

## 6.0 MONITORING AND ADAPTIVE MANAGEMENT PROGRAM

This chapter describes the monitoring and adaptive management program for the MSHCP. The purposes of this program are to ensure compliance with the conditions of the MSHCP, assess the status of covered and other native species and natural communities within the conservation lands and on the Solar Sites; and to evaluate the effects and effectiveness of the management actions such that the conservation strategy described in Chapter 5, including the biological goals and objectives, are achieved. Adaptive management and monitoring will be integrated into one cohesive program, where monitoring will inform and change management actions to continually improve outcomes for covered and other native species and natural communities. An overview of the program, monitoring actions, and data management requirements follows.

Three specific types of monitoring will be conducted in association with the MSHCP that are mandatory elements of all HCPs (50 CFR 17.22, 17.32, and 222.307). These types of monitoring are:

1. Compliance monitoring, which tracks the permit holder's compliance with the requirements specified in the HCP and permit;
2. Effects monitoring, which tracks the effects of the Covered Activities on Covered Species; and
3. Effectiveness monitoring, which tracks the progress of the conservation strategy in meeting the biological goals and objectives of the HCP.

To ensure that all monitoring is properly implemented and tracked, a geo-database will be created. The database will contain information on:

- The physical and Project-related attributes of each Solar Site;
- The minimization and avoidance measures that must be employed for each Solar Site;
- The progress of construction activities on each Solar Site;
- The level of monitoring employed during construction, operations and maintenance, and decommissioning activities;
- Incidences of take of individuals of Covered Species and loss of Covered Species habitat;
- Compensatory requirements related to each of the Solar Sites;
- The physical and biological attributes of each of the Conservation Sites that would contribute to the conservation of each species;

- Habitat enhancement measures that are required to be performed on each Movement Corridor and Conservation Site;
- A list of surveys and studies, and a schedule for implementing those surveys and studies on each Project component (Solar Sites, Movement Corridors, and Conservation Sites); and
- Estimates of staffing needs for each identified task.

The database will be populated with relevant information as tasks are completed, including the results of surveys and studies. Information gleaned from queries of the database will help guide the adaptive management process.

The monitoring and tracking efforts that will be implemented for compliance monitoring, effects monitoring, and effectiveness monitoring are described below.

### **6.1 Compliance Monitoring**

Maricopa Sun, LLC will ensure that compliance with the terms and conditions of the MSHCP are met by monitoring the implementation of minimization and avoidance measures during pre-construction activities, construction activities, operations and maintenance activities, decommissioning activities, and conservation actions within the Permit Area. A checklist of all minimization and avoidance measures will be used to ensure compliance with all provisions of the MSHCP. The official checklist of all minimization, avoidance, and mitigation measures will be known as the Minimization, Mitigation, Reporting, and Compliance Program (MMRCP). Compliance monitoring will comprise the following components:

- Tracking the conversion of lands on the Solar Sites and impacts to occupied Covered Species habitat to ensure impact limits are not exceeded, and to ensure compliance with the requirement of proactively providing compensation lands;
- Tracking the incidental take of Covered Species as a result of Covered Activities on Permit Area lands to ensure that minimization and avoidance measures are effective at reducing impacts to the level authorized under permits;
- Tracking the implementation and timing of habitat enhancement, restoration, and other conservation actions, such as the installation of fencing (see Chapter 5 and Appendix C);
- Tracking implementation of establishing conservation easements;
- Tracking implementation of minimization and avoidance requirements; and
- Tracking and reporting of management and monitoring activities.

Compliance monitoring will be conducted by qualified biologists that are approved by the USFWS. Compliance monitoring will consist of the following tasks presented by project phase.

### 6.1.1 COMPLIANCE MONITORING OF PRE-CONSTRUCTION AND CONSTRUCTION ACTIVITIES

Pre-construction activities and construction activities have the potential to adversely affect Covered Species (see Chapter 4). To ensure that all activities comply with the terms and conditions of the MSHCP, pre-construction surveys (see Chapter 2, Section 2.3.5) will be conducted prior to ground-disturbing activities to identify areas where Covered Species might be at risk. Monitoring of construction activities will occur to ensure that Project effects to Covered Species are minimized or avoided.

- Prior to any ground-disturbing activities, the biological monitors, under the direction of the Project lead biologist, will conduct pre-construction surveys of the Solar Development Footprint to determine locations of Covered Species and occupied habitat where specific minimization and avoidance measures will be required. These surveys will be conducted within two weeks prior to the start of pre-construction and construction activities. If more than two weeks pass between the date of the pre-construction survey and the initiation of project activities, a repeat of the pre-construction survey will be conducted.
- Biological monitors will be on site to monitor the placement and installation of exclusion fencing and flagging of ESAs, and for construction boundary fencing.
- Biological monitors will be on site to conduct pre-activity biological sweeps immediately prior to (the morning of) the initiation of construction activities to ensure that all work areas are free of Covered Species, to ensure that fencing is intact and maintained, and to ensure that all minimization and avoidance measures are being complied with.
- Biological monitors will be on site to closely monitor construction activities when those activities occur within 200 feet of area known to be occupied by Covered Species, except in the case of burrowing owls. Covered Activities occurring in proximity of known locations of burrowing owls require full-time monitors on site when activities occur at specified avoidance distances as identified in the “Staff Report on Burrowing Owl Mitigation” (CDFG 1995a), which are seasonally dependant and may require avoidance distances of up to 250 feet. Upon approval of USFWS, the on-site biological monitor may reduce buffers, but to do so it must be demonstrated that a reduction in the buffer distance does not adversely affect the Covered Species present. A full-time biological monitor must be present when activities are being conducted anywhere within the footprint of the reduced area.
- A post-activity biological sweep of the active construction areas will be conducted at the end of the workday to ensure that all SWPPP BMPs are correctly in place, that all trash or micro-trash has been disposed of properly, and that all minimization and avoidance measures are complied with.
- Biological monitors will track the incidental take of Covered Species and habitat to ensure that minimization and avoidance measures are effective in reducing impacts to the level authorized under permits.

- Biological monitors will track and document the progress of work conducted to install the solar facilities, and the corresponding biological clearance surveys and monitoring to verify compliance with MSHCP terms and conditions.

The number of biological monitors required at any given time will be a function of the number of Solar Sites under construction, the sizes of those Solar Sites, the intensity and extent of the pre-construction activities and construction activities being performed, the presence of Covered Species on or near the work areas, and the range of minimization and avoidance measures that are applicable to the work being conducted.

In areas within 200 feet of areas known to be occupied by Covered Species (or within up to 250 feet for burrowing owl occurrences), an individual monitor will accompany each construction crew working in the area. Biological monitors will not be required to directly accompany crews when working in areas where no Covered Species occur, based upon recurring site surveys (effectiveness monitoring surveys, Section 6.3), pre-construction surveys, and biological sweeps conducted immediately prior to construction.

A minimum of four biological monitors per 160 acres of Solar Site will be present each day throughout the construction period whenever construction activities are being performed to conduct biological sweeps, track the progress of construction, track the implementation of project mitigation measures, and respond to biological issues as they arise.

#### **6.1.2 COMPLIANCE MONITORING OF OPERATIONS AND MAINTENANCE ACTIVITIES**

Operations and maintenance activities will be routine to solar operations. Such activities as vehicle use during solar panel washing and occasional site inspections, and repairs to underground electrical components or other solar facility components that result in the need to perform ground disturbance have the potential to impact Covered Species, if those species become established.

The degree to which Covered Species will be at risk from operations and maintenance activities will be directly related to the degree that Covered Species become established on the Solar Sites. The establishment of Covered Species will be assessed as described in Section 6.3. The results of the information gathered during effectiveness monitoring (Tier 1 and Tier 2 studies, described in Section 6.3) will be used to determine the level of on-site compliance monitoring needed during the operations and maintenance phase activities. Ongoing effectiveness monitoring will provide much needed information on the occurrence of Covered Species, but specific pre-construction surveys and biological sweeps will be needed prior to ground-disturbing operations and maintenance activities to aid in species avoidance. Implementation of minimization and avoidance measures will limit impacts from operations and maintenance activities and no lethal take will occur.

Compliance monitoring during the operations and maintenance activities will include:

- Conducting pre-activity surveys prior to any operations and maintenance activities to determine the level of compliance monitoring required;

- Tracking the maintenance and repairs to the perimeter fencing and to other project facilities, including documenting and reporting on all maintenance activities conducted;
- Tracking implementation of minimization and avoidance requirements; and
- Tracking and monitoring the ongoing vegetation management on the solar sites.

To accomplish these tasks, biological monitors will conduct pre-activity surveys for any repair or maintenance actions that will be required. The monitors will conduct site inspections on a monthly basis throughout the operational period to track all maintenance and repair activities, inspect fencing and ensure fence repairs are conducted in a timely manner, ensure that all minimization and avoidance measures are implemented, and evaluate vegetation conditions and track vegetation management actions.

The number of monitors required at any given time will be a function of the number of Solar Sites that are in operation and the sizes of those Solar Sites.

### **6.1.3 COMPLIANCE MONITORING OF DECOMMISSIONING ACTIVITIES**

Decommissioning activities have the potential to pose a higher risk of adverse affects on Covered Species than pre-construction and construction activities, primarily because Covered Species may become established on the Solar Sites during the solar operational life. The degree to which Covered Species will be at risk from decommissioning activities will be directly related to the degree that Covered Species become established on the Solar Sites. Throughout the operational period, surveys will be conducted on the Solar Sites to determine the rate and degree of site use by Covered Species. To ensure that the information available is timely, accurate, and of sufficient detail, comprehensive pre-activity surveys will be conducted immediately prior to decommissioning. Pre-activity surveys will provide information to determine the distribution and abundance of Covered Species on the sites so that the risk of take can be managed, and minimization and avoidance measures (including implementing relocation programs in consultation with USFWS) can be appropriately applied. On-site monitoring of decommissioning activities will occur to ensure that Project effects to Covered Species are minimized or avoided.

The following will be implemented:

- Prior to any ground-disturbing activities, biological monitors will conduct comprehensive pre-activity surveys of the Solar Sites to determine the extent of Covered Species' presence, and to identify areas of special concern where specific minimization and avoidance measures will be required. These surveys will be conducted no more than two weeks prior to decommissioning activities. If more than two weeks pass between the survey and initiation of the construction activities, an additional survey will be completed;
- Biological monitors will be on site to conduct pre-activity biological sweeps immediately prior to (the morning of) the initiation of removal activities (Chapter 2, Section 2.3.4);

- Biological monitors will be on site to continuously monitor decommissioning activities. When decommissioning activities occur within 200 feet of areas known to be occupied by Covered Species, biological monitors will be required to directly accompany each crew conducting that work. For monitoring of known locations of burrowing owls, specified avoidance distances identified in the “Staff Report on Burrowing Owl Mitigation” (CDFG 1995a) will apply. Upon approval by USFWS (and/or CDFW), the on-site biologist may reduce ESA avoidance buffers. In order to reduce a buffer, it must be demonstrated that a reduction in the buffer distance does not adversely affect the Covered Species present. A full-time biological monitor must be present to directly monitor activities that are being conducted anywhere within the footprint of the reduced area;
- Biological monitors will be on site to monitor the placement and installation of ESA fencing and flagging and project area boundary fencing;
- Biological monitors will conduct daily site inspections of active work sites during the decommissioning period to ensure that all work areas are free of Covered Species, or to ensure that affects to Covered Species are minimized, and to ensure that all minimization and avoidance measures are being complied with;
- A post-activity biological sweep of the active construction (decommissioning) areas will be conducted at the end of the workday to ensure that all trash or micro-trash has been disposed of properly, and that all minimization and avoidance measures have been complied with; and
- Biological monitors will track the take of Covered Species and habitat to ensure that impacts do not exceed the level authorized under permits.

The number of monitors required at any given time during decommissioning will be a function of the number of Solar Sites undergoing decommissioning activities, the intensity and extent of the decommissioning activities being performed, the presence of Covered Species on or near the work areas, and the range of minimization and avoidance measures that are applicable to the work being conducted. In areas within 200 feet of known Covered Species occurrences (or within up to 250 feet for burrowing owl occurrences), one biological monitor will directly accompany each construction crew. Monitors will not be required to directly accompany crews when working in areas where no Covered Species occur, based upon recurring site surveys (effectiveness monitoring surveys, see Section 6.3), pre-construction surveys, and biological sweeps conducted immediately prior to construction.

A minimum of four biological monitors per 160 acres of Solar Site will be present each day throughout the construction period whenever construction activities are being performed to conduct biological sweeps, track the progress of decommissioning, track the implementation of project mitigation measures, and respond to biological issues as they arise.

#### **6.1.4 COMPLIANCE MONITORING OF CONSERVATION ACTIONS**

Conservation actions include placing conservation easements on conservation lands, installing fencing around the perimeters of conservation lands, installing micro-topographic relief, and

implementing vegetation enhancement and control measures. Conducting studies to determine and monitor the use of conservation lands by Covered Species is discussed in Section 6.3, but the results of those monitoring efforts will be tracked as part of the compliance monitoring.

- Compliance monitoring of conservation actions will require both on-site monitoring and tracking of implementation of specified measures, as follows: Tracking the placement of conservation easements on identified properties to ensure that dedicated conservation lands remain at or above minimum requirements relative to the development of Solar Sites, and that the appropriate species-specific habitat ratios are being met (i.e., expected habitat losses on a species-by-species basis are adequately compensated for prior to the phased solar development).
- On-site monitoring and tracking of the applied habitat enhancement measures (e.g., fencing, micro-topographic relief, habitat creation activities, installation of dens and perches, vegetation control measures) to ensure that they are implemented at the appropriate time, that they are in compliance with the prescribed level of effort, and that appropriate minimization and avoidance measures are employed during the performance of these actions.
- Tracking of the performance of surveys and studies to determine the use of the Conservation Sites by Covered Species.

Compliance monitoring of conservation actions will require a variable effort, dependent upon the rate at which solar development proceeds (in terms of both number and acreage), the concomitant amount of conservation lands that must be placed into easements and managed, and the actions that are prescribed to occur on each Conservation Site.

## **6.2 Monitoring the Effects on Covered Species**

Maricopa Sun, LLC will monitor the effects of Covered Activities on the San Joaquin kit fox, Tipton kangaroo rat, Nelson's antelope squirrel, western burrowing owl, and blunt-nosed leopard lizard. Research will be needed to analyze changes in habitat and species conditions, both on the Solar Sites, and within Movement Corridors and Conservation Areas. Evaluation of data gathered through research and monitoring will be necessary to determine the effects of the solar development on these species and the effectiveness of conservation actions. Data maintained in the geo-database will be compiled to document the amount of take incidental to construction and other Covered Activities. Incidental take covered under the MSHCP will be documented in the geo-database and reported to the USFWS to ensure compliance.

Evaluation of the effects of the Project on Covered Species will be achieved through the use of both qualitative and quantitative data. Management outcomes will be compared with management goals (as described in Chapter 3 and in Appendix C), and Project conditions will be compared with Project objectives (Chapter 5). Data will be evaluated based on the following criteria:

- Level of take of species and habitats during pre-construction, construction, operations and maintenance, and decommissioning activities;

- Physical outcomes related to increased use of the Solar Sites, Movement Corridors, and Conservation Sites by Covered Species and other special-status species (i.e., changes in species numbers, changes in species distribution, changes in habitat distribution, amount of habitat destroyed as documented in the geo-database); and
- Status of threatened and endangered species based on community composition.

Monitoring will be conducted to document Project outcomes and impacts and to assess the effects and effectiveness of conservation strategies on both species and their habitat. The survey and study methodologies presented in the following section (Section 6.3) will be used as a basis for determining some of the Project effects on Covered Species.

### **6.3 Monitoring of the Effectiveness of the Conservation Program**

The data obtained from the process described in the previous section (Section 6.2) will assist Maricopa Sun, LLC and the USFWS in assessing the effectiveness of the MSHCP. The following effectiveness monitoring description applies to Solar Sites, Conservation Areas, and Movement Corridors. The primary purposes of effectiveness monitoring will be to:

- Develop information regarding the use of Conservation Sites by Covered Species; and
- Develop information regarding the effectiveness of conservation efforts by quantifying the effectiveness of the conservation program based on monitoring the status of the measurable objectives (Chapter 5).

Data from the geo-database will be queried to determine: (1) the number and size of Solar Sites completed and the area of habitat affected for each Covered Species; (2) compliance with the minimization and avoidance measures; (3) area of compensatory mitigation secured; (4) degree of use of the Conservation Sites by Covered Species; and (5) any observations of injured or dead Covered Species. This review process will be used to help ensure that the MSHCP's operating conservation program is successful.

To monitor the effectiveness of the Project's conservation program, the use of the Solar Sites, Movement Corridors, and Conservation Sites by Covered Species will be evaluated on a routine basis throughout the life of the Project. The use of the Conservation Sites by Covered Species will be monitored in perpetuity to ensure adequate implementation of management actions and to ensure that MSHCP objectives and goals are continuously met. Management goals and objectives, and management actions are provided in Chapter 3 and in Appendix C. The surveys and studies outlined below will be implemented during the operational life of the Project.

Baseline habitat conditions on most of the Solar Sites, Movement Corridors, and Conservation Sites are of poor quality for native species due to repeated disking (Quad Knopf 2010a). The Sites are generally situated within a larger landscape matrix that supports sparse populations of Covered Species, including the San Joaquin kit fox, Tipton kangaroo rat, Nelson's antelope squirrel, western burrowing owl, and blunt-nosed leopard lizard, as well as other special-status species. It is anticipated that the proximity to existing populations of Covered Species, coupled with the components of the conservation program, including the protection and enhancement of

Movement Corridors, will increase the value of the Solar Sites to Covered Species. It is possible that the installation of solar panels will be compatible with some Covered Species (O'Farrell and Uptain 1985). Thus, expansion of populations and increased use of the land beneath and between the solar arrays is anticipated. One purpose of the monitoring program will be to develop information regarding the suitability of a solar complex as habitat for the Covered Species. The monitoring program will also provide information on the long-term use of conservation lands by special status species, and information useful in developing and implementing adaptive management prescriptions.

### **6.3.1 MONITORING SPECIES USE OF THE SOLAR SITES, MOVEMENT CORRIDORS, AND CONSERVATION SITES**

The monitoring program outlined herein includes the evaluation of habitat within Solar Sites, Conservation Sites and Movement Corridors. This evaluation will be conducted to determine changes in vegetation cover and use by Covered Species and other wildlife, and will be used to drive management decisions. Evaluations will also be conducted on representative native habitat in the region to monitor natural fluctuations in abundance of Covered Species. Standard methodologies will be applied to these efforts.

#### ***Study Design***

The Solar Sites, Movement Corridors, and most of the Conservation Sites currently consist of repeatedly disked lands providing poor quality habitat for foraging, breeding, and dispersal of Covered Species. It is anticipated that some period of time (five years, for example) will be required for these lands to become more suitable to Covered Species, even with applied enhancement measures. Because of these existing conditions, two tiers of studies are appropriate: Tier 1 and Tier 2.

Tier 1 studies consist of broad-based, wide-ranging, cursory surveys to detect the presence of Covered Species on a site-wide basis, and are focused on simply determining whether the Sites are used by Covered Species, and if so, how extensive that use is. These surveys will include small mammal trapping where burrows are found, to verify species presence. Both qualitative and quantitative techniques will be used in these site-wide evaluations.

Tier 2 studies are designed to gather much more precise data on the use of the sites by Covered Species, and provide data that can be used to evaluate the effects of management actions. Tier 2 studies are designed to provide information on the abundance of Covered Species, to quantitatively track changes in habitat conditions, and to provide comparative and replicated data for a rigorous analysis. The methodologies for these two tiers of studies are provided below.

### **TIER 1 STUDY METHODOLOGY**

Tier 1 studies will consist of evaluating the Solar Sites, Conservation Sites, and Movement Corridors to assess the use of these areas by Covered Species, determine rates of Covered Species establishment, and evaluate broad-scale habitat conditions. Tier 1 studies are not intended to assess presence of Covered Species for the purpose of clearing a site for Covered Activities (see Pre-Activity Surveys, Chapter 2, Section 2.3.5). Methods employed will consist

of conducting pedestrian transect surveys, night spotlighting surveys, inspections of installed dens, evaluations of the use of installed perches; and verification trapping for small mammals, if burrows are encountered.

The primary method employed will be to conduct pedestrian transects across all Sites at a rate of one transect each 100 feet, or the equivalent of 53, one mile-long transects per square mile. Because of the configuration of the Movement Corridors, only a single transect will be walked along each linear mile of the Movement Corridors. Transect surveys will be conducted only when air temperatures are between 77 and 95 degrees Fahrenheit. During these transect surveys, all sightings and diagnostic signs of Covered Species will be noted, and habitat characteristics will be qualitatively documented. Transect surveys will be conducted once per survey season, between April 15 and June 30. Night spotlighting will be conducted around the perimeter of each Site, or if access is not available, around all accessible areas of each Site. Spotlighting will be conducted during three consecutive nights, once each survey season (April 15 to June 30). All installed dens and perches will be inspected for use by Covered Species twice per year, once between April 15 and June 30, and once between August 1 and October 1. All sightings and diagnostic signs of Covered Species will be documented.

Species verification trapping for the Tipton kangaroo rat will be conducted in representative areas containing small mammal burrows. No trapping will be required at a Tier 1 level on a Site where Tipton kangaroo rats have been trapped within Tier 2 study plots. When trapping is required, it will be conducted once each survey season (April 15 to June 30) until a Tipton kangaroo rat is captured or for three consecutive nights in the event that no individuals are trapped.

No more than two representative areas within a 320-acre portion of a Site will be trapped. The number of traps deployed will be dependent upon the number and distribution of burrows present and the patch size of the area occupied. In some cases, especially soon after the cessation of disking, as few as 10 traps in each area may be sufficient to sample a patch of small mammal habitat. As occupied patch sizes increase, additional traps may be needed. However, in no case shall more than 100 traps be deployed per occupied area.

Tier 1 studies will be conducted each year on the Solar Sites, beginning the year after solar facilities have been installed, until the sites have been decommissioned. Tier 1 studies will be completed on the Movement Corridors each year beginning the year after their establishment and continuing until decommissioning. Tier 1 studies will be completed on the Conservation Sites beginning within one year of having a conservation easement placed on the land and continuing until the year of decommissioning. Upon decommissioning, Tier 1 studies will be replaced with long-term management studies, as described in the Long-term HMP (LTHMP) (Appendix C).

## **TIER 2 STUDY METHODOLOGY**

A study plot will be established within each 320-acre block of each Solar Site and Conservation Site. Each plot will be 20 acres (approximately 933 feet on a side), and roughly centered within each 320-acre block. Some adjustments in study plot size and configuration, as well as placement locations may need to be made to accommodate site-specific conditions. For example, Conservation Site 3-C2 is 150 acres and triangular. Although this site is less than 320 acres, it

does represent a primary conservation area and a study plot will be established within its boundary. The placement of the study plot within that Conservation Site will need to be skewed to the east of center. At full project buildout, there will be 18 study plots totaling 360 acres established within the Permit Area, with 8 of those plots being established within Conservation Sites (Figure 6-1). Within each plot, plant transects, small mammal trapping lines, bird survey transects and point counts, and reptile transects will be conducted. In addition to these plot-specific activities, off-plot activities conducted as part of Tier 2 studies will include plant transects and track station monitoring. A conceptual study plot design is provided (Figure 6-2) and descriptions of the tasks to be conducted are below.

Sampling will occur on these study plots each year for the first five years after construction of Solar Sites, and each year for the first five years after easements have been placed on the Conservation Areas. After the first five years, it is anticipated that ecological conditions will begin to stabilize and the goals and objectives of the conservation program will have been met. After the first five years, the level of sampling will be reduced to once each three years for the duration of the life of the project to track the suitability of habitat conditions (e.g., vegetation densities and weed control). Upon decommissioning, sampling will be replaced by protocols presented in the LTHMP (Appendix C).

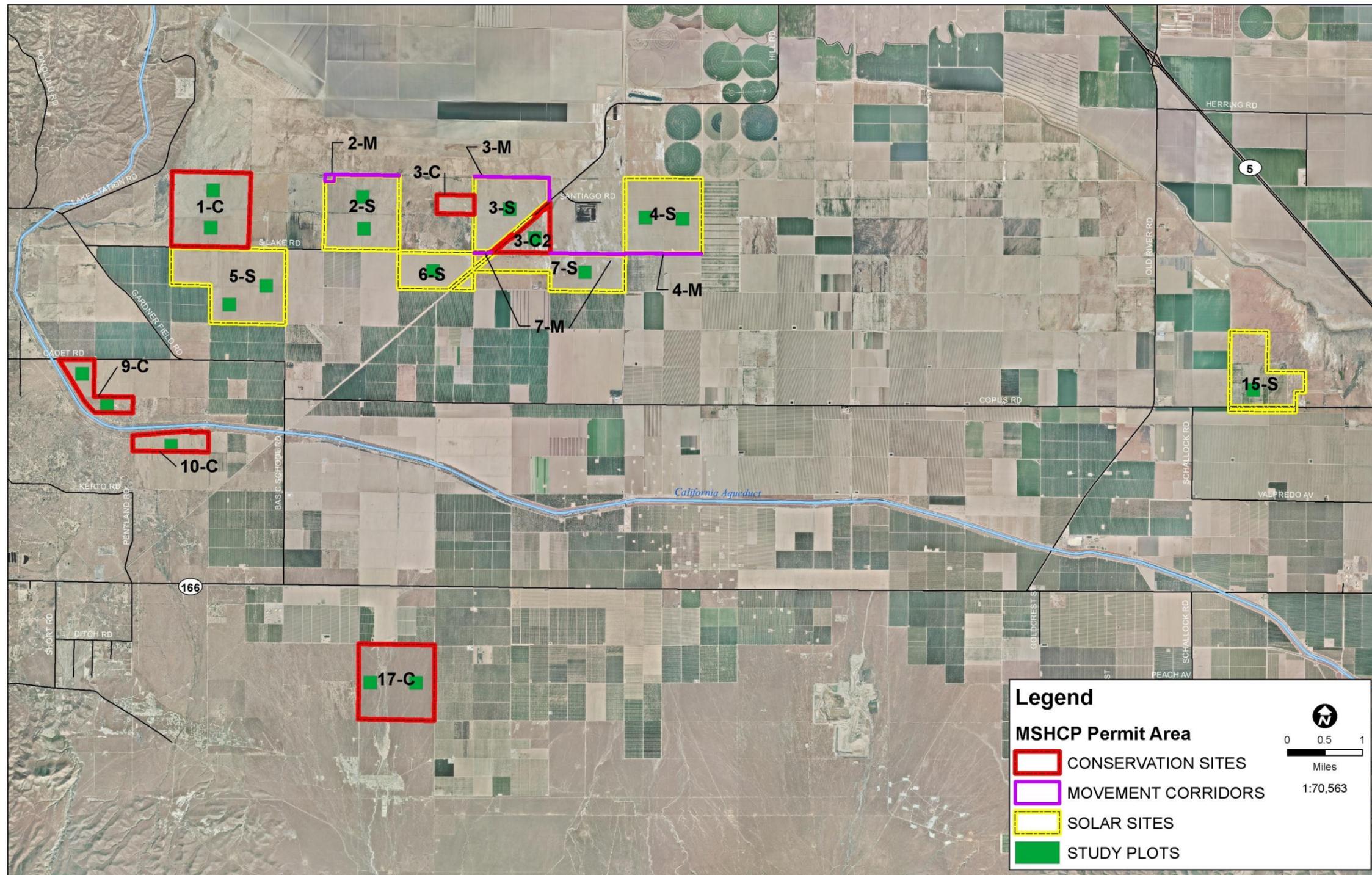
Sampling will be conducted concurrently (within a three-week period) on the study plots to reduce variation due to temporal conditions. All transects will be placed at right angles to the solar installations to ensure that each transect encompasses the greatest amount of diversity available on the plot (i.e., both the vegetated areas that are anticipated to develop under the solar panels and the non-vegetated maintenance roads situated between the panels).

All data collected will be entered into a geo-database and proofed to ensure accuracy prior to analysis. Descriptive statistics, Student's t-tests, Analysis of Variance (ANOVA), and other relevant statistical analyses will be performed as appropriate, using suitable statistical software. Repeated measures analysis will be used to track changes in vegetation and wildlife use of the study plots over time and in response to habitat improvement. Specific methodologies used for each sampling regime are described below.

#### ***Vegetation Sampling***

Vegetation sampling will be conducted along four 328-foot long transects. Sampling will occur during the spring of each sampling year. Ten vegetation samples (approximately 13.5 in x 27.5 in rectangular quadrants) will be taken from each transect.

A stratified random sampling approach will be employed on the Solar Sites, with each transect divided into two primary categories: areas under solar panels and areas not under solar panels. Five quadrants will be randomly placed within each category along each transect.

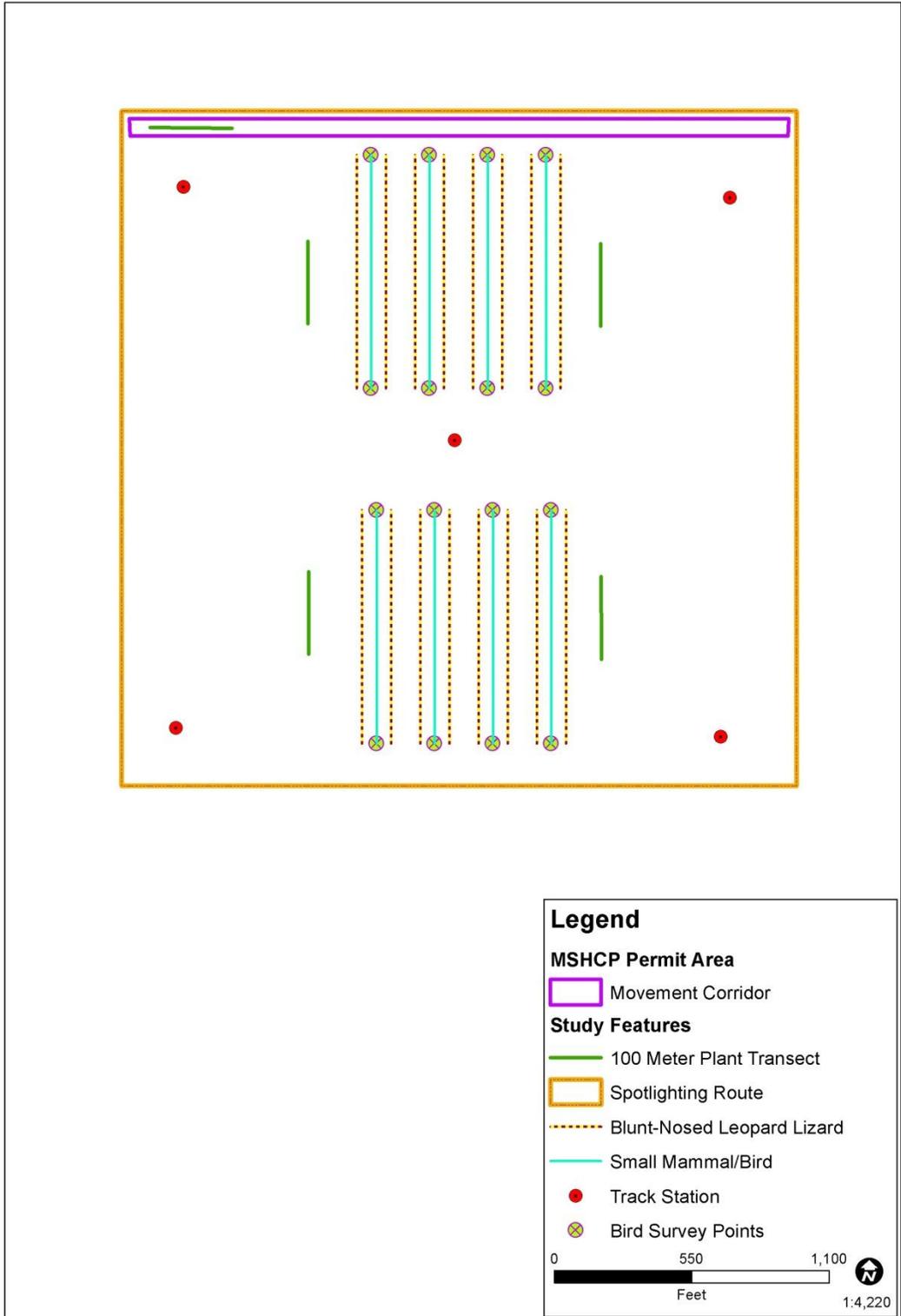


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**SITE PLAN**  
**MARICOPA SUN SOLAR COMPLEX, KERN COUNTY, CALIFORNIA**

Figure  
6 - 1



**CONCEPTUAL STUDY PLOT CONFIGURATION  
FOR LONG-TERM MONITORING  
STUDIES ON THE COVERED LANDS**

**Figure  
6 - 2**

A simple random sampling approach will be employed on study plots established on the Conservation Sites. All species will be noted, and the percent cover contributed by each species will be estimated using a modified Daubenmire cover scale (Bonham 1989). Total percent cover of all vegetation within the quadrant will be estimated using the same cover scale. When identification to species level is not possible, species will be assigned morpho-species names (e.g., "unknown *Atriplex*," "unknown with red cotyledons"). The height of annual vegetation will be measured at 3.28-foot intervals along each transect. The height of shrubs intersecting the transect will be measured, identified to species, and shrub cover will be determined. Shrub cover will be calculated by measuring the distance between locations where shrubs and transects intersect and dividing the total by the length of the given transect. Representative digital 35 mm photographs will be taken at each end of each plant transect to provide a record of vegetation conditions occurring on each Site. In addition to plant transects established on the study plots, two supplemental transects will be established along each of the one-mile long Movement Corridors.

#### ***Small Mammal Trapping***

Small mammal trapping will be conducted along four trapping lines established on each study plot in April and October of each sampling year. Each trapping line will be approximately 984 feet long, each containing 20 traps spaced at 49-foot intervals, resulting in a total of 80 Sherman™ live-traps on each plot. Traps will be checked for four consecutive nights each trapping period. Traps will be opened before sunset and baited with a mixture of proso millet, cracked oats, and peanut butter. All traps will be checked at approximately 0200 hours and closed for the night. All animals captured will be identified to species; and their sex, sexual condition, and weight will be recorded. Each animal captured will be marked by clipping a patch of fur on its hindquarters to determine newly captured animals from recaptures. Animals will be released immediately after processing.

#### ***Bird Surveys***

Each of four transects established on each study plot will be walked on four consecutive survey days in January, April, July, and October. Transects will be surveyed during the first 3.5 hours after sunrise, on days when there is no rain and the wind speed is below 10 mph. Each transect survey will be uniformly time-constrained to standardize the level of search effort expended. A biologist familiar with the songs, calls, and visual characteristics of the birds of the region will identify to species every bird seen or heard within 164 feet of each transect line. During the transect surveys, point-counts will be conducted at each end of each transect, with five minutes being spent at each point. All birds seen or heard will be tallied for each point sampled.

#### ***Reptile Surveys***

Eight transects approximately 984 feet long, spaced at intervals of approximately 100 feet on each study plot, will be walked for twelve survey days between April 15<sup>th</sup> and July 15<sup>th</sup>. Sampling will be conducted on no more than two periods of four consecutive days each on any given plot. Transects will be walked in the morning hours when temperatures are between 77 and 95 degrees F and wind speeds are less than 10 mph. Each transect survey will be uniformly time-constrained to standardize the level of search effort expended and will follow standard grid

survey protocols (Tollestrup 1979). Biologists familiar with the herpetofauna of the region will thoroughly search the area within 50 feet of each transect, identifying all individuals detected to species and recording the GPS location of each animal found. Sightings of Nelson's antelope squirrels will be recorded during this survey.

#### ***Track and Camera Stations***

Track stations will consist of a 3.28-foot-diameter area covered with fire clay or dolomite on which imprints of tracks can be seen. Each station will be baited in the center with a can of cat food. Each track station will be equipped with a digital camera that is activated by an infrared trigger and a motion sensitive trigger. Each track station will be inspected for tracks and digital images will be downloaded on a daily basis for four consecutive days during January, April, July, and October of each monitoring year. All photographs will be archived and reviewed to produce a tally of species visiting the stations.

Track and camera stations will not be associated directly with the study plots, but instead, 42 stations will be established in the locations shown on Figure 6-2. Additionally, each artificial den installed will be evaluated to determine use by San Joaquin kit foxes. To accomplish this evaluation, digital cameras with infrared and motion sensitive triggers will be established at each den and monitored for three consecutive nights during each of the four survey periods each year that sampling is performed.

### **6.4 Adaptive Management Strategy**

Adaptive management is defined as the use of new information gathered from a monitoring program or from other sources to adjust management strategies and practices to improve conservation of a Covered Species (California Fish and Game Code 2805[a]). The federal rules and regulations require that adaptive management programs address all foreseeable biological and environmental changes, and that programs be designed so that new applicable scientific information and information developed through monitoring efforts are incorporated into the conservation plan. Under adaptive management, the MSHCP's conservation strategies will be monitored and analyzed to determine if they are producing the desired results (e.g., providing for movement of species through the Solar Sites, providing expansion of use by Covered Species into previously disked areas). If the desired results are not being achieved, then adjustments in the management actions will be made to achieve the stated Project goals and objectives (Chapter 5).

Adaptive management will be used in this MSHCP to adjust management actions and to modify management programs in response to information gained through biological monitoring. Management actions will be adapted to conform to changing conditions and data compiled from research, monitoring, and evaluation of data. Results of research, monitoring, and evaluation of data will be communicated by the Project administrator to the USFWS and to all solar developers. The USFWS will be consulted prior to implementing modifications to specified management actions. The decision to adapt management strategies based upon evaluation results may involve: A) adjusting management strategies; B) defining further conservation measures; C) modifying or adopting additional monitoring and research criteria; and D) changing management policies.

In general, the Monitoring Agent (see description in Chapter 8) will assess monitoring data and develop management strategies to better meet Project goals and objectives (Chapter 5). For example, species presence and relative abundance will be assessed in relation to vegetation characteristics. Subsequently, subject to review and approval by the USFWS, management activities will be adjusted to allow for development of vegetation communities that are most likely to be beneficial for Covered Species. The geo-database will be developed depicting locations of Covered Species and location of impacts to Covered Species. Covered Species locations and impacts will be assessed annually to determine when and where adjustments to project measures and other minimization efforts will be needed.