP also included criteria to site and design projects to maintain the connectivity for wildlife across I-10 through three north-south wildlife corridors that are within a 5-mile-wide linkage centered on Wiley's Well Road (Figure 2). The Service concluded that the land use plan amendment for the DRECP was not likely to jeopardize the desert tortoise or result in the destruction or adverse modification of its designated critical habitat. The action area analyzed for the Project in this biological opinion is within a DFA.

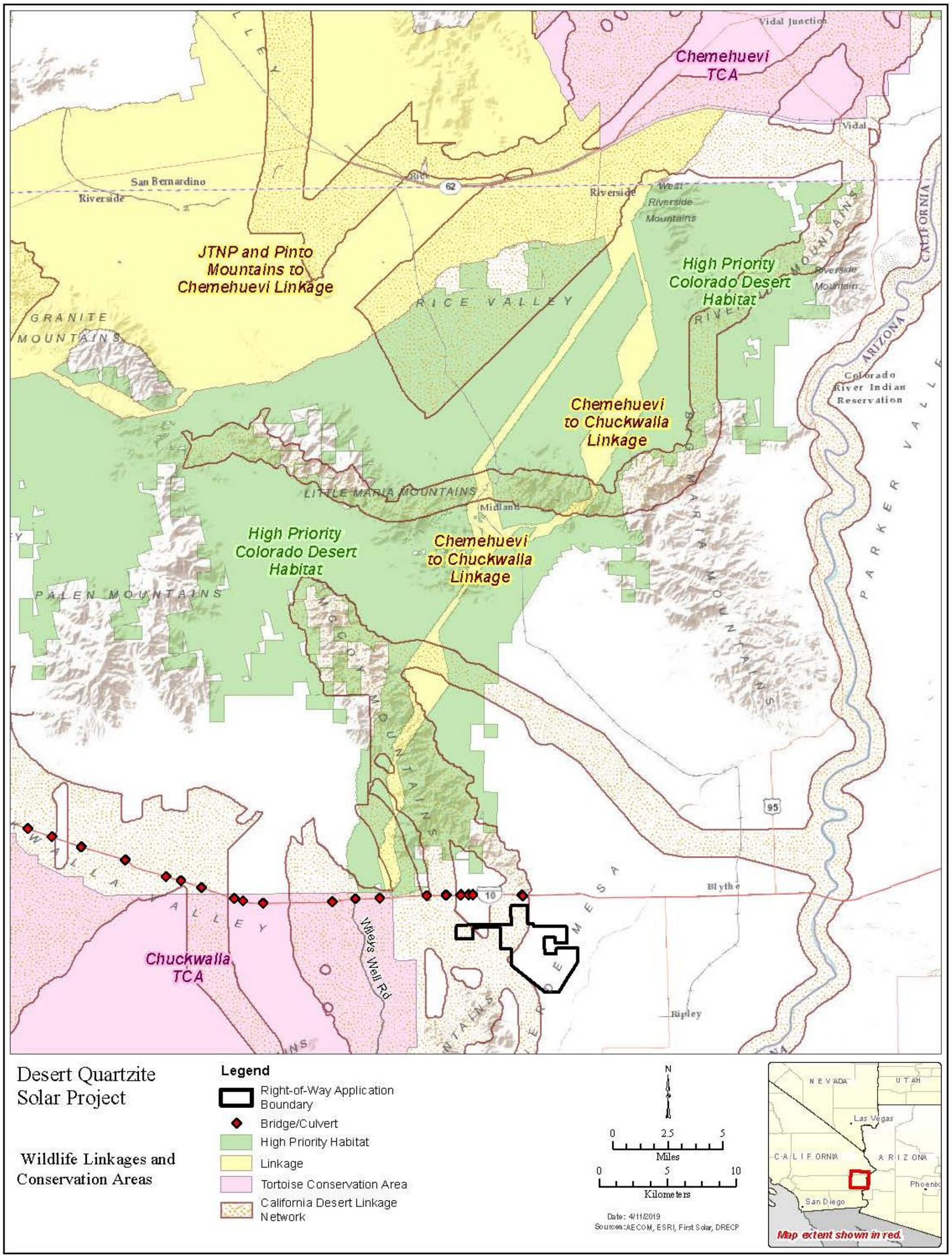

Figure 2: Regional Linkages and Bridges and Culverts under I-10 near the Desert Quartzite Solar Facility.

In 2017, the Service (2017a) issued a programmatic biological opinion evaluating the effects to desert tortoise and its designated critical habitat from construction, operation, maintenance, and decommissioning activities covering a wide range of BLM management actions within the CDCA. Management actions associated with habitat restoration and enhancement, route repairs and closures, fence construction, recreation activities, mine leasing, and other land actions were analyzed. The Service concluded that these BLM management actions are not likely to jeopardize the desert tortoise or result in the destruction or adverse modification of its designated critical habitat.

In sum, the biological opinions listed above have authorized a relatively small amount of take within the large areas that they cover. Implementation of conservation measures similar to those included in this biological opinion minimizes the associated adverse effects of the taking of desert tortoise and impacts to designated critical habitat. Because the action areas defined for these projects narrowly intersect the action area analyzed for the Project in this biological opinion, only a relatively small portion of the total take associated with the above projects would coincide geographically with the proposed Project. However, the collective effect of these various project approvals has likely reduced desert tortoise population levels in portions of the action area, which could reduce the extent of population distribution and connectivity to an unknown degree.

Habitat Characteristics within the Action Area

The BRTR for the Project indicates that Sonoran Desert Scrub alliance covers approximately 98 percent of the Project area. This alliance is dominated by creosote bush (*Larrea tridentata*) and white bursage (*Ambrosia dumosa*), with scattered occurrences of cheese bush (*Ambrosia salsola*), brittlebush (*Encelia farinosa*), Emory's indigo bush (*Psorothamnus emoryi*), big galleta grass (*Hilaria rigida*), and occasional cactus species. Sand dunes onsite are stabilized and partially stabilized accumulations supporting an herbaceous alliance dominated by big galleta grass. Ten invasive nonnative plant species occur on the Project site, including Russian thistle (*Salsola tragus*), Saharan mustard (*Brassica tournefortii*), and Mediterranean grass (*Schismus barbatus*). Desert Dry Wash Woodland alliance is located in two distinct washes, comprising approximately 2 percent of the Project site. Dominant plants species include ironwood (*Olneya tesota*) and blue palo verde (*Parkinsonia florida*), with an occasional honey mesquite (*Prosopis glandulosa*).

Soils within the action area are dominated by gravely sands and sandy loams, and range from very fine sand to gravel. Soil data from the Natural Resources Conservation Service (NRCS) is not available in the northwest portion of the Project area. Desert pavement is present in the extreme northwest and southwest limits of the Project area. Human disturbances within the action area include off-highway vehicle (OHV) activity, fallow agricultural sites, existing utility corridors (i.e., overhead power transmission lines and underground petroleum pipeline), residential trash dumping and access roads for both utilities and fallow agriculture sites. A 160-ac inholding within the Project site is a historical jojoba farm that currently supports creosote bush scrub. The 160-ac site was either chained or bulldozed and is surrounded by bulldozed berms about 4 ft to 5 ft high.

Status of the Species in the Action Area

The action area is situated within the southeastern portion of the Colorado Desert Recovery Unit (Service 2011). From 2004 to 2014, the number of desert tortoises in conservation areas in the Colorado Desert Recovery Unit decreased by about 36 percent (Service 2017a).

The U.S. Geological Survey (USGS) developed a quantitative habitat model for the range of the Mojave population of desert tortoise, which includes the Colorado Desert Recovery Unit 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. Based on the USGS model, the action area contains suitable desert tortoise habitat that ranges in low statistical probability of habitat potential (between 0.1 and 0.3), though these values do not reflect habitat degradation resulting from anthropogenic activities (Nussear *et al.* 2009). Based on surveys conducted in association with renewable energy projects within the southeastern portion of the Colorado Desert Recovery Unit, we consider that the area north of I-10 near the City of Blythe supports low abundance of desert tortoises (Service 2013, 2014).

On a regional scale, the action area is situated outside priority habitat and linkages for desert tortoise (Figure 2), based on the Nussear *et al.* (2009) habitat model and least cost paths modeled by Hagerty *et al.* (2011). On a local scale, desert tortoise connectivity is impaired by adjacent land uses and natural habitats, as the Project site is bounded by agricultural lands to the east and I-10 with associated berms to the north below we summarize the desert tortoise survey information based on the BA (West 2018) and on survey reports compiled in the BRTR (Ironwood 2014) and draft EIS/EIR. Full-coverage pre-project desert tortoise surveys were conducted consistent with Service protocols from March 25 to April 15, 2013. Per the protocol, surveys employed belt transects approximately 33 ft wide to provide 100 percent (full) coverage of the entire Project area. All tortoise sign, e.g., live tortoises (all age classes), shells, bones, scutes, scats, burrows, pallets, tracks, egg shell fragments, and courtship rings, were recorded (Figure 3).

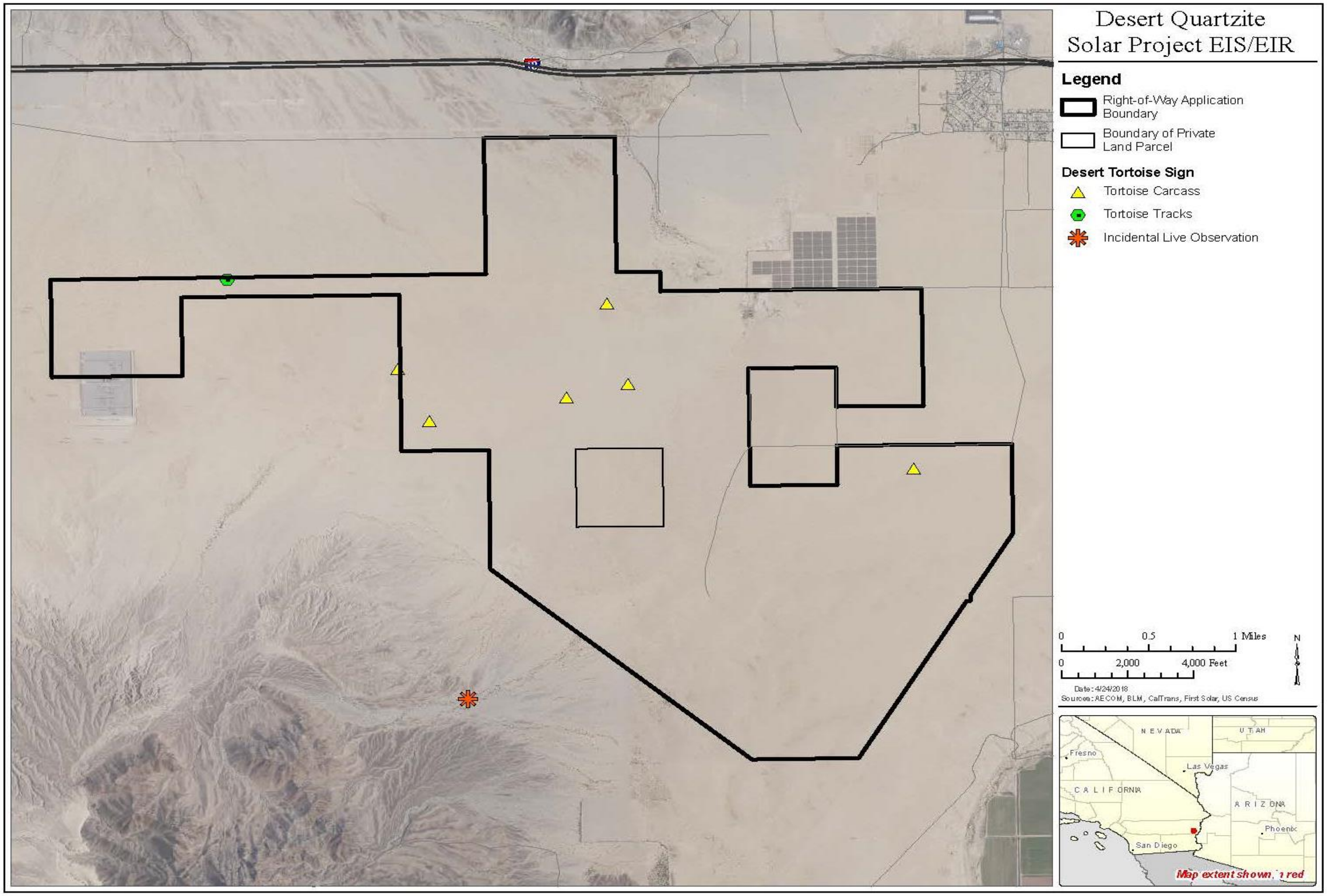

Figure 3: Desert Tortoise Sign Based on Pre-Project Surveys (Ironwood 2014).

Six carcasses, disarticulated and greater than 4 years old, were found within the survey boundary but no live tortoises were detected. One live tortoise was detected within the larger survey buffer area around the Project boundary during avian surveys. No desert tortoise burrows were detected during the surveys. There is no evidence of desert tortoise on the 160-ac private inholding, but protocol desert tortoise surveys were not conducted there.

Pre-project surveys represent a snapshot in time and the size and location of desert tortoise home ranges vary year to year (Berry 1986). Also, desert tortoise absence from specific areas is difficult to confirm since they hibernate in shelters for part of the year (Thompson 2004, MacKenzie *et al.* 2005). However, based on preliminary telemetry data associated with the proposed Crimson Solar Project (Hinderle 2019), there is a large population of desert tortoise (approximately 40 large tortoises) on the north and west sides of the Mule Mountains within the alluvial fans just outside of the action area. Because tortoise may occasionally move outside of their activity centers depending on the time of year and other factors (Sadoti *et al.* 2017), we anticipate some of those tortoise could occasionally move onto the Project area.

Protocol surveys are used to determine tortoise presence and calculate tortoise density on project sites. The calculation is based on the observation of live tortoises during pre-project surveys. However, pre-project protocol desert tortoise surveys for the Desert Quartzite Project did not detect live tortoises and indicated tortoise sign only. Therefore, to derive density of desert tortoise on the Project site, we will use alternative methods used in past consultations.

An alternative method of calculating density within the Project is to apply the calculation used in the amended biological opinion for the CDCA for the NECO planning areas (Service 2007). To derive density of desert tortoises outside the DWMAs and other conservation areas within the Colorado Desert Recovery Unit, we multiplied the average density of desert tortoises within these more protected areas in the recovery unit by 10 percent (Service 2007). This calculation is based on our professional opinion that densities outside DWMAs and other protected areas are generally lower based on habitat conditions, including elevation, rainfall, vegetation community composition, and other geographic variables that typically result in supporting fewer animals. Density of tortoises at the recovery unit level is based on line-distance sampling from 2004 to 2014. Mean density for the Colorado Desert Recovery Unit is 9.6 tortoises per square mile (Service 2015). Applying the reduced density of tortoises for areas outside protected areas (0.1 x 9.6 = 0.96 tortoises per square mi) to the solar facility footprint (2,831 ac / 640 ac = 4.4 square mi) yields a rounded estimate of four large tortoise that may occur in the Project footprint (4.4 square mi x 0.96 desert tortoises per square mi = 4.2).

Proposed Translocation Recipient and Control Site

The Service’s draft translocation guidance recommends translocating animals to regional augmentation sites (Service 2017c). However, an augmentation site for the Colorado Desert Recovery Unit has not been identified. Therefore, tortoises that need to be translocated from within the Project boundary will be translocated to the recipient site identified for the Desert Sunlight Project (Ironwood 2011). The general area of the Desert Sunlight Recipient Site (Recipient Site) is undeveloped and, therefore, not affected by extensive habitat destruction or degradation. The Recipient Site may be impacted to some extent by invasive nonnative plants and predation from common ravens foraging, nesting, and roosting along existing Metropolitan Water District (MWD) transmission lines that bisect the site. The site may also be impacted due to berms constructed to protect MWD's Colorado River Aqueduct. No designated critical habitat occurs in or near the Recipient Site. The density of tortoise on the Recipient Site is currently 5 tortoises per square mi (NER 2017), which is below the recommended density of 10 tortoises per square mi listed in our draft translocation guidance (Service 2017c). Based on information in the final report for the Desert Sunlight Translocation Plan, fatalities of tortoises due to translocation were not significantly different than those animals monitored on the control site (NER 2017). If an augmentation site is designated prior to start of construction of the Desert Quartzite Project, the Service will work with the Applicant, BLM, and CDFW to determine whether that augmentation site is a better alternative for tortoise conservation than the Recipient Site, and this biological opinion will be amended accordingly.

Based on pre-project survey data and our site density analysis, we do not anticipate this Project will need a control site. This conclusion considers previous translocation research that has demonstrated translocation to be an effective conservation tool (see Service 2017c) and the low density of large tortoises that may be found within the Project footprint. Because our current translocation guidance recommends that for each translocated tortoise, the same number of tortoises are tracked in a control site, monitoring of four tortoises in a control site will not likely result in statistically valid information to add to our current body of translocation knowledge (Field *et al.* 2007, Esque *et al.* 2010, Drake *et al.* 2009, Nussear *et al.* 2012, Farnsworth *et al.* 2015, Hinderle *et al.* 2015, Brand *et al.* 2016, Nafus *et al.* 2017). However, if more than four large tortoises are translocated from the Desert Quartzite solar facility, that will trigger a reinitiation of this biological opinion and we will reconsider whether a control site may be necessary for this Project at that time.

Conservation Lands

Habitat acquisition, with potential restoration or enhancement as needed, is proposed to offset the loss of tortoise habitat resulting from the Project. As described in CM 14, the compensation lands selected for acquisition will be within the Colorado Desert Recovery Unit, with potential to contribute to desert tortoise habitat connectivity and build linkages between desert tortoise designated critical habitat, known populations of desert tortoise, and/or other preserve lands. These future conservation lands will be conserved and managed in perpetuity for tortoises. Using available data on landownership and willing sellers, the Service has determined that a sufficient amount of privately owned desert tortoise habitat exists within the Colorado Desert Recovery Unit that will be available for acquisition.

The abundance of tortoises in potential conservation lands is unknown since the specific areas have not yet been identified. However, because acquisition will focus on areas connected to lands with tortoise habitat equal to or better in quality than the Project footprint, we anticipate that these conservation lands will contain suitable habitat that is currently occupied or likely to be occupied by desert tortoise in the future.

EFFECTS OF THE ACTION

Effects of the action refer to the direct and indirect effects of an action on the species or critical habitat, which then factor into 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. 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.

Methodology

<u>Permanent and Temporary Impacts</u>
Because full recovery of desert vegetation can take several decades, we consider all ground-disturbing impacts associated with the proposed Project to be effectively permanent. Vasek *et al.* (1975) found that in the Mojave Desert transmission line construction and O&M activities resulted in a permanently devegetated maintenance road, enhanced vegetation along the road edge and between tower sites, and reduced vegetation cover under the towers, which recovered significantly but not completely in approximately 33 years. 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 generally occurs within 100 years, but in fewer than 40 years in some situations. He also found that vegetation recovery times are likely impacted by a number of variables, including but not limited to climate (e.g. temperatures and rainfall), amount of cover of nonnative plants, and level of ongoing disturbance. Based on these factors, we consider temporary impacts to be equivalent to permanent impacts for the purposes of our effects analysis relative to the 30-year life of the Project.

<u>Small Tortoises and Eggs</u>
We do not provide an estimate for the number of small tortoises (<180 mm MCL) that would be injured or killed as a result of Project construction and O&M. The Service occasionally uses the work of Turner *et al.* (1987) to estimate the number of desert tortoises on a project site that are smaller than 180 mm MCL. These estimates involve several assumptions and the estimates can change depending on project size, location, and timing of construction. However, we anticipate that any loss of small tortoises will not result in population-level effects in the recovery unit or range-wide since the number of small tortoises that occur on the Project site is likely low given the low number of adults that likely occupy the Project area.

We also do not provide an estimate for the number of eggs that would be moved or destroyed as a result of Project construction and O&M. We assume it is possible a small number of eggs may be affected by the Project even though no burrows were detected during pre-project surveys.

However, we anticipate that the loss of eggs would not be significant at a population level because areas where eggs would be moved or destroyed and the population of reproductive adults within these areas that would produce eggs likely comprises a very small proportion of the reproductive capacity of desert tortoises in the action area and in the Colorado Desert Recovery Unit.

Direct Effects

Direct effects associated with the construction and O&M of the Project may result in death or injury to desert tortoises. Direct effects associated with the Project include death or injury resulting from (1) project equipment and construction activities, (2) increased traffic and road access, (3) translocation of tortoises from the Project area, and (4) loss of habitat that provides resource needs such as foraging and sheltering that support reproduction, population numbers, and distribution.

Construction and Operations and Maintenance

Death and injury of desert tortoises would result from 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. Desert tortoises would also be injured or killed during vegetation removal and clearing, trenching activities, and entrapment in open trenches and pipes. Individual tortoises or their eggs would be crushed or buried in burrows by machinery 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 due to the causes described above.

To minimize incidental death and injury of desert tortoises residing in or entering the construction or O&M disturbance areas (e.g., solar facility, gen-tie line, and access roads), the applicant would implement the general and species-specific actions specified in the Conservation Measures (CM) section as part of the proposed action. This section outlines specific measures and their component parts that are summarized below with representative examples of how the applicant would minimize adverse effects to the desert tortoise. The take of tortoises would be minimized by employing an Authorized Biologist(s) and Desert Tortoise Monitor(s), as necessary (CM's 2, 3, and 4). These biologists would be present during all ground-disturbing construction activities and present on the linear or other unfenced sections that have not been cleared of tortoises. All Authorized Biologists will have authority to halt all activities in any area where there would be an unauthorized adverse impact. All Authorized Biologists must meet the minimum qualifications as outlined in CM 2 above. To further reduce the risk to any tortoises that inadvertently venture onto the gen-tie line access road during O&M activities, an Authorized Biologist or Desert Tortoise Monitor under their supervision will monitor O&M activities along the gen-tie line, access road, or any other Project elements that are unfenced and perform surveys 30 days prior to planned activities to map all signs of desert tortoise (CM 8). Additionally, workers will be trained on how to avoid impacts to the tortoise (CM 9). Parked vehicles will be inspected prior to being moved and if a tortoise is found beneath a vehicle it will be given up to 30 minutes to move of its own accord. If it does not, the Authorized Biologist will move the animal from harm's way following the handling guidelines outlined in the Service's Desert Tortoise Field Manual (Service 2009). The posting and enforcement of speed limits (CM 16) will also reduce adverse impacts to desert tortoise associated with O&M activities.

To keep tortoises from entering the solar facility during construction phases and O&M, the Applicant will fence the facility with permanent tortoise exclusion fencing in accordance with the Desert Tortoise Field Manual (Service 2009) or most up-to-date Service protocol, and incorporate shade structures along the fence per CM 6. After clearance surveys, any desert tortoises located would be either moved out of harm's way or translocated to the approved Recipient Site as outlined in the Service-approved Desert Tortoise Translocation Plan (CM 5). The Authorized Biologist or Desert Tortoise Monitor under their supervision will monitor daily Project activities that involve the use of heavy equipment or vehicles during construction, O&M along the gen-tie line, or any other Project elements that are unfenced (CM 8).

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 who will receive Worker Environmental Awareness Program training. This training would be administered to all onsite personnel for the life of the Project (CM 9). 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 measures to avoid and minimize incidental death and injury of desert tortoises include ensuring open trenches, pits, or excavated areas outside the fenced areas are sloped at a 3:1 ratio at the ends or provided with escape ramps to provide wildlife exit points, or covered completely to prevent wildlife access and entrapment (CM 17), limiting disturbance areas (CM 18), and minimizing the amount of water used for dust abatement to avoid ponding, which acts as an attractant to desert tortoises and their predators (CM 23).

Overall, we expect that death and injury of most large tortoises would be avoided during construction and O&M activities through compliance with the conservation measures. Although we estimate up to four large tortoises may occur within the Project area, we anticipate if necessary all tortoises encountered may be moved out of harm's way or translocated (CM 5 and CM 7) by an Authorized Biologist (CM 2). We also anticipate that small tortoises may be taken but based on the difficulty of detecting these small individual tortoises (Service 2015), we are unable to provide a number. The loss of these individuals is not likely to appreciably diminish the numbers of desert tortoises overall because relatively few desert tortoises will be affected by the activities considered in this biological opinion.

Desert Tortoise Translocation

In addition to construction and O&M-related activities, accidental death and injury could result from capturing, handling, and moving tortoises for the purpose of translocation. Accidental death and injury could result from (1) disease transmission associated with handling tortoises; (2)

stress associated with moving individuals outside of their established home range; (3) stress associated with artificially increasing the density of tortoises in an area and thereby increasing competition for resources; and (4) disease transmission between translocated and resident tortoises. Capture and handling of translocated and resident tortoises for the purposes of assessing health and monitoring could also result in accidental death or injury from handling to conduct visual health assessments, draw blood for ELISA testing (enzyme-linked immunosorbent assay), and attaching transmitters.

Incidental take of desert tortoises associated with the proposed action can be minimized through translocation, which recent studies have shown to be an effective conservation tool (Field *et al.* 2007, Esque *et al.* 2010, Drake *et al.* 2012, Nussear *et al.* 2012, Farnsworth *et al.* 2015, Hinderle *et al.* 2015, Brand *et al.* 2016, Nafus *et al.* 2017). However, capturing, handling, and moving tortoises for the purposes of translocating them out of the Project boundary or moving them 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. If multiple desert tortoises are handled by biologists without the use of appropriate protective measures and procedures, such as not re-using latex gloves, pathogens may be spread among individuals. To address these potential translocation adverse effects, the Project Translocation Plan will be drafted in accordance with the most recent Service guidance (Service 2017c). The Translocation Plan would be adaptively managed over time to facilitate a successful translocation effort. Because the Project Applicant would adhere to the most recent Service guidance in addition to implementing the conservation measures outlined above, we anticipate any mortality or injury to desert tortoises from activities associated with removing individuals from the Project boundary is unlikely.

We anticipate most, if not all, large desert tortoises would be captured and translocated to the Recipient Site or moved from harm's way to outside of the Project boundary. Tortoises found on the perimeter tortoise exclusion fence line may be moved more than 984 ft, or moved outside of the Project boundary following coordination with the BLM, Service, and CDFW to eliminate the need for translocation to the Recipient Site outside of the animal's current home range. Based on the survey results for the proposed Project site, we estimate that up to four large desert tortoises may be translocated to the Recipient Site.

Following the Service's draft translocation guidance (Service 2017c), health assessments would be conducted on all tortoises to be translocated prior to being released. For tortoises that would be moved less than 984 ft, visual health assessments (without blood draw for ELISA testing) would be conducted. These tortoises may also be transmitted and monitored until construction activities within the immediate area are complete. For tortoises that would be moved greater than 984 ft to the Recipient Site, visual health assessments and blood draw for ELISA testing would be conducted.

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

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

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

c. Any animal that has clinical signs of disease or ELISA-positive blood test would not be translocated. The Service will be informed of the ELISA-positive test results and decide on an appropriate course of action.

d. Long-term monitoring, if required, of translocated individuals would be implemented to determine the prevalence of disease transmission.

Because ELISA testing can result in false-positive results (i.e., an animal may test positive even though it is not a carrier of the disease), the potential exists for removal of healthy individuals from the translocated population due to concern over disease. These individuals would not be released into the wild and would no longer contribute to the environmental baseline for the action area. Because the applicant would coordinate with the Service and perform follow-up testing of ELISA-positive individuals, the potential for removing false-positive individuals from the translocated population is low. Consequently, we conclude that few, if any, desert tortoises would be incorrectly removed from the population due to false positive results. Similarly, some of the animals that test positive may have survived past disease infections and are healthy. Although our understanding of disease ecology is not complete and removal of these individuals from the wild population could eliminate individuals with superior fitness and genetic adaptations for surviving disease from the gene pool, the low numbers of tortoises involved likely 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 Desert Quartzite Project site would be moved into areas now supporting resident and translocated tortoises, which may result in increased competition for forage, especially during drought years. Increased tortoise densities may lead to increased inter-specific encounters and thereby increase the potential for spread of disease, potentially reducing the health of the overall population. Increased tortoise densities also may lead to increased competition for shelter sites and other limited resources or increased incidence of aggressive interactions between individuals (Saethre *et al.* 2003). Therefore, recipient sites must be sufficiently large to accommodate and maintain the resident and translocated desert tortoises (Service 2017c). Based on our estimate of the resident population in the Recipient Site as discussed in the Environmental Baseline section above, we estimate the population at the Recipient Site is below the recommended density threshold, so we do not anticipate that translocation of up to four large tortoises to the Recipient

Site would impact the densities. The density of tortoise on the Recipient Site is currently five tortoises per square mi (NER 2017), which is below the recommended density of 10 tortoises per square mi listed in our draft translocation guidance (Service 2017c). However, if the density of resident tortoises at the Recipient Site is determined to be higher, then the size of the Recipient Site may need to be expanded to ensure tortoise density following translocation does not exceed the maximum allowable density. The best available information regarding density estimates and thresholds and methods for determining disease prevalence indicate that all four of the desert tortoises expected to be translocated from the Project area can be accommodated at the Recipient Site.

Following the Service's translocation guidance (Service 2017c; see Figure 1 on page 3), if a large tortoise is translocated, an equal number of translocated, resident, and control tortoises should be monitored for at least 5 years. Because we have determined a control site will not provide additional information on the benefits of translocation, we anticipate up to 8 tortoises (4 each from the Project site and Recipient Site) will carry transmitters and be regularly monitored and handled annually for health assessments and blood draw for ELISA testing (spring and fall). Some potential exists that handling of desert tortoises for the purposes of conducting health assessments and monitoring may cause elevated levels of stress that may render these animals more susceptible to disease or dehydration from loss of fluids, but because health assessments and monitoring will be conducted by a Service-approved biologist, we do not expect these activities to result in direct injury or death.

For tortoises that are moved out of harm's way, we do not anticipate that moving tortoises less than 984 ft from the point of capture would result in death or injury because these individuals would be moved a relatively short distance and they would remain near or within their home range. Because these tortoises typically remain within their home range, we do not anticipate additional significant social or competitive impacts to resident tortoises within the 984-ft area.

During the initial weeks after translocation 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 (Berry 1986, Nussear 2004, Field *et al.* 2007, U.S. Army 2010). Of these, predation appeared to be the primary mortality mechanism in most translocation studies (Field *et al.* 2007; Nussear 2004; U.S. Army 2010). These studies indicate that desert tortoise mortality is most likely to occur during the first year after release. After the first year, translocated individuals are more likely to establish new home ranges and mortality is likely to decrease.

Various studies have documented mortality rates of translocated desert tortoises ranging from 0 to 21.4 percent (Nussear 2004, Field *et al.* 2007). Recent studies in support of the Fort Irwin expansion (U.S. Army 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). Based on the available data 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, large tortoises will be the direct result of translocation.

Based on the pre-Project survey data (Ironwood 2014), we anticipate that few, if any, desert tortoises are likely to be moved during construction of the linear gen-tie line. 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 corridor will continue to occupy familiar territory and use known shelter sites and are unlikely to suffer 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. Therefore, 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.

Habitat Loss

Up to 2,831 ac of desert tortoise habitat would be directly impacted by construction of the Project. The permanent loss of habitat would adversely impact resident tortoises by eliminating available habitat. Within the action area, desert tortoise appear to be restricted to the upper alluvial fans near the base of the Mule Mountains, where at least one resident tortoise was found adjacent to the Project boundary. When considering an area occupied by resident desert tortoises, we expect that home range size will vary with respect to location and year (Berry 1986), and this expansion and contraction may indicate changes in resource availability, reproductive opportunities, and social interaction (O'Connor *et al.* 1994). Over their lifetimes, individual desert tortoises may use, on average, more than 1.5 square miles of habitat (Service 1994) and may make periodic movements of more than 4.3 miles at a time (Berry 1986). Therefore, we expect that if available, the lower quality habitat on the Project site would have been utilized again under more favorable weather conditions that produce forage or suitable cover.

To offset permanent loss of this tortoise habitat, a total of 2,831 ac of equivalent or better quality habitat would be acquired to benefit the desert tortoise by connecting occupied habitat adjacent to critical habitat, and/or other core habitats in the Colorado Desert Recovery Unit (CM 14). These future conservation lands will be conserved and managed in perpetuity for tortoises.

We expect less than 0.04 percent of the suitable habitat within the Colorado Desert Recovery Unit (which is approximately 7,635,000 acres) would be lost by constructing this Project. Because of the location, we do not expect this loss of habitat to regionally impact population connectivity. We evaluated the habitat loss in regard to regional connectivity by looking at various models identifying priority linkages or connectivity corridors for desert tortoise (see Penrod *et al.* 2012). The Service's Desert Tortoise Recovery Office modeled landscape-scale connectivity and identified priority habitat linkages between and among tortoise conservation areas in the Sonoran and Mojave deserts (Averill-Murray *et al*. 2013). Although the landscape scale of these modeling efforts can overlook site-specific conditions at a more local scale, these modeling results did not indicate a regional-scale linkage across the Palo Verde Mesa in the action area.

Indirect Effects

Human activities may provide food in the form of trash and litter or water that attracts tortoise predators such as the common raven. Ravens capitalize on human encroachment and expand into areas where they were previously absent or in low abundance. Ravens habituate to human activities and are subsidized by the food and water, as well as roosting and nesting resources, that are introduced or augmented by human encroachment. The nearby Blythe airport and electrical transmission lines provide food, water features, and roosting/nesting substrates that otherwise would be unavailable. Facility infrastructure such as electrical transmission lines, fence lines, buildings, and other structures on the Project site would also provide perching, roosting, and nesting opportunities for ravens.

Common ravens are natural predators on small desert tortoises. Natural predation rates by ravens may be altered or increased when natural habitats are disturbed or modified. 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 small tortoises is considered an unnatural occurrence (BLM 1990). We expect that such increases in raven occurrences in the Mojave Desert are similarly indicative of the Sonoran Desert where human-related disturbances are increasing.

To minimize the generation of food subsidies that may attract common ravens during construction and O&M-related activities, all trash materials would be disposed of in self-closing containers and removed to prevent the attraction of tortoise predators to the Project site, and road-killed animals would be immediately removed and disposed (CM 21 and CM 22). The Applicant would minimize water subsidies by ensuring water does not pool or pond for more than 20 minutes (CM 23). Also, increases in raven abundance in the action area would be minimized by measures outlined in the Raven Management Plan (CM 10). To further minimize indirect and cumulative impacts of raven predation on tortoises associated with the proposed Project, the Applicant would contribute to the Service's Regional Raven Management Program developed to address raven predation on tortoises at a population scale in the California desert region as a conservation action for desert tortoise.

Native shrubs and annual plants used by tortoises for sheltering and feeding adjacent to the Project area also may be adversely affected by introduced invasive nonnative plants (or weeds) that respond positively to ground disturbing activities. Project equipment may transport or spread invasive nonnative plants in the action area where they may become established. Additionally, the potential introduction of invasive plants may lead to increased wildfire risk (Brooks *et al.* 2003). However, potential degradation of habitat due to spread of invasive nonnative plants would be avoided and minimized by measures outlined in the Integrated Weed

Management Plan designed to prevent the introduction of any new weeds and the spread of existing weeds as a result of Project construction and O&M (CM 11).

Effect on Recovery

Per section 2(b) of the Act, 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), and 7(a)(1) of the Act, the implementing regulations to section 7(a)(2) at 50 CFR § 402.02and related preamble at 51 FR 19926 (June 3, 1986) generally mandate Federal agencies to further the survival and recovery of listed species in the use of their authorities. Our analysis below assesses whether the proposed action adequately offsets its adverse effects to the environmental baseline to the desert tortoise, and 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 19926).

The Project Applicant would implement numerous measures to avoid, minimize, and offset the adverse effects to habitat and the relatively few tortoises in the Project area (see Conservation Measures section above). Overall, we expect that four or fewer large desert tortoises would be injured or killed during construction and O&M during the life of the solar facility, and that a relatively small but unquantifiable number of small tortoises and eggs may be moved or destroyed during construction and O&M. We expect that most large tortoises encountered during work activities would be either moved short distances out of harm’s way or translocated. Because the BLM and Project Applicant would implement a variety of measures to reduce stress to these animals, we do not anticipate that injury or mortality would result from the handling and relocation of these animals.

Based on the results of studies discussed above, most of the large tortoises moved from the Project area likely would continue to survive and reproduce at the location where they are moved (i.e., in adjacent habitat or the Recipient Site). Consequently, we anticipate the Project would not appreciably diminish the reproductive capacity of the species, particularly in light of the relatively few tortoises that would be affected.

The distribution of the desert tortoise would be minimally reduced because the proposed Project would result in loss of a small percentage (0.04 percent) of the habitat in the Colorado Desert Recovery Unit, which does not constitute a substantial portion of the recovery unit. Given the location of the Project in an area near the edge of the tortoise’s range, we do not anticipate the amount of habitat to be lost because of Project activities would reduce the distribution of the tortoise to an appreciable degree. We do not anticipate that loss of habitat in the Project area would substantially reduce the ability of the tortoise to survive and recover in the wild because the recovery plan (Service 2011) primarily focuses long-term conservation priorities in higher value habitat areas. The proposed acquisition of tortoise habitat would benefit tortoise habitat connectivity between known populations of tortoises, and/or or other preserve lands in the

Colorado Desert Recovery Unit. Therefore, we conclude that the proposed action is not likely to cause significant impairment of recovery efforts or adversely affect the desert tortoise's prospects for recovery.

CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, local, private, or certain tribal 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. The Service has no information regarding any future State, local, private, or certain tribal actions that are reasonably certain to occur in the action area.

CONCLUSION

After reviewing the current status, environmental baseline for the action area, effects of the proposed action, and cumulative effects of the desert tortoise, 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 decision on the following:

1. The Applicant will implement numerous measures to ensure that most tortoises are moved out of the Project footprint and injury and death of tortoises is minimized (i.e., clearance surveys, exclusion fencing, relocation, translocation, and employing authorized tortoise biologists).

2. The Applicant will implement measures to reduce the potential for increased predation by common ravens, both in the vicinity of the Project footprint and regionally, and to reduce the spread of invasive nonnative plants in the Project area.

3. Given the small number of tortoises potentially affected by the Project, we have no information to indicate that construction and O&M of the Project would appreciably reduce the tortoise population levels in the Colorado Desert Recovery Unit.

4. Few, if any, tortoises are likely to be injured and killed as a result of relocation or translocation.

5. Although the proposed Project would reduce the amount of available tortoise habitat and thereby result in a loss of habitat connectivity, habitat would remain to the west of the proposed Project to provide connectivity of tortoises in the long term.

6. Relocation of some tortoises into habitat adjacent to the project area, and translocation of some tortoises to the Recipient Site will increase tortoise numbers in those areas. Successful translocation would minimize adverse effects by allowing

those tortoises to remain in the population and contribute towards recovery of the species.

7. Compensation requirements of acquisition and/or restoration/enhancement through the BLM and CDFW will result in an increase in the quantity and quality of habitat managed for tortoise conservation.

8. No designated critical habitat occurs within the Project boundary.

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 listed species 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 intended as part 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 tortoise are non-discretionary and must be undertaken by the BLM as binding conditions of any grant or permit issued to the Applicant/Permittee, 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 Applicant/Permittee to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to 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

We anticipate that the number of desert tortoises that may be incidentally taken would be low due to the small number of individuals estimated to occur within the Project area and the anticipated effectiveness of conservation measures described as part of the proposed action. However, quantifying the precise number of individuals that may be incidentally taken is not possible because this species is cryptically colored to avoid predation, and spends the majority of its life inhabiting burrows to avoid environmental extremes or predation, making the observation or detection of death or injury difficult. In addition, population numbers fluctuate in response to weather patterns and other biotic and abiotic factors, and population levels and the distribution of individual animals may have changed since the species surveys were completed and are anticipated to continue changing over the 30-year life of the Project. As a result, finding dead or injured individuals within the Project area is difficult as individuals may be crushed or buried underground in burrows that were not found or inspected, and otherwise hard to recognize or detect. The number of tortoise eggs and small individuals is even more difficult to quantify. Because eggs and small tortoises are almost never found during clearance surveys, we assume virtually all these early life forms will be killed or injured by construction and O&M activities if they occur within the Project footprint.

While we cannot provide the precise number of desert tortoises that may be taken, we have estimated the number of large tortoises (>180 mm MCL) in the Project area based on the best available information. Based on this estimate, we have established take thresholds that, if exceeded, will trigger reinitiation of consultation.

Take of desert tortoises is anticipated and exempted as follows:

1. The loss of up to 2,831 ac of habitat from construction and O&M-related activities may result in accidental death or injury of tortoise eggs and small and large tortoises from crushing, trampling, or burial. If the Project impacts more than this acreage of tortoise habitat, the take threshold will be exceeded.

2. As discussed in the “Environmental Baseline” section above, we estimate that up to four large tortoises may occupy the Project site. While we cannot quantify the precise numbers of tortoises that may be killed or injured as a result of construction or O&M activities for the reasons discussed above, we anticipate the number of large tortoises that may be killed or injured will be low because no tortoises were found in the Project survey area during surveys, which likely indicates a small population. Therefore, using our best professional judgment in light of best available information, we anticipate that construction of the Project will result in the incidental take of four large desert tortoises.

3. Because we do not want to limit the ability of the Service-approved Authorized Biologist to avoid and minimize the direct injury or death of tortoises by relocating and translocating tortoises found during preconstruction clearance surveys or O&M activities, all take in the form of trapping, capture, or collection for the purposes of relocation from harm’s way or translocation to a recipient site is exempted for any eggs and small and large tortoises found during clearance surveys, monitoring activities, O&M activities, or other incidental observations, subject to the reasonable and prudent measures and terms and conditions below. Because the capture or collection, relocation and translocation, and release of desert tortoises will be conducted by a Service-approved biologist, we do not expect these activities to result in direct injury or death of any relocated or translocated tortoises. Therefore, if any

tortoises are directly injured or killed during relocation or translocation, the take threshold will be exceeded.

4. Take, in the form of capture or collection, of up to eight large tortoises (up to four each from the Project footprint and Recipient Site) may result from attaching transmitters to tortoises and monitoring their activities. Although transmittered tortoises may be captured multiple times over the course of the post-translocation monitoring effort, we do not anticipate injury or mortality of these individuals due to post-translocation monitoring. However, if any tortoises are directly injured or killed during monitoring activities, the take threshold will be exceeded.

5. Take, in the form of capture or collection, of up to eight large tortoises (up to four each from the Project footprint and Recipient Site) may result from blood draw for ELISA testing to assess disease prevalence. Although such an invasive procedure presents some likelihood that individuals could be injured or killed, we do not anticipate that blood draw will result in the death or injury of any individuals because blood draw will be conducted by Service-approved biologists, following Service-approved methods. If any tortoises are directly injured or killed as a result of blood draw, the take threshold will be exceeded. This provision is included to ensure that the Service and BLM have the flexibility to collect samples if deemed necessary.

IMPACT OF THE INCIDENTAL TAKING OF THE SPECIES

In the accompanying biological opinion, the Service determined that these levels of anticipated take are not likely to result in jeopardy or adversely affect the recovery of the desert tortoise.

REASONABLE AND PRUDENT MEASURES

The BLM and Applicant are implementing conservation measures for this project as part of the proposed action to minimize the taking of desert tortoises. The Service's evaluation in the biological opinion includes consideration of the conservation measures developed by the BLM and Applicant to reduce the adverse effects of the proposed project on this species. Any subsequent changes in the conservation measures proposed by BLM or Applicant or in the conditions under which these activities will occur may constitute a modification of the proposed action and may warrant reinitiation of formal consultation, as specified at 50 CFR § 402.16. These reasonable and prudent measures are intended to supplement the conservation measures that were proposed by BLM and Applicant as part of the proposed action, and are necessary and appropriate to minimize the impact of the taking on desert tortoises.

a. The BLM and Applicant shall monitor and report the level of incidental take of desert tortoises to the Service throughout the life of the project and report on the effectiveness of the project minimization measures to reduce the impact of incidental take of tortoises.

TERMS AND CONDITIONS

To be exempt from the prohibitions of section 9 of the Act, BLM and Applicant, and their agents and contractors, must comply with the following terms and conditions, which implement the reasonable and prudent measure described above and are intended to minimize the impact of the incidental taking. These terms and conditions are non-discretionary (see section 7(o)(2)).

The following term and condition implements the reasonable and prudent measure above.

The Applicant shall prepare and provide to the Service and BLM an annual report by January 31 of each year of the Project. The annual report shall document but not be limited to the following:

1. Compliance with project specifications and conservation measures outlined in this biological opinion as they relate to desert tortoises.

2. Any activities determined by the Authorized Biologist or Desert Tortoise Monitors to be out of compliance with project-specifications and conservation measures outlined in this biological opinion and the corrective measures implemented to bring the Project back into compliance.

3. The total amount and location of desert tortoise habitat disturbed by construction and O&M activities during the reporting year.

4. The number and location of desert tortoises killed or injured during project construction or O&M activities during the reporting year and a description of the circumstances leading to the death or injury of individuals of the species.

5. Activities conducted during the reporting year. These activities include but are not limited to: (1) the number and location of desert tortoises located during project activities and relocated or translocated during preconstruction; (2) construction, and O&M activities during the reporting year; (3) a detailed description of the relocation and translocation activities; and (4) a detailed description of monitoring activities conducted at the Recipient Site during the reporting year.

    a. If more than four adult desert tortoises, or any eggs or small tortoises, are found within the Project footprint, the Authorized Biologist shall immediately report the observation to the Service, prior to any subsequent relocation or translocation activities. The Service will review the information to determine its consistency with the effects analysis above and whether relocation or translocation of additional desert tortoises would benefit their survival, or whether reinitiation of consultation is warranted.

6. Activities conducted under the Raven Management Plan (CM 10) during the reporting year, including but not limited to the results of raven nest monitoring and removal of raven nests and offending ravens.

7. Activities conducted under the Weed Management Plan (CM 11), including but not limited to invasive plant species control activities conducted during construction or O&M activities in the Project area during the reporting year and the status of control activities conducted the previous year.

Disposition of Sick, Injured, or Dead Specimens

Pursuant to 50 CFR § 402.14(i)(1)(v), the BLM must notify the Service immediately at 760-322-2070 (Palm Spring Fish and Wildlife Office) 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, location, and photograph of the carcass, and any other pertinent information. Care must be taken in handling sick or injured individuals to ensure effective treatment, and care and in handling dead specimens to preserve biological material in the best possible state.

The BLM must also notify the Service immediately at 760-320-2070 if any endangered or threatened species not addressed in this biological opinion is found dead or injured in the Project footprint during the life of the project. The same reporting requirements also shall pertain to any healthy individual(s) of any threatened or endangered species found in the action area and handled to remove the animal to a more secure location. Refer to the "Terms and Conditions" section above for details on reporting procedures.

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. We recommend that the BLM work with the Applicant and the Service to determine if the transmittered desert tortoises associated with the translocated populations can be used to answer additional research questions related to translocation or desert tortoise biology.

REINITIATION NOTICE

This concludes formal consultation on the proposed Project for the desert tortoise. As provided in 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 incidental take 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 not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action.

If you have any questions regarding this document, please contact Felicia Sirchia of the Palm Springs Fish and Wildlife Office at (760-322-2070, extension 405; or felicia_sirchia@fws.gov).

LITERATURE CITED

Abella, S. R. 2010. Disturbance and plant succession in the Mojave and Sonoran deserts of the American Southwest. *International Journal of Environmental Research and Public Health* 7:1248-1284.

Averill-Murray, R., C.R. Darst, N. Strout, and M. Wong. 2013. Conserving population linkages for the Mojave desert tortoise. Herpetological Conservation Biology 8(1):1-15.

Berry, K. H. 1986. Desert tortoise (*Gopherus agassizii*) relocation: Implications of social behavior and movements. *Herpetologica* 42(1):113-125.

Boarman, W. I. 2002. Threats to desert tortoise populations: A critical review of the literature. Unpublished report prepared for the West Mojave Planning Team, Bureau of Land Management. Western Ecological Research Center, U.S. Geological Survey, Sacramento, California. August 9, 2002.

Brand L.A., M.L. Farnsworth, J. Meyers, B.G. Dickson, C. Grouios, A.F. Scheib, R.D. Scherer. 2016. Mitigation-driven translocation effects on temperature, condition, growth, and mortality of Mojave desert tortoise (Gopherus agassizii) in the face of solar energy development. Biological Conservation, 200:104–11

Brooks, M. L., T. C. Esque, and J. R. Matchett. 2003. Current status and management of alien plants and fire in desert tortoise habitat. Proceedings of the 2003 Desert Tortoise Council Symposium.

[BLM] Bureau of Land Management (BLM). 1990. Draft raven management plan for the California Desert Conservation Area. Prepared by Bureau of Land Management, California Desert District, Riverside, California. April 1990.

[BLM] Bureau of Land Management (BLM). 2002. Proposed Northern and Eastern Colorado Desert Coordinated Management Plan and final environmental impact statement. Prepared by BLM, California Desert District Office and California Department of Fish and Game, Inland, Deserts, and Eastern Sierra Region. July 2002.

Drake. K.K., T.C. Esque, K.E. Nussear, B.M. Jacobs, K.M. Nolte, and P. A. Medica. 2009. An annual report for the Fort Irwin Desert Tortoise Translocation Project, 2009 Progress. Unpublished report prepared by the U.S. Geological Survey, Western Ecological Research Center. 36 pp. + appendices

Drake, K.K., K.E. Nussear, T.C. Esque, AM. Barber, KM. Vittum, P.A. Medica, C.R. Tracy, and K.W. Hunter. 2012. Does translocation influence physiological stress in the desert tortoise? Animal Conservation doi:10.1111/j.1469-1795.2012.00549.x.

Drake, K.K., L. Bowen, K. E. Nussear, T.C. Esque, A.J. Berger, N. A. Custer, S. C. Waters, J. D. Johnson, A.K. Miles, and R.L. Lewison. 2016. Negative impacts of invasive plants on conservation of sensitive desert wildlife. Ecosphere 7(10):

Esque, T.C., K.E. Nussear, K.K. Drake, A.D. Walde, K.H. Berry, R.C. Averill-Murray, A.P. Woodman, W.I. Boarman, P.A. Medica, J. Mack, and J.S. Heaton. 2010. Effects of subsidized predator, resource variability, and human population density on desert tortoise populations in the Mojave Desert. *Endangered Species Research* 12:167–177.

Farnsworth, M.L., B.G. Dickson, L.J. Zachmann, E.E. Hegeman, A.R. Cangelosi, T.G. Jackson, A.F. Scheib. 2015. Short-term space-use patterns of translocated Mojave Desert Tortoise in southern California. PLoS One, 10, e0134250.

Field, K. J., C. R. Tracy, P. A. Medica, R. W. Marlow, and P. S. Corn. 2007. Return to the wild: Translocation as a tool in conservation of the desert tortoise (*Gopherus agassizii*). *Biological Conservation* 136:232-245.

Hagerty, B., Nussear, K., Esque, T., and Tracy, C. 2011. Making molehills out of mountains: Landscape genetics of the Mojave desert tortoise. Landscape Ecology 25(2):267–280.

Hinderle, D., et al. 2015. The effects of homing and movement behaviors on translocation: desert tortoises in the western Mojave Desert. Journal of Wildlife Management 79:137–147.

Hinderle, D. 2019. 2018 Annual Summary and Comprehensive Reports for USFWS Permit #TE-218901-6 and CDFW MOU 2081a-2018-003-R6, Desert Tortoise (*Gopherus agassizii*) Home Range, Habitat Use, and Health Assessment: Crimson Solar Energy Project. January 31, 2019. San Diego, CA. 7 pp.

[Ironwood] Ironwood Consulting, Inc. 2011. Desert Tortoise Translocation Plan, Desert Sunlight solar Farm Project and Red Bluff Substation. Case File Number CACA-48649. Prepared for Desert Sunlight Holdings, LLC. Redlands, CA.

[Ironwood] Ironwood Consulting, Inc. 2014. Biological Resources Technical Report Desert Quartzite Solar Project, BLM Case File Number CACA-49397. Prepared for Desert Quartzite, LLC. San Francisco, CA.

Lovich J.E., J.R. Ennen, K. Meyer, M. Agha, C. Loughran, C. Bjurlin, M. Austin, S. Madrak. 2015. Not putting all their eggs in one basket: bet-hedging despite extraordinary annual reproductive output of desert tortoises. Biological Journal of the Linnean Society, 115(2): 399–410.

MacKenzie, D.I., Nichols, J.D., Lachman, G.B., Droege, S., Royle, J.A. and Langtimm, C.A. 2005. Estimating site occupancy rates when detection probabilities are less than one. Ecology, 83:2248-2255.

Nafus, M.G., T.C. Esque, R.C. Averill-Murray, K.E. Nussear, R.R. Swaisgood. 2017. Habitat drives dispersal and survival of translocated juvenile desert tortoises. Journal of Applied Ecology 54:430–438.

[NER] Northstar Environmental Remediation. 2017. Final Desert Tortoise Monitoring Report, Desert Sunlight Solar Farm Project. Prepared for NextEra Energy Resources, in compliance with the California Desert Conservation Area Plan Amendment and Final Environmental Impact Statement, February 03, 2017. Lake Forest, CA.

Nussear, K. E. 2004. Mechanistic investigation of the distributional limits of the desert tortoise, *Gopherus agassizii*. Ph.D. Dissertation. University of Nevada, Reno.

Nussear, K. E., T. C. Esque, R. D. Inman, L. Gass, K. A. Thomas, C. S. A. Wallace, J.B. Blainey, D. M. Miller, and R. H. Webb. 2009. Modeling habitat of the desert tortoise (*Gopherus agassizii*) in the Mojave and parts of the Sonoran Deserts of California, Nevada, Utah, and Arizona: U.S. Geological Survey Open-File Report 2009-1102.

Nussear, K.E., C.R Tracy, P.A. Medica, D.S. Wilson, R.W. Marlow, P.S. Corn. 2012. Translocation as a conservation tool for Agassiz's desert tortoise: survivorship, reproduction, and movements. Journal of Wildlife Management 76:1341–1353.

O'Connor, M.P., L.C. Zimmerman, D.E. Ruby, S. Bulova, and J.R. Spotila. 1994. Home range size and movements of desert tortoises (*Gopherus agassizii*). Herpetological Monographs 8:60–71.

Oftedal, O.T., S. Hillard, and D.J. Morafka. 2002. Selective spring foraging by juvenile desert tortoises (*Gopherus agassizii*) in the Mojave Desert: evidence of an adaptive nutritional strategy. Chelonian Conservation and Biology 4(2):341-352.

Penrod K, P. Beier, E. Garding, C. Cabanero. 2012. A linkage network for the California deserts. The Wildlands Conservancy, Fair Oaks, CA. Available from www.scwildlands.org.

Sadoti, G., M.E. Gray, M.L. Farnsworth, and B.G. Dickson. 2017. Discriminating patterns and drivers of multiscale movement in herpetofauna: The dynamic and changing environment of the Mojave desert tortoise. Ecology and Evolution 7:7010–7022.

Saethre, M. B., T. C. Esque, P. A. Medica, R. Marlow, and C. R. Tracy. 2003. Determining carrying capacity of desert tortoises. Abstract of a paper present at the 28th annual meeting and symposium of the Desert Tortoise Council.

[Service] U.S. Fish and Wildlife Service. 1990. Endangered and threatened wildlife and plants; Determination of threatened status for the Mojave population of the desert tortoise; Final rule. *Federal Register* 55:12178-12191.

[Service] U.S. Fish and Wildlife Service. 1994. Desert tortoise (Mojave population) recovery plan. U.S. Fish and Wildlife Service, Portland, Oregon.

[Service] U.S. Fish and Wildlife Service. 2005. Biological opinion for the California Desert Conservation Area Plan [desert tortoise] (6840 CA930(P)) (1-8-04-F-43R). Dated March 31. Memorandum to State Director, Bureau of Land Management, Sacramento, California. From Field Supervisor, Ventura Fish and Wildlife Office. Ventura, California.

[Service] U.S. Fish and Wildlife Service. 2007. Amendment to the biological opinion for the California Desert Conservation Area Plan [desert tortoise] (6840 CA930(P)) (1-8-04-F-43R). November 30, 2007. Ventura, California.

[Service] U.S. Fish and Wildlife Service. 2009. Desert tortoise (Mojave population) field manual (*Gopherus agassizii*). Region 8, Sacramento, California. *https://www.fws.gov/nevada/desert_tortoise/documents/field_manual/Desert-Tortoise-Field-Manual.pdf*

[Service] U.S. Fish and Wildlife Service. 2010. Mojave population of the desert tortoise (*Gopherus agassizii*) 5-year review: summary and evaluation. Desert Tortoise Recovery Office. Reno, Nevada.

[Service] U.S. Fish and Wildlife Service. 2011. Revised Recovery Plan for the Mojave Population of the Desert Tortoise (*Gopherus agassizii*). Pacific Southwest Region, Sacramento, California.

[Service] U.S. Fish and Wildlife Service. 2012a. Amendment to the Biological Opinion on the Desert Sunlight Solar Farm Project (FWS-ERIV-08B0789-11F0041-R001), Riverside County, California, May 11, 2012. Carlsbad Fish and Wildlife Office, Carlsbad, California.

[Service] U.S. Fish and Wildlife Service. 2012b. Programmatic Biological Opinion for the FWS Division of Consultation, Habitat Conservation Plans, Recovery, and State Grants based on materials provided by FWS Regions 2, 6, and 8.

[Service] U.S. Fish and Wildlife Service. 2013. Section 7 Biological Opinion on the McCoy Solar Power Project, Riverside County, California (FWS-ERIV-10B0592-13F0179), Riverside County, California, March 6, 2013. Carlsbad Fish and Wildlife Office, Carlsbad, California.

[Service] U.S. Fish and Wildlife Service. 2014. Biological Opinion for Operations and Activities at Fort Irwin, San Bernardino County, California (FWS-SB-14B0363-14F0495), San Bernardino County, California, August 8, 2014. Carlsbad Fish and Wildlife Office, Carlsbad, California.

[Service] U.S. Fish and Wildlife Service. 2015. Range-wide Monitoring of the Mojave Desert Tortoise (*Gopherus agassizii*): 2013 and 2014 Annual Reports. Report by the Desert Tortoise Recovery Office, U.S. Fish and Wildlife Service, Reno, Nevada.

[Service] Fish and Wildlife Service. 2016. Biological opinion for the Proposed Land use Plan Amendment under the Desert Renewable Energy Plan (FWS-KRN/SBD/INY/LA/IMP/RIV-16B0138-16F0200), Kern/San Bernardino/Inyo/Los Angeles/Imperial/Riverside County, California, August 16, 2016. Carlsbad Fish and Wildlife Office, Carlsbad, California.

[Service] Fish and Wildlife Service. 2017a. Programmatic Biological Opinion for Activities in the California Desert Conservation Area (FWS-KRN/SBD/INY/LA/IMP/RIV-17B0532-17F1029), Kern/San Bernardino/Inyo/Los Angeles/Imperial/Riverside County, California, September 1, 2017. Carlsbad Fish and Wildlife Office, Carlsbad, California.

[Service] U.S. Fish and Wildlife Service. 2017b. Biological option for the Eagle Mountain Pumped Storage Hydroelectric Project (FWS-ERIV-08B0101-11F0266-R001). October 30, 2017. Carlsbad, California.

[Service] U.S. Fish and Wildlife Service. 2017c. Draft Revised Translocation of desert tortoise (Mojave population) from project sites: Plan development guidance. November 2017. Desert Tortoise Recovery Office, Reno, Nevada.

[Service and NMFS] U.S. Fish and Wildlife Service and National Marine Fisheries Service. 1998. Endangered species consultation handbook http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.pdf

Thompson, W.L. 2004. Sampling rare or elusive species. Island Press, Washington DC, USA.

Tracy, C.R., R. Averill-Murray, W. I. Boarman, D. Delehanty, J. S. Heaton, E. McCoy, D. Morafka, K. Nussear, B. Hagerty, and P. Medica. 2004. Desert tortoise Recovery Plan Assessment. Technical report to U.S. Fish and Wildlife Service, Reno, 254 pp.

Turner, F.B., K.H. Berry, D.C. Randall, and G.C. White. 1987. Population ecology of the desert tortoise at Goffs, California, in 1983-1986. Annual Report to Southern California Edison Company, Rosemead, California.

[U.S. Army] U.S. Department of the Army. 2010. 2009 annual reports for the Fort Irwin biological opinions and desert tortoise permit for the Fort Irwin translocation project. Undated. Fort Irwin, California

Vasek, F. C., H. B. Johnson, and D. H. Eslinger. 1975. Effects of pipeline construction on creosote bush scrub vegetation of the Mojave Desert. Madroño 23:1-13.

[West] Western Ecosystems Technology, Inc. 2018. Biological Assessment for the Desert Quartzite Solar Project Riverside County, California. Prepared for and modified by: Bureau of Land Management Palm Springs-South Coast Field Office, Palm Springs, CA. Redlands, CA. October 2018.

Unpublished Reports

[Service] U.S. Fish and Wildlife Service. 2013-2015. Documented patterns of mortality to Yuma Ridgway's rail and willow flycatcher from energy infrastructure in the California desert. Unpublished data.

Bird and Bat Conservation Strategy
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June 09, 2017
Updated May 2019

WEST Inc.

LIST OF ACRONYMS

ABPP	Avian and Bat Protection Plan
amsl	above mean sea level
AO	Authorized Officer
APLIC	Avian and Power Line Interaction Committee
BBCM	Bird and Bat Conservation Measure
BBCS	Bird and Bat Conservation Strategy
BBS	Breeding Bird Survey
BCC	Bird of Conservation Concern
BCI	Bat Conservation International
BGEPA	Bald and Golden Eagle Protection Act
BLM	Bureau of Land Management
BRMIMP	Biological Resources Mitigation, Implementation, and Monitoring Plan
CBOC	California Burrowing Owl Consortium
CDCA	California Desert Conservation Area
CDFG	California Department of Fish and Game
CDFW	California Department of Fish and Wildlife
CEC	California Energy Commission
CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
CFR	Code of Federal Regulations
Cm	centimeter
CI	confidence interval
COD	commercial operation delivery
CNDDB	California Natural Diversity Database
CRSS	Colorado River Substation
CV	coefficient of variation
CVSR	California Valley Solar Ranch
DB	Designated Biologist
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
ESA	Endangered Species Act
FEIS	Final Environmental Impact Statement
FONSI	Finding of No Significant Impact
Ft	foot
GIS	Geographic Information System
GPS	Global Positioning System
IBA	Important Bird Area
I-10	Interstate 10
gen-tie	generation tie line
Km	kilometer
Kph	kilometers per hour
kV	kilovolt
M	meter
MBTA	Migratory Bird Treaty Act
Min	minute
MM	Mitigation Measures
Mph	miles per hour
DQ	Desert Quartzite Solar Energy Project (also, Project)
MW	megawatt

NEPA	National Environmental Policy Act
O&M facility	operations and maintenance facility
PA	Plan Amendment
PA/FEIS	Plan Amendment/Final Environmental Impact Statement
PCS	power converter station
Solar PEIS	Programmatic Environmental Impact Statement
Plan	Post-Construction Monitoring Plan
Project	Desert Quartzite Solar Energy Project (also, DQ)
PV	Photovoltaic
REAT	Renewable Energy Action Team
COUNTY	Riverside County, California
ROD	Record of Decision
ROW	right-of-way
SEZ	Solar Energy Zone
SCE	Southern California Edison
SPUT Permit	Special Purpose Utility Permit
SCC	Species of Special Concern
TAG	Technical Advisory Group
US	United States
USC	United States Code
USFWS	United States Fish and Wildlife Service
WBWG	Western Bat Working Group
WEAP	Worker Environmental Awareness Program
WRI	Wildlife Research Institute

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Appendix A Post-Construction Fatality Monitoring Plan

Appendix B Desert Quartzite Wildlife Incident Reporting System (WIRS)

1.0 INTRODUCTION

Desert Quartzite, LLC (Desert Quartzite) is proposing the Desert Quartzite Solar Energy Project (Project), an approximately 450 megawatt (MW) alternating current (AC) photovoltaic (PV) solar power generation facility. The Project site is located in rural eastern Riverside County near the City of Blythe, California, and situated on the Blythe United States Geological Survey (USGS) 7.5-minute Topographic Quadrangle (Figure 1). The site is situated just south of Interstate Highway 10 (I-10) and approximately 2.5 miles to the southwest of the Blythe Airport. The majority of the Project site is located on land administered by the Bureau of Land Management (BLM). A 160-acre private parcel land inholding is also included in the Project's Preliminary Site Plan (Figure 2).

The primary access to the Project site will be via I-10 to State Route 78 (SR 78)/S. Neighbours Boulevard to 16th Avenue/Seeley Boulevard. Emergency access from the west of the overall Project Site will be provided by I-10 to Wiley's Well Road to Power Line Road (both Wiley's Well Road and Power Line Road are paved) and then from the north of the existing Colorado River Substation (CRSS) via a maintenance road along the proposed generation interconnection transmission line (Gen-tie) route. Land uses in the Project vicinity include agricultural uses, off-highway vehicle (OHV) recreation, roads, pipelines, and transmission line rights-of-way.

This Bird and Bat Conservation Strategy (BBCS) was developed to identify bird and bat resources and potential Project related impacts and to formalize efforts by Desert Quartzite to avoid and minimize Project related impacts to birds and bats. This document will present general information such as the Project description, the BBCS purpose, and regulatory framework. The document will also provide information to detail the environmental setting and proposed action to address bird and bat impacts. This information will include the following:

- Baseline conditions/environmental setting
- Risk assessment, risk reduction and conservation measures
- Post-construction monitoring
- Reporting
- Adaptive management

1.1 Project Description

The Project will consist of the construction, operation, and maintenance of the solar power generation facility. Project components include on-site facilities, offsite facilities, and temporary facilities needed to construct the Project. Major on-site facilities are the solar field (comprised of multiple blocks of solar PV panels mounted on fixed tilt or tracking systems and associated equipment), a project substation, and operations and maintenance (O&M) facilities. The perimeter of the occupied portions of the Solar Facility will be fenced to limit public access. The entrance to the completed Project will be gated and restricted to unauthorized entry, and the Project will be surrounded by a permanent, six-foot tall, chain-link security fence with barbed wire. The offsite facilities include an approximately 3.94-mile long 230 kilovolt (kV) gen-tie located on BLM-administered lands within a 160-foot wide operational right-of-way (ROW). Interconnection to the California Independent System Operator (CAISO) Grid will be via the Southern California Edison (SCE)- operated transmission system at the CRSS. Temporary facilities, which will be removed at the end of the construction period, include the on-site mobilization, laydown, and construction areas and, if needed, any dust suppression water storage tanks. The total Project area under application for BLM and County of Riverside approval is approximately 5,275 acres (approximately 5,115 acres of BLM administered lands and 160 acres of private lands). The Project would occupy approximately 3,772 acres when completed, including 3,714 acres for the solar facility site and 58 acres for the proposed 160-foot wide gen-tie ROW. The Project's Preliminary Site Plan is presented in Figure 2.

The Project site is characterized by a relatively flat landscape comprised of alluvial and eolian deposits, with an elevation of approximately 300 to 500 feet above mean sea level (amsl). The surrounding vicinity includes similar conditions, with additional landscape features that include the Mule Mountains situated south of the Project, the McCoy Mountains situated north of the Project, Chuckwalla Valley situated west of the Project, and Palo Verde Valley and the Colorado River situated east of the Project (Figure 1).

1.2 BBCS Purpose

The U.S. Fish and Wildlife Service (USFWS) and the California Department of Fish and Wildlife (CDFW) currently recommend the development of a project-specific BBCS, formerly called an Avian and Bat Protection Plan (ABPP), for renewable energy projects that may impact bird and bat resources. This BBCS applies to the entire Project and associated infrastructure and will be updated as needed if aspects of the Project change. Although this BBCS will be implemented across the entire Project, the County's jurisdiction is limited to the 160 acres of private land inholding and the BLM's jurisdiction is limited to the remaining approximate 3,772 acres of BLM land. The purpose of this BBCS is to:

- Describe baseline conditions for bird and bat species present within the Project site, including results of site-specific surveys;
- Assess potential risk to birds and bats based on the proposed activities;
- Specify conservation measures that will be employed to avoid, minimize, and/or mitigate any potential adverse effects to these species;
- Describe the incidental monitoring and reporting that will take place during construction;
- Provide details for avian and bat post-construction monitoring and reporting;
- Specify the adaptive management process that will be used to address potential adverse effects on these species.

1.3 Regulatory Setting

Several federal and state laws and regulations, including the National Environmental Policy Act (NEPA), the federal Endangered Species Act (ESA), the California Endangered Species Act (CESA), the Migratory Bird Treaty Act (MBTA), the Bald and Golden Eagle Protection Act (BGEPA), California Fish and Game Codes, and the California Environmental Quality Act (CEQA) provide guidance for the development of this BBCS.

1.3.1 National Environmental Policy Act

Under NEPA (42 United States Code [USC] §§ 4321-4370h), federal agencies are required to prepare an Environmental Impact Statement (EIS) for any major federal action significantly affecting the quality of the human environment. The environmental impacts of the Project will be addressed by the Final EIS (FEIS); design features and/or potential mitigation and conservation actions related to birds and bats that are defined in the FEIS/EIR and grant of right-of-way will be incorporated into the Final BBCS.

1.3.2 Endangered Species Act

Certain species at risk of extinction, including many birds and bats, are protected under the federal ESA of 1973, as amended. The ESA defines and lists species as “endangered” and “threatened” and provides regulatory protection for the listed species. The federal ESA provides a program for conservation and recovery of threatened and endangered species. Section 7(a)(2) directs all federal agencies to insure that any action they authorize, fund, or carry-out does not jeopardize the continued existence of an endangered or threatened species or designated or proposed critical habitat (collectively, referred to as protected resources).

1.3.3 Migratory Bird Treaty Act

The MBTA (16 USC §§ 703, *et seq.*), passed by the US Congress and signed into law in 1918, makes it unlawful to “pursue, hunt, take, capture or kill; attempt to take capture or kill; possess; offer to or sell, barter, purchase, or deliver; or cause to be shipped, exported, imported, transported, or received any native migratory bird, part, nest, egg, or product.” The MBTA, enforced by the USFWS, protects all MBTA-listed migratory birds within the United States. In the continental US, native non-covered species generally belong to the Order Galliformes (i.e., game birds). Common non-native species not protected by the MBTA include rock pigeon (*Columba livia*), Eurasian collared-doves (*Streptopelia decaocto*), European starling (*Sturnus vulgaris*), and English house sparrow (*Passer domesticus;* USFWS 2005). Although permits may be obtained to collect MBTA-listed birds for scientific purposes or to destroy depredating migratory birds, the MBTA does not provide any permit mechanism authorizing the incidental take of migratory birds in connection with otherwise lawful activities. Nevertheless, federal agencies such as the BLM have been directed under Executive Order 13186 to evaluate the effects of its actions on migratory birds, with an emphasis on species of concern.

1.3.4 Bald and Golden Eagle Protection Act

The BGEPA (16 USC §§ 668-668d) prohibits the take, defined as to “pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest, or disturb,” of any bald eagle (*Haliaeetus* *leucocephalus*) or golden eagle (*Aquila chrysaetos*). Through recent regulation (50 Code of Federal Regulations [CFR] § 22.26; USFWS 2009), the USFWS can authorize take of bald and golden eagles when the take is associated with, but not the purpose of, an otherwise lawful activity and cannot practicably be avoided. The USFWS has issued Eagle Conservation Plan Guidance (USFWS 2013) for land-based wind energy projects to help project proponents avoid unanticipated take of bald and golden eagles and comply with the BGEPA. Although the guidelines were developed for land- based wind energy projects, certain components of the guidelines, such as eagle surveys, monitoring, and risk assessment, are applicable to other renewable energy projects, including PV solar plants, and have been incorporated into this BBCS.

1.3.5 California Endangered Species Act

The CESA (Fish and Game Code Sections [§§] 2050 - 2097) protects and preserves species designated by the Fish and Game Commission as either threatened or endangered in the state of California. These protected resources include those native species of fishes, amphibians, reptiles, birds, mammals, invertebrates, and plants, and their habitats, that are threatened with extinction, as well as those experiencing a significant decline which, if not halted, would lead to a threatened or endangered designation. The CESA also allows for take that is incidental to otherwise lawful development projects.

1.3.6 California Fish and Game Codes

Section 2050-2085 (threatened or endangered species) – These codes encompass the applicable declarations and definitions of the CESA.

Sections 3503 and 3503.5 (protection of birds and raptors) – These codes state that it is unlawful to take, possess, or needlessly destroy the nest or eggs of any native bird (§ 3503) and birds of prey (§ 3503.5), except as otherwise provided by this code or any regulation made pursuant thereto. These sections do not apply to non-native species.

Sections 3511, 4700, 5050, and 5515 (fully protected species) – These state laws classify and prohibit the take of "fully protected" bird, mammal, amphibian/reptile, and fish species in California.

Section 3513 (migratory birds) – This code prohibits any take or possession of birds that are designated by the MBTA as migratory non-game birds except as allowed by federal rules and regulations promulgated pursuant to the MBTA.

Sections 4150 (mammals) – This code defines all mammals that naturally occur in California as non-game mammals, with exceptions for those defined as game mammals, fully protected mammals, or fur-bearing mammals. Non-game mammals or parts thereof may not be taken or possessed except as otherwise provided by this code or any regulation made pursuant thereto.

1.3.7 California Environmental Quality Act (CEQA)

Riverside County is the CEQA lead agency for the private land component of the Project. Any relevant conditions defined in the Final EIS/Environmental Impact Report and the County issued Conditional Use Permit will be incorporated into this BBCS.

1.4 Personnel Roles and Responsibilities

Four key positions will be responsible for the implementation of the BBCS, including post construction mortality monitoring: Lead Avian Biologist, Lead Bat Biologist, Avian Biologists, and Biological Monitors.

1.4.1 Lead Avian Biologist

Desert Quartzite will assign a Lead Avian Biologist to the Project. The Lead Avian Biologist will be responsible for overseeing the implementation of the BBCS and ensuring all monitoring and reporting requirements are met and will be onsite as needed to handle events as they occur. Desert Quartzite will ensure the Lead Avian Biologist meets the minimum qualifications below and will submit the resume of the proposed Lead Avian Biologist to the BLM and the County for review in consultation with the CDFW and USFWS to confirm that the Lead Avian Biologist meets the minimum qualifications. Desert Quartzite will also designate an alternate Lead Avian Biologist with the same minimum qualifications as the Lead Avian Biologist, to be reviewed by the BLM and the County in consultation with the CDFW and USFWS. The Lead Avian Biologist and alternate Lead Avian Biologist will have the following minimum qualifications:

- A bachelor's degree in biological sciences, zoology, botany, ecology, or a related field and 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;
- Demonstrate proficiency at current avian survey and monitoring techniques; and
- At least one year of field experience with avian resources and/or monitoring in the southwest region.

The resume shall demonstrate to the satisfaction of the BLM and County that the proposed Lead Avian Biologist and alternate Lead Avian Biologist have the appropriate training and background to implement the BBCS effectively. The Applicant will ensure that the Lead Avian Biologist performs the activities specified in the BBCS. The Lead Avian Biologist may be the same as the overall site lead given the individual meets the approval of the BLM and the County.

1.4.2 Avian Biologist

The Applicant may designate qualified Avian Biologists to the Project. Avian Biologists will be responsible for conducting fieldwork pursuant to the conservation measures included in the BBCS that require implementation by a trained avian biologist. Field tasks may include species identification for the post - construction avian fatality surveys. Resumes of all proposed Avian Biologists will be submitted to the BLM and the County for review in consultation with the

CDFW and USFWS to confirm that they meet the minimum qualifications. Avian Biologists will have the following minimum qualifications:

- A bachelor's degree in biological sciences, zoology, botany, ecology, or a related field;
- Demonstrate proficiency at current avian survey and monitoring techniques; and
- At least one year of field experience with avian research and/or monitoring in the southwest region.

The resume shall demonstrate to the satisfaction of the BLM and County that the proposed Avian Biologists have the appropriate training and background to implement the BBCS effectively. The Lead Avian Biologist will ensure that the Avian Biologists perform the activities specified in the BBCS and may assist in the field as needed.

1.4.3 Lead Bat Biologist

The Applicant will assign a Lead Bat Biologist to the Project. The Lead Bat Biologist will be responsible for overseeing the implementation of the portions of the BBCS addressing bat conservation and ensuring all bat-related monitoring and reporting requirements are met. The Applicant will submit the resume of the proposed Lead Bat Biologist to the BLM and the County for review in consultation with the CDFW and USFWS to confirm that the Lead Bat Biologist meets the minimum qualifications. The Lead Avian and Bat Biologist(s) may be the same individual if they possess the proper qualifications. The proposed Bat Lead will have the minimum qualifications:

- A minimum of one year of field experience with bat resources in the southwest region;
- Demonstrate proficiency at current bat survey and monitoring techniques; and
- Possess at least a bachelor's degree in biological sciences, zoology, botany, ecology, or a related field and three years of experience in field biology or current certification of a nationally recognized biological society.

The resume shall demonstrate to the satisfaction of the BLM and County that the proposed Lead Bat Biologist has the appropriate training and background to implement the BBCS effectively. The Applicant will ensure that the Lead Bat Biologist performs the activities specified in the BBCS. The Lead Bat Biologist may be the same as the overall site lead given the individual meets the approval of the BLM and the County.

1.4.4 Biological Monitors

The Lead Avian and Bat Biologists may designate general Biological Monitors for the Project, as needed. Biological Monitors will have either proven bird or bat identification experience or an appropriate level of oversight by the Lead Avian and Bat Biologists and/or Avian Biologists. As appropriate, the Biological Monitors may also be assigned to record observations of special status avian and bat species on the Project site and vicinity, as well as instances of avian or bat mortality.

The Biological Monitors may assist with certain avian-related field tasks, such as responding to incidental mortality observations found during construction and post-construction mortality monitoring.

Monitors will be trained in distance-sampling search methodology, identification and documentation of carcasses, implementation of carcass removal trials, and notification of a rehabilitation center in the event of injured birds or bats. Only staff/technicians that are listed under the Special Purpose Utility Permit (SPUT) will be allowed to handle carcasses. An avian biologist will evaluate all carcass detections to ensure proper species identification. Accurate identification of rare, special status species will be emphasized during training. All surveyors will take photographs of all avian or bat carcass finds. All data collection will be standardized and the approved Lead Avian Biologist will determine likely cause of the fatality; however, all fatalities that were not conclusive will be reported.

2.0 PRE-CONSTRUCTION CONSERVATION MEASURES

2.1 Environmental Setting

The Project is located primarily on BLM-administered land, with a small privately-owned inholding. The site is characterized by a relatively flat landscape comprised of alluvial and eolian deposits, with an approximate elevation ranging from 300 to 500 feet AMSL. The dominant vegetation community type across the Project is Sonoran Creosote Bush Scrub. This community includes creosote bush (*Larrea tridentate*), burro bush (*Ambrosia dumosa*), and other scattered occurrences of shrubs, grass, and cactus species (see Ironwood 2016 for a full description). Other vegetative communities are less common and include Sand Dunes and Desert Wash Woodland. Non-vegetated areas include desert pavement and disturbed/developed land. No landscape features such as permanent water bodies have been identified in or immediately adjacent to the Project that would attract wildlife beyond normal conditions. The closest large bodies of water that could be considered major bird attractants are the Colorado River (20 km [12 miles] to the east of the Project), the Salton Sea (90 km [56 miles] southwest of the Project), and Lake Havasu (100 km [62 miles] to the northeast of the Project). The general region around the Project is considered part of the Pacific Flyway, which may increase flyovers seasonally. Stopover areas, such as open and linear waterbodies, are crucial to successful migration; however, birds may occur throughout the region depending on resource availability and weather conditions (Newton 2010).

2.2 Special Status Species

For the purposes of this BBCS, special status avian and bat species include the following:

- Species listed or proposed for listing as threatened or endangered under the federal Endangered Species Act (ESA) (50 Code of Federal Regulations [CFR] 17.12 [listed plants], 50 CFR 17.11 [listed animals], and various notices in the Federal Register [FR] [proposed species]).

- Species that are candidates for possible future listing as threatened or endangered under ESA (67 FR 40657, June 13, 2002).
- Species not already federal or state listed, proposed, or candidates that are listed by the BLM State Director as Sensitive Species. The BLM policy is to "ensure that actions authorized, funded, or carried out do not contribute to the need to list any of these species as threatened or endangered."
- Species listed or proposed for listing by the State of California as threatened or endangered under the CESA (14 California Code of Regulations [CCR] 670.5).
- Species that meet the definitions of rare or endangered under CEQA (State CEQA Guidelines Section 15380).
- Species of Special Concern (SSC) as listed by California Department of Fish and Wildlife (CDFW) (2016).
- Fully Protected Animals (FP) in California (including California Fish and Game Code Sections 3511 [birds] and 4700 [mammals]).
- Bird and bat species included on the California Special Animals List (CDFW 2016) because of inclusion on one or more of several "watch lists," including the CDFW Watch List (WL), International Union for Conservation of Nature (IUCN) Red List, the American Bird Conservancy (ABC) Green List, the Audubon WatchList, the BLM Sensitive Animals list, the California Department of Forestry and Fire Protection Sensitive Species list, the U.S. Forest Service (USFS) Sensitive Species list, the USFWS Birds of Conservation Concern (BCC) list, the United States Bird Conservation (USBC) Watch List, bat species included on the Western Bat Working Group's (WBWG) Regional Priority Matrix as High or Medium, and the Xerces Society Red list of pollinators.

2.3 Pre-Siting Data Collection

Data were collected to identify biological resources that exist within the Project vicinity to inform risk assessments and to identity potential future conservation measures.

2.3.1 Avian Studies

Avian surveys were completed at the Project site from spring 2013 to winter 2014 – 2015. Various methods were implemented to maximize migratory and resident bird detection across habitats and life stages. These methods were designed to specifically identify sensitive and/or state or federally listed species. Special status avian species have the potential to occur within the Project vicinity (Table 1). Survey techniques included unlimited distance bird migration surveys (Figure 3), line transect sampling (no summer sampling Figure 4), burrowing owl surveys (Figure 5), golden eagle surveys (Figure 6), elf owl surveys, and raptor/raven nest surveys (Corvis Ecological Consulting, LLC 2015, Figure 6)). All survey methods were completed following guidance provided by the BLM, USFWS, CDFW, and other published survey literature.

Table 1. Special-status bird species with the potential to occur within the Desert Quartzite Solar Energy Project vicinity, Riverside County, California.*

Common Name			Observed				Other Status[6]
bald eagle	*Haliaeetus leucocephalus*	Winter	No	Delisted 2007	Endangered	Sensitive	California FP; USFWS BCC
least Bell's vireo	*Vireo bellii pusillus*	Migrant	No	Endangered	Endangered	–	
Arizona Bell's vireo	*Vireo bellii arizonae*	Summer	No	–	Endangered	Sensitive	USFWS BCC
Bendire's thrasher	*Toxostoma bendirei*	Summer	No	–	–	Sensitive	California SSC; USFWS BCC
black-chinned sparrow	*Spizella atrogularis*	Rare	No	–	–	–	USFWS BCC
California black rail	*Laterallus jamaicensis coturniculus*	Year-round	No	–	Threatened	Sensitive	California FP; USFWS BCC
black skimmer	*Rynchops niger*	Summer	No	–	–	–	California SSC; USFWS BCC
Brewer's sparrow	*Spizella breweri*	Winter	Yes	–	–	–	USFWS BCC
burrowing owl	*Athene cunicularia*	Summer	Yes	–	–	Sensitive	California SSC; USFWS BCC
Costa's hummingbird	*Calypte costae*	Summer	Yes	–	–	–	USFWS BCC
crissal thrasher	*Toxostoma crissale*	Year-round	No	–	–	–	California SSC
elf owl	*Micrathene whitneyi*	Summer	No	–	Endangered	Sensitive	USFWS BCC
ferruginous hawk	*Buteo regalis*	Winter	Yes	–	–	–	CDFW WL; USFWS BCC
Gila woodpecker	*Melanerpes uropygialis*	Year-round	No	–	Endangered	Sensitive	USFWS BCC
gilded flicker	*Colaptes chrysoides*	Year-round	No	–	Endangered	Sensitive	USFWS BCC
golden eagle	*Aquila chrysaetos*	Winter	Off-site	–	–	Sensitive	California FP, WL; USFWS BCC
gray vireo	*Vireo vicinior*	Rare	No	–	–	Sensitive	California SSC; USFWS BCC
greater sandhill crane	*Grus canadensis tabida*	Migrant	No	–	Threatened	Sensitive	California FP
gull-billed tern	*Sterna nilotica*	Summer	No	–	–	–	California SSC; USFWS BCC
Lawrence's goldfinch	*Carduelis lawrencei*	Winter	No	–	–	–	USFWS BCC
least bittern	*Ixobrychus exilis*	Winter	No	–	–	–	California SSC; USFWS BCC
Le Conte's thrasher	*Toxostoma lecontei*	Year-round	Yes	–	–	–	California SSC; USFWS BCC
loggerhead shrike	*Lanius ludovicianus*	Year-round	Yes	–	–	–	California SSC; USFWS BCC

Table 1. Special-status bird species with the potential to occur within the Desert Quartzite Solar Energy Project vicinity, Riverside County, California.*

Common Name	Scientific Name	Resident Classification[1]	Observed within the DQ?[2]	ESA Status[3]	CESA Status[4]	BLM Status[5]	Other Status[6]
long-billed curlew	*Numenius americanus*	Winter	No	–	–	–	California WL; USFWS BCC
Lucy's warbler	*Vermivora luciae*	Summer	No	–	–	Sensitive	California SSC; USFWS BCC
mountain plover	*Charadrius montanus*	Winter	Yes	–	–	Sensitive	California SSC; USFWS BCC
northern harrier	*Circus cyaneus*	Winter	Yes	–	–	–	California SSC
American peregrine falcon	*Falco peregrinus anatum*	Migrant, Winter	No	Delisted 1999	Delisted 1999	–	California FP; USFWS BCC
prairie falcon	*Falco mexicanus*	Year-round	Yes	–	–	–	California WL; USFWS BCC
Yuma clapper (Ridgway's) rail	*Rallus longirostris (obsoletus) yumanensis*	Year-round	No	Endangered	Threatened	Sensitive	California FP
short-eared owl	*Asio flammeus*	Rare	No	–	–	–	California SSC
Southwestern willow flycatcher	*Empidonax trailii extimus*	Migrant	No	Endangered	Endangered	Sensitive	California Endangered
willow flycatcher	*Empidonax tralii*	Migrants	No	-	Endangered		USFWS BCC
Swainson's hawk	*Buteo swainsoni*	Migrant	Yes	–	Threatened	Sensitive	USFWS BCC
western snowy plover	*Charadrius alexandrinus nivosus*	Rare	No	Threatened	–	–	California SSC; USFWS BCC
yellow-billed cuckoo	*Coccyzus americanus*	Summer	No	Threatened	Endangered	Sensitive	USFWS BCC
yellow-breasted chat	*Icteria virens*	Summer, Migrant	No	–	–	–	California SSC
yellow warbler	*Dendroica petechia*	Winter	Yes	–	–	–	California SSC; USFWS BCC
Sonoran yellow warbler	*Dendroica petechial sonorana*	Winter	Yes	–	–	–	California SSC; USFWS BCC

* List primarily derived from California Special Animals list (CDFW 2016).
1. Resident classification taken from Sibley 2000.
2. Desert Quartzite Solar Energy Project, Riverside County, California. Yes = observed within Project during protocol surveys; No = not observed during protocol surveys; Off-Site = observed outside of the project area, not during protocol surveys. Data reported in the Corvus Ecological Consulting 2015 technical report.
3. Designated by USFWS as Threatened, Endangered or Candidate species under ESA.
4. Designated by CDFW as Threatened or Endangered under CESA.
5. Designated by the BLM as a sensitive species (BLM 2010)
6. Species appears on agency listing outside of ESA, CESA or BLM Sensitive, as listed on the California Special Animals list (CDFW 2016)
Status information from USFWS 1999, 2007, 2015; CDFW 2016; California Natural Diversity Database (CNDDB) 2016; BLM 2010.

2.3.2 Unlimited Distance Extended Observation Surveys

Unlimited distance extended observation surveys were conducted during the spring and fall of 2013 and 2014 to monitor bird migration trends (Corvus Ecological Consulting, LLC 2015). A total of four migration periods were sampled. The methods followed guidance provided by the BLM, USFWS, CDFW, and Hawk Migration Association of North America (HMANA).

Two migration points (MPs) were established to monitor and record migrating birds across the proposed Project site (Figure 3). Starting in spring 2014, the MPs were altered in an effort to maximize visibility of migrating birds. Avian biologists conducted surveys at each MP, once per week, in spring and fall of 2013 and 2014. Each MP was visited six times during spring 2013 (4/18/13 – 5/18/13), 11 times in fall 2013 (9/2/13 – 11/12/13), 11 times in spring 2014 (3/3/14 – 5/22/14), and 11 times in fall 2014 (9/5/14 – 11/15/14).

Reported results are summarized below:

- Avian use (mean number of birds/survey) varied within seasons and between seasons
- A peak in avian use occurred in spring during late March 2014
- Three peaks in avian use were observed in fall (2013 and 2014) extending from mid-September through mid-October
- For small bird observations, unidentified swallows and tree swallows (*Tachycineta bicolor*) had the highest single season counts (spring 2014) which included 1,000 and 950 individuals, respectively, on a single day. Large bird observations were highest for turkey vultures (and Swainson’s hawks (*Buteo swainsoni;* 782 and 620 in one day, respectively) during fall migration
- Other raptor species observations included American kestrel (*Falco sparverius)* , Cooper’s hawk (*Accipiter cooperii)*, ferruginous hawk (*Buteo regalis)*, northern harrier (*Circus cyaneus)*, osprey (*Pandion haliaetus)*, prairie falcon (*Falco mexicanus)*, and sharp-shinned hawk (*Accipiter striatus)*
- Over the entire survey period the most recorded species (not including the species listed in previous bullet points) included barn swallow (*Hirundo rustica)*, horned lark (*Eremophila alpestris)*, house finch (*Haemorhous mexicanus)*, sandhill crane (*Antigone canadensis)*, violet-green swallow (*Tachycineta thalassina)*, white-winged dove (*Zenaida asiatica)*, and yellow-rumped warbler (*Setophaga coronate)*

2.3.3 Line Transect Sampling

Project-specific line transect sampling protocol was conducted by Ironwood (2016). The survey included traveling predetermined routes and recording birds observed while scanning from side to side. Surveys were established to capture migrants, breeding birds, and residents. A total of eight 2,000-m long transects were surveyed in spring 2013 and eight additional transects were surveyed in fall 2013 (Figure 4). Surveys were conducted through the 2014 – 2015 winter season. Transects were located within and outside of the Project site. Two 500-m transects (T17 and T18) were surveyed in the private land inholding in Oct 2014. Transect survey order was randomized to reduce potential temporal bias.

The sampling effort documented 17,973 birds from 3,534 detections during 345 surveys. A subset of the collected data was analyzed to compare bird use on and off the Project site, as well as between seasons. Based on this preliminary analysis, more birds were observed off site when compared to on site, with the exception of spring 2014, but this was not statistically tested. No clear seasonal pattern in bird density emerged from the results. In general, the fall 2013 and spring 2014 monitoring periods recorded the high avian use in the project area (Table 2).

Table 2. Preliminary analysis of avian line transect results spring 2013 – winter 2014/15.

Season -Year	# of Detections	Estimated Density of Birds (per Ha)		Estimated Density of Cluster (per Ha)		Expected Cluster Size		Estimated # of Birds		Total # Species	
		Control	Footprint	Control	Footprint	Control	Footprint	Control	Footprint	Control	Footprint
Spring 2013	119	0.30	0.18	0.19	0.08	1.62	2.25	2117	348	25	17
Fall 2013	688	1.39	1.07	0.33	0.25		4.23	9429	2106	56	43
Winter 2013-14	460	1.12	0.40	0.31	0.12	3.6	3.3	7614	790	37	21
Spring 2014	495	0.4	2.18	0.19	0.52	2.12	4.2	2747	4287		42
Fall 2014	211	0.14	0.13		0.04 4.22		3.22	937	266	18	15
Winter 2014-15	283	0.20	0.15	0.09	0.07		2.32	1355	304	19	16

47

0.07 2.03

2.15

2.3.4 Burrowing Owl Surveys

Burrowing owl (*Athene cunicularia*) presence/absence surveys were conducted across the Project site and 150-m buffer (Figure 5). The goal of the surveys was to assess occupancy, abundance, Project site use, and distribution. Belt transect surveys were conducted at the Project site from Oct. 22, 2012 through April 15, 2013 and in the buffer area from May 14 – 17, 2013. Transects were spaced 10-m apart in the Project site and no more than 30-m apart in the buffer area. Additional burrowing owl surveys were conducted in spring 2014. During the presence/absence surveys, all owl sign (e.g., whitewash, tracks, pellets, feathers) were documented and burrows were ranked based on condition (rankings: 1 – excellent; 2 – good; 3 – fair; 4 – poor).

In addition to the presence/absence surveys, fixed-point surveys were completed to further assess burrowing owls (Rank 1-3 only). Surveys conducted in 2013 included burrow specific 3-hr surveys. Surveys conducted in 2014 spanned multiple intervals in April, May, and June. In 2015, burrows ranked 1 and 2 were revisited.

During the presence/absence surveys (fall 2012, spring 2013, spring 2014), 70 burrows (rank 1-3) were recorded within the Project site, with four confirmed burrowing owls (2013 – 2014). One burrow in the buffer area was identified as being recently used. Follow-up assessment surveys documented two pairs during the breeding season in 2013, none in 2014.

Burrowing owl use of the Project site varied over time with more observations of burrowing owls in the Project area during the non-breeding season, likely as a result of winter migrants. However statistical tests were not conducted.

2.3.5 Elf Owl Surveys

Elf owl (*Micrathene whitneyi*) surveys were conducted by Great Basin Bird Observatory specialist Dorothy Crowe. The surveys included a tour of the Project site to assess potential habitat suitability for nesting elf owls. Dorothy Crowe examined specific features within the 1-mile survey buffer and identified the location for notable features. Based on the surveys it was determined that the majority of the Project area and 1-mile buffer does not provide suitable habitat for the elf owls. No areas were identified that met the minimum requirements for elf owl. The potential for elf owls in the Project is very low.

2.3.6 Golden Eagle Surveys

Two seasons of golden eagle territory occupancy surveys were conducted to assess the potential for golden eagle use in the Project vicinity. Habitat data was used to establish 18 observation points (some 2013/2014 points were replaced in 2014/2015 surveys) in the Project site and 10-mile buffer; points were visited twice during the courtship/breeding period (December and January) in 2013 and 2014 (Ironwood 2015, Corvus 2015). One golden eagle was observed on January 21, 2014 approximately six miles southwest of the Project site. Follow up surveys were completed, but no golden eagles were observed. The historical golden eagle nest was observed to be occupied by a pair of red-tailed hawks (*Buteo jamaicensis*) during the

2013-2014 season survey period, but inactive during the 2014-2015 survey period (Corvus 2015). Twenty-six raptor nests were identified within 10 miles of the Project during nest surveys, but no nests were observed to be occupied by golden eagles (Corvus 2015). Additional Project surveys and studies were completed without an incidental observation or survey observation of a golden eagle (Corvus 2015, Ironwood 2015).

The Project would likely not result in direct or indirect impacts to golden eagle nest sites during O&M activities because the nearest inactive nest site is approximately 8 miles from the Project site, and no active golden eagle nests were documented within 10 miles of the site during the Territory and Occupancy Survey conducted for the Project. Based on avian point counts and focused golden eagle surveys, and the low abundance of prey item density, foraging use of the Study Area is considered low (Ironwood 2016).

Recent surveys for the Crimson Solar Project, adjacent to the Project to the east/south east concluded in the 2018 final report that nine golden eagle nests were found in the area. No active golden eagle nests were confirmed. (Bloom Biological 2018). Two potential golden eagle nests with evidence of fresh material were documented approximately 14.01 miles southwest and approximately 5.59 miles north of the Project site. As no bird was observed with either nest, they were considered unconfirmed as golden eagle nests by Bloom Biological and the territories are designated as “potentially occupied” by golden eagles (2018).

A review of the mortality monitoring data from Desert Sunlight and Genesis indicates that no eagle mortality collisions were noted for either of the existing solar facilities. The monitoring data suggest that there is a potential for mortality due to collision with the gen-tie or distribution lines, resulting from regional and local movement of avian species through the area, despite the distance from known golden eagle nests and nesting habitat and the lack of known prey concentrations on the Project site (Ironwood 2016).

The BLM has considered whether development of the DQSP could cause impacts to golden eagles related to the loss of potential foraging habitat. Although it is unknown whether golden eagles that might nest in the McCoy, Little Maria, and Big Maria Mountains in the future would utilize the Project area for foraging, avian point counts, the Territory and Occupancy Survey, and the prey abundance estimate that have been conducted for the Project suggest that golden eagles don’t maintain breeding/nesting territories on any portion of the Project, and only infrequently use the area for foraging (Ironwood 2016. Additionally, the population density of the black-tailed jackrabbit, a prey item of the golden eagle, was estimated to only be 0.0035 rabbits per acre based on transect data and as provided in Ironwood (2016). Furthermore, the habitat that would be disturbed or removed by development of the Project is neither unique nor limiting on the landscape, and does not represent a known prey concentration. Comparable or better foraging opportunities are expected to be available within the surrounding areas. For these reasons, development and operation of the Project is not expected to appreciably disturb the foraging of any eagle pairs within 10 miles of the Project site, and indirect impacts are expected to be negligible.

2.3.7 Raptor Nest and Raven Surveys

Nest surveys were completed to identify the number and distribution of raptor and raven nests within the Project site and 1-mile buffer. Surveys were completed monthly from May 1 June 1, in 2013 and 2014. A total of 38 nests (including corvids) were recorded during the survey period (Figure 6). Ten nests were identified as red-tailed hawks or common ravens and of these, three red-tailed hawk and one common raven nest successfully produced offspring. Other species (varied passerines, American kestrel, and unidentified hawks) composed the remainder of the nests documented. No other raptors species nests were identified during the surveys.

2.4 Bat Studies

Of the 47 bat species in the United States, 23 potentially occur within the Project vicinity based on known species range and habitat requirements (Table 2.3, Bat Conservation International [BCI] 2013). Seven of these species were detected in the Project Study Area (Ironwood 2016). One of the 23 bat species with potential to occur in the Project vicinity is a candidate for listing under CESA (Townsend's big-eared bat) and an additional nine bat species are listed as BLM Sensitive Animals, and an additional five species are listed as CDFW SSC animals (Table 2.3).

Table 3. Bat species potentially occurring within the Desert Quartzite Solar Energy Project area, Riverside County, California.

Common Name	Scientific Name	Detected in the Study Area? (Y/N)[1]	BLM Status[2]	Other Status[3]	Western Bat Working Group Priority Level[4]
Arizona myotis	Myotis occultus	N	-	California SSC	Medium
big brown bat	Eptesicus fuscus	N	-	-	Low
big free-tailed bat	Nyctinomops macrotis	N	-	California SSC	Medium-High
California leaf-nosed bat	Macrotus californicus	N	Sensitive	California SSC	High
California myotis	Myotis californicus	Y	-	-	Low
canyon bat*	Pipistrellus hesperus	Y	-	-	Low
cave myotis	Myotis velifer	Y	Sensitive	California SSC	Medium
dark-nosed small-footed bat	Myotis melanorhinus	N	-	-	-
fringed myotis	Myotis thysandodes	N	Sensitive	-	High
hoary bat	Lasiurus cinereus	N	-	-	Medium
little brown bat	Myotis lucifugus	N	–	–	Medium
long-eared myotis	Myotis evotis	N	Sensitive	-	Medium
long-legged myotis	Myotis volans	N	-	-	High
Mexican free-tailed bat	Tadarida brasiliensis	Y	-	-	Low
Mexican long-tongued bat	Choeronycteris mexicana	N	-	California SSC	High
pallid bat	Antrozous pallidus	Y	Sensitive	California SSC	High
pocketed free-tailed bat	Nyctinomops femorosaccus	Y	-	California SSC	Medium
small-footed myotis	Myotis ciliolabrum	N	Sensitive	-	Medium
spotted bat	Euderma maculatum	N	Sensitive	California SSC; CESA	High
Townsend's big-eared bat	Corynorhinus townsendii	N	Sensitive	Candidate; California SSC	High
western mastiff bat	Eumops perotis californicus	Y	Sensitive	California SSC	High
western red bat	Lasiurus blossevillii	N	-	California SSC	High
Yuma bat	Myotis yumanensis	N	Sensitive	-	Low-Medium

1. According to Ironwood (2016)
2. BLM Sensitive Species; (–) indicates species is not considered to be sensitive (BLM 2010).
3. Appears on the California Special Animals List, (–) indicates species is not listed (CDFW 2016).
4. Status derived from Western Bat Working Group (WBWG) Regional Priority Matrix Region 8; Low = Overall status of the species is believed to be secure, Medium = More information is needed to adequately assess species status, High = Species are imperiled or are at high risk of imperilment (WBWG 2007).

* formerly western pipistrelle (Pipistrellus hesperus)

Acoustic bat surveys were conducted over the course of 3 nights in spring of 2013 at 12 survey locations within the Project site and 1-mile buffer (Figure 7; Ironwood 2016). Seven bat species were detected foraging during the survey period, including four SSC species (pallid bat [*Antrozous pallidus*], cave myotis [*Myotis velifer*], western mastiff bat [*Eumops perotis*], and pocketed free-tailed bat [*Nyctinomops femorosaccus*]). The species most commonly detected during the surveys were the canyon bats and California myotis (*Myotis californicus*). More bat calls were recorded near sites with extensive woody vegetation, specifically the wash immediately east and south of the Project.

Additionally, the Project and surrounding area were searched for potential bat roosts and hibernacula, such as abandoned mines and caves (Ironwood 2016). Two gated mine sites in the McCoy Mountains (Uvanum and McCoy #3 mines, located approximately 4.4 miles northwest of the Project site) were previously identified as California leaf-nosed bat maternity colonies. During monitoring of these mine sites, 33 bats exited and 26 entered the Uvanum Mine, and 71 bats exited and 44 bats entered the McCoy #3 mine (Ironwood 2016). Identified bat species included pallid bats and California leaf-nosed bats (Ironwood 2016). One mine site in the Mule Mountains, the Stonehouse mine, was also surveyed (Ironwood 2016). This mine site has been extensively studied in the past, and is believed to support the largest winter colony of California leaf-nosed bats in the United States. It is also confirmed to be a maternity colony for California leaf-nosed bats and cave myotis. During monitoring of this mine site, a total of 3,348 bats were counted exiting the mine's five portals.

3.0 CONSERVATION MEASURES

Desert Quartzite will implement avoidance and minimization measures (MM) during the construction, operations, maintenance, and decommissioning phases to avoid and minimize Project-related bird and bat injuries and fatalities. Additional MMs may be included in the FEIS/EIR, which will be added to this BBCS once the FEIS/EIR is approved. Implementation of these MMs shall be required to comply with the BLM ROW Grant and County requirements issued for the Project.

3.1 Project Siting

Desert Quartzite is sited within the BLM-designated Riverside East Solar Energy Zone (SEZ). This SEZ was identified as part of the BLM and DOE Final Programmatic Environmental Impact Statement (PEIS) for Solar Energy Development in Six Southwestern States (BLM and DOE 2010; 2012) as a priority area for utility-scale solar energy development. The Project is proposed within the BLM's California Desert District and within the planning boundaries of the California Desert Conservation Area (CDCA Plan, which is the applicable Resource Management Plan (RMP) for the Project site and the surrounding areas. The Project site is classified as Multiple Use Class M (Moderate Use) in the CDCA Plan. The Moderate Use classification is based upon a controlled balance between higher intensity use and protection of public lands. This class provides for a wide variety of present and future uses such as mining, livestock grazing, recreation, energy, and utility development. The DRECP land use plan amendment eliminated the Multiple Use Class system for projects that are subject to the DRECP; however, the Project is a pending project under the DRECP and is not subject to the DRECP land use plan decisions.

3.2 Facility Design

3.2.1 Utility Poles and Lines

The Applicant would comply with Avian Power Line Interaction Committee (APLIC; 2006, 2012) guidance for preventing avian electrocutions and collisions with overhead power lines:

- Project specific Risk Assessment will be performed to identify those portions of the gen-tie line that pose the greatest risk of collision to avian and bat species.
- Based on the Risk Assessment, line markers will be installed to increase visibility of the gen-tie line to minimize collision risk.
- Monopoles, rather than lattice structures, will be used to minimized nesting opportunities for bird and therefore reduce electrocution risk.
- Bonding electrical connection on all metal (metal reinforced) structures to reduce electrocution risk.
- Installing covers on all appropriate insulators, and potential points of contact (neutral grounds, jumpers, or hardware).
- Provide appropriate clearances, horizontal and vertical, per structure materials and voltage to prevent bird induced arcing. For a proposed 230 kV gen-tie line, approximately 94 inches horizontal and 74 inches vertical.

3.2.2 Lighting

The Project will be designed to minimize lighting. Consistent with safety and security considerations, all permanent exterior lighting and all temporary construction lighting will be designed to minimize night-sky impacts to the extent practicable during construction and operations. Lighting for facilities will not exceed the minimum number of lights and brightness required for safety and security and will not cause excessive glare. Specific design features include the following:

- Low spectrum LED or low pressure sodium light sources will be used to reduce light pollution.
- Full cut-off luminaires will be used to minimize uplighting.
- Lights will be directed downward or toward the area to be illuminated.
- Light fixtures will not spill light beyond the Project boundary.
- Lights in highly illuminated areas that are not occupied on a continuous basis will have switches, timer switches, or motion detectors so that the lights operate only when the area is occupied.
- Where practicable, vehicle mounted lights will be used for night maintenance activities.

- Where practicable, consistent with safety and security, lighting will be kept off when not in use.

3.3 General Avoidance Measures and Management Practices

3.3.1 Pre-Construction/Maintenance Nest Surveys

The Applicant will ensure a Nesting Bird Management Plan (NBMP) is prepared for the Project prior to the initiation of construction activities. The Applicant will provide the NBMP to the BLM, USFWS and California Department of Fish and Wildlife for review and approval prior to finalizing the NBMP and initiating construction. Prior to initial grading or mowing activity, a pre-construction avian nest survey shall be conducted if ground-disturbing construction or maintenance activities are initiated between January 1 and August 31. The survey will occur within 4-7 days of those activities. On the day construction/maintenance activities commence, an additional walk-through of the immediate construction/maintenance site will be conducted. Furthermore, surveys for raptor nests within the Project site and a 500-feet buffer will be performed during the construction phase of the Project; raptor nest surveys will be conducted once per month during the breeding season (January 1 through August 31). Potential golden eagle nests within 2-miles of the Project site will also be monitored once per month during the breeding season. The qualified biologists conducting the surveys shall be experienced bird surveyors familiar with standard nest-locating techniques such as those described in Martin and Guepel (1993).

Surveys and monitoring specific to raptor nests within the Project site and established buffer will also be performed during the construction phase of the Project. These surveys will be conducted once per month during the breeding season (January 1 through August 31) and will entail inspecting all potentially suitable structures in the Project vicinity for the presence of raptor nests to the extent practicable, with some potential access restrictions on private land. CDFW guidelines require raptor nest surveys during the entire breeding season; however, the level of later survey effort may be considerably less as CDFW guidelines allow vehicular surveys after May 31.

The Applicant will specify measures in the Biological Resources Mitigation Implementation and Monitoring Plan (BRMIMP) for performing nest searches and establishing/monitoring no-disturbance buffers around active nests based on species. Active nests will be defined as any nest, burrow, or cavity found with the presence of eggs, chicks, or incubating adults. These buffers can be reduced if necessary to allow work within the buffer, but an avian biologist must be present with the authority to discontinue work if the breeding birds exhibit behavior indicating that the nest attempt may be disturbed. Nests should be monitored at least every four days to determine when the nesting attempt is complete and the buffer can be removed.

3.4 Other Avian-Specific Measures

3.4.1 Burrowing Owl Mitigation

The Applicant will ensure that a Burrowing Owl Mitigation Plan is prepared for the Project prior to the initiation of construction activities. The Applicant will provide the Burrowing Owl Mitigation Plan to BLM for review and approval prior to finalizing the plan and initiation of construction.

This plan will include details for conducting pre-construction surveys, identifying appropriate off-site areas for creation or enhancement of burrows, implementing the passive relocation of burrowing owls from the Project site, and reporting protocol, per guidance provided by applicable CDFW staff reports/guidelines.

3.4.2 Raven Management

The Applicant will ensure that a Raven Management Plan is prepared for the Project prior to the initiation of construction activities. The Applicant will provide the Raven Management Plan to BLM for review and approval prior to finalizing the plan and initiation of construction. The Raven Management Plan will include measures designed to: 1) minimize attracting and subsidizing ravens, 2) provide education to Project personnel, 3) remove raven nests and offending ravens, and 4) implement adaptive management where appropriate.

3.4.3 Incidental Mortality Observations during Construction

Throughout the construction phase of the Project, all incidentally discovered carcasses of birds and bats (i.e., incidental fatality discoveries by Worker Environmental Awareness Program (WEAP)-trained construction facility workers and staff as well as environmental staff when on site) will be reported to Biological Monitors and/or Avian Biologists. The Applicant's WEAP will be provided to the BLM for review and approval prior to providing training to facility workers. Facility workers and staff will be instructed during WEAP training to report mortalities to the appropriate supervisor who will in turn contact the biological monitor or avian biologist, if present. Information recorded for carcasses detected is shown on the Wildlife Incidence Response Form (WIRF) in Appendix B. During construction periods when a Biological Monitor or Avian Biologist is not on site, responsible facility personnel will be required to contact a designated on-call avian biologist who will be responsible for going to the site and recording the fatality data (see Appendix B). The Lead Avian Biologist will be responsible for retrieving and storing carcasses in freezers on-site per the terms and conditions of the Project Special Use Utility Permit (SPUT) and keeping records and reporting all fatalities to BLM and USFWS on a monthly basis. If a carcass of a species that is fully protected by the state or federally or state-listed as threatened or endangered, and for which handling is not specifically authorized under the applicable salvage permits, data and photos will be collected as for any other fatality but shall be covered with a bucket or cone and left in place to avoid attracting predators. If it has been confirmed as a federally listed species under the ESA, the surveyor will contact the appropriate Desert Quartzite representative as soon as reasonably possible. Desert Quartzite will be responsible for contacting the USFWS Office of Law Enforcement (OLE) within 24 hours of the injury or mortality being detected to determine the appropriate follow-up action.

3.4.4 Bird Rescue

Personnel will record any injured or rescued birds and bats found and Desert Quartzite will report them to BLM via email within 48 hours. Observers will immediately report and provide means of transportation for injured birds and bats to the nearest permitted wildlife rehabilitation facility for rescue and proper care. Waterbirds that are found alive and unable to take off but otherwise uninjured will be immediately reported and transported to the nearest permitted rehabilitation facility for rescue or if determined to be uninjured released at the nearest sizable body of water (e.g. along the Colorado River). Information on licensed wildlife rehabilitators will be kept up to date and provided by Lead Avian Biologists. From the Project site, the closest rehabilitation facilities capable of handling all avian and bat species (respectively) are:

- Coachella Valley Wild Bird Center, 46500 Van Buren, Indio, California, 92201; Phone: 760-347-2647; Contact: Linda York, Executive Director; Hours of Operation: 9:00 am-12:00 pm, seven days a week.
- The Living Desert Zoo & Gardens, 47900 Portola Avenue, Palm Desert, California, 92260; Phone: 760-346-5694 x8 x1; Contact: Sheila Lindquist, North American Manager; Hours of operation: 8:00 am-1:30 pm (June-September), 9:00 am-5:00 pm (October-May), seven days a week (closed Christmas Day). http://www.livingdesert.org/animals/wildlife-rehabilitation/
- Hope Wildlife Rescue, 18950 Consul Avenue, Corona, California 92881; Phone: 951-279-3232; Contact: Bill Anderson or Cyndi Floreno; **must call first (this is a California-licensed rehabilitator working out of a personal residence)**.
- All God's Creatures Wildlife Rescue & Rehabilitation, Chino Hills, California; Phone: 909-393-1590; Contact: Lori Bayour; http://www.allgodscreatures.net/index.html; no address available, contact by phone.
- International Bird Rescue, Los Angeles Center, San Pedro, California 90731; Phone: 310- 514-2573; Hours: 8:00 am - 5:00 pm.
- A list of wildlife rehabilitators maintained by California Department of Fish and Wildlife: http://www.dfg.ca.gov/wildlife/WIL/rehab/facilities.html
- The California Council for Wildlife Rehabilitators: http://www.ccwr.org/resources/rehabilitation-facilities-region-6.html

If a member of the facility staff encounters a dead individual of a species that is fully protected (federal or state) or state-listed as threatened or endangered, staff will collect data per SPUT requirements, and photos. If a dead individual is a federally or state-listed species, the surveyor will contact the appropriate Desert Quartzite representative as soon as reasonably possible. Desert Quartzite will be responsible for contacting the USFWS Office of Law Enforcement (OLE) within 24 hours to determine the appropriate follow-up action. The USFWS OLE contact for the Project is:

- Erin Dean; erin_dean@fws.gov; 310-328-1516

4.0 POST-CONSTRUCTION MONITORING

4.1 Post-Construction Avian and Bat Fatality Monitoring Plan

Desert Quartzite will implement a continuous monitoring program for a minimum of two years. Based on the results from the first year of monitoring, the second year monitoring methodology may be adjusted to best fit temporal/seasonal trends observed in the data collected from the first year of monitoring. A framework to evaluate the Project impacts in the context of other solar projects in the region is presented in Section 5.0. The monitoring program will inform adaptive management decisions and Technical Advisory Group (TAG) recommendations regarding any additional Bird and Bat Conservation Measures (BBCM) to avoid, minimize, and mitigate for observed impacts to birds or bats or to determine if additional monitoring is warranted.

4.1.1 Post-Construction Fatality Monitoring

Appendix A provides details of the avian fatality study to be conducted during the post-construction phase of the Project. This study will be implemented for a minimum of two years post-construction. The study will include standard and accepted methods used to evaluate project impacts on birds and bats. The monitoring will follow a distance sampling approach in the solar arrays, supported by searcher efficiency and carcass persistence trials. The monitoring in the solar arrays will include formal adjusted fatality estimates.

Adaptive management will be an integral component of the monitoring plan. The goal of adaptive management is to evaluate the monitoring results and identify the need for potential avoidance and minimization measure as warranted and feasible. A review of Project data will be critical at the end of each survey year to identify if any adaptive management strategies or additional conservation measures are appropriate.

4.1.2 Post-Construction Reporting

As detailed in Appendix A, post-construction reporting will include: 1) semi-annual electronic (email) summaries of fatality monitoring activities, 2) an annual report that provides detailed documentation and analyses of the avian fatality study, and 3) electronic communications (emails) of injury or fatality events of special status avian species within 24 hours of their discovery. The semi-annual summaries, annual reports, and fatality discoveries will be submitted to members of the TAG. The monthly summary of fatalities should be provided in a spreadsheet with the same data fields used during monitoring at other solar projects in the region (i.e., Desert Sunlight, Blythe, McCoy). The USFWS will provide a template of this spreadsheet for data collection and reporting. Semi-annual reports will include a summary of the fatality monitoring study activities for the period. Special status species fatality event emails will include details of the location and species discovered, and whether the discovery was an incidental observation or made as part of the post- construction fatality monitoring study.

The annual reports will highlight all injuries or fatality occurrences at the Project as well as suspected causes of mortality where field observable evidence exists, with an emphasis on any special status species occurrences. The annual reports will include maps detailing locations of mortality events, and photos that provide further documentation of mortality events and may include recommendations for possible adaptive management actions. The annual report for year two will include comparisons to year one results where appropriate.

5.0 TECHNICAL ADVISORY GROUP AND ADAPTIVE MANAGEMENT

A TAG will monitor Project activities, including fatality data, to provide recommendations to the BLM on the need for any adaptive management for bird or bat species based on reported data. The TAG will consist of representatives from the BLM, USFWS, and CDFW. Two additional non-voting members, representing Desert Quartzite, would serve as members of the TAG. Person(s) with scientific expertise may be invited by TAG members, if deemed appropriate. In addition, representatives from the Project and the consultants involved in the conduct of the studies will typically be invited to attend and participate in TAG meetings. The TAG will provide advice and recommendations to the BLM on developing and implementing effective measures to monitor, avoid, minimize, and mitigate impacts to any bird or bat species and their habitats related to operations. The BLM will evaluate any recommendations of the TAG, including discussions with Desert Quartzite concerning new measures or measures that are not completely detailed in this BBCS, and make a decision on what measure(s) and monitoring to require for implementation. It is assumed that cost may be a factor considered when recommending any changes to the monitoring protocol or other adaptive management measures.

A TAG Lead from the Project will be designated for the group whose duties will include disseminating Project data, including data on fatality events, attending meetings, reviewing of fatality data, and documenting adaptive management recommendations for the Project. The BLM will provide one designated TAG Lead for the Project. The BLM TAG Lead will serve as TAG chair, and it is the responsibility of the chair to coordinate meetings and involve all team members.

The guiding principles, duties, and responsibilities of the TAG include the following:

- Review results of fatality monitoring;
- Review annual report on status of compliance with mitigation measures and permit conditions and provide recommendations to the BLM as necessary.

- If the BLM determines, based on post-construction monitoring, that bird or bat mortality caused by solar facilities is having potentially adverse impacts on bird or bat species, the TAG may recommend adaptive management strategies. Adaptive management will be an integral component of the monitoring plan. The goal of adaptive management is to evaluate the monitoring results and identify the need for potential avoidance and minimization measure as warranted and feasible. However, the dearth of information pertaining to avian and bat mortality at large-scale photovoltaic solar energy facilities makes the establishment of adaptive management recommendations and trigger thresholds difficult to assign prior to data collection and evaluation. The guidelines and potential adaptive management responses listed below are provided as a starting point to guide the adaptive management discussions, but are not assumed to be stagnant or clearly defined. The adaptive management process and actions should be fluid based on study plan results and currently available data from other publically available studies.

The TAG shall hold the first meeting prior to commencement of post-construction monitoring to review any final details of the monitoring plan. Subsequent meetings will be held twice per year, once after the first two monitoring seasons are complete, and after the end of each annual monitoring cycle. A conference call or web-based meeting will ensue to review the data collected to date and take comments. After the meeting following the conclusion of the annual monitoring cycles, the monitoring consultant will revise the Annual Report and resubmit to the BLM which, in consultation with the USFWS and CDFW, will approve the report as final.

After the first year of monitoring, Desert Quartzite and the TAG will review the findings to determine if adjustments to the monitoring frequency or methods are warranted based on first year monitoring results. Continued/focused monitoring beyond two years may be warranted if data indicate that bird and bat mortality caused by solar facilities is substantial (based on evaluation criteria to be developed by the TAG) and is having potential adverse impacts on bird or bat species or there are other special circumstances (e.g. large fatality events). Such monitoring will be designed to address specific concerns that are identified after review of the data.

The guiding principles associated with adaptive management at the Project are:

- Recommendations will be made based on best available science;
- Recommendations will generally be made by consensus. Where consensus cannot be reached, multiple recommendations will be put forth to the BLM for a final decision;
- Provide sufficient flexibility to adapt as more is learned about the Project as well as science-based strategies to reduce special status species impacts, if warranted;
- Recommendations will be assessed by all agencies involved, as well as representatives for the Project;
- Implement adaptive management program measures to reduce or offset mortalities caused by the Project.

Potential adaptive management responses may include but would not be limited to:

- Additional monitoring to assess if impacts represent ongoing and significant risk;
- An assessment to evaluate why impacts are occurring and to aid in developing appropriate actions to further avoid, minimize or mitigate the impacts;
- Modifications to prey-base or habitat to reduce ongoing risk (e.g., additional on-site carcass removal, increased frequency of vegetation management), as appropriate;
- Installation of bird deterrent devices that follow industry best practices for solar arrays, gen-ties and/or along fence lines; or
- Additional anti-perching, anti-nesting, anti-electrocution, or flight diverter devices to transmission/collector lines or within substations/switchyard, as appropriate.

As more post-construction fatality monitoring studies at PV facilities become publically available, a broader understanding of the impacts of PV on birds will emerge. Post-construction Project-related impact assessment is highly complex, particularly with regard to relatively new technologies such as utility-scale solar PV projects.

6.0 REFERENCES

Anderson, R., M. Morrison, K. Sinclair, and D. Strickland. 1999. Studying Wind Energy/Bird Interactions: A Guidance Document. Metrics and Methods for Determining or Monitoring Potential Impacts on Birds at Existing and Proposed Wind Energy Sites. Prepared for the Avian Subcommittee and National Wind Coordinating Collaborative (NWCC). December 1999. National Wind Coordinating Committee/RESOLVE. Washington, D.C. 87 pp.

Avian Power Line Interaction Committee (APLIC). 2005. Avian Protection Plan (APP) Guidelines. A Joint Document prepared by the Edison Electric Institute's Avian Power Line Interaction Committee (APLIC) and the US Fish and Wildlife Service (USFWS).

Avian Power Line Interaction Committee (APLIC). 2006. Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006. Public Interest Energy Research Program (PIER) Final Project Report CEC-500-2006-022. Edison Electric Institute, APLIC, and the California Energy Commission. Washington D.C. and Sacramento, California.

Avian Power Line Interaction Committee (APLIC). 2012. Reducing Avian Collisions with Power Lines: The State of the Art in 2012. Edison Electric Institute and APLIC, Washington D.C.

Bat Conservation International (BCI). 2013. BCI Species Profiles. BCI, Inc., Austin, Texas. Accessed 2016. Homepage: http://www.batcon.org

Buckland, S. T., D. R. Anderson, K. P. Burnham, and J. L. Laake. 1993. Distance Sampling: Estimating Abundance of Biological Populations. Chapman & Hall, London, United Kingdom.

Bureau of Land Management (BLM). 2010. Special Status Animals in California, Including BLM Designated Sensitive Species. February 8, 2010. Accessed Novmber 21, 2017. https://www.blm.gov/ca/dir/pdfs/2010/im/CAIM2010-008ATT1.pdf

Bureau of Land Management (BLM). 2012. Desert Quartzite Solar Energy Project Draft Plan Amendment and Environmental Impact Statement. CACA #048728. United States Department of the Interior BLM, Palm Springs - South Coast Field Office, Palm Springs, California, USA. May 2012.

Bureau of Land Management (BLM). 2013. Desert Quartzite Solar Energy Project Draft Plan Amendment and Environmental Impact Statement. CACA #048728. Palm Springs – South Coast Field Office, Palm Springs, California, USA.

California Burrowing Owl Consortium (CBOC). 1993. Burrowing Owl Survey Protocol and Mitigation Guidelines. Prepared by the California Burrowing Owl Consortium. April 1993.

California Department of Fish and Game (CDFG). 2011. Special Animals (898 Taxa). State of California Natural Resources Agency, Biogeographic Data Branch, California Natural Diversity Database (CNNDB). January 2011.

California Department of Fish and Wildlife (CDFW). 2017. Natural Diversity Database January 2017 Special Animals List. Periodic publication. 51 pp. Available online at: https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=109406&inline

California Energy Commission (CEC) and California Department of Fish and Game (CDFG). 2007. California Guidelines for Reducing Impacts to Birds and Bats from Wind Energy Development. Commission Final Report. CEC, Renewables Committee, and Energy Facilities Siting Division, and CDFG, Resources Management and Policy Division. CEC-700-2007-008-CMF.

California Natural Diversity Database (CNDDB). 2015. State and Federally Listed Endangered and Threatened Animals of California. State of California, Natural Resources Agency, Department of Fish and Wildlife (CDFW), Biogeographic Data Branch, CNDDB. March 2015. Threatened and endangered species list available online at: https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=109390&inline

Chatfield, A., W. Erickson, and K. Bay. 2009. Avian and Bat Fatality Study, Dillon Wind-Energy Facility, Riverside County, California. Final Report: March 26, 2008 - March 26, 2009. Prepared for Iberdrola Renewables, Portland, Oregon. Prepared by Western EcoSystems Technology, Inc. (WEST), Cheyenne, Wyoming. June 3, 2009.

Chatfield, A., W. P. Erickson, and K. Bay. 2010. Avian Studies for the Alta Infill Wind Resource Area, Kern County, California. Spring Interim Report: February 1 - May 27, 2010. Prepared for CH2M HILL, Oakland, California. Prepared by Western EcoSystems Technology, Inc. (WEST), Cheyenne, Wyoming.

Corvus Ecological Consulting, LLC 2015. Desert Quartzite Avian Work Summary Spring 2013 – Winter 2015. Report prepared for Desert Quartzite, LLC. June, 2015.

ESRI. ArcInfo 10.0. ESRI, producers of ArcGIS software. Redlands, California.

Flyways.us website. Pacific Flyway. Homepage: http://www.flyways.us/flyways/info; Pacific Flyway: http://www.flyways.us/flyways/pacific

H.T. Harvey and Associates. 2014. California Valley Solar Ranch Project Avian and Bat Protection Plan Annual Postconstruction Fatality Report: 16 August 2012 – 15 August 2013. Project # 3326-03. Prepared for HPR II, LLC, California Valley Solar Ranch, Santa Margarita, California. Prepared by

H.T. Harvey and Associates, San Luis Obispo, California. March 28, 2014. Hawk Migration Association of North America (HMANA). http://www.hmana.org

Huso, M. 2010. An Estimator of Wildlife Fatality from Observed Carcasses. Environmetrics 22(3): 318-329. doi: 10.1002/env.1052.

Huso, M., N. Som, and L. Ladd. 2012. Fatality Estimator User's Guide. US Geological Survey (USGS) Data Series 729. 22 pp. Available online at: http://pubs.usgs.gov/ds/729/pdf/ds729.pdfIronwood Consulting, Inc. (Ironwood). 2016. Biological Resources Technical Report for the Desert Quartzite Solar Project. BLM Case File Number CACA-49397. Riverside County, California.Korner-Nievergelt, F., P. Korner-Nievergelt, O. Behr, I. Niermann, R. Brinkmann, and B. Hellriegel. 2011. A New Method to Determine Bird and Bat Fatality at Wind Energy Turbines from Carcass Searches. Wildlife Biology 17: 350-363.

National Audubon Society. 2015. The Important Bird Areas. Accessed March 2015. Information available online at: http://www.audubon.org/bird/iba

Newton, I. 2010. The Migration Ecology of Birds. Academic Press, San Diego, California, USA. North American Datum (NAD). 1983. NAD83 Geodetic Datum.

Pagel, J. E., D. M. Whittington, and G. T. Allen. 2010. Interim Golden Eagle Technical Guidance: Inventory and Monitoring Protocols; and Other Recommendations in Support of Golden Eagle Management and Permit Issuance. US Fish and Wildlife Service (USFWS). February 2010. Available online at: http://www.energy.ca.gov/sitingcases/palen/compliance/2013-03-12_US_Fish_and_Wildlife_Services_Interim_Golden_Eagle_Technical_Guidance_-_Inventory_and_Monitoring_Protocols_and_Other_Recommendations_TN-69896.pdf

Riverside County Planning Department. 2013. Desert Quartzite Solar Energy Project. Revised Draft Environmental Impact Report. State Clearinghouse No. 2011101007.

Sauer, J. R., J. E. Hines, J. E. Fallon, K. L. Pardieck, D. J. Ziolkowski, Jr., and W. A. Link. 2014. The North American Breeding Bird Survey, Results and Analysis 1966 - 2012. Version 02.19.2014. US Geological Survey [USGS] Patuxent Wildlife Research Center. Laurel, Maryland. BBS Routes available online at: http://www.mbr-pwrc.usgs.gov/bbs/bbs.html

Shoenfeld, P. 2004. Suggestions Regarding Avian Mortality Extrapolation. Technical memo provided to FPL Energy. West Virginia Highlands Conservancy, HC70, Box 553, Davis, West Virginia, 26260.

Sibley, D. A. 2000. The Sibley Guide to Birds. Chanticleer Press, Inc., New York.

Smallwood, K. S. 2007. Estimating Wind Turbine-Caused Bird Mortality. Journal of Wildlife Management 71: 2781-2791.

Smallwood, K. S. 2013. Comparing Bird and Bat Fatality-Rate Estimates among North American Wind-Energy Projects. Wildlife Society Bulletin 37(1): 19-33.

Smallwood, K. S., D. A. Bell, S. A. Snyder, and J. E. DiDonato. 2010. Novel Scavenger Removal Trials Increase Wind Turbine-Caused Avian Fatality Estimates. Journal of Wildlife Management 74: 1089-1097. doi: 10.2193/2009-266.

Solar Energy Development Programmatic EIS (Solar PEIS) website. 2015. Solar Energy Zones. Solar PEIS, Online Center. Prepared by the US Department of Energy, Office of Energy Efficiency and Renewable Energy (DOE), and the US Department of the Interior, Bureau of Land Management (BLM), with assistance from Argonne National Laboratory. BLM, Washington, D.C., and DOE, Washington, D.C. Accessed May 5, 2015. Information available online at: http://solareis.anl.gov/sez/index.cfm

Strickland, M. D., E. B. Arnett, W. P. Erickson, D. H. Johnson, G. D. Johnson, M. L. Morrison, J. A. Shaffer, and W. Warren-Hicks. 2011. Comprehensive Guide to Studying Wind Energy/Wildlife Interactions. Prepared for the National Wind Coordinating Collaborative (NWCC), Washington, D.C., USA. June 2011. Available online at http://www.batsandwind.org/pdf/Comprehensive_Guide_to_Studying_Wind_Energy_Wildlife_Interactions_2011.pdf

TerraStat Consulting Group (TerraStat). 2013. Estimation of 90% Confidence Bounds for Avian Mortality Estimates at Ivanpah 1. Seattle, Washington. Technical memorandum prepared on 13 August 2013 for H.T. Harvey and Associates, Los Gatos, California.

Tetra Tech. 2011. Golden Eagle Risk Assessment. Desert Quartzite Solar Energy Project, Riverside County, California. Portland, Oregon, USA.

Tetra Tech. 2014a. Avian Radar Survey Report for the Blythe Solar Power Project, Blythe, California. Tetra Tech. 2014b. Common Raven Management and Control Plan for the Desert Quartzite Solar Energy

Project, Riverside County, California. Lakewood, Colorado, USA.

Tetra Tech. 2014c. Fall 2013 Avian Survey Report. Desert Quartzite Solar Energy Project, Riverside County, California. USA.

Tetra Tech and A. Karl. 2011. Biological Resources Technical Report. Desert Quartzite Solar Energy Project, Riverside County, California. Lakewood, Colorado, USA.

Tetra Tech and A. Karl. 2012. Winter 2011-2012 Avian Point Count Survey Report. Desert Quartzite Solar Energy Project, Riverside County, California. Lakewood, Colorado, USA.

Thompson, J. and K. Bay. 2012. Post-Construction Fatality Surveys for the Dry Lake II Wind Project: February 2011 – February 2012. Prepared for Iberdrola Renewables, LLC, Portland, Oregon. Prepared by Western Ecosystems Technology, Inc. (WEST), Cheyenne, Wyoming. June 6, 2012.

US Fish and Wildlife Service (USFWS). 1999. Endangered and Threatened Wildlife and Plants; Final Rule to Remove the American Peregrine Falcon from the Federal List of Endangered and Threatened Wildlife, and to Remove the Similarity of Appearance Provision for Free-Flying Peregrines in the Conterminous United States; Final Rule. 50 CFR Part 17. Part III Department of the Interior Fish and Wildlife Service. 64 Federal Register (FR) 164: 46542-46558. August 25, 1999. Available online at: http://ecos.fws.gov/docs/federal_register/fr3444.pdf

US Fish and Wildlife Service (USFWS). 2007. Removing the Bald Eagle in the Lower 48 States from the List of Endangered and Threatened Wildlife. 72 Federal Register (FR) 37346-37372. July 9, 2007. Available online at: https://www.gpo.gov/fdsys/pkg/FR-2007-07-09/pdf/E7-13149.pdf US Fish and Wildlife Service (USFWS). 2008. Birds of Conservation Concern 2008. December 2008. Division of Migratory Bird Management. Arlington, Virginia. https://www.fws.gov/migratorybirds/pdf/management/BCC2008.pdf US Fish and Wildlife Service (USFWS). 2009. Title 50 - Wildlife and Fisheries. Chapter I - United States Fish and Wildlife Service, Department of the Interior (Continued). Subchapter B - Taking, Possession, Transportation, Sale, Purchase, Barter, Exportation, and Importation of Wildlife and Plants (Continued). Part 22 - Eagle Permits. Subpart C - Eagle Permits: Permits for Eagle Take That Is Associated with, but Not the Purpose of, an Activity. 50 CFR § 22.26 (a)(2). October 1, 2009.

US Fish and Wildlife Service (USFWS). 2010a. Preparing for any Action that May Occur within the Range of the Mojave Desert Tortoise (*Goperus agassizii*). Available online at: http://www.deserttortoise.org/documents/2010DTPre-projectSurveyProtocol.pdf

US Fish and Wildlife Service (USFWS). 2010b. Interim Guidance for Solar Energy Facilities.

US Fish and Wildlife Service (USFWS). 2012. Final Land-Based Wind Energy Guidelines. March 23, 2012. 82 pp. Available online at: https://www.fws.gov/ecological-services/es-library/pdfs/WEG_final.pdf

US Fish and Wildlife Service (USFWS). 2013. Eagle Conservation Plan Guidance. Module 1 - Land-Based Wind Energy. Version 2. Division of Migratory Bird Management, USFWS. April 2013. Available online at: https://www.fws.gov/migratorybirds/pdf/management/eagleconservationplanguidance.pdf

US Fish and Wildlife Service (USFWS). 2015. IPaC - Information, Planning, and Conservation System. IPaC, Environmental Conservation Online System (ECOS), USFWS. April 29, 2015. Information available online at: http://ecos.fws.gov/ipac/

Warren-Hicks, W., J. Newman, R. Wolpert, B. Karas, and L. Tran. 2013. Improving Methods for Estimating Fatality of Birds and Bats at Wind Energy Facilities. Public Interest Energy Research (PIER) Program CEC-500-2012-086. Final Project Report. Prepared for the California Energy Commission, Prepared on behalf of the California Wind Energy Association (CalWEA). February 2013. Available online at: http://www.energy.ca.gov/publications/displayOneReport.php?pubNum=CEC-500-2012-086

Western Bat Working Group (WBWG). 2007. Western Bat Working Group: Regional Bat Species Priority Matrix. Available at: http://wbwg.org/matrices/species-matrix/

Wildlife Research Institute (WRI). 2010. Phase I Golden Eagle Aerial Surveys Surrounding Four Proposed Energy Developments in the Mojave Desert Region, California. Report prepared Tetra Tech EC.

Wildlife Research Institute (WRI). 2011a. Phase 2 Summary of Findings Golden Eagle Aerial Surveys Surrounding the Desert Quartzite Solar Project in Riverside County, California. Report prepared Tetra Tech.

Wildlife Research Institute (WRI). 2011b. Phase I Summary of Findings Golden Eagle Aerial Surveys Surrounding the Desert Quartzite Solar Project in Riverside County, California. Report prepared Tetra Tech.

Laws, Acts, And Regulations

16 United States Code (USC) 703. 1918. Title 16 - Conservation; Chapter 7 - Protection of Migratory Game and Insectivorous Birds; Subchapter II - Migratory Bird Treaty; § 703 - Taking, Killing, or Possessing Migratory Birds Unlawful. (July 3, 1918, ch. 128, § 2,40 Stat. 755; June 20, 1936, ch. 634, § 3,49 Stat. 1556; Pub. L. 93–300, § 1,June 1, 1974, 88 Stat. 190; Pub. L. 101–233, § 15,Dec. 13, 1989, 103 Stat. 1977; Pub. L. 108–447, div. E, title I, § 143(b),Dec. 8, 2004, 118 Stat. 3071.).

16 US Code (USC) 668. 1940. Bald and Golden Eagles. (June 8, 1940, Ch. 278, § 1,54 Stat. 250; Pub. L. 86–70, § 14, June 25, 1959, 73 Stat. 143; Pub. L. 87–884, Oct. 24, 1962, 76 Stat. 1246; Pub. L. 92–535, § 1,Oct. 23, 1972, 86 Stat. 1064.)

42 United States Code (USC) 4321-4370h. 1970. Title 42 - the Public Health and Welfare; Chapter 55 - National Environmental Policy; Subchapters I (Policies and Goals) and II (Council on Environmental Quality); Sections (§§) 4321-4370h. Public Law 91–190, § 2, January 1, 1970, 83 Statute 852.

50 Code of Federal Regulations (CFR) 10.13. 1973. Title 50 - Wildlife and Fisheries; Chapter I -United States Fish and Wildlife Service, Department of the Interior; Subchapter B Taking, Possession, Transportation, Sale, Purchase, Barter, Exportation, and Importation of Wildlife and Plants; Part 10- General Provisions; Subpart B - Definitions; Section (§)10.13. List of Migratory Birds. 50 CFR 10.13; 38 Federal Register (FR) 22015, August 15, 1973, as amended 50 FR 52889, December 26, 1985.

50 Code of Federal Regulations (CFR) 22.26. 2009. Title 50 - Wildlife and Fisheries; Chapter I -United States Fish and Wildlife Service, Department of the Interior; Subchapter B - Taking, Possession, Transportation, Sale, Purchase, Barter, Exportation, and Importation of of Wildlife and Plants; Part 22 - Eagle Permits; Subpart C - Eagle Permits; Section (§) 22.26 - Permits for Eagle Take That Is Associated with, but Not the Purpose of, an Activity. (74 Federal Register (FR) 46877, September 11, 2009, as amended at 79 FR 73725, December 9, 2013).

Bald and Golden Eagle Protection Act (BGEPA). 1940. 16 United States Code (USC) § 668-668d. Bald Eagle Protection Act of 1940, June 8, 1940, Chapter 278, § 2, 54 Statute (Stat.) 251; Expanded to include the related species of the golden eagle October 24, 1962, Public Law (PL) 87-884, 76 Stat. 1246. As amended: October 23, 1972, PL 92-535, § 2, 86 Stat. 1065; November 8, 1978, PL 95-616, § 9, 92 Stat. 3114.

California Endangered Species Act (CESA). 1984. Fish and Game Code § 2050 - 2115.5.

California Fish and Game Code, § 3511. California Fish and Game Code; Division 4. Birds and Mammals; Part 2. Birds; Chapter 1. General Provisions; § 3511. Fully Protected Birds. California Department of Fish and Game (CDFG). Available online at California Attorney References: http://law.onecle.com/california/fish/3511.html

California Fish and Game Code, § 3513. California Fish and Game Code; Division 4. Birds and Mammals; Part 2. Birds; Chapter 1. General Provisions; § 3513. California Department of Fish and Game (CDFG). Available online at California Attorney References: http://law.onecle.com/california/fish/3513.html

California Fish and Game Code, § 4150. California Fish and Game Code; Division 4. Birds and Mammals; Part 3. Mammals; Chapter 3. Nongame Mammals and Depredators; Article 1. Nongame Mammals; § 4150. California Department of Fish and Game (CDFG). Available online at California Attorney References: http://law.onecle.com/california/fish/4150.html

California Fish and Game Code, § 4700. California Fish and Game Code; Division 4. Birds and Mammals; Part 3. Mammals; Chapter 8. Fully Protected Mammals; § 4700. California Department of Fish and Game (CDFG). Available online at California Attorney References: http://law.onecle.com/california/fish/4700.html

California Fish and Game Code, § 5050. California Fish and Game Code; Division 5. Protected Reptiles and Amphibians; Chapter 2. Fully Protected Reptiles and Amphibians; § 5050. California Department of Fish and Game (CDFG). Available online at California Attorney References: http://law.onecle.com/california/fish/5050.html

California Fish and Game Code, § 5515. California Fish and Game Code; Division 6. Fish; Part 1. Generally; Chapter 1. Miscellaneous; § 5515. California Department of Fish and Game (CDFG). Available online at California Attorney References: http://law.onecle.com/california/fish/5515.html

California Fish and Game Code, §§ 2050-2097. California Fish and Game Code; Division 3. Fish and Game Generally; Chapter 1.5. Endangered Species. California Department of Fish and Game (CDFG). Available online at California Attorney References: http://law.onecle.com/california/ fish/index.html

California Fish and Game Code, §§ 3503 and 3503.5. California Fish and Game Code; Division 4. Birds and Mammals; Part 2. Birds; Chapter 1. General Provisions. California Department of Fish and Game (CDFG). Available online at California Attorney References: http://law.onecle.com/california/fish/sec-3500-3516.html

Endangered Species Act (ESA). 1973. 16 United States Code (USC) § 1531-1544, Public Law (PL) 93-205, December 28, 1973, as amended, PL 100-478 [16 USC 1531 *et seq.*]; 50 Code of Federal Regulations (CFR) 402.

Executive Order (EO) 13186. 2001. Responsibilities of Federal Agencies to Protect Migratory Birds. EO 13186 of January 10, 2001. 66 Federal Register (FR) 11: 3853-3856. Published in the FR January 17, 2001. Available online at: https://www.fws.gov/migratorybirds/ Partnerships/migbrdeo.pdf

Migratory Bird Treaty Act (MBTA). 1918. 16 United States Code (USC) § 703-712. July 13, 1918.

National Environmental Policy Act (NEPA). 1970. 42 United States Code (USC) 4321-4370h. Public Law 91–190, § 2, January 1, 1970, 83 Statute 852.

Figures

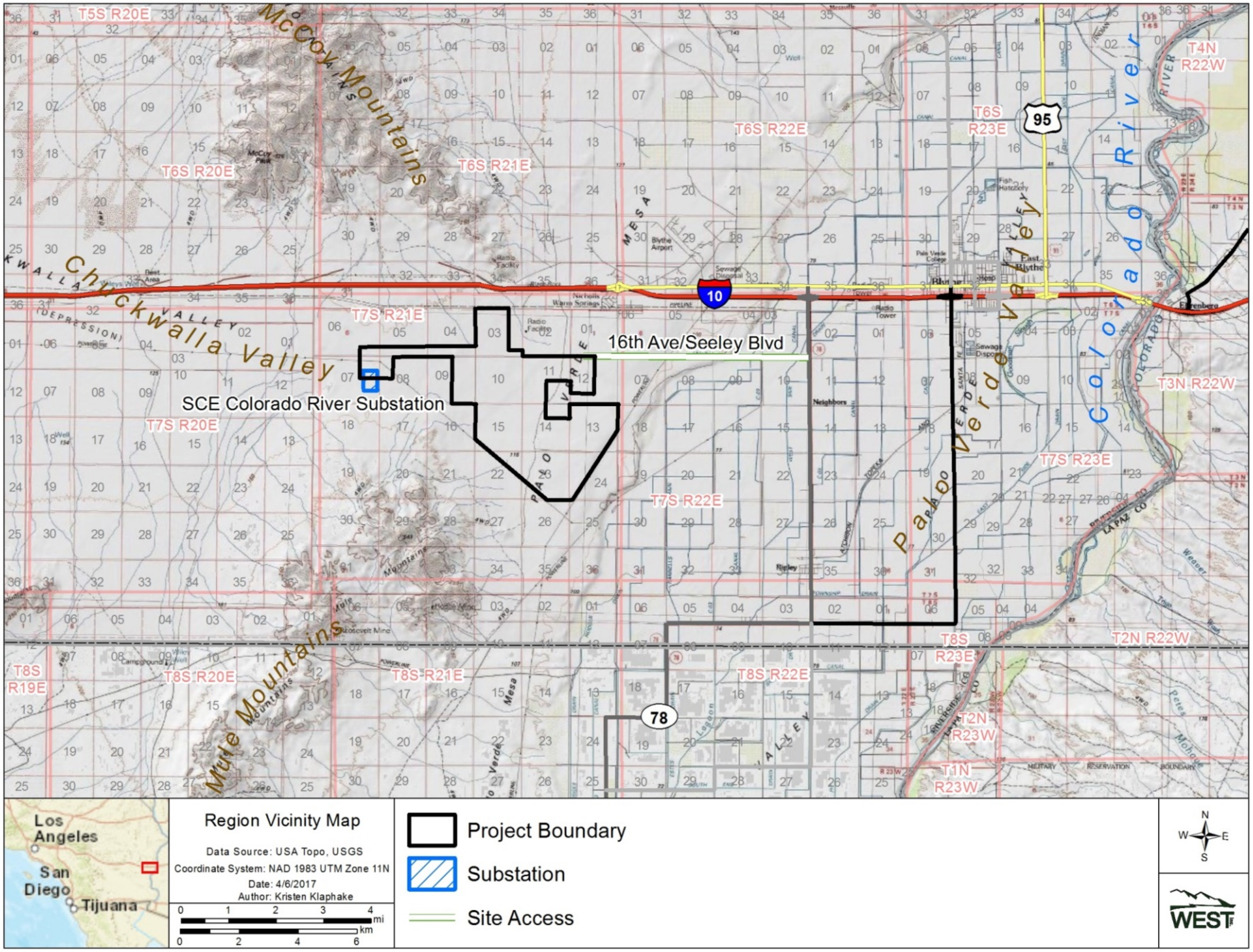


Figure 1. Regional vicinity map.

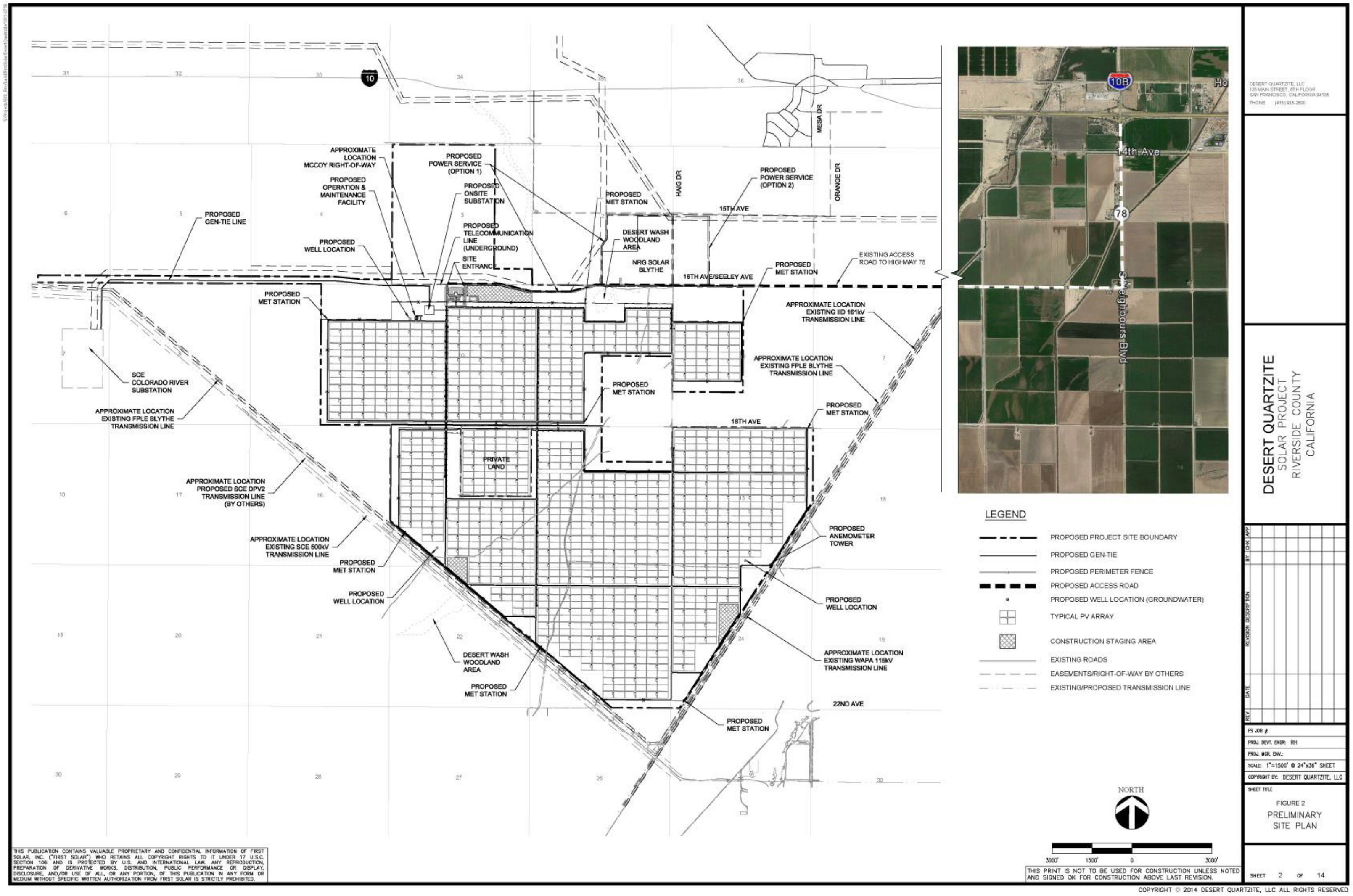
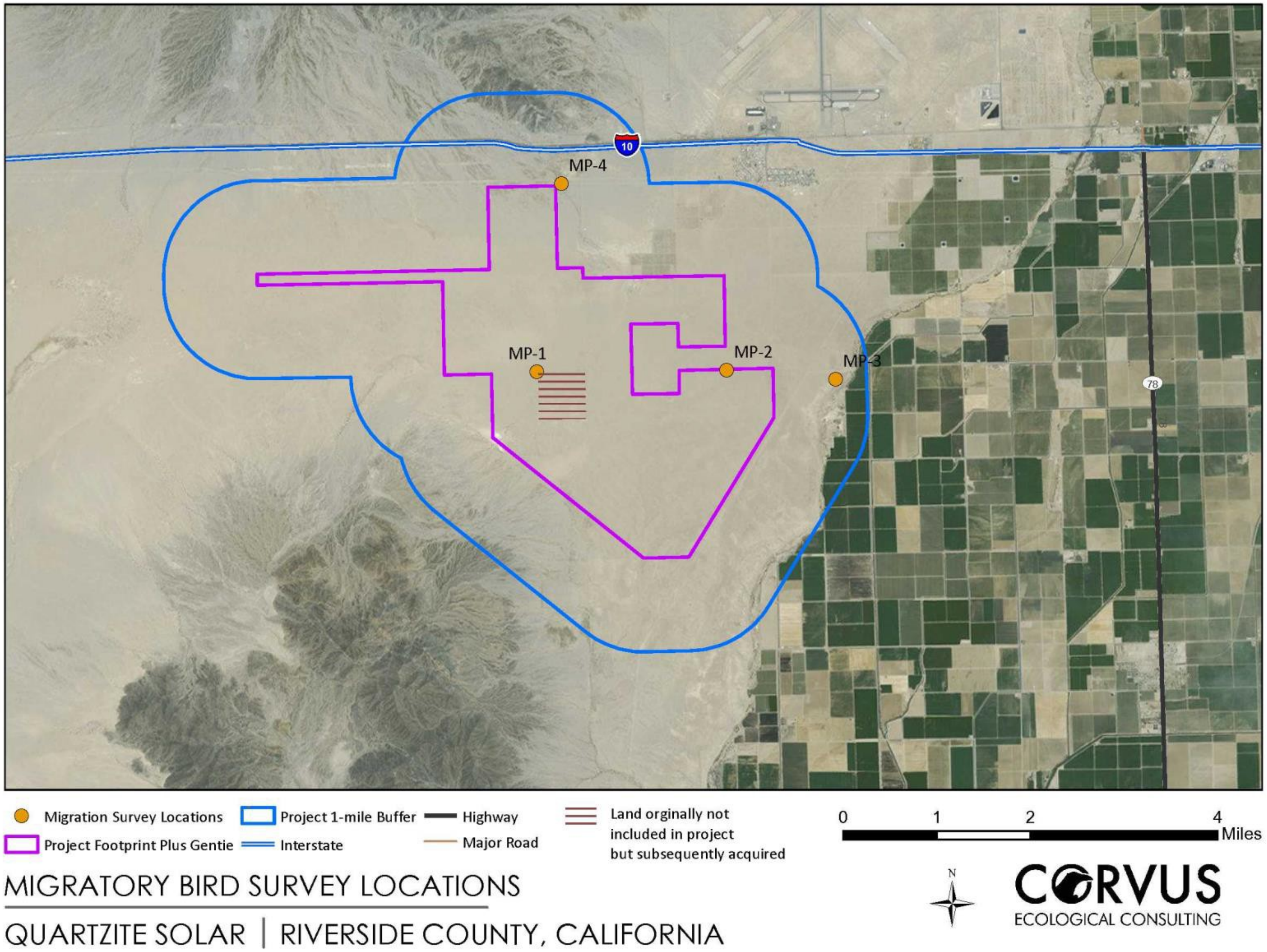


Figure 2. Preliminary site plan.



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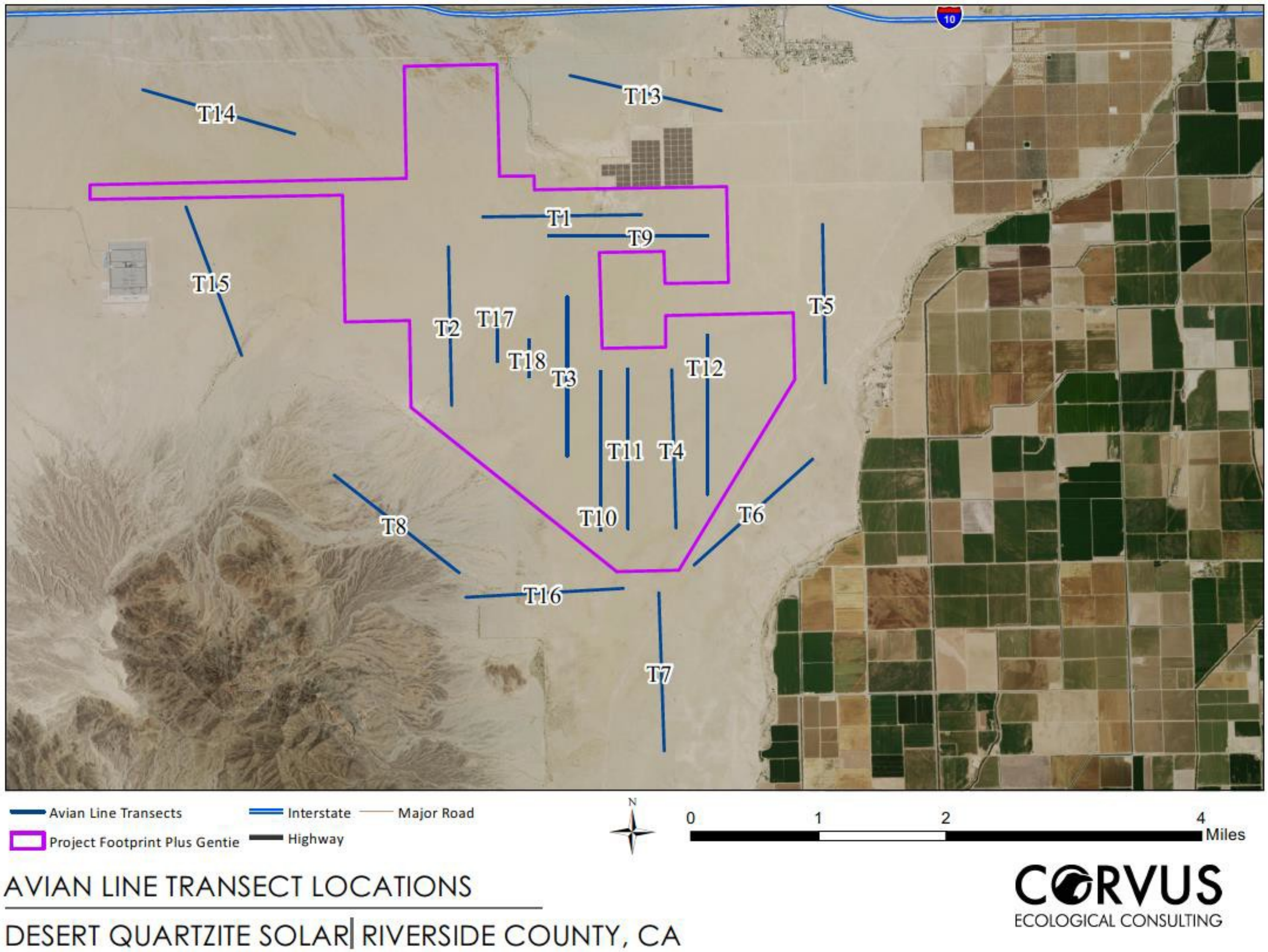

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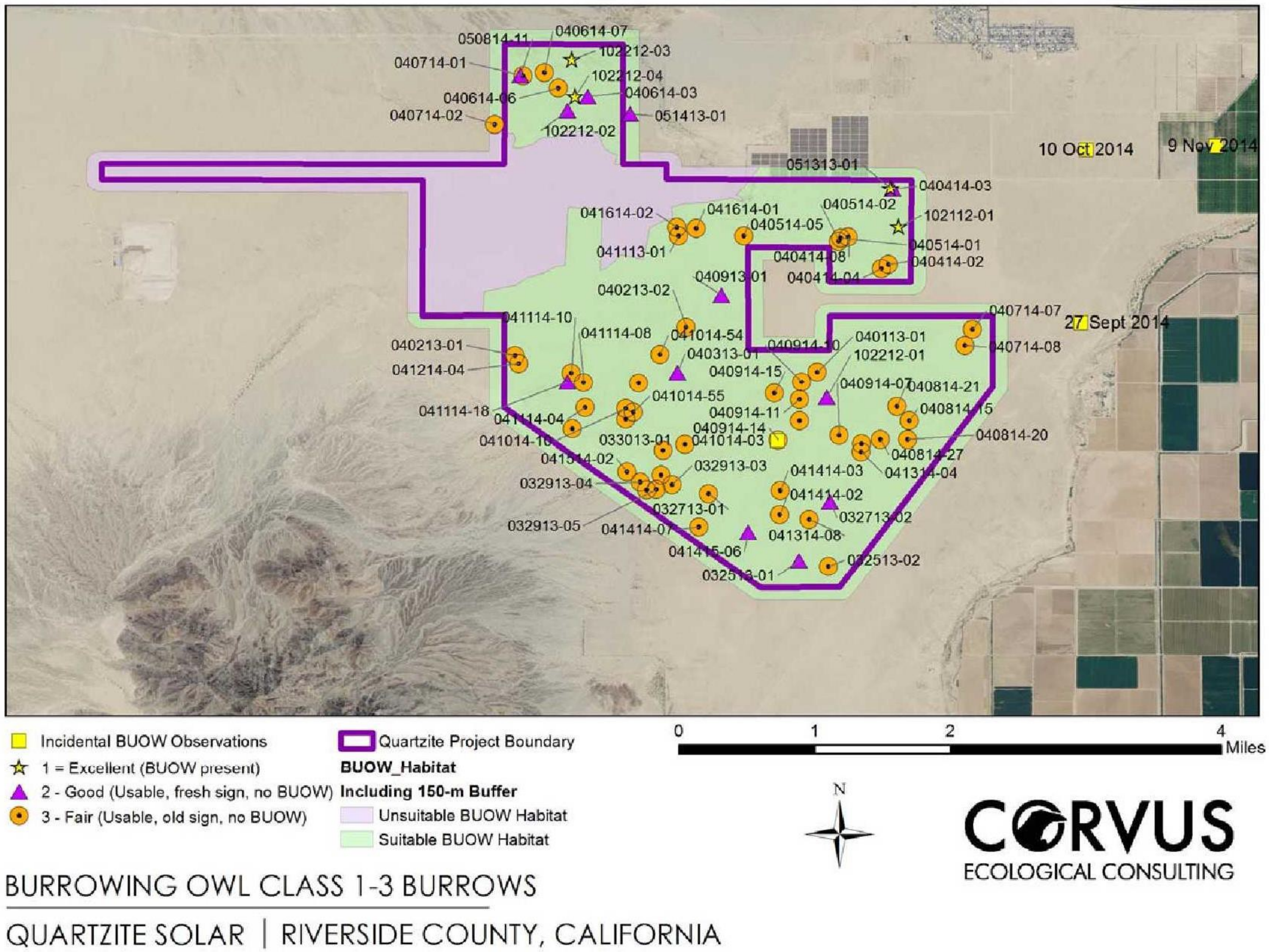

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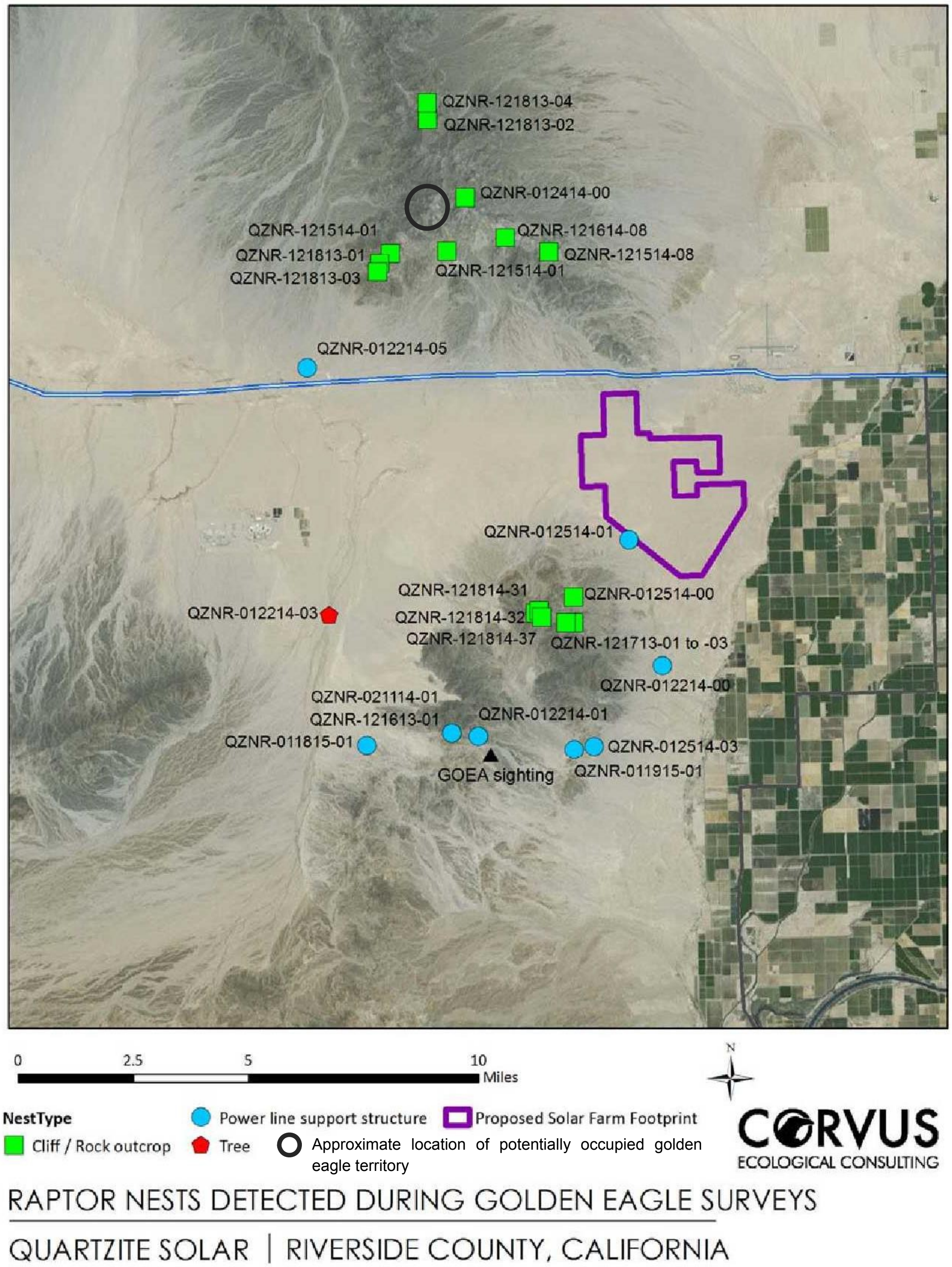

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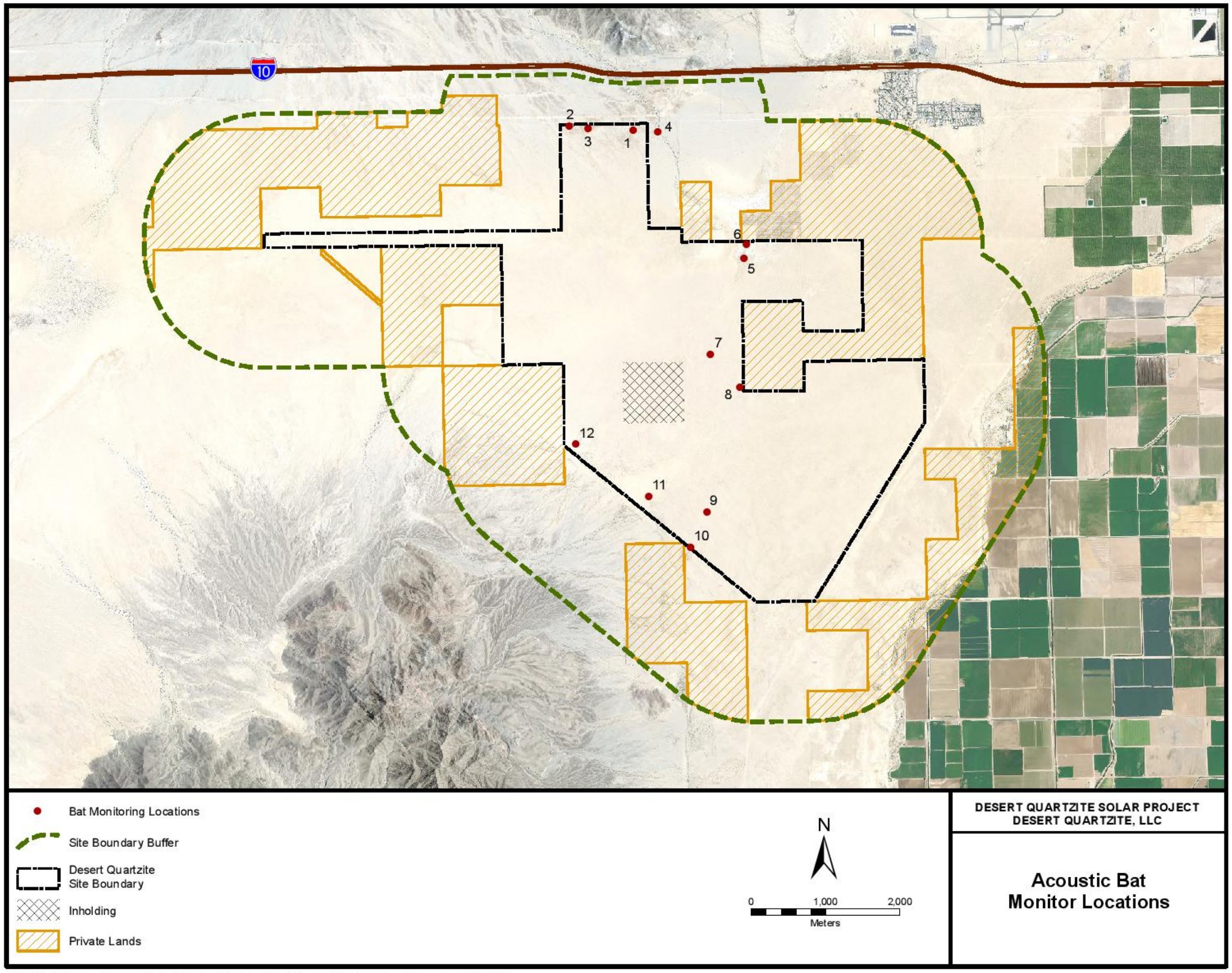

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Appendix A
Post-Construction Fatality Monitoring Plan

Avian and Bat Post-Construction Fatality Monitoring Plan
Desert Quartzite Solar Project
Riverside County, California

Prepared for:

Desert Quartzite, LLC

135 Main Street, 6th floor
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June 2017

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REPORT REFERENCE

Western EcoSystems Technology, Inc. (WEST). 2016. Avian and Bat Post-Construction Fatality Monitoring Plan for the Desert Quartzite Solar Project, Riverside County, California. Prepared for Desert Quartzite, LLC, San Francisco, California. Prepared by WEST, Cheyenne, Wyoming.

1.0 INTRODUCTION

Desert Quartzite, LLC (Desert Quartzite) is proposing the Desert Quartzite Solar Energy Project (Project), an approximately 450 megawatt (MW) alternating current (AC) photovoltaic (PV) solar power generation facility. The Project site is located in rural eastern Riverside County near the City of Blythe, California, and situated on the Blythe United States Geological Survey (USGS) 7.5-minute Topographic Quadrangle (Figure 1). The site is situated just south of Interstate Highway 10 (I-10) and approximately 2.5 miles to the southwest of the Blythe Airport. The majority of the Project site is located on land administered by the Bureau of Land Management (BLM). A 160-acre private parcel land inholding is also included in the Project's Preliminary Site Plan (Figure 2).

The Project will consist of the construction, operation, and maintenance of the solar power generation facility. Project components include on-site facilities, offsite facilities, and temporary facilities needed to construct the Project. Major on-site facilities are the solar field (comprised of multiple blocks of solar PV panels mounted on fixed tilt or tracking systems and associated equipment), a project substation, and operations and maintenance (O&M) facilities. The perimeter of the occupied portions of the Solar Facility will be fenced to limit public access. The entrance to the completed Project will be gated and restricted to unauthorized entry, and the Project will be surrounded by a permanent, six-foot tall, chain-link security fence with barbed wire. The offsite facilities include an approximately 3.94-mile 230 kV generation interconnection transmission line (gen-tie line) located on BLM-administered lands within a 160-foot wide operational right-of-way (ROW). Interconnection to the California Independent System Operator (CAISO) Grid will be via the Southern California Edison (SCE)- operated transmission system at the Colorado River Substation (CRSS). Temporary facilities, which will be removed at the end of the construction period, include the on-site mobilization, laydown, and construction areas and, if needed, any dust suppression water storage tanks. The total Project area under application for BLM and County of Riverside approval is approximately 5,275 acres (approximately 5,115 acres of BLM administered lands and 160 acres of private lands). The Project would occupy approximately 3,772 acres when completed, including 3,714 acres for the solar facility site and 58 acres for the proposed 160-foot wide gen-tie line ROW. The Project would be implemented in a phased approach, with blocks of solar arrays being constructed and energized in a sequential fashion leading up to its completion. The Project's Preliminary Site Plan is presented in Figure 2.

This Post-Construction Avian and Bat Fatality Monitoring Plan (hereafter referred to as the "Plan") establishes search protocols to monitor avian and bat fatalities at the site, and establishes analytic methods to estimate post-construction avian and bat fatality rates associated with development of the Project. This Plan outlines a standardized approach to document bird and bat fatalities and injuries, and to estimate post-construction fatality rates associated with the Project. In particular, the Plan outlines a statistically sound spatial and temporal sampling plan, including protocols for establishing corrections for detection biases associated with estimating fatality rates, including searcher-efficiency and scavenger removal biases. It describes specific data to collect during scheduled carcass searches, protocols to address any injured birds/bats that are found, and procedures for reporting incidents involving federally or state-listed species to U.S. Fish and Wildlife Service (USFWS) and/or the California Department of Fish and Wildlife (CDFW), as appropriate. Pursuant to BLM direction, the Plan is modeled on a similar plan for the McCoy Solar Project, which was approved by BLM and USFWS in March 2016.

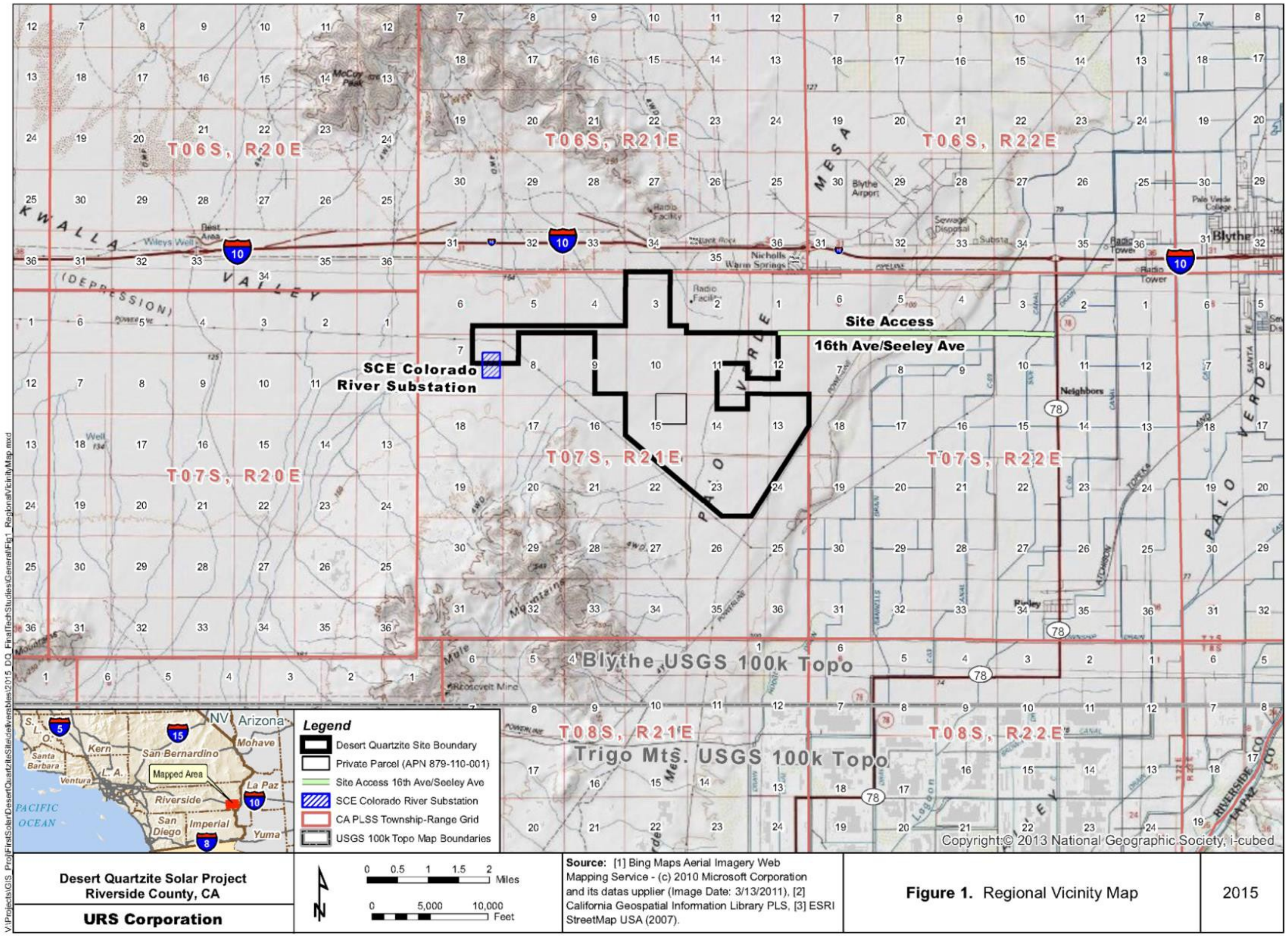

Figure 1. Location of the Desert Quartzite Solar Project, Riverside County, California.

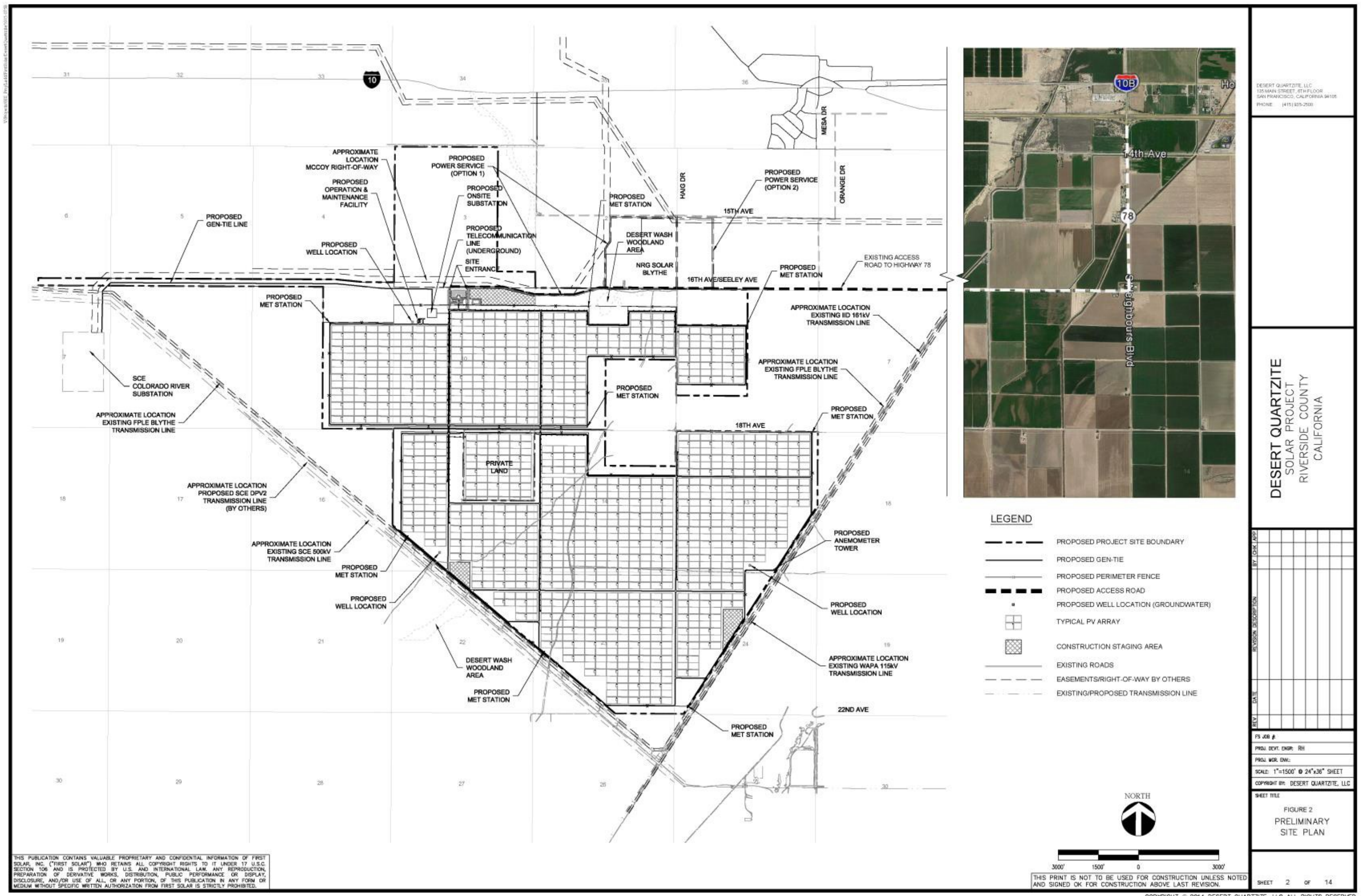

Figure 2. Desert Quartzite Solar Project Plan.

1.1 Goals and Objectives

The goal of this Plan is to provide data and analysis that will assess the level of bird and bat injuries/fatalities within the PV array field and associated infrastructure (i.e., the perimeter fence).

The specific objectives of this Plan are as follows:

1. Conduct fatality searches for a minimum of two years, according to a spatial and temporal sampling plan that provides representative and statistically sound coverage of the solar array field and perimeter fence.
2. Conduct statistically sound assessments to quantify and evaluate carcass removal rates (i.e., carcass removal, destruction, or burial in sand due to scavengers, decay, or other abiotic [e.g., wind] or human [e.g., vehicle activity] factors) and support calculation of total facility mortality estimates that account for variation in carcass removal rates by carcass type/size classes.
3. Use current, scientifically validated and accepted methods for calculating fatality rates adjusted for searcher efficiency, carcass removal rates, and spatial and temporal sampling intensity.

2.0 MONITORING METHODS

2.1 Post-Construction Monitoring

The fundamental components of a sampling program designed to produce valid estimates of fatality rates for a solar facility include sampling methods, spatial sample coverage, temporal sample coverage, adjustment of counts for search efficiency, adjustment of counts for carcass removal, and selection of an appropriate statistical fatality estimator.

The following hierarchical terminology is useful for describing the spatial and temporal sampling design outlined here:

1. **PV module:** the basic unit of a photovoltaic solar facility consisting of a semiconductor material sandwiched between two layers of glass
2. **Row:** A collection PV modules that are mounted on long steel and aluminum support structures.
3. **Array:** A collection of rows treated as one electrical system
4. **PV Array Field,** The composition of all of the arrays that comprise the solar facility.

2.1.1 Sampling Methods

Sampling strategies used in carcass searches at wind facilities have typically involved transect sampling, whereby searchers walk along pre-defined transects and search for carcasses in a swath that may be 10 – 30 m (33 – 98 ft) wide. The layout of a PV array field presents problems for a transect-sampling strategy, but it is highly amenable to a distance-sampling strategy. One constraint with transect sampling within a PV array is that the rows of panels are close together (generally less than five m [16 ft]). Because the modules are either fixed-tilt in nature or are mounted on tracking devices to follow the sun, modules may be for most daylight hours off-horizontal and a searcher walking a transect between two rows can only effectively search one side of the transect (a 2.5-m [8.2-ft] swath), and the other side is obscured by the edge of a PV row. Because the transect width is only 2.5 m, transects would need to be four to 12 times as long as if the width was 10 – 30 m to maintain the same search area.

On the other hand, the PV array field (and perimeter fence) is flat and relatively clear of obstructions (i.e., vegetation), making it particularly suitable for a distance sampling design (Huso et. al 2016b). Distance sampling still involves searchers walking a transect line, but the transects are positioned on the roads between or on the edge of solar arrays, and searchers search between the PV rows without leaving the road. Analytically, distance sampling departs from transect survey methodology in its treatment of carcass detection. Distance sampling assumes that searcher efficiency decreases (possibly dramatically) as a function of distance from the observer. This leads to the expectation that the number of carcasses documented by a searcher will be highest along the transect line, and will decrease with distance from the transect.

If carcass occurrence varied systematically within solar arrays, the detection function and the fatality estimate would be biased. Spatial analysis of carcass distribution from post-construction monitoring at another photovoltaic solar facility in central California (California Valley Solar Ranch, or CVSR; H.T. Harvey and Associates 2014) has indicated no systematic spatial variation of carcasses among the arrays suggesting that distance sampling is a viable option for mortality surveys within PV solar array fields. Data from more recent studies also suggests no distinct pattern in the distribution of carcasses found within arrays (WEST 2016a).

One way to consider the manner in which distance sampling adjusts carcass counts to account for variable searcher efficiency is that it estimates the *effective* area searched. Effective area is the actual area multiplied by the probability of detection at that distance. As a highly simplified example, if a searcher walks a 10-m long transect line and detects 100% of carcasses within 5 m of the line, 80% of all carcasses 5 to 10 m from the line, and 60% of carcasses that are 10 to 20 m from the line, then the effective area between 0 and 5 m would be 5 m × 10 m × 1.0 = 50 m^2 the effective area searched between 5 and 10 m would be 5 m × 10 m × 0.8 = 40 m^2, and the effective area searched between 10 and 20 m would be 10 m × 10 m × 0.6 = 60 m^2. For the total 10 by 20-m area, the adjustment factor would be $\frac{50\ m^2 + 40\ m^2 + 60\ m^2}{50\ m^2 + 50\ m^2 + 100\ m^2}$ = 0.75. In practice, searcher efficiency is modeled as a continuous function of distance, and the detection function is estimated from the carcass data (as opposed to a bias trial).

Distance sampling is a mature methodology that is well suited to estimate population sizes even when the detection function indicates a rapid decay in detectability with distance, and is ideally suited to situations in which animals (or carcasses) are sparsely distributed across a landscape (Buckland et al. 1993). On this basis, fatality sampling on the Project will proceed using distance-sampling survey techniques and analytical methods, which include estimating and accounting for distance-related variation in searcher efficiency based on the carcass data. Carcass removal bias trials will address carcass persistence and are described below. Methods will be used to determine the effective viewshed, which will be determined using a point at which the detection is not zero (Buckland et al. 1993).

2.1.2 Spatial Sampling Design

The sampling design is intended to follow the USFWS *Land-Based Wind Energy Guidelines* (USFWS 2012), which states that "the carcass searching protocol should be adequate to answer applicable Tier 4 questions at an appropriate level of precision to make general conclusions about the project, *and is not intended to provide highly precise measurements of fatalities*" (p. 45; emphasis added). The sampling design to be used at the Project is based on similar designs utilized at DSL (WEST 2016a), Blythe (WEST 2016b), and McCoy (WEST 2016c) solar projects, and is also informed by recent suggested methodology (Huso et. al 2016b), and other simulation studies (H. T. Harvey & Associates 2014, Reyes et. al 2016).

Based on information provided in the sources above and the characteristics of the Project, Desert Quartzite will employ a mortality monitoring methodology such that initial sampling will encompass approximately 40% of the solar arrays, 50% of the gen-tie line and 100% of the perimeter fence accessible by vehicle. To ensure representative coverage of the sampled PV array field, arrays to be sampled ('sampling units') will be chosen using a systematic design with a random start point.

Following completion of construction activities, observers will survey sampling units by either walking or driving slowly perpendicular to the rows, along the perimeter fence scanning between each row or along the linear features for fatalities. Alternative searcher approaches, such as the use of specially-trained dogs, may also be used, subject to approval from the TAG. A decision on which method to use (driving, walking, or alternative) will be made based on the characteristics of the site and the arrays, and an initial evaluation of the expected searcher efficiency of each method. Each site-specific survey within the array field will cover half the width of the array (Figure 5). Observers will carry binoculars, which they will use at their discretion to help identify objects that may be carcasses. The walking or driving surveys of the arrays will occur along roadways that run perpendicular to the rows, to facilitate scanning between rows. This survey design reflects two concerns: 1) minimizing movement between rows of solar panels, because the area between electrified panel rows is an area of elevated risk and best practices are to minimize exposure of personnel to areas of elevated risk; and 2) achieving an effective balance between logistic efficiency and sampling rigor. In addition, if suitable conditions exist, the perimeter fence may be monitored by driving slowly along the structure and scanning for carcasses.

This survey methodology has been effective on other solar projects, including Desert Sunlight (WEST 2016a). Results from Desert Sunlight showed that effective sampling for medium and larger birds could be expected to extend to 140 m, and for smaller birds or bats, effective sampling could extend potentially out to 50 m or beyond, depending on visibility. The sampling approaches may be appropriately varied, however, depending on the type of technology (tracker vs. fixed). Current protocols at two tracker facilities (Blythe and McCoy) use vehicles because the width of rows and height of panels is adequate to accommodate vehicles, while Desert Sunlight, which has fixed arrays, uses walking due to safety concerns associated with width of roads, distance between panels, and height of panels.

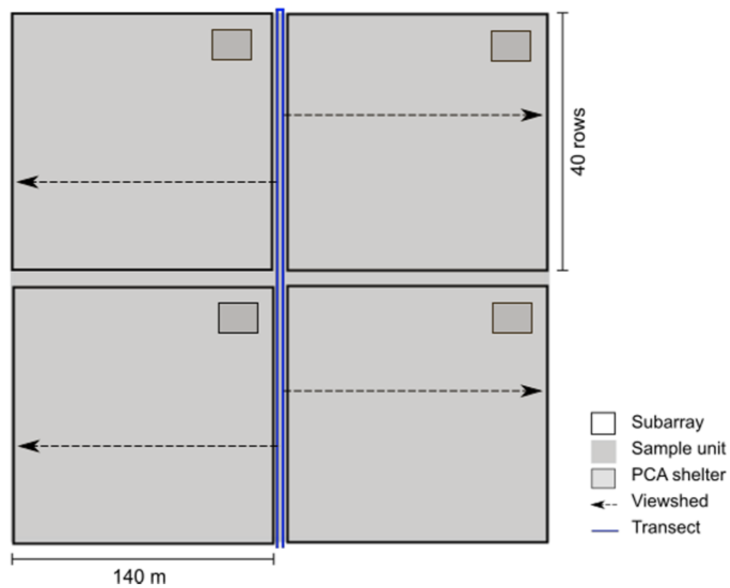

Figure 3. Illustration of a typical sampling unit and transect surveys. Direction of walking/driving will be consistently rotated. The viewsheds may vary depending on the dimensions of the arrays.

2.1.3 Perimeter Fence

The Project will be bounded by a chain-link security fence. Fences that interrupt unbroken, open expanses, with few intervening obstacles present a potential collision threat to flying birds/bats; especially in low-light conditions. The nature of the barrier results in associated fatalities remaining close to the fence, a phenomenon that supports high search efficiency from a relatively narrow search transect. This search will be conducted for a minimum of two years post-construction.

- Surveys of perimeter fencing will be conducted inside the fence and will include a 6-m wide swath centered on the fence line. Surveyors will survey 3 m on either side of the fence. Surveys will be conducted by driving the perimeter of the fence.

2.1.4 Temporal Sampling Design

The appropriate frequency of fatality surveys depends on the species of interest and average carcass persistence times (Smallwood 2007, Strickland et al. 2011, USFWS 2012). As has been found at other projects, large bodied birds (e.g. most raptors, water birds, water fowl) tend to persist and remain detectable for extended periods (weeks to months) due to low scavenging rates and relatively slow decay rates (H.T. Harvey 2015, WEST 2016a,d). If only large species were of interest, extended search intervals might be appropriate; however, smaller birds and bats typically disappear at much faster rates, so shorter search intervals are required to ensure effective documentation of fatality rates among these species. For example, at the nearby DSL PV solar facility, median persistence times across the four seasons were between 6.4 days and 18.5 days for medium carcasses, between 11.7 and 49.2 days for large carcasses, and between 4.4 and 13.6 days for small birds, in the solar field (WEST 2016a). In addition, carcass persistence times may vary substantially depending on the habitat, the types of scavengers present, climatic conditions, the season, and the number of carcasses typically present on the landscape (Smallwood 2007, 2013).

The search interval for fatality monitoring ideally should not be more than twice the median persistence time for the focused bird group (e.g., water-associated birds), while Huso et. al (2016) suggest an initial target for the search interval should enable an average of 50% of carcasses to persist between searches. Comparative analyses have demonstrated, however, that biases can be limited by using different analytical methods to estimate fatality rates corrected for searcher efficiency and carcass persistence, depending on whether the search interval is shorter or longer than the average carcass-persistence time (Huso 2010, 2012; Korner-Nievergelt et al. 2011; Strickland et al. 2011).

Based on fatality patterns found at other PV solar facilities in the region, the majority of carcasses are detected in fall and spring. Thus, the monitoring schedule proposed focuses on the fall and spring periods where the majority of the carcasses are concentrated. The starting search intervals for the fatality monitoring will be conducted every seven days during standard spring and fall migration periods (March 1 – May 31, and August 15 – November 15, respectively). This is consistent with other regional solar projects conducting monitoring.

2.1.5 Survey and Data Collection Protocols

If an observer detects a potential carcass or injured bird or bat, the observer shall immediately proceed down the row to confirm the detection and, if valid, fully document it according to standard protocols (see below). For those species protected pursuant to relevant federal or state law, carcasses and injured animals cannot be handled unless appropriate permits are obtained (see section 2.2). To avoid counting carcasses multiple times during successive searches, the observer will mark the carcass by covering it with a bucket with a weight on top.

Carcasses will be classified as a fatality according to commonly applied standards (Altamont Pass Monitoring Team 2007, CEC and CDFG 2007), which dictate that when only feathers are found, to be classified as a fatality, each find must include a feather spot of at least five tail feathers or two primary flight feathers within five meters (16.4 ft) or less of each other, or a total of 10 feathers of any type (i.e., including body feathers). Searchers will make their best attempt to classify feather spots by species and/or size according to the sizes or identifying features of the feathers. Digital photographs will be taken to document all incidents, and when possible, plausible cause of death will be indicated on data sheets based on evidence (such as blood or fecal smears on solar panels, burns that may indicate electrocution or blunt trauma that may indicate collisions). If the cause of death cannot be confidently determined, this will be noted on datasheets. Maps will be provided of injury/fatality events showing location of occurrence and distance to closest infrastructure.

Two additional protocols will be followed to ensure accurate distance-based estimation of fatality densities. First, to ensure accurate delineation of the injury/fatality locations, the observer will record both Global Positioning System (GPS) coordinates at the site of the fatality, using a handheld device accurate to ± three to four meters (9.8 to 13.1 ft), and a measurement of the distance from the fatality location to the end of the panel row or other infrastructure from which the carcass was detected. When an observer proceeds down panel rows to confirm and document detected fatalities, they may detect other fatalities that they did not observe based on the perimeter-only survey. Including such detections in the fatality estimate will confound estimation of fatality density based on application of standard distance-sampling analytical methodology.

Surveyors will record data for each detection on a standardized form. To conform to requirements from wildlife agencies (WLA), data collection will include:

- Surveyor name
- Discovery date and time
- A unique identification code
- Species
- Sex and age (if determined)
- Cause of death or injury (if determined)
- GPS waypoint of find (WGS84 datum)
- Nearest project component(s) (PV array, power line, power line structure, building, fence, pond, materials storage, vehicle /equipment, other)
- Distance to nearest project component
- Distance to nearest PV panel
- Identifiers for photographs taken in situ (close and wide)
- Observed weather (% cloud, temperature, wind)
- Precipitation within previous 24 hours
- Moon phase the night prior
- Sustained high winds during previous 24 hours
- Condition of specimen
    - alive, no sign of physical trauma
    - dead and intact

  - dismembered
  - feather spot*
  - injured but alive
- Disposition of live bird
  - released
  - sent to rehab
- Time since death
  - < 1 day (no rigor mortis)
  - 1 day (rigor mortis, no odor)
  - 2-3 days (odor present, eyes dried /missing)
  - 3-5 days (strong odor, decomposing)
  - Unknown (feather pile*/other)
  - N/A (animal still alive)
- Evidence of scavenging (Y/N)
- Additional relevant comments to support the recorded information.

*A feather spot consists of at least five tail feathers or two primary flight feathers within five meters (16.4 ft) or less of each other, or a total of 10 feathers of any type (i.e., including body feathers).

2.2 Permits and Wildlife Handling Procedures

State and federal collecting/salvaging permits will be acquired from CDFW and the USFWS (Special Purpose Utility Permit [SPUT], etc.) prior to commencement of the post-construction mortality monitoring study to enable searchers to collect and handle carcasses in compliance with laws pertaining to the collection and possession of wildlife and migratory birds. All carcasses found incidentally or during systematic fatality monitoring at the Project will be placed in freezer bags labeled with the species, date, and unique identifier and stored in freezers on-site. The USFWS (OLE, Ecological Services, or Migratory Birds) will assist the project operator with the ultimate disposition of carcasses. If an injured bird or bat is discovered by a searcher, the injured bird protocol described in section 3.4.2 will be followed. If a searcher discovers a dead individual of a species that is fully protected by the state or federally or state-listed as threatened or endangered, and for which handling is not specifically authorized under the applicable salvage permits, he/she will collect data and photos as for any other fatality, but then mark its location, cover it with a bucket or another way to secure its location, and leave it in place. The surveyor will contact the appropriate Desert Quartzite representative as soon as reasonably possible. Desert Quartzite will be responsible for contacting the USFWS Office of Law Enforcement (OLE) within 24 hours to determine the appropriate follow-up action.

2.2.1 Incidentally Discovered Carcasses and Fatalities

Bird and bat carcasses that are discovered incidentally will be documented and reported, but will not be included in fatality estimates. The statistical assumptions necessary in a distance sampling framework preclude using incidental discoveries in fatality estimates. However, in keeping with the general goal of providing a bellwether assessment of bird and bat fatality in the PV array field, incidental reporting of fatalities and injuries are another mechanism by which problematic fatality events may be detected.

Data from incidental finds within standardized search areas will be included in analyses to estimate mortality within the solar arrays to be conservative. Appropriate caveats can be included within the seasonal and annual reports to document the potential magnitude of any biases created by recovering these carcasses.

2.2.2 Searcher-Efficiency

Estimating searcher-efficiency (distance-related detection functions) is a standard component of the distance-sampling approach. Moreover, because estimating detection functions is applied to all survey data and can be organized to variably adjust in relation to covariates of interest (e.g., season, habitat, and carcass size classes), application of this approach will account for typical factors of interest for fatality studies (CEC and CDFG 2007, Huso 2011, Korner-Nievergelt et al. 2011, USFWS 2012, Smallwood 2013). In this case, independent searcher-efficiency trials per season will be conducted to help assess and adjust for potential spatial bias in the distribution of fatalities among arrays.

The desert landscape in which this Project is located generally changes little with the seasons, save for brief periods following winter and spring rains when floods may occur and blooming plants may flourish. A recent meta-analysis involving data from more than 70 wind-energy projects suggested that including habitat visibility class as a predictive variable generally eliminated any otherwise apparent seasonal effects on searcher efficiency (Smallwood 2013). Nevertheless, the supplementary searcher efficiency trials for this Project will be repeated seasonally (winter, spring, summer, and fall) and trials will be organized so that all search personnel participate in bias trials. Placement of trial specimens will be timed to limit the number of trial carcasses placed on the landscape at any one time (minimizing the chance of artificially attracting scavengers or, conversely, scavenger swamping; Smallwood 2007). This approach will also ensure that any new surveyors that join the crew participate in searcher efficiency trials. Prior to study initiation, the habitat will be categorized into visibility classes related to vegetative ground cover or cobble size that might affect observer ability to detect carcasses (low, medium, and high, if relevant), to determine the sample effort. Further, size classes of birds (small, medium, and large), and detection distance will be used to determine sample effort

The bias-trial sample sizes required to produce precise, adjusted fatality estimates are not well established, in part because needs may vary substantially depending on actual project-specific searcher efficiency, carcass removal, and fatality rates. However, using searcher-efficiency trials to help evaluate the efficacy of perimeter-only surveys and the distance-sampling approach used in this investigation will require larger sample sizes to produce a sampling design that effectively accounts for distance as a key covariate of interest. In addition, if growth of new ruderal vegetation, or substrate heterogeneity caused by flood events, is sufficient to create a new visibility class under the arrays, the specimen numbers would need to increase to effectively account for this factor. It will also be necessary to ensure that the estimates of searcher efficiency encompass variation among multiple surveyors. The influence of individual surveyors will not be accounted for in a formal, statistical sense by including “surveyor” as a covariate in the estimation model; however, all surveyors will be tested similarly. Each surveyor will be exposed to multiple test specimens of each size class, and at similar repeated levels if testing in different habitat visibility classes is required. A minimum of 25 carcass samples per small size class, 15 for medium, and 10 for large is anticipated within the solar array and 50 percent of gen-tie line per season, while 15 small, 10 medium, and 10 large carcasses are anticipated along the fence line sampling areas, per season (Table 1). Searcher efficiency will be summarized for each individual searcher, but to avoid needlessly inflating the variance of the estimate, individual searcher effects will not be included in the fatality estimation model.

Besides representing birds of different sizes, another important factor to consider in searcher-efficiency and carcass-removal trials is the bird species to use as trial specimens. Ideally, all carcasses used for both searcher-efficiency trials should reflect the range of species likely to be encountered as fatalities in the Project area (CEC and CDFG 2007). Because obtaining sufficient samples of “natural” carcasses are difficult, researchers frequently use readily available, *non-native surrogate species in bias trials.* Small bird trial carcasses could be house sparrow (*Passer domesticus*) and juvenile Corturnix quail. Large bird trial carcasses could include domestic mallard (*Anas platyrhynchos*) and ring-necked pheasant (*Phasianus colchicus*).

Another factor that influences carcass detectability is how fresh and intact the carcass is (Smallwood 2007, 2013). If multiple pieces of a depredated or scavenged carcass are scattered over a modest area, in some cases the fatality may be more easily detected; however, detectability generally decreases when only remnants of a carcass are present, or when the carcass is aged and degraded. Nevertheless, in contrast to wind energy projects, there is little expectation that this Project will cause injuries and fatalities that result in dismembered carcasses, so this factor is not expected to influence searcher efficiency bias or carcass removal rates (Smallwood 2013). Therefore, bias trials conducted in this study will involve primarily intact carcasses. The searcher-efficiency trial specimens may range from freshly thawed to partially decayed (i.e., selected, subject to availability, to mimic the range of carcass decay that typically accrues over 7-day periods).

A field supervisor or other technician not involved in the standard surveys will place the trial specimens and will recover any specimens missed by the surveyors. All trial specimens will be placed according to a sampling plan that randomly allocates carcasses of different sizes among survey plots and survey days within the assessment areas, but is stratified to ensure equitable representation of different surveyors, and fence line versus solar arrays versus seasons. To minimize the possibility of unnecessarily attracting scavengers or, conversely, contributing to scavenger swamping(Smallwood 2007, Smallwood et al. 2010), placement of searcher-efficiency trial specimens will be distributed throughout the year (appropriately organized to provide season-specific estimates with adequate samples to provide a robust estimate of searcher efficiency), with few specimens placed at any one time. Carcasses will be placed carefully to minimize disturbance of substrates that may bias carcass detection. Technicians placing carcasses will take note if scavengers are observed during carcass placement. If scavengers are observed during carcass placement, then efforts will be made to place carcasses earlier to avoid or minimize possible bias associated with scavengers.

All trial specimens will be inconspicuously marked with a piece of black electrical tape wrapped around one leg, in a manner that allows the surveyor to readily distinguish trial specimens from new fatalities, but without rendering the specimen unnaturally conspicuous (Smallwood 2007, USFWS 2012). To ensure a degree of "natural" placement, carcasses need to be represented by placing them between rows of panels, under panels, near I-beams supporting the panels, or in the open. Therefore, carcasses will be tossed towards the designated, randomly chosen placement spot from a distance of three to six m (10 to 20 ft). Documentation of each location will include GPS coordinates, notes about the substrate and carcass placement, and a digital photo of the placement location.

Surveyors will have only one opportunity to discover placed specimens. Any missed specimens will be recovered as quickly as possible after surveys have been completed in a given area, and after the surveyor(s) have become aware of the trial through discovery of one or more specimens. Some researchers have argued for leaving missed specimens in place to enable possible discovery in a subsequent survey and thereby mimic the natural situation in which "bleed-through" is possible (e.g., Smallwood 2013, Warren-Hicks et al. 2013; discussed further below). Although this approach may have merit in some situations, its potential value for this Project is offset by the need to avoid attracting ravens because they may prey on desert tortoises in the area (Tetra Tech 2014).

Table 1. Sample sizes for search efficiency trials per season.

Project Component	Size	Initial Sample Size
Solar arrays	Small	25
	Medium	15
	Large	10
Fence	Small	15
	Medium	10
	Large	10
Gen-tie	Small	25
	Medium	15
	Large	10
Total		**120**

2.2.3 Carcass Persistence Trials

The degree to which carcasses persist on the landscape depends on a variety of factors reflecting seasonal and inter-annual variation in landscape/climatic conditions and the scavenger community. The composition and activity patterns of the scavenger community often vary seasonally as birds migrate, new juvenile birds and mammals join the local population, and mammalian scavengers variably hibernate or estivate. The scavenger community may also vary substantially from year to year because of variation in annual reproduction and survival related to changes in landscape condition. Seasonally and annually variable climatic conditions also may contribute to variation in carcass decay and removal rates due to variation in temperatures, solar insolation, wind patterns, and the frequency of flooding events. Therefore, to ensure accurate treatment of this bias factor, carcass-removal rates typically are assessed on a quarterly basis during each year that fatality surveys are conducted (USFWS 2012, Smallwood 2013). It is also imperative that carcass-removal trials effectively account for the influence of carcass type/size, given that persistence times may vary widely depending on the species and size class involved (Smallwood 2013).

To quantify carcass removal rates, the Plan proposes to place 20 small bird trial carcasses, 10 medium bird carcass, and 10 large bird trial carcasses per season in the solar field (solar arrays + fence line). The carcasses will be distributed in each season to assess carcass removal throughout the year, and carcasses will be dispersed to random locations throughout the study site. The carcasses will be monitored using either motion-triggered, digital trail cameras (e.g., see Smallwood et al. 2010), or visited (day 1, 2, 3, 4 and approximately every 7 days thereafter) for 30 days or until the carcass has been removed to the point where it would no longer qualify as a documentable fatality. Fake cameras or cameras without bias trial carcasses will also be placed to avoid training scavengers to recognize cameras as “feeding stations”. To minimize potential bias caused by scavenger swamping (Smallwood 2007, Smallwood et al. 2010), carcass-removal specimens will be distributed across the entire Solar Facility, not just in areas subject to standard surveys and will be placed on multiple dates. Sample size and frequency of trials in the second year may be reduced or increased if the data suggests these changes are needed to better inform the objectives.

Trial specimens will include only intact, fresh (i.e., estimated to be no more than one or two days old and not noticeably desiccated) bird carcasses that are either discovered during the study or are acquired from other sources after having been frozen immediately following death. If permits allow, preference will be to use carcasses of species that occur in the area. Surrogates (such as upland game birds and waterfowl) that are similar in size and appearance to species that occur in the area, will be obtained from commercial sources and used if necessary to meet the required sample sizes. However, domestic waterfowl or upland game birds that are white or brightly colored (e.g., male ring-necked pheasants [Phasianus colchicus]) will not be used. Scavenging rates for some surrogates (e.g. medium to large sized game birds that are used to represent raptors) may be artificially high (Smallwood 2007, 2013) and may lead to conservative fatality estimates (i.e., an overestimate) for some taxa/bird types.

To reduce possible biases related to leaving scent traces or visual cues that may unnecessarily alert potential scavengers, all carcasses used in carcass-removal trials will be handled with latex gloves, and handling time will be minimized. If allowed by the site operation plan, efforts will be made to place trials throughout the day, including dawn and dusk. Trial administrators will also implement BMP tactics that may include using different vehicles, traveling different routes in the site, rotating head gear and clothing, or other methods deemed appropriate to reduce potential scavenger learning. All trial specimens will be inconspicuously marked with a small piece of electrical tape (or similar material) wrapped around a leg to distinguish them from unmarked fatalities.

Upon conclusion of the relevant monitoring period, each trial specimen will be classified into one of the following categories:

Intact: Whole and un-scavenged other than by insects
Scavenged/depredated: Carcass present but incomplete, dismembered, or flesh removed
Feather spot: Carcass scavenged and removed, but sufficient feathers remain to qualify as a fatality, as defined above
Removed: Not enough remains to be considered a fatality during standard surveys, as defined above

2.2.4 Estimating Adjusted Fatality Rates

The sampling design will enable calculation of fatality estimates adjusted for searcher-efficiency, carcass-removal rates, and proportion of area sampled. The adjustment for searcher efficiency will occur by virtue of applying standard methods for analyzing detection data collected using distance-sampling methods, with the data partitioned by season and standardized carcass size classes. The fatality estimates will be adjusted for variation in carcass persistence, by applying seasonal and carcass-size-specific correction factors to the fatality estimates that have been adjusted for distance-related variation in the probability of detection.

The analytical approach used to calculate adjusted fatality estimates will be similar to that applied in cases where the fatality estimates are derived from strip transects. For illustrative purposes, we summarize here the basic formulation of the Huso estimator (Huso 2011), the first part of which pertains to fatality estimation for different strata, or groups. Essentially, the smallest group for which fatalities are estimated can be considered a stratum, with stratum *k* representing, for example, a set of similarly sized birds within a defined habitat visibility class. Note that strata should be defined to ensure minimum variance in detection probabilities within individual strata, whereas probabilities may vary considerably among strata (e.g., for small versus large birds, or in habitats of low versus high visibility). Depending on the circumstances, there can be strata based on species groups, size classes, seasons, habitats, and/or infrastructure types (also could conceivably model distance categories as another covariate).

For a particular stratum *k* for a given survey plot and search interval, fatality can be estimated as:

$$\hat{F}_k = \frac{c_k}{\hat{\pi}_k}$$

where c_k is the number of observed carcasses and g_k is the probability of detecting a carcass. The detection probability *g* typically is the product of three variables: the probability of a carcass persisting (*r*), the probability of a carcass being observed given that it persists (*p*), and the effective proportion of the interval sampled (*v*):

$$\widehat{\pi_k} = \widehat{p_k} \cdot \widehat{r_k} \cdot \hat{v}_k$$

Estimation of Searcher Efficiency Rates

Searcher efficiency rates, $\hat{p}$, are estimated for each size class using a logistic regression model. Additional covariates for this logistic regression model may include season, ground visibility, and the interactions between these variables. The logistic regression models the natural logarithm of the odds of finding an available carcass as a function of the above covariates. The model assumes that searchers have a single opportunity to discover a carcass. The best model is selected using an information theoretic approach known as AICc, or corrected Akaike Information Criteria (Burnham and Anderson 2002).

Estimation of Carcass Persistence Rates

Estimates of carcass persistence rates are used to adjust carcass counts for removal bias. Carcass persistence is modeled as a function of carcass size, and possibly other variables including plot type, season, ground visibility, and the interactions between these variables. The average probability of persistence of a carcass, $\hat{r}$, is estimated from an interval censored survival regression model. Exponential, log-logistic, lognormal, and Weibull distributions are fit and the best model is selected with AICc.

Carcasses Excluded from Fatality Estimation

One of the underlying assumptions of the Huso model is that searchers have a single opportunity to discover a carcass (Huso et al. 2016a). In practice, particularly when carcass persistence times are long, carcasses may be discovered that have been available for more than one search. In order to meet the assumptions of the Huso model, the estimated time since death is determined for each carcass, in the field. A carcass is excluded from fatality estimation if the estimated time since death is longer than the search interval associated with that carcass; in other words, a carcass with estimated time since death longer than the search interval is assumed to have been available for more than one search.

Adjusted Facility-Related Fatality Rates

The estimated probability that a carcass in category *k* was available and detected is:

$$\widehat{\pi_k} = \widehat{p_k} \cdot \widehat{r_k} \cdot \widehat{v_k}$$

where $\widehat{v_k}$ = min(1, $\hat{\hat{I}}_k / I_k$). The model assumes that searchers have a single opportunity to find each carcass, even though some carcasses may persist through multiple searches before being detected. Therefore, a carcass is included in adjusted fatality estimates if it has been available since the last search, and no longer. The probable time since death, recorded in the field, is used to evaluate each carcass for inclusion in the final fatality estimates.

The total number of fatalities ($\widehat{f}_k$) in category *k,* based on the number of carcasses found in category *k* is given by:

$$\widehat{f}_k = \frac{c_k}{\widehat{\pi}_k}.$$

Adjusted fatality estimates for the Project may be expressed per unit area (e.g., acres or arrays) per year, or overall (extrapolated from the sample units) per year.

2.2.5 Clearance Surveys

A clearance survey will be conducted within 7 days before the first round of official surveys begin. The purpose of this survey will be to clear the survey area of any accumulated carcasses that may be present. This is necessary to ensure that carcasses detected during the first round of surveys represent only fatalities that occurred during a preceding interval equivalent to the search interval that will apply afterward. Carcasses that are missed during the clearance survey will cause an upward (conservative) bias in the fatality estimate.

2.2.6 Incidental Fatality Documentation

Once post-construction fatality monitoring begins, all subsequent bird and bat injuries and fatalities detected incidentally to the standardized post-construction monitoring program will be classified as “incidental finds,” documented using similar procedures as are used for specimens discovered during the standardized surveys, and integrated with records from the standardized surveys for summary reporting and evaluation purposes. Incidental finds that occur outside of standard search areas will not be included in calculations of adjusted post-construction fatality estimates, but will be summarized within seasonal and annual reports (discussed below).

From a statistical standpoint, a bias will occur if carcasses that are found in standard search areas, but not during standardized surveys, are recorded and removed prior to the next search of that array. Per USFWS direction, and to be consistent with the Raven Monitoring, Management, and Control Plan, these carcasses will be reported directly to an authorized biologist. These incidental finds will be documented using the same procedures as those discovered during standardized surveys. Data from incidental finds within standardized search areas will be included in analyses to estimate mortality within the solar arrays to be conservative. Appropriate caveats can be included within the seasonal and annual reports to document the potential magnitude of any biases created by recovering these carcasses.

3.0 REPORTING

3.1 Reporting During Construction

The Project will report all documented bird and bat injuries and fatalities to the BLM, CDFW and USFWS using the required Avian Injury and Mortality Reporting Form that is a reporting requirement of the USFWS SPUT Permit issued to the Project to authorize the handling of dead or injured birds. SPUT Permit reporting will be submitted monthly or in accordance with the terms of the permit. Similar reporting to the CDFW will be accomplished as a condition of any relevant Scientific Collecting Permit that the CDFW may issue to authorize the handling of dead or injured birds under state law.

3.2 Reporting During Operations and Maintenance

Desert Quartzite will maintain an internal system in which to organize information derived from this monitoring program. This internal system will be designed to provide comprehensive tracking of survey effort, details of documented injuries and fatalities, and any relevant actions/responses taken to rectify or mitigate issues identified and documented during adaptive management.

All injury and fatality incidents discovered outside of the standardized carcass surveys will be documented in the same manner as used for those discovered during the carcass surveys, and will be reported to the USFWS and CDFW as part of the SPUT Permit process. Special-status or listed species will also be handled in a way that is consistent with Project-specific SPUT Permit conditions.

Desert Quartzite, LLC will submit semi-annual fatality monitoring updates (interim reports), annual reports, and notifications of fatality events. The semi-annual reports, submitted to the BLM in electronic (email) format, will include a summary of the fatality monitoring study activities for the period, including the dates, durations, and preliminary results of the fatality monitoring study, as well as an account of any fatality events discovered and documented during the semi-annual period. The updates will include a map of fatality occurrences, survey area where found (i.e. arrays, fence, gen-tie, or other), and probable/possible cause of death, if discernable. Adjusted fatality estimates will not be provided in semi-annual reports; however, estimates of search efficiency and carcass persistence will be provided for review as methods affecting those parameters could be adjusted.

Fatality events of special status species discovered on the Project, either during the course of conducting the fatality monitoring or incidentally, will be reported to the BLM within 48 hours of their discovery in the form of a brief email. The fatality event email will include information pertaining to the location and species, and accompanied by photographs. Annual reports will be prepared by Desert Quartzite or its consultant and submitted to BLM, USFWS, CDFW, and County of Riverside.

The annual reports will be submitted after four quarters of fatality monitoring have been completed for the Project or portion of the Project. Annual reporting will highlight all fatality occurrences at the Project as well as suspected causes of mortality where field observable evidence exists, with an emphasis on any special status species occurrences. Annual reports will include maps detailing locations of mortality events, and photos that provide further documentation of mortality events. The annual reports may also include recommendations for possible adaptive management actions related to special status species. The annual reports will submitted within 60 days of completion of the annual monitoring. The report will analyze any Project-related bird and bat fatalities or injuries detected; and provide context for the findings in the form of fatality rates at similar PV solar facilities in the region, or suitable reference sites, as data are available. To address the specific objectives of the monitoring plan, the annual report will include overall fatality estimates with confidence intervals.

4.0 ADAPTIVE MANAGEMENT

After each year of monitoring, the Lead Avian/Bat Biologists will summarize the data from the Project and may provide suggested adaptive management actions, relative to special status species in consultation with the TAG (see section 5.0 of the BBCS). The TAG will discuss any recommended changes to the monitoring study.

In addition, fatality-monitoring protocols should also integrate with other monitoring components of the Project, including the Raven Management Plan. Adaptive management may be required to address both the methods and metrics of all associated protocols. Additionally, any future ESA-listing of bird or bat species that are not addressed in the BBCS and are known to occur or that have the potential to occur in the project site may require changes to the avoidance, minimization, and mitigation plan presented in this BBCS.

5.0 LITERATURE CITED

Altamont Pass Avian Monitoring Team. 2007. Altamont Pass Wind Resource Area Bird and Bat Monitoring Protocols. Accessed June 2013. Arnett, E. B., M. R. Schirmacher, M. M. P. Huso, and J. P. Hayes. 2009. Patterns of Bat Fatality at the Casselman Wind Project in South-Central Pennsylvania. 2008 Annual Report. Annual report prepared for the Bats and Wind Energy Cooperative (BWEC) and the Pennsylvania Game C ommission. Bat Conservation International (BCI), Austin, Texas. June 2009. Available online at: http://www.batsandwind.org/pdf/2008%20Casselman%20Fatality%20Report.pdf

Avian Power Line Interaction Committee (APLIC). 2005. Avian Protection Plan (APP) Guidelines. Edison Electric Institute and US Fish and Wildlife Service (USFWS), Washington, D.C.

Avian Power Line Interaction Committee (APLIC). 2006. Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006. Public Interest Energy Research Program (PIER) Final Project Report CEC-500-2006-022. Edison Electric Institute, APLIC, and the California Energy Commission. Washington D.C. and Sacramento, California.

Avian Power Line Interaction Committee (APLIC). 2012. Reducing Avian Collisions with Power Lines: The State of the Art in 2012. Edison Electric Institute and APLIC, Washington D.C.

Baerwald, E. F. and R. M. R. Barclay. 2009. Geographic Variation in Activity and Fatality of Migratory Bats at Wind Energy Facilities. Journal of Mammalogy 90(6): 1341–1349.

Buckland, S. T., D. R. Anderson, K. P. Burnham, and J. L. Laake. 1993. Distance Sampling: Estimating Abundance of Biological Populations. Chapman & Hall, London, United Kingdom.

Bureau of Land Management (BLM). 1998. Las Vegas Resource Management Plan and Final Environmental Impact Statement. US Department of the Interior BLM, Las Vegas, Nevada.

California Energy Commission (CEC) and California Department of Fish and Game (CDFG). 2007. California Guidelines for Reducing Impacts to Birds and Bats from Wind Energy Development. Commission Final Report. CEC, Renewables Committee, and Energy Facilities Siting Division, and CDFG, Resources Management and Policy Division. CEC-700-2007-008-CMF.

Chatfield, A., W. Erickson, and K. Bay. 2009. Avian and Bat Fatality Study, Dillon Wind-Energy Facility, Riverside County, California. Final Report: March 26, 2008 - March 26, 2009. Prepared for Iberdrola Renewables, Portland, Oregon. Prepared by Western EcoSystems Technology, Inc. (WEST), Cheyenne, Wyoming. June 3, 2009.

Chatfield, A., W.P. Erickson, and K. Bay. 2010. Final Report: Avian and Bat Fatality Study at the Alite Wind-Energy Facility, Kern County, California. Final Report: June 15, 2009 – June 15, 2010. Prepared by Western EcoSystems Technology, Inc. (WEST), Cheyenne, Wyoming. Prepared for CH2M HILL, Oakland, California.

Erickson, W. P., J. Jeffrey, K. Kronner, and K. Bay. 2004. Stateline Wind Project Wildlife Monitoring Annual Report. July 2001 - December 2003. Technical report peer-reviewed by and submitted to FPL Energy, the Oregon Energy Facility Siting Council, and the Stateline Technical Advisory Committee. Western EcoSystems Technology, Inc. (WEST), Cheyenne, Wyoming, and Northwest Wildlife Consultants, Inc. (NWC), Pendleton, Oregon. December 2004.

Erickson, W. P., G. D. Johnson, M. D. Strickland, and K. Kronner. 2000. Avian and Bat Mortality Associated with the Vansycle Wind Project, Umatilla County, Oregon: 1999 Study Year. Final report prepared for Umatilla County Department of Resource Services and Development, Pendleton, Oregon. February 7, 2000.

ESRI. ArcInfo 10.0. ESRI, producers of ArcGIS software. Redlands, California.

H.T. Harvey and Associates. 2013. Desert Sunlight Solar Farm Carcass Detectability Study. Fresno, California. Prepared for Desert Sunlight Holdings, LLC, Oakland, California.

H.T. Harvey and Associates. 2014. Avian and Bat Protection Plan Annual Postconstruction Fatality Report for the California Valley Solar Ranch Project Covering 16 August 2012 to 15 August 2013. Prepared for High Plains Ranch II, LLC, Carlsbad, California.

H.T. Harvey and Associates. 2015. Ivanpah Solar Electric Generating System Avian & Bat Monitoring Plan First Annual Report (2013-2014)(29 October 2013 – 20October 2014). Prepared for Solar Partners I, II, and VIII.

Huso, M. 2010. An Estimator of Wildlife Fatality from Observed Carcasses. Environmetrics 22(3): 318-329. doi: 10.1002/env.1052.

Huso, M., N. Som, and L. Ladd. 2012. Fatality Estimator User's Guide. US Geological Survey (USGS) Data Series 729. Accessed April 2013. Available online at: http://pubs.usgs.gov/ds/729/pdf/ds729.pdf

Huso, M., D. H. Dalthorp, T. Miller, and D. Bruns. 2016a. Wind Energy Development- Methods for Assessing Post-Construction Bird and Bat Mortality. Human-Wildlife Interactions 10(1): 62-70.

Huso, M., T. Dietsch, and C. Nicolai. 2016b. Mortality Monitoring Design for Utility-Scale Solar Power Facilities. US Geological Survey (USGS) Open-File Report 2016-1087. 44 pp.

Johnson, G. D., W. P. Erickson, M. D. Strickland, M. F. Shepherd, and D. A. Shepherd. 2000. Avian Monitoring Studies at the Buffalo Ridge Wind Resource Area, Minnesota: Results of a 4-Year Study. Final report prepared for Northern States Power Company, Minneapolis, Minnesota, by Western EcoSystems Technology, Inc. (WEST), Cheyenne, Wyoming. September 22, 2000. 212 pp.

Johnson, G. D., W. P. Erickson, M. D. Strickland, M. F. Shepherd, D. A. Shepherd, and S. A. Sarappo. 2003. Mortality of Bats at a Large-Scale Wind Power Development at Buffalo Ridge, Minnesota. The American Midland Naturalist 150: 332-342.

Kerns, J. and P. Kerlinger. 2004. A Study of Bird and Bat Collision Fatalities at the Mountaineer Wind Energy Center, Tucker County, West Virginia: Annual Report for 2003. Prepared for FPL Energy and the Mountaineer Wind Energy Center Technical Review Committee. February 14, 2004. 39 pp. http://www.batsandwind.org/pdf/Kerns%20and%20Kerlinger_2006.pdf Korner-Nievergelt, F., P. Korner-Nievergelt, O. Behr, I. Niermann, R. Brinkmann, and B. Hellriegel. 2011. A New Method to Determine Bird and Bat Fatality at Wind Energy Turbines from Carcass Searches. Wildlife Biology 17: 350-363.

Reyes, G. A., M. J. Rodriguez, K. T. Lindke, K. L. Ayres, M. D. Halterman, B. B. Boroski, and D. S. Johnston. 2016. Searcher Efficiency and Survey Coverage Affect Precision of Fatality Estimates. Journal of Wildlife Management 80: 1488–1496. doi: 10.1002/jwmg.21126

Shoenfeld, P. 2004. Suggestions Regarding Avian Mortality Extrapolation. Technical memo provided to FPL Energy. West Virginia Highlands Conservancy, HC70, Box 553, Davis, West Virginia, 26260.

Smallwood, K. S. 2007. Estimating Wind Turbine-Caused Bird Mortality. Journal of Wildlife Management 71: 2781-2791.

Smallwood, K. S. 2013. Comparing Bird and Bat Fatality-Rate Estimates among North American Wind-Energy Projects. Wildlife Society Bulletin 37(1): 19-33.

Smallwood, K. S., D. A. Bell, S. A. Snyder, and J. E. DiDonato. 2010. Novel Scavenger Removal Trials Increase Wind Turbine-Caused Avian Fatality Estimates. Journal of Wildlife Management 74: 1089-1097.

Strickland, M. D., E. B. Arnett, W. P. Erickson, D. H. Johnson, G. D. Johnson, M. L. Morrison, J. A. Shaffer, and W. Warren-Hicks. 2011. Comprehensive Guide to Studying Wind Energy/Wildlife Interactions. Prepared for the National Wind Coordinating Collaborative (NWCC), Washington, D.C., USA. June 2011. Available online at: https://nationalwind.org/wp-content/uploads/assets/publications/Comprehensive_Guide_to_Studying_Wind_Energy_Wildlife_Interactions_2011_Updated.pdf TerraStat Consulting Group. 2013. Estimation of 90% Confidence Bounds for Avian Mortality Estimates at Ivanpah 1. Seattle, Washington. Technical memorandum prepared on 13 August 2013 for H.T. Harvey and Associates, Los Gatos, California. Accessed June 5, 2014. Available online at:

Thompson, S. K. 1992. Sampling. John Wiley and Sons, Inc., New York, New York.

US Fish and Wildlife Service (USFWS). 2012. Final Land-Based Wind Energy Guidelines. March 23, 2012. 82 pp. Available online at: https://www.fws.gov/ecological-services/es-library/pdfs/WEG_final.pdf Warren-Hicks, W., J. Newman, R. Wolpert, B. Karas, and L. Tran. 2013. Improving Methods for Estimating Fatality of Birds and Bats at Wind Energy Facilities. Public Interest Energy Research (PIER) Program CEC-500-2012-086. Final Project Report. Prepared for the California Energy Commission, Prepared on behalf of the California Wind Energy Association (CalWEA). February 2013. Available online at: http://www.energy.ca.gov/publications/displayOneReport.php?pubNum=CEC-500-2012-086 Western Ecosystems Technology, Inc. (WEST). 2016a. Avian and Bat Monitoring at the Desert Sunlight Solar Farm Project Riverside County, California, 2015 - 2016 Annual ReportFinal. Prepared for Desert Sunlight 250, LLC and Desert Sunlight 300, LLC, Juno Beach, Florida. Prepared by WEST, Cheyenne Wyoming.

Western EcoSystems Technology, Inc. (WEST). 2016b. Bird and Bat Conservation Strategy, Blythe Solar Energy Project, Riverside County, California. 57 pp.

Western EcoSystems Technology, Inc. (WEST). 2016c. Bird and Bat Conservation Strategy, McCoy Solar Energy Project, Riverside County, California. 57 pp.

Western EcoSystems Technology, Inc. (WEST). 2016d. Ivanpah Solar Electric Generating System Avian & Bat Monitoring Plan 2014-2015 Annual Report and Two Year Comparison 21 October 2014-20 October 2015. Prepared for Solar Partners l, ll, and Vlll.

Appendix B
Desert Quartzite Wildlife Incident Reporting System (WIRS)

DESERT QUARTZITE
WILDLIFE INCIDENT REPORTING SYSTEM (WIRS)

BACKGROUND AND INTRODUCTION

Desert Quartzite will voluntarily implement a wildlife incident response and reporting system. Desert Quartzite will record and report all dead and injured wildlife including but not limited to birds found incidentally in the project areas over the entire life of the project as part of the project operations and monitoring efforts. The purpose of this Wildlife Incident Reporting System (WIRS) is to standardize the actions taken by site personnel in response to wildlife incidents found within project boundaries. The WIRS provides direction for site personnel who may encounter a wildlife incident in an effort to fulfill obligations in reporting wildlife incidents. Wildlife fatalities or injuries found by project personnel or others will be reported and processed following the protocols described in this document.

DESERT QUARTZITE WIRS POLICY

This WIRS will be active for the life of the solar project. All employees, contractors and subcontractors of Desert Quartzite have a responsibility to comply with all environmental laws and regulations. Most birds are protected by the federal Migratory Bird Treaty Act (MBTA), and eagles are further protected by the Bald and Golden Eagle Protection Act (BGEPA). In addition, the state of California has an Endangered Species Act (CESA). Under the federal statutes, it is illegal to harm, harass, kill, or collect birds that may be found in the solar facility. A summary of these statutes is presented below. It is recognized that other wildlife including bats are generally not protected by federal or state law unless listed as a threatened or endangered species. However, it is the policy of FS to treat all wildlife incidents the same as avian incidents and include them in the WIRS.

It is illegal to collect an injured or dead bird without appropriate federal and state permits. **THE TOUCHING, POSSESSION, TRANSFER, OR TAMPERING WITH ANY WILDLIFE SPECIES (ALIVE OR DEAD) BY DESERT QUARTZITE EMPLOYEES OR SUBCONTRACTORS IS STRICTLY PROHIBITED UNLESS CONSISTENT WITH PERMITS.** The WIRS is designed to provide a means of recording and collecting data about wildlife species found in the solar facilities to increase the understanding of solar and wildlife interactions. Desert Quartzite maintains an ongoing commitment to investigate wildlife incidents involving company facilities and to work cooperatively with federal and state agencies in an effort to minimize the potential for future bird and wildlife fatalities. The objective of this policy is to insure that the best available information about wildlife incidents found in Desert Quartzite facilities is recorded and the proper authorities are notified. It is the responsibility of Desert Quartzite employees, contractors and subcontractors to report all wildlife incidents as outlined in this WIRS.

APPLICABLE LAWS AND REGULATIONS

Migratory Bird Treaty Act

The Migratory Bird Treaty Act of 1918 (MBTA) (16 USC 703-712) is the cornerstone of migratory bird conservation and protection in the United States. The MBTA implements four treaties that provide for international protection of migratory birds. It is a strict liability statute wherein proof of intent is not an element of a "taking" violation. Wording is clear that most actions resulting in a taking or possession (permanent or temporary) of a protected species can be a violation, regardless of intent.

Specifically, the MBTA states: “Unless and except as permitted by regulations...it shall be unlawful at any time, by any means or in any manner, to pursue, hunt, take, capture, kill, attempt to take, capture or kill, possess…any migratory bird, any part, nest, or egg of any such bird…(The Act) prohibits the taking, killing possession, transportation, and importation of migratory birds, their eggs, parts, and nests, expect when specifically authorized by the Department of the Interior." The word "take" is defined as "to pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to pursue, hunt, shoot, wound, kill, trap capture, or collect."

The MBTA protects 836 species of migratory birds (listed in 50 CFR 10.13), including waterfowl, shorebirds, seabirds, wading birds, raptors, and passerines. Generally, the MBTA protects all birds in the U.S. except upland gamebirds (e.g., pheasant, quail, etc), rock doves (pigeons), European starlings, and English house sparrows. Nearly all birds found at Desert Quartzite are protected under the MBTA.

Bald and Golden Eagle Protection Act

In June 1940, Congress signed into law the Bald and Golden Eagle Protection Act (BGEPA) (16 USC 668-688d) which affords additional protection to the bald and golden eagle. Specifically, the BGEPA states: “Whoever, with the United States or any place subject to the jurisdiction thereof, without being permitted to do so as provided…shall knowingly or with wanton disregard for the consequences of his act take, possess, transport…at any time or in any manner, any bald or golden eagle, alive or dead, or any part, nest or egg thereof shall be fined…that the commission of each taking or other act prohibited by this section, with respect to a bald or golden eagle, shall constitute a separate violation of this section." Penalties for violations of the BGEPA are up to $250,000 and/or 2 years imprisonment for a felony (violations are defined as a felony), with fines doubled for organizations.

Endangered Species Act

In 1973, the Endangered Species Act (ESA) (16 USC 1513-1543) was passed to protect endangered and threatened species and to provide a means to conserve their ecosystems. Under the ESA, Federal agencies are directed to utilize their authorities to conserve listed species, as well as "Candidate" species that may be listed in the near future, and make sure that federal agencies' actions do not jeopardize the continued existence of these species. As with the MBTA and the BGEPA, the ESA as amended prohibits the taking of species listed under the act as threatened or endangered.

BLM Sensitive Species

BLM Sensitive Species are species designated by the State Director and includes only those species that are not already federal listed proposed, or candidate species, or State listed because of potential endangerment. BLM’s policy is to "ensure that actions authorized, funded, or carried out do not contribute to the need to list any of these species as threatened or endangered."

California Fish and Game Code

Sections 3511, 4700, 5050, and 5515 of the California Fish and Game Code outline protection for fully protected species of mammals, birds, reptiles, amphibians, and fish. Species that are fully protected by these sections may not be taken or possessed at any time. CDFW cannot issue permits or licenses that authorize the "take" of any fully protected species, except under certain circumstances such as scientific research and live capture and relocation of such species pursuant to a permit for the protection of livestock. Furthermore, is the responsibility of the CDFW to maintain viable populations of all native species. To that end, the CDFW has designated certain vertebrate species as Species of Special Concern because declining population levels, limited ranges, and/or continuing threats have made them vulnerable to extinction**.**

California Endangered Species Act

The California Endangered Species Act (CESA; Fish and Game Code Sections [§§] 2050 - 2097) protects and preserves species designated by the Fish and Game Commission as either threatened or endangered in the state of California. These protected resources include those native species of fishes, amphibians, reptiles, birds, mammals, invertebrates, and plants, and their habitats, that are threatened with extinction, as well as those experiencing a significant decline which, if not halted, would lead to a threatened or endangered designation. The CESA also allows for take that is incidental to otherwise lawful development projects.

DESERT QUARTZITE WILDLIFE INCIDENT REPORTING

The following procedures are to be followed when Desert Quartzite personnel or subcontractors discover a wildlife fatality or injury while on site. These procedures are intended to be in place for the life of the project and are independent of the post-construction monitoring studies. Prior to the initiation of operations, on-site training will be provided to Desert Quartzite personnel and subcontractors regarding the implementation of this WIRS.

When To Use The WIRS - What Constitutes A Reportable Incident?

For the purposes of this reporting system, *incident* is a general term that refers to any wildlife species, or evidence thereof, that is found dead or injured within the solar project. Note that an incident may include an injured animal and does not necessarily refer only to a carcass or fatality.

An intact carcass, carcass parts, bones, scattered feathers, or an injured wildlife species all represent reportable incidents. Desert Quartzite personnel and subcontractors shall report all such discoveries even if you are uncertain if the carcass or parts are associated with the facility.

> A ***fatality*** is any find where death occurred, such as a carcass, carcass parts, bones, or feather spot (10 or more feathers).
>
> An ***injury*** or injured animal is any wildlife species with an apparent injury, or that exhibits signs of distress to the point where it cannot move under normal means or does not display normal escape or defense behavior.

Prior to assuming a wildlife species is injured, it should be observed to determine if it cannot or does not display normal behaviors. For example, raptors will occasionally walk on the ground, especially if they have captured a prey item. Raptors also "mantle" or hold their wings out and down to cover a prey item. These types of behaviors may make the wings appear broken or the animal injured. Identification of specific behaviors typical to the life cycles and distress behaviors of wildlife will be part of the Desert Quartzite wildlife training program. Always exercise caution before approaching an injured wildlife species. **<u>Under no circumstances are site personnel that are not included in the SPUT permit allowed to handle carcasses or injured animals.</u>**

Note: *Any incident involving a federally or state listed threatened or endangered species, bald eagle, or golden eagle must be reported to United States Fish and Wildlife Service (USFWS) and/or California Department of Fish and Wildlife (CDFW) <u>within 24 hours of identification</u>. See project personnel listing for contact information.*

<u>MATERIALS NEEDED TO REPORT AN INCIDENT</u>

1. A copy of this WIRS
2. A Wildlife Incident Report Form (see Attachment 1)
3. Project Personnel Listing and Contact Information
4. Pencil, Pen
5. Camera
6. Flagging

DESERT QUARTZITE WILDLIFE INCIDENT REPORTING PROCEDURES

The following procedures apply if the incident involves a **Wildlife Fatality** or **Injured Wildlife Species**:

- **Leave the subject animal in place**. A flag may be used to mark its location for easy finding while the data sheet is being completed. It is recommended that any flagging be marked with the date, time, and initials of the recorder. **DO NOT HANDLE THE CARCASS.**

- **Report** the find to the Site Operations Manager immediately.

- The Site Operations Manager shall complete the following steps:

    - **Photograph** the incident as it was found in the field. Take at least two pictures: a close up shot of the animal as it lays in the field and a broader view of the animal (marked by a flag) with the road, solar facilities, or other local features in the view. For the close up picture, place an object (e.g., radio, pencil, coin, etc.) next to the carcass for a scale of size.

    - **Prepare a Wildlife Incident Report Form.** The form and associated instructions are presented below.

    - **Report** the find to Desert Quartzite's Environmental Department.

The following procedures apply if the incident involves an **Injured Wildlife Species**:

- **Move** to a distance far enough away that it is not visibly disturbed or uneasy due to your presence. **DO NOT ATTEMPT TO CAPTURE OR HANDLE AN INJURED ANIMAL.**

- **Report** the find immediately to the Operations Site Manager

- The Site Operations Manager shall complete the following steps:

    - **Report** the find to the Environmental Affairs Lead immediately.

    - **Contact** a local rehabilitation center (*see contact list below*) for further instructions on handling and transport/pickup of the injured animal.

    - **Prepare a Wildlife Incident Report Form.** The form and instructions for filling out the form are provided below.

*** Any incident involving a federally or state listed threatened or endangered species or a bald or golden eagle must be reported to the USFWS and/or CDFW within 24 hours of identification. These incidents will be reported to the agency verbally by the Operations Manager or Desert Quartzite's Environmental Department.**

DESERT QUARTZITE
WILDLIFE INCIDENT REPORTING FORM

INCIDENT DETAILS
Project Location/Name:
Name of Observer/s:______________________ Date: ____________ Time: ________
Type of Incident: ☐ Injury ☐ Fatality
Carcass Condition: ☐ Intact Carcass ☐ Partial Carcass ☐ Feathers Only
Age of Remains (days): ☐ 1-2 (fluid filled eyes) ☐ 2-4 (maggots) ☐ 5+ (dried bones/feathers)
Photos Taken: ☐ Yes ☐ No (Take photos of - Birds: beak, legs, feathers, body. Wildlife: face and ears, tail and feet, body)
Who was notified of incident? (see contact list below)____________________________________
Comments on Carcass Condition or Behavior of Injured Animal:____
____

LOCATION
Where Found: ☐ On Access Road ☐ Solar Array ☐ Under Power Line ☐ Substation
GPS Coordinates: UTM N: UTM E: DATUM:__________
Comments on Location:____
____

IDENTIFICATION
☐ Bird ☐ Bat ☐ Mammal ☐ Other:_________________________
Species (to best of ability):____
Description of Color/Markings:____
Does Animal Resemble a Species of Concern discussed at Training? ☐ Yes ☐ No
Identification Remarks:____
____
(Describe details of - Birds: beak size, color, and shape; leg size, color, and shape; feather color; body size. Bats: color of fur and wings; muzzle long or short, tail attached or extending; ear color and shape); Other Wildlife: color of fur, any markings, and body size.
____

ENVIRONMENTAL CONDITIONS
Weather (Check all that apply): ☐ Clear ☐ Cloudy ☐ Rain ☐ Dust Storm
Approximate Temperature (F°):_______
Wind: ☐ Calm ☐ Breezy/Gusty ☐ Strong Winds
Habitat where found: ☐ Gravel (access road/turbine pad) ☐ Bare Ground ☐ Wash ☐ Desert scrub

OTHER NOTES/COMMENTS:____
____
____

CONTACT LIST (Immediately notify one of these individuals of incident)

1. Operations Manager:
2. Environmental Affairs Lead: