Biological Impact Analysis and Mitigation Report

High Desert Solar Project

San Bernardino County, California

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30 YEARS
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ENVIRONMENTAL CONSULTANTS

ECORP Consulting, Inc. has assisted public and private land owners with environmental regulation compliance since 1987. We offer full-service capability, from initial baseline environmental studies through environmental planning review, permitting negotiation, liaison to obtain legal agreements, mitigation design, and construction monitoring and reporting.

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1.0 INTRODUCTION

The High Desert Solar Project (project) will be a nominal 108-megawatt (MWAC) solar photovoltaic (PV) power facility with a proposed integrated battery energy storage system (BESS) located in the City of Victorville, San Bernardino County, California. The project applicant is HDSI, Inc (Applicant). The project will provide renewable energy required to advance California's Renewable Portfolio Standard (RPS) goals and climate policies, and to enhance electrical grid reliability. In support of the environmental review process for the project, ECORP Consulting, Inc. (ECORP) completed focused biological surveys at the project area and prepared a Comprehensive Biological Technical Report that documents the results of those surveys (ECORP 2018a). This document was prepared for the Comprehensive Biological Technical Report and provides an analysis of the potential biological impacts associated with the project as well as measures to avoid, minimize, or mitigate biological impacts. Impacts to water features that are either federally or state-jurisdictional are excluded from this document and are presented in a separate document (*High Desert Solar Aquatic Resources Delineation Report*) that was prepared for the project (ECORP 2018b)

1.1 Project Location

As depicted on the United States Geological Survey (USGS) Victorville NW, Helendale, and Victorville 7.5-minute topographic quadrangles, the project area is located in the City of Victorville, in Township 6 North, Range 5 West of the San Bernardino Baseline and Meridian, in San Bernardino County, California. Elevations on the project area range from 2,730 to 2,815 feet above mean sea level (msl). The project area is located mostly east of Helendale Road and west of Floreate Road directly north of the Southern California Logistics Airport (SCLA) and east of the Victor Valley Wastewater Reclamation Authority (VVWRA) properties. Project location maps can be found in the Comprehensive Biological Technical Report (ECORP 2018a).

1.2 Project Description

The following is a summarized version of the official project description that pertains to impacts to biological resources. The complete project description is included in Appendix A.

The project will consist of a solar photovoltaic field, BESS, substation, and related facilities, collectively referred to as the Solar Field Area, and a corridor consisting of a 2.3-mile 230-kV generation tie line (Gen-Tie) that will run east and then south to connect to the existing Victor-Caldwell 230-kV line, upstream of the first pole on the Southern California Edison system. The Gen-Tie corridor will be approximately 120 feet wide. Additionally, a 1.7-mile 12.47-kV service line (Service Line) will connect to the Victorville Municipal Utility Services (VMUS) system. This line will run as underbuilt with the Gen-Tie for the first mile and then diverge to the west and run on standard distribution utility poles to connect to VMUS at the Industrial Wastewater Treatment facility south of the Solar Field Area. The Service Line corridor will be approximately 40 feet wide. The Gen-Tie and Service Line, and associated wire-pulling sites are collectively referred to as the Interconnection Facilities.

In this document, the evaluation of potential impacts to sensitive biological resources has generally been broken into three project components (Project Components): the Solar Field Area, the Interconnection Facilities (comprising the Gen-Tie, Service Line, and associated features), and the Access Roads (Figure 1). The Solar Field Area is the largest Project Component followed by the Interconnection Facilities, then Access Roads. The Access Roads component includes all roads that will be used for access to the Solar Field Area and Interconnection Facilities. Collectively, these three Project Components are referred to as the project or project area, and the acreages associated with each are described in this document.

1.2.1 Project Design Features

Project Design Features include measures and actions that will be implemented to address specific impacts that may result from project implementation. Project Design Features that will be implemented for the project and are applicable to biological resources, include the following:

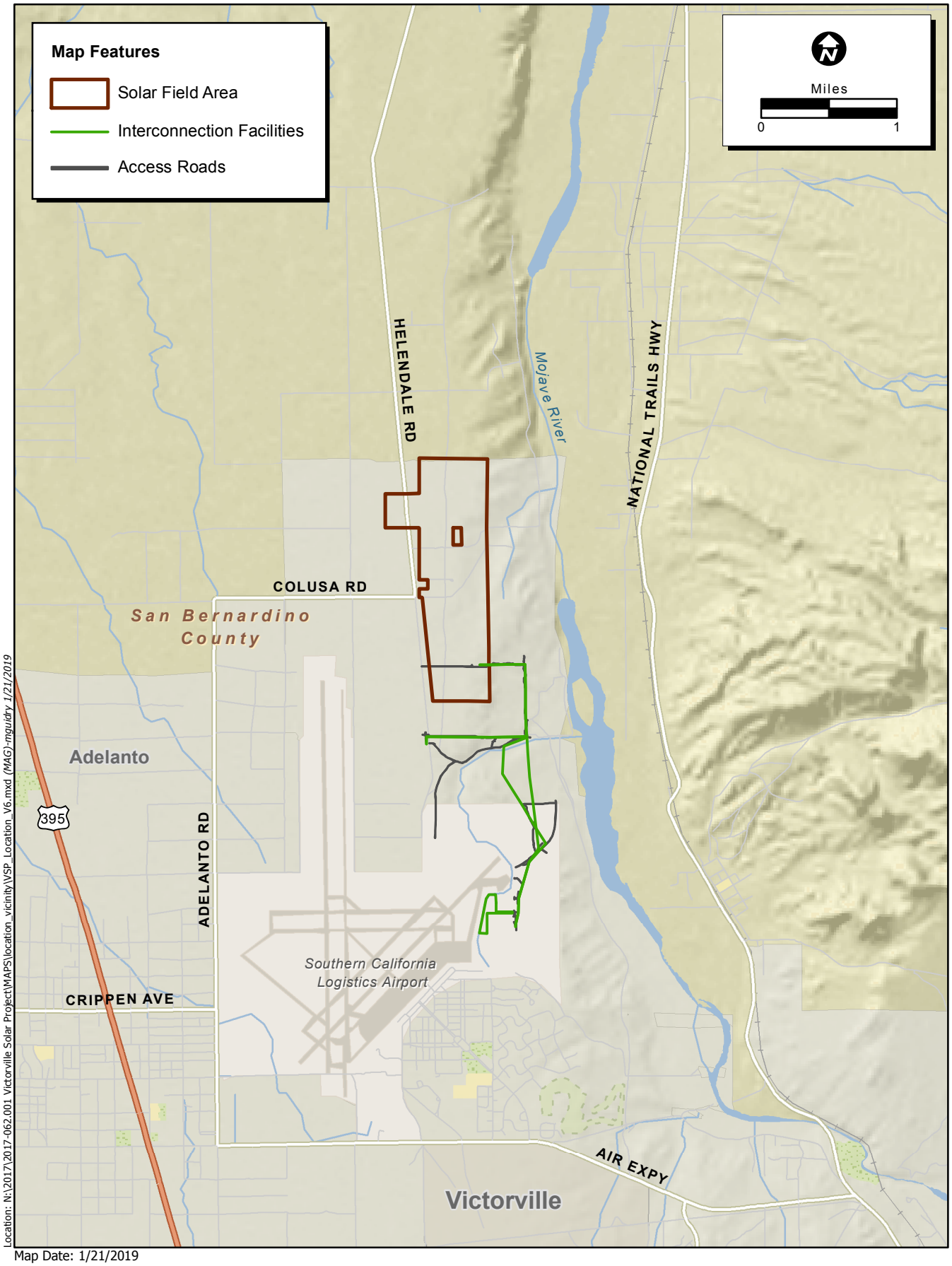
- Storm water pollution prevention
- Hazardous substance management
- Weed management
- Raven management program

The key components associated with these Project Design Features are included in Appendix B.

1.3 Project Survey Background

ECORP conducted the following biological technical studies in 2017 and 2018 in support of the project:

- Literature review
- Biological reconnaissance survey
- Mohave ground squirrel (*Xerospermophilus mohavensis*; MGS) habitat assessment
- Focused surveys for special-status plant species
- Focused surveys for desert tortoise (*Gopherus agassizii*)
- Focused surveys for burrowing owl (*Athene cunicularia*)



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Map Date: 1/21/2019
Source: ESRI

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Figure 1. Project Location

2017-062 Victorville Solar Project

Other sensitive biological resources incidentally observed during the aforementioned studies were documented. These species included desert kit fox (*Vulpes macrotis arsipus*), nesting birds, Swainson's hawk (*Buteo swainsoni*), northern harrier (*Circus hudsonius*), peregrine falcon (*Falco peregrinus*), loggerhead shrike (*Lanius ludovicianus*), and yellow-headed blackbird (*Xanthocephalus xanthocephalus*). American badger (*Taxidea taxus*) was not documented on or adjacent to the project area during the aforementioned studies; however, this species was found to have a high potential to occur on or in the vicinity of the project. The methods and results of these studies are discussed in more detail in the *Comprehensive Biological Technical Report for the High Desert Solar Project: 2017-2018 Survey Results* (ECORP 2018a). In November 2018, a laydown yard for the Interconnection Facilities was added to the project design after the Comprehensive Biological Technical Report had been completed. The results of the biological reconnaissance survey of the laydown yard are presented in Appendix C. Potential project-related impacts pertaining to the biological resources identified on or adjacent to the project area during these surveys are addressed in this document.

2.0 DEFINITIONS

2.1 CEQA Significance Criteria

Section 15064.7 of the CEQA Guidelines encourages local agencies to develop and publish the thresholds that the agency uses in determining the significance of environmental effects caused by projects under its review. However, agencies may also rely upon the guidance provided by the expanded Initial Study checklist contained in Appendix G of the CEQA Guidelines. The Appendix G "checklist" is a screening tool used to determine whether an effect may be significant. With respect to biological resources, Appendix G provides that impacts may be considered significant if there is evidence that the project would:

- Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by California Department of Fish and Wildlife (CDFW) or United States Fish and Wildlife Service (USFWS);
- Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by CDFW or USFWS;
- Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (CWA) (including, but not limited to, marsh, vernal pool, coastal) through direct removal, filling, hydrological interruption, or other means;
- Interfere substantially with the movement of any native resident or migratory fish or wildlife species, or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites;
- Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance; and
- Conflict with the provisions of an adopted Habitat Conservation Plan (HCP), Natural Community Conservation Plan (NCCP), or other approved local, regional or state habitat conservation plan.

An evaluation of whether or not an impact on biological resources would be substantial must consider both the resource itself and how that resource fits into a regional or local context. Substantial impacts would be those that would diminish, or result in the loss of, an important biological resource, or those that would obviously conflict with local, state, or federal resource conservation plans, goals, or regulations. Impacts are sometimes locally important but not significant according to CEQA. The reason for this is that although the impacts would result in an adverse alteration of existing conditions, they would not substantially diminish, or result in the permanent loss of an important resource on a population-wide or region-wide basis.

2.2 Impact Definitions

"Effects analyzed under CEQA must be related to a physical change" (CEQA Guidelines § 15358(b)). This section discusses potential effects or impacts, whether direct or indirect, to the biological resources that could result from project construction and operations.

- Direct impact: CEQA Guidelines § 15358(a)(1) provides that effects include "direct or primary effects which are caused by the project and occur at the same time and place." Any alteration, disturbance or destruction of biological resources that could result from project related activities is considered a direct impact.
- Indirect impact: CEQA Guidelines § 15358(a)(2) provides that as a result of project-related activities, biological resources may also be affected in a manner that is not direct. CEQA Guidelines § 15358(a)(2) provides that effects include "indirect or secondary effects which are caused by the project and are later in time or farther removed in distance but are still reasonably foreseeable." "Indirect or secondary effects may include growth-inducing effects and other effects related to induced changes in the pattern of land use, population density, or growth rate, and related effects on air and water and other natural systems, including ecosystems."

Direct and indirect impacts may be either "permanent" or "temporary" in nature:

- **Temporary impacts (short-term):** impacts considered having reversible impacts to biological resources can be viewed as temporary. For the purposes of impact analyses, consultation with state and federal wildlife agencies, and compensatory mitigation calculations, temporary impacts to habitat/vegetation communities within the Mojave Desert will be treated as permanent impacts due to the extensive amount of time it takes for desert scrub communities to recover. The temporary and permanent impact acreages are identified separately in this document to maintain consistency with the description of project activities.
- **Permanent impacts (long-term):** impacts that result in the irreversible removal of biological resources are considered permanent.

Examples of direct, permanent project impacts include grading, clearing, disking, and paving, where a permanent change (land conversion) would occur. Direct, permanent project impacts to biological resources would result from Solar Field Area, the Interconnection Facilities, and operations and maintenance (O&M) of the project.

Examples of direct, temporary project impacts include trenching for electrical cables and conduit, construction laydown and debris sites, and wire stringing sites. Examples of short-term temporary impacts include increased vehicle traffic and noise and the generation of fugitive dust, pollution, and erosion during construction.

To determine potential impacts to biological resources from project implementation, the project design (October 2018), was overlaid on the result maps that were prepared after conducting the literature review and biological surveys.

2.2.1 Potential Project-Related Direct Impacts

Direct, permanent project impacts include areas within the limits of ground-disturbing activities where a permanent change (land conversion) would occur. Biological resources, including vegetation communities, non-vegetated features, plants, wildlife, and jurisdictional areas, if any, within these areas are anticipated to be permanently affected.

Project construction-related ground disturbing and habitat altering activities could directly kill, injure or harass wildlife. Potential direct impacts to less mobile fossorial (burrowing) animals that are underground during most of the day or year (e.g., small mammals or lizards) or have a life stage in the soil or on plants (e.g., amphibians, nesting birds, insects) could occur from encounters with vehicles or heavy equipment. Animals may be crushed or buried by construction vehicles/equipment and may also be injured or killed as a result of collisions with vehicles.

2.2.2 Potential Project-Related Indirect Impacts

Indirect impacts may either be short-term, related to construction, or long-term and may affect plant and wildlife populations, habitats, and water quality over an extended period of time, long after construction activities have been completed. Indirect impacts to biological resources are hard to predict; however, potential project-related indirect impacts are described below.

Project construction-generated fugitive dust, pollution, runoff, siltation, sedimentation, and erosion could alter site conditions and affect vegetation by settling on plant surfaces and inhibiting metabolic processes including photosynthesis and respiration. It could also degrade and alter site conditions, water quality, hydrology patterns, habitats, and soils that are adjacent to project construction sites. Consequently, the ability of these areas to support plant and wildlife populations may decrease.

Project construction could result in temporarily increased noise levels, vibrations, lighting and/or human activity in and adjacent to project work sites. Potential impacts include a disruption of natural foraging, roosting, denning, and/or breeding behavior of wildlife species in or near the construction sites. Noise could interfere with territorial and mating vocalizations and wildlife breeding patterns. Nighttime project construction work with artificial lighting could disrupt natural foraging, roosting, and breeding behaviors and/or alter wildlife movement patterns and migratory routes of nocturnally active species. Most animals would attempt to avoid moving in or near the lighting; however, some animals including insects, migratory birds, and bats might be attracted to the lighting. This could lead to being detected by nocturnal predators increasing construction-related mortalities. Wildlife species stressed by increased noise levels, vibrations, lighting and/or human activity may disperse from habitat in the project

area/project vicinity and/or lead to the loss (take) of adults and/or their young. Workers could provide food subsidies in the form of trash and litter or water which attracts opportunistic predators, including the common raven (*Corvus corax*), northern raccoon (*Procyon lotor*), Virginia opossum (*Didelphis virginiana*), and coyote (*Canis latrans*).

Development of the project and the permanent loss of habitats and physical features could indirectly lead to mortality, injury, or harassment of wildlife species from:

- The loss of foraging, roosting, denning, and/or breeding habitats available. Habitat loss could displace species from existing territories and reduce the home range of those species and impact nearby populations of similar species. Displaced species would then have to compete for and/or find new territories and compete for food with resident species. This could result in delayed nest building, fewer nest attempts, reduced clutch size, and an overall reduction in reproductive output.
- Habitat fragmentation. Permanent structures could serve as significant barriers to wildlife movement through the project area and region.
- Increased traffic and collisions with vehicles.
- Increased lighting, glare, and noise which could disrupt wildlife behavior.

Removing established vegetation within temporary impact areas and creating areas of exposed soil could indirectly create areas that are favorable to non-native invasive plants. The introduction of invasive, exotic species could reduce native plant population growth, dispersal, and recruitment. These conditions could also harm wildlife species. Weeds could displace native vegetation that serve as forage and breeding habitats for wildlife. The introduction of noxious weeds could also lead to increased wildfire risks.

Development of new permanent structures and impervious areas could indirectly alter water flow patterns and degrade water quality. Alteration of drainage patterns could also affect vegetation by altering site conditions so that the location in which they are growing becomes unfavorable. This could also affect wildlife by reducing food sources for herbivores, or by reducing the amount of cover.

3.0 IMPACT ANALYSIS

Potential impacts to biological resources are discussed below. Where appropriate, impacts to biological resources have been broken down according to individual Project Components (i.e., Solar Field Area, Interconnection Facilities, and Access Roads).

Project-related impacts will be offset by off-site habitat compensation (compensatory mitigation) and species-specific impact avoidance and minimization measures for federally and/or state-listed species and their habitats that will be addressed through the following permits:

- A federal Section 7 consultation process between the United States Army Corps of Engineers (USACE) and the USFWS, as part of permitting of impacts to jurisdictional waters of the U.S. and receipt of a project Biological Opinion (BO),

- A federal Section 10 consultation with the USFWS that includes preparation of a Habitat Conservation Plan (HCP) and an internal BO with the USFWS, and
- Consultation with CDFW and receipt of an Incidental Take Permit (ITP) under Section 2081 of the California Endangered Species Act.

This impact analysis section identifies the project-related impacts to desert tortoise, MGS, burrowing owl, desert kit fox, nesting birds, other special-status species, and their habitats (i.e., vegetation communities). Additional items requiring impact analysis through CEQA (wildlife corridors, nursery sites, and existing HCPs and Natural Community Conservation Plans [NCCPs]) are also included in this section. A detailed discussion of the mitigation measures is provided in Section 4.0.

3.1 Vegetation Communities

Implementation of the project would result in the disturbance of native soils and the permanent loss of native vegetation communities. The loss of these vegetation communities is a direct, permanent impact. The acreage of permanent and temporary impacts for each vegetation community within the three Project Components is shown in Table 1. Table 2 shows the total amount of permanent and temporary impacts to each vegetation community. Potential impacts to these communities will be offset by compensatory mitigation that is required for impacts to the special-status species identified on the project area.

Three native vegetation communities mapped within the project area (i.e., Mojave creosote bush scrub, Mojave creosote bush scrub (disturbed), and desert saltbush scrub) provide suitable habitat for desert tortoise, MGS, burrowing owl, desert kit fox, and nesting birds. Disturbed rabbitbrush scrub is also a native vegetation community within the project boundaries and was mapped within the Gen-Tie laydown yard boundaries (part of the Interconnection Facilities Project Component). In this area of the project, disturbed rabbitbrush scrub only provides suitable habitat for burrowing owl, desert kit fox, and nesting birds. The location and disturbed condition of the disturbed rabbitbrush scrub within the laydown yard does not provide suitable habitat for desert tortoise and MGS. Within the project area, disturbed land cover also provides suitable habitat for burrowing owl, desert kit fox, and some species of nesting birds. Impacts to special-status species and their habitats are discussed in taxonomic order in Sections 3.2 through 3.8, below.

Table 1. Vegetation Communities and Land Cover Type Impact Acreages by Project Component

Project Component	Vegetation Community	Permanent Impacts (Acres)	Temporary Impacts (Acres)	Total Acres
Solar Field Area				
	Mojave Creosote Bush Scrub*	547.23	0.00	547.23
	Disturbed	33.64	0.00	33.64
	Solar Field Area Subtotal	*580.87*	*0.00*	*580.87*
Interconnection Facilities				
	Desert Saltbush Scrub*	0.00	0.48	0.48
	Disturbed Rabbitbrush Scrub**	0.00	0.03	0.03
	Mojave Creosote Bush Scrub*	0.02	9.58	9.60
	Mojave Creosote Bush Scrub (Disturbed)*	0.01	4.12	4.13
	Mojave Desert Wash Scrub	0.00	0.09	0.09
	Developed	0.01	1.89	1.90
	Disturbed	0.01	15.69	15.70
	Interconnection Facilities Subtotal	*0.05*	*31.88*	*31.93*
Access Roads				
	Desert Saltbush Scrub*	0.03	0.19	0.22
	Mojave Creosote Bush Scrub*	1.99	2.86	4.85
	Mojave Creosote Bush Scrub (Disturbed)*	0.18	0.97	1.15
	Developed	0.05	0.08	0.13
	Disturbed	0.30	2.76	3.06
	Access Roads Subtotal	*2.55*	*6.86*	*9.41*
	Total	**583.47**	**38.74**	**622.21**

* Native vegetation community
**Native vegetation community but its disturbed nature limits habitat suitability

Table 2. Temporary and Permanent Impact Acreages by Vegetation Community and Land Cover Type

Vegetation Community	Permanent Impacts (Acres)	Temporary Impacts (Acres)	Total Acres
Desert Saltbush Scrub*	0.03	0.67	0.70
Disturbed Rabbitbrush Scrub**	0.00	0.03	0.03
Mojave Creosote Bush Scrub*	549.23	12.44	561.67
Mojave Creosote Bush Scrub (Disturbed)*	0.19	5.09	5.28
Mojave Desert Wash Scrub	0.00	0.09	0.09
Developed	0.06	1.97	2.03
Disturbed	33.96	18.44	52.40
Total	**583.47**	**38.73†**	**622.20†**

* Native vegetation community
**Native vegetation community but its disturbed nature limits habitat suitability
†Acreage totals may be off due to rounding error

3.2 Special-Status Plant Species

Special-status plant species, including federally and state-listed species, were neither observed nor detected on or adjacent to the project area during focused surveys. Therefore, no impacts to special-status plant species are expected.

Branched pencil cholla (*Cylindropuntia ramosissima*), silver cholla (*Cylindropuntia echinocarpa*), and beavertail cactus (*Opuntia basilaris* var. *basilaris)* were identified within the project footprint. Under certain circumstances, a harvesting permit from the Commissioner or the Sheriff of the county in which the native plants are growing under the Food and Agricultural Code Division 23: California Desert Native Plants Act may be required. However, the California Desert Native Plants Act provides that a landowner or agent of the landowner, upon 10 days' notice to the Commissioner, may clear or remove these plants from a building site or road, or other ROW, if the plants are not transported from the land or offered for sale (Food and Agricultural Code 80117(c)).

No compensatory mitigation for impacts special-status plant species or cactus species will be required.

3.2.1 Joshua Trees

The City of Victorville (City) has a Joshua Tree (*Yucca brevifolia*) Ordinance that provides for the protection and preservation of Joshua trees in all areas of the City (Ordinance Number 1224; Municipal Code Chapter 13.33). Written consent from the City's Director of Parks and Recreation (or the Director's designee) is required prior to removal. An estimated total of 352 Joshua trees (*Yucca brevifolia*) would likely have to be removed for the project, and direct impacts to Joshua trees in the form of removal would be considered significant if not avoided or mitigated. In order to mitigate any potentially significant impacts, the Applicant will obtain written permission from the City's Director of Parks and Recreation prior to removal of the Joshua trees. Prior to seeking approval, a Joshua tree health assessment and final inventory will need to be conducted to document the size, location, and general health of all Joshua trees that may be affected by the project. Implementation of Mitigation Measure BIO-1 (see Section 4, below) will reduce impacts to Joshua tree in the form of removal to a less than significant level.

3.3 Desert Tortoise

Desert tortoises and their sign (i.e., burrows, scat, tracks, carcasses) were identified within and adjacent to the project area during surveys conducted in 2017 and 2018 (ECORP 2018a). Suitable habitat for desert tortoise is present in the project area in the form of desert saltbush scrub, Mojave creosote bush scrub, Mojave creosote bush scrub (disturbed), and Mojave desert wash scrub; however, the quality of the habitat is considered low due to the presence of existing disturbances and development and the lack of continuity with higher quality habitat areas in the region (ECORP 2018a). Disturbed rabbitbrush scrub within the project was determined to not be suitable for desert tortoise due to its extremely disturbed nature and because it is isolated from existing suitable habitat in the vicinity of the project.

No designated critical habitat for desert tortoise is present within the project boundaries (USFWS 1990; USFWS 1994). The Fremont-Kramer Desert Wildlife Management Area (DWMA) is the nearest designated

Critical Habitat unit for desert tortoise and is located approximately three miles (4.8 kilometers) north. No permanent or temporary impacts will occur to desert tortoise Critical Habitat.

3.3.1 Estimated Desert Tortoise Density

Desert tortoise densities for the Project Components were calculated for the purposes of consultation with the state and federal wildlife agencies. The calculations and a discussion of the estimated desert tortoise density and abundance in the project area is included in Appendix D.

3.3.2 Direct Impacts

Direct impacts to desert tortoise may occur in the form of loss of occupied habitat, mortality, injury, and disease. These impacts are described in detail below.

Habitat Loss

Suitable desert tortoise habitat that will be permanently or temporarily affected by the project is used by desert tortoise for foraging, movement throughout the region, sheltering (burrow sites), and/or reproduction. Table 3 lists the acreage of desert tortoise habitat that will be permanently and temporarily affected by project activities.

Table 3. Desert Tortoise Habitat Impact Acreages

Project Component	Vegetation Community*	Permanent Impacts (Acres)	Temporary Impacts (Acres)	Total Acres
Solar Field Area				
	Mojave Creosote Bush Scrub	547.23	0.00	547.23
Interconnection Facilities				
	Desert Saltbush Scrub	0.00	0.48	0.48
	Mojave Creosote Bush Scrub	0.02	9.58	9.60
	Mojave Creosote Bush Scrub (Disturbed)	0.01	4.12	4.13
	Mojave Desert Wash Scrub	0.00	0.09	0.09
	Interconnection Facilities Subtotal	*0.03*	*14.27*	*14.30*
Access Roads				
	Desert Saltbush Scrub	0.03	0.19	0.22
	Mojave Creosote Bush Scrub	1.99	2.86	4.85
	Mojave Creosote Bush Scrub (Disturbed)	0.18	0.97	1.15
	Access Roads Subtotal	*2.20*	*4.02*	*6.22*
	Total	**549.46**	**18.29**	**567.75**

*The vegetation communities included in this table provide suitable habitat to desert tortoise. Subtotals and total acreages do not match Tables 1 and 2 because not all communities provide suitable habitat for this species.

Permanent Impacts

Permanent impacts to occupied desert tortoise habitat will occur during construction of the Solar Field Area, installation of the power poles associated with the Interconnection Facilities, and construction of

new spur roads to access the power poles where vegetation will be permanently removed from these areas. Direct, permanent impacts to desert tortoise in the form of loss of occupied habitat is a significant impact. However, the habitat present in the project area is of lower quality than in other areas throughout the desert tortoise's range and continuity with higher quality habitat in the region is constrained due to existing development and the Mojave River. With these factors in mind, discussions with the state and federal wildlife agencies have concluded that translocating desert tortoises present in the project area is preferable to reduce impacts to the desert tortoise, including impacts to the species relating to habitat loss (impacts specifically pertaining to desert tortoise translocation activities are discussed in the Mortality, Injury, and Disease section, below). Implementation of mitigation measures BIO-2 and BIO-3 will reduce these impacts to a less than significant level.

Permanent impacts in the form of habitat loss can also occur due to the presence of non-native and invasive plant species introduced into adjacent areas once the project has been constructed. Seeds can be introduced to desert tortoise habitat by the entering and exiting of construction equipment contaminated by invasive species, the inclusion of invasive species in seed mixtures and mulch, and by the improper removal and disposal of invasive species. Project Design Features include developing a vegetation management and weed abatement program to control vegetation within work zones and access roads, and avoidance and minimization measures have been developed to guide the content of the Project Design Features. Impacts to desert tortoise in the form of disturbances from non-native and invasive plant species is not expected to be a significant impact.

Temporary Impacts

Temporary impacts to occupied desert tortoise habitat will occur along the Interconnection Facilities and Access Roads due to assembly areas adjacent to each of the proposed new tower sites, wire stringing sites, and surface disturbance activities associated with access roads. Activities associated with the Interconnection Facilities and Access Roads may result in the crushing or trampling of vegetation by equipment, vehicles, and personnel. These impacts are considered temporary because the temporary impact areas will be stabilized with sediment erosion control measures and a one-time native seeding process after use. These areas are not planned for use during O&M activities. Direct, temporary impacts to desert tortoise in the form of loss of habitat is a significant impact; however, implementation of mitigation measure BIO-2 will reduce these impacts to a less than significant level.

Mortality, Injury, and Disease

Desert tortoises encountered during clearance surveys and monitoring activities conducted prior to and during the project will be permanently removed and translocated to an off-site location (recipient site). Direct and permanent impacts to desert tortoise may occur in the form of mortality, injury, and disease as a result of translocation activities. In order to offset these potentially significant impacts, a Desert Tortoise Translocation Plan will be developed in consultation with the state and federal wildlife agencies that contains specific methods and protocols to reduce or eliminate the potential for impacts to desert tortoise. Implementation of BIO-3 will reduce these impacts to a less than significant level.

Mortality and/or injury to desert tortoises is not expected to occur during the construction or O&M phase of the project because desert tortoises encountered during clearance surveys and subsequent monitoring

efforts will be permanently removed from the project. Furthermore, project measures implemented to exclude desert tortoises from the work areas will also facilitate avoidance of potentially significant impacts to desert tortoise in the form of mortality and/or injury. Prior to the start of construction, permanent desert tortoise fencing will be installed around the Solar Field Area and protocol-level clearance surveys for desert tortoise will occur again inside the exclusion fencing. Pre-construction desert tortoise clearance surveys will also be conducted in the Interconnection Facilities and Access Roads work areas. Following desert tortoise translocation activities, a biological monitor will be present during project construction activities. Implementation of mitigation measures BIO-3, BIO-4, and BIO-5 will reduce impacts related to desert tortoise mortality and injury to a less than significant level.

Although desert tortoise mortality and/or injury is not expected because of the aforementioned Project Design Features to exclude desert tortoises from the work area, there is potential for resident tortoises located in the vicinity of the project to move into the newly unoccupied habitat surrounding the project following the translocation activities. These tortoises would not have been detected during pre-project focused surveys conducted in 2017 and 2018 or during pre-construction surveys because they would be located outside the survey areas. Although possible, this is expected to be unlikely because of the low density of the regional desert tortoise population in the vicinity of the project and the expanded effort to move all tortoises detected during clearance surveys and monitoring activities. Nevertheless, direct impacts in the form of mortality and/or injury may occur to nearby resident tortoises as a result of the project. Mortality and/or injury to desert tortoises may occur during construction and O&M of the Interconnection Facilities and Access Roads. Newly created roads and increased traffic resulting from project construction would result in an increased potential for desert tortoise injury and/or mortality associated with vehicle travel and may improve the ability for some desert tortoise predators (such as coyotes) to secure prey by traveling along newly constructed roads.

Although project safety and precautionary measures will be in place, there is an increased potential for accidental wildfire associated with construction and O&M of the Interconnection Facilities and Access Roads. Furthermore, maintenance of previously unused roads during construction and O&M in the area may allow the general public to gain access to areas that were inaccessible prior to the project. Human actions associated with the general public's use of newly maintained roads can be possibly detrimental to desert tortoises in the form of illegal collection activities and collision with off-highway vehicle use. These temporary impacts could be significant and would occur during project construction and O&M phases of the project. Adherence to the measures in the project permits regarding desert tortoise injury or mortality will reduce the likelihood of this impact occurring to desert tortoises. The Desert Tortoise Translocation Plan will outline appropriate measures to take if a desert tortoise is observed during O&M activities and a worker education program will be implemented to inform workers on what to do if a desert tortoise is encountered. Implementation of mitigation measures BIO-3, BIO-4, and BIO-5 will reduce these impacts to a less than significant level.

Mortality and/or injury of nearby resident desert tortoises during O&M of the Solar Field Area is not anticipated because the permanent desert tortoise fencing will remain in place and will be maintained to prevent desert tortoise entry into the Solar Field Area and any tortoises found during clearance and construction monitoring efforts will be translocated, including those along the Interconnection Facilities

and Access Roads. Furthermore, desert tortoise grates at access gates to the Solar Field Area will also be installed to prevent tortoises from entering the site. No impacts to nearby resident tortoises are expected to occur during O&M of the Solar Field Area.

Introduction of disease to desert tortoises may occur as a result of the project; however, it is expected to be a low possibility because all desert tortoises encountered during the clearance surveys and subsequent construction monitoring efforts will be translocated to the recipient site. There is potential for the project to expose nearby resident desert tortoises to disease through the presence of pets (including captive tortoises) and unauthorized handling of desert tortoises. This is a potentially significant impact to nearby resident tortoises and may be a permanent impact to the local desert tortoise population. In order to reduce this possibility, pets (including captive tortoises) will not be allowed in the work areas during construction or O&M, so the possibility of introduction of disease, such as upper respiratory tract disease (URTD), will not affect nearby resident desert tortoises. Furthermore, project personnel will not be allowed to touch or handle desert tortoises that may wander in the vicinity of or on the site. These project-specific measures will be incorporated into the worker education awareness program. Implementation of mitigation measures BIO-3, BIO-4, and BIO-5 will reduce impacts to tortoise in the form of disease to a less than significant level.

Predation

The project may provide subsidies to predators (e.g., common raven, coyote, domestic dogs and cats). Trash and food waste, standing water, and perching and nesting substrates may be associated with the project during construction and O&M and can draw predators to the project area or support local populations of these predators in the vicinity of the project. Impacts resulting from predation are not expected to have a significant impact with the implementation of the Project Design Features (see Appendix B), which will reduce predator attraction to the site. In addition, the translocation of desert tortoises is expected to substantially reduce the desert tortoise population in the area, thereby further reducing the impact of increased predation potential.

3.3.3 Indirect Impacts

Indirect impacts to desert tortoises are not expected because tortoises observed during pre-construction clearance surveys will be moved to a recipient site and will not be exposed to the potential indirect impacts associated with the project. However, there is potential for nearby resident tortoises to move into the newly unoccupied areas following translocation. This section addresses the potential indirect impacts to nearby resident desert tortoises.

Noise and Ground Vibrations

Noise and ground vibrations from activities associated with the implementation of the project has the potential to indirectly affect behavior of nearby resident tortoises. The use of large pieces of equipment with running engines, compaction equipment, and drilling has the potential to affect the natural behavior of the desert tortoise. Construction noise may also disrupt the communication and damage the auditory system in desert tortoises or mask the sounds of an approaching predator (USFWS 1994).

Construction-related vibrations resulting from the project may temporarily displace a tortoise, prompt a desert tortoise to leave its burrow, and may affect courtship/breeding activities of desert tortoises located in the vicinity of the project. Impacts to desert tortoise in the form of noise and ground vibrations are expected to be a temporary, indirect impact that would occur only during construction and periodic maintenance of Project Components. Furthermore, densities of desert tortoise in the areas surrounding the project are low, meaning that few, if any, desert tortoises would be exposed to this impact. Permanent desert tortoise exclusion fencing will be established around the Solar Field Area and the area will be cleared for desert tortoise, thereby reducing the presence of tortoise and potential for indirect impacts. Additionally, any desert tortoises found in survey buffer areas and construction monitoring areas (where land access is granted) around the Project Components will be cleared and all desert tortoises found will be translocated per the Desert Tortoise Translocation Plan. This will further reduce the presence of desert tortoises and the potential for indirect impacts. Once the Solar Field has been constructed, noise and vibrations are not expected during the O&M phase. Potential noise and ground vibration impacts would not be considered significant because desert tortoises are not expected to be in the immediate project vicinity due to translocation activities and the low desert tortoise population density of the surrounding areas.

Increased Human Activity and Visual Disturbances

Increased human activity and visual disturbances would be associated with construction and O&M of all Project Components. A permanent increase in human activity and visual disturbances may affect desert tortoises located in habitat adjacent to the project once it has been constructed. This increase in human activity and visual disturbances could affect desert tortoises by altering normal behavior. Over time, it is possible that nearby resident tortoises will become accustomed to the O&M activities. Impacts to desert tortoise due to human activity and visual disturbances would not be considered significant because desert tortoises are not expected to be in the immediate project vicinity due to translocation activities and the low population density of the surrounding areas.

Habitat Fragmentation and Degradation

The project has the potential to fragment desert tortoise habitat, specifically to areas south of the Solar Field Area because of the narrow band of suitable habitat that would remain after construction of the project. Beginning with the installation of the permanent tortoise fencing around the Solar Field Area prior to construction, there would be an approximate 3,000-foot corridor containing suitable tortoise habitat between the southwest corner of the Solar Field Area and the SCLA, separated by Helendale Road. On the east side of the Solar Field Area, there would be an approximate 2,000-foot corridor containing suitable tortoise habitat between the Solar Field Area and the Mojave River. These corridors would present the only two areas where desert tortoises may live and travel between areas north or south of the Solar Field Area. Opportunities for east-west travel will be limited once the project has been constructed.

Desert tortoise habitat fragmentation is not expected to affect translocated desert tortoises, but there is a low potential for resident tortoises located in the vicinity of the project to move into the newly unoccupied habitat surrounding the project. These nearby resident tortoises would not have been detected during pre-project focused surveys conducted in 2017 and 2018 or during pre-construction

surveys or construction monitoring efforts because they would be located outside the survey areas. Although possible, this is expected to be unlikely because of the low density of the regional desert tortoise population and the low quality of the habitat surrounding the project. Nevertheless, indirect impacts in the form of habitat fragmentation may occur to nearby resident tortoises as a result of the project and would be a permanent, significant impact. Implementation of mitigation measures BIO-2 and BIO-3 would reduce impacts to tortoise to a less than significant level.

Degradation of habitat in the vicinity of the project may also occur. Newly constructed roads and maintenance of previously unused roads in the area may allow the general public to gain access to areas that were inaccessible prior to the project. Human actions associated with the general public's use of newly constructed and maintained roads can degrade the habitat in the vicinity of the project through unauthorized trash dumping, off-highway vehicle use, introduction of nonnative plant species, and increased dust. These factors can degrade the habitat in the vicinity of the project by reducing available forage plants, creating disturbances in areas that were previously undisturbed, and contributing to a general deterioration of the quality of the habitat. Habitat degradation in the areas outside of the project boundaries paired with the temporary and permanent loss of desert tortoise habitat could be a permanent and significant impact. The weed management program that will be implemented as part of a Project Design Feature will reduce or eliminate impacts to habitat degradation from nonnative plant species, and implementation of mitigation measures BIO-2, BIO-3, and BIO-4 would reduce impacts to desert tortoise to a less than significant level.

Increased Dust

A temporary increase in fugitive dust from construction activities within the project will likely occur. Dust may result in impacts to desert tortoise in the form of altered behavior by tortoises taking shelter or avoiding overly dusty conditions arising from the project. Furthermore, increased dust has the potential to coat the leaves of forage plants and inhibiting growth or killing the plant, thus reducing the availability of forage for nearby resident desert tortoises. This impact will occur during construction and O&M; however, dust control measures incorporated into the project design and those required by the Mojave Desert Air Quality Management District will minimize dust related to project activities and this impact is not expected to be significant to desert tortoise.

Lighting

Minimal lighting is proposed for the project to accommodate nighttime project activities. Nighttime lighting is not expected to be an impact to desert tortoise because the animal is generally only active during daylight hours when nighttime lighting would not be necessary.

3.4 Mohave Ground Squirrel

Suitable habitat for the MGS is present in the project area and is composed of the same vegetation communities that provide suitable habitat for desert tortoise (i.e., desert saltbush scrub, Mojave creosote bush scrub, Mojave creosote bush scrub (disturbed), and Mojave desert wash scrub) (ECORP 2018a). The quality of the habitat is considered low due to the presence of existing disturbances and development and the lack of continuity with higher quality habitat areas in the region (ECORP 2018a). The Applicant has

elected to assume presence of this state-listed species within all potentially suitable habitat affected by the project.

3.4.1 Direct Impacts

Direct impacts to MGS habitat may occur in the form of loss of presumed occupied habitat, mortality, and injury. These impacts are described in more detail below.

Habitat Loss

Habitat that will be permanently or temporarily affected is considered suitable for MGS foraging, movement throughout the region, sheltering (burrow sites), and/or reproduction. Table 3, above, lists the acreage of each suitable vegetation type that will be permanently and temporarily affected by project activities.

Permanent Impacts

Permanent impacts to MGS habitat are expected to be the same as those described for desert tortoise habitat. Implementation of mitigation measure BIO-2 would reduce these impacts to a less than significant level.

Temporary Impacts

Temporary impacts to MGS habitat are expected to be the same as those described above for desert tortoise habitat. Implementation of mitigation measure BIO-2 would reduce these impacts to a less than significant level.

Mortality and Injury

There is potential for construction-related injury or mortality to individual squirrels during the construction and O&M for all Project Components. Although the Solar Field Area will be fenced, the type of fencing that will be used (desert tortoise exclusion fencing) will not necessarily exclude MGS. Although it is unlikely, MGS have the ability to climb up and over the fence. Mortality by vehicle strikes and entombment in burrows during vegetation removal, grading, and maintenance activities may occur during the project. Newly created roads and increased traffic from the project would result in an increased potential for MGS injury and/or mortality associated with vehicle travel. Although project safety and precautionary measures will be in place, there is an increased potential for accidental wildfire associated with construction and O&M of the Interconnection Facilities and Access Roads. Loss or injury of individual MGS could be significant to regional populations of MGS. Implementation of the avoidance and minimization measures in the Section 2081 Incidental Take Permit (ITP) will reduce the potential for MGS mortality and injury. Biological monitoring and education of workers on MGS identification and ecology will further reduce the significance of these impacts. Implementation of mitigation measures BIO-4 and BIO-5 will reduce these impacts to a less than significant level.

3.4.2 Indirect Impacts

Indirect impacts to MGS may occur during construction and O&M of all Project Components in the form of noise, ground vibrations, habitat degradation and fragmentation, increased human activity and visual disturbances, increased dust, and nighttime lighting. These indirect impacts are described in more detail below.

Noise and Ground Vibrations

Indirect impacts to MGS in the form of noise and ground vibrations are expected to be the same as those described for desert tortoise; however, these impacts to MGS may be significant because animals in the vicinity of the project area will not be translocated prior to construction activities. These impacts would be temporary, occurring during construction and periodic maintenance of the Project Components. MGS incidentally observed or aurally detected during clearance and pre-construction surveys for other special-status species will be documented, and conditions in project permits regarding incidental observations of MGS will be adhered to during project. Conditions pertaining to MGS may include temporarily stopping work activities and establishing a disturbance limit buffer around active burrows. Implementation of mitigation measures BIO-4, biological monitoring, and BIO-5, worker education program, will reduce these impacts to a less than significant level.

Habitat Fragmentation and Degradation

The project has the potential to permanently fragment MGS habitat, as described in the desert tortoise section above. Habitat fragmentation could result in indirect impacts to MGS by affecting reproduction, population gene flow, and dispersal of young. MGS inhabiting areas that are separated by development are essentially cut off from one another and are unable to reproduce with the animals in other areas, thus disrupting gene flow in the local populations. Furthermore, dispersal of young may be affected in that juveniles have limited areas for dispersing, which also affects future reproductive activities and subsequent gene flow through local populations. Indirect impacts to MGS in the form of habitat fragmentation could be significant to location populations; however, implementation of mitigation measure BIO-2 would reduce impacts to MGS to a less than significant level.

Degradation of habitat for MGS in the vicinity of the project area may also occur and is consistent with what was described for desert tortoise. Habitat degradation in the areas outside of the project boundaries paired with the temporary and permanent loss of MGS habitat as a result of the project is considered a permanent and significant impact. Implementation of mitigation measures BIO-2, BIO-4, and BIO-5 would reduce impacts to MGS to a less than significant level.

Increased Human Activity and Visual Disturbances

Increased human activity and visual disturbances would be associated with construction and O&M of all Project Components, and although the potential impacts are similar to those described for desert tortoise, the effects are different to MGS. A permanent increase in human activity and visual disturbances may affect MGS located in habitat adjacent to the project area once it has been constructed. This increase in human activity and visual disturbances may result in a temporary significant impact to MGS during construction activities by altering normal behavior and can lead to MGS leaving the areas in the vicinity of

the project area for habitat with little to no human activity and visual disturbances. Over time and during O&M activities, it is likely that MGS will either become accustomed to the increased human activity and visual disturbances or animals will leave the area in search of less disturbed habitat, thus reducing the effects on MGS to a less than significant level. Conditions in the Section 2081 ITP that address incidental observations of MGS in the vicinity of work areas, which may include stopping work activities that may harm live MGS (if present), will be implemented and will reduce the effects of increased human activity and visual disturbances to MGS. A worker education program will also be implemented that will inform workers on the appropriate procedures to take should an MGS be encountered during project activities. Implementation of mitigation measures BIO-4 and BIO-5, biological monitoring and worker education training, respectively, would further reduce impacts to MGS during construction activities to a less than significant level.

Increased Dust

A temporary increase in fugitive dust from construction activities within the project area will likely occur. Impacts to MGS from fugitive dust are similar to those described for desert tortoise and these impacts are not expected to be significant to MGS.

Lighting

Minimal lighting is proposed for the project to accommodate nighttime project activities. Nighttime lighting is not expected to be an impact to MGS because the animal is only active during the daylight hours when nighttime lighting would not be necessary.

3.5 Burrowing Owl

Burrowing owls were not found to be occupying the project area during protocol breeding season surveys conducted in 2017 and 2018; however, a single adult burrowing owl individual was observed during a habitat assessment conducted in the southeastern portion of the Solar Field Area in October 2018 and was likely a migrating individual (ECORP 2018a). Although burrowing owls were not documented using the project area for breeding purposes in 2017 or 2018, the presence of multiple burrows with sign of previous burrowing owl use (i.e., occupied burrows) were documented throughout the project and surrounding areas. Due to the presence of occupied burrows and the live individual observed, the project is considered occupied by burrowing owl.

Suitable habitat for burrowing owl in the form of desert saltbush scrub, disturbed rabbitbrush scrub, Mojave creosote bush scrub, Mojave creosote bush scrub (disturbed), and Mojave desert wash scrub was identified throughout the majority of the project boundaries. Areas that were classified as disturbed are also considered suitable habitat for burrowing owl.

3.5.1 Direct Impacts

Impacts to burrowing owl individuals are expected to be low due to the presumed low population density of burrowing owls in the vicinity of the project area based on the results of the focused surveys conducted in 2017 and 2018. Direct impacts to burrowing owl may occur in the form of habitat loss, mortality, and injury. These impacts are described in detail below.

Habitat Loss

Habitat that will be permanently or temporarily affected by the project is considered suitable for burrowing owl foraging, migration, sheltering (burrow sites), and/or reproduction. Table 4 lists the acreage of burrowing owl habitat that will be permanently and temporarily affected by project activities.

Table 4. Burrowing Owl Habitat Impact Acreages

Project Component	Vegetation Community*	Permanent Impacts (Acres)	Temporary Impacts (Acres)	Total Acres
Solar Field Area				
	Mojave Creosote Bush Scrub	547.23	0.00	547.23
	Disturbed	33.64	0.00	33.64
	Solar Field Area Subtotal	*580.87*	*0.00*	*580.67*
Interconnection Facilities				
	Desert Saltbush Scrub	0.00	0.48	0.48
	Disturbed Rabbitbrush Scrub	0.00	0.03	0.03
	Mojave Creosote Bush Scrub	0.02	9.58	9.60
	Mojave Creosote Bush Scrub (Disturbed)	0.01	4.12	4.13
	Mojave Desert Wash Scrub	0.00	0.09	0.09
	Disturbed	0.01	15.69	15.70
	Interconnection Facilities Subtotal	*0.04*	*29.99*	*30.03*
Access Roads				
	Desert Saltbush Scrub	0.03	0.19	0.22
	Mojave Creosote Bush Scrub	1.99	2.86	4.85
	Mojave Creosote Bush Scrub (Disturbed)	0.18	0.97	1.15
	Disturbed	0.30	2.76	3.06
	Access Roads Subtotal	*2.50*	*6.78*	*9.28*
	Total	**583.41**	**36.77**	**620.18**

**The vegetation communities included in this table provide suitable habitat to burrowing owl. Subtotals and total acreages do not match Tables 1 and 2 because not all communities provide suitable habitat for this species.*

Permanent Impacts

Permanent impacts to burrowing owl habitat are similar to those described for desert tortoise. Direct, permanent impacts to burrowing owl in the form of loss of habitat is a potentially significant impact to burrowing owl. Burrowing owl occupy many of the same habitats as desert tortoise and MGS; therefore, implementation of mitigation measure BIO-2 will reduce permanent habitat loss impacts to burrowing owl to a less than significant level.

Temporary Impacts

Temporary impacts to burrowing owl habitat are similar to those described for desert tortoise with the addition of acreage associated with the disturbed rabbitbrush scrub vegetation community. Direct, temporary impacts to burrowing owl in the form of loss of habitat is a potentially significant impact.

Implementation of mitigation measure BIO-2 for desert tortoise and MGS will reduce temporary habitat loss impacts to burrowing owl to a less than significant level because these species occupy many of the same habitats.

Mortality and Injury

Impacts associated with mortality and injury to burrowing owls are similar to those described for MGS. Loss or injury of individual burrowing owls could be a significant impact to regional populations. Prior to the start of project activities, a Burrowing Owl Management Plan will be developed in consultation with CDFW that will include protection, avoidance, and minimization measures for burrowing owl. Implementation of mitigation measures BIO-4, BIO-5, and BIO-6 will reduce these impacts to a less than significant level.

3.5.2 Indirect Impacts

Although burrowing owls located within the Solar Field Area and within the disturbance areas of the Interconnection Facilities and Access Roads will be passively relocated and excluded from burrows in the project disturbance footprints, burrowing owls may remain in the vicinity of the project. Therefore, indirect impacts to burrowing owl may occur during construction and O&M of all Project Components in the form of noise, ground vibrations, habitat degradation and fragmentation, increased human activity and visual disturbances, increased dust, and nighttime lighting.

Noise and Ground Vibrations

Indirect impacts to burrowing owl in the form of noise and ground vibrations, habitat degradation and fragmentation, and increased human activity and visual disturbances are expected to be the same as those described for MGS, above. A Burrowing Owl Management Plan will also be prepared and will have specific conditions pertaining to burrowing owls that will reduce project effects on burrowing owls, including, but not limited to, seasonal restrictions to work activities around burrows and disturbance limit buffers. Implementation of mitigation measures BIO-2, BIO-4, BIO-5, and BIO-6 will reduce these impacts to a less than significant level.

Habitat Fragmentation and Degradation

The project has the potential to permanently fragment and degrade habitat for burrowing owl in a similar way as described for desert tortoise, above (i.e., construction of and use of existing dirt roads may lead to introduction of nonnative plant species, increased dust, unauthorized trash dumping, and off-highway vehicle use). The degradation and fragmentation of habitat surrounding the project area is not expected to affect resident burrowing owls in the project area because those individuals will be passively relocated and excluded from their burrows in accordance with the project's Burrowing Owl Management Plan. Indirect impacts could occur to migrating or dispersing burrowing owls by driving individuals to exert more energy in search of higher quality habitat to use as a migratory stopover or to reside in for the season. However, due to the highly mobile nature of the burrowing owl and with the large amount and availability of habitat in the surrounding region that can be used for migratory stopover and dispersal activities, this impact is not expected to be significant.

Increased Dust

A temporary increase in fugitive dust from construction activities within the project area will likely occur. Potential impacts to burrowing owl from fugitive dust are similar to those described for desert tortoise and are not expected to be significant to burrowing owl.

Lighting

Minimal lighting is proposed for the project to accommodate nighttime project activities. Shoebox type light fixtures mounted on poles will be installed at the primary site entrance to the Solar Field as well as at the substation entrance. There will be no lighting within the solar arrays or around the perimeter fence. Although the burrowing owl is known to be primarily nocturnal during foraging and migration activities, lighting associated with the project is not expected to be an impact to burrowing owls. Project design of nighttime lighting would reduce or eliminate any potential impacts to burrowing owl associated with lighting.

3.6 Desert Kit Fox and American Badger

Desert kit foxes and evidence of desert kit fox presence were documented in the project area and surrounding areas during biological surveys (ECORP 2018a). Based on these findings, desert kit fox is considered present in the project area. Although evidence of American badger was not documented during biological surveys of the site in 2017 and 2018, the project area is located within the known range of the species and it is known to occur in the vicinity (ECORP 2018a). Project impacts to desert kit fox and American badger are expected to be similar, so impacts to the two species are addressed in this section. These two species are known to occupy the same habitats as burrowing owl, including desert saltbush scrub, disturbed rabbitbrush scrub, Mojave creosote bush scrub, Mojave creosote bush scrub (disturbed), Mojave desert wash scrub, and disturbed areas.

3.6.1 Direct Impacts

Direct impacts to desert kit fox and American badger may occur in the form of habitat loss, mortality, injury, disease, and predation. These impacts are described in more detail below.

Habitat Loss

Habitat that will be permanently or temporarily affected is considered suitable for foraging, movement throughout the region, sheltering (burrow sites), and/or reproduction for both the desert kit fox and American badger. Table 4, above, lists the acreage of each suitable vegetation type for these species that will be permanently and temporarily affected by project activities.

Permanent Impacts

Permanent impacts to desert kit fox and American badger habitat are expected to be the same as those described for desert tortoise habitat because they occupy the same habitats. Permanent, direct impacts to desert kit fox and American badger in the form of loss of habitat is a potentially significant impact. Implementation of mitigation measure BIO-2 would reduce these impacts to a less than significant level.

Temporary Impacts

Temporary impacts to desert kit fox and American badger habitat will be similar to those described for desert tortoise with the addition of acreage associated with the disturbed rabbitbrush scrub vegetation community. Direct, temporary impacts to desert kit fox and American badger in the form of loss of habitat is a potentially significant impact. Implementation of mitigation measure BIO-2 would reduce these impacts to a less than significant level.

Mortality, Injury, and Disease

Impacts to desert kit fox and American badger in the form of mortality and injury would be expected to be similar as those described for desert tortoise and MGS (i.e., vehicle/equipment strikes and potential entombment in burrows). These species will be passively relocated and excluded from the Solar Field Area prior to the start of construction; however, they are expected to remain in the project vicinity following relocation efforts. Loss or injury of individual desert kit foxes and/or American badgers could be significant to regional populations. Implementation of mitigation measures BIO-4, BIO-5, and BIO-7 will reduce these impacts to a less than significant level.

Introduction of disease to desert kit fox and American badger may occur as a result of the project. There is potential for the project to expose individuals of these species to disease through the presence of pets (including domestic dogs). Furthermore, the project may provide subsidized resources (e.g., food, water, shelter) that attract or support feral dogs or coyotes and these animals could transmit diseases to healthy individuals in the area that would not have come into contact with these individuals prior to the project. This is a potentially significant impact and could be a permanent impact to the local population. In order to reduce this possibility, pets (including domestic dogs) will not be allowed in the work areas during construction or O&M, so the possibility of introduction of disease will not affect desert kit foxes or American badgers. Furthermore, the project will have requirements that control trash and other subsidized resources that may attract feral dogs and coyotes in the area. A Desert Kit Fox and American Badger Management Plan will be prepared and will address the exclusion and passive relocation of these species as well as the management measures to minimize the potential for transmission of diseases. Implementation of mitigation measures BIO-4, BIO-5, and BIO-7 will reduce impacts to a less than significant level.

Predation

The project may provide subsidized resources to predators to desert kit fox, namely coyotes. Trash and food waste and standing water may be associated with the project during construction and O&M and can draw coyotes to the project area or support local populations in the vicinity of the project. These impacts are permanent and potentially significant. Measures to reduce or eliminate increased predation associated with the project will be described in the Desert Kit Fox and American Badger Management Plan and will be implemented during project activities accordingly. Implementation of mitigation measure BIO-7 will reduce these impacts to a less than significant level.

3.6.2 Indirect Impacts

Although desert kit fox and American badgers located within the Solar Field Area and within the disturbance areas of the Interconnection Facilities and Access Roads will be passively relocated and excluded from burrows in the project disturbance footprints, they may remain in the vicinity of the project. Therefore, indirect impacts to desert kit fox and American badger may occur during construction and O&M of all Project Components in the form of noise, ground vibrations, habitat degradation and fragmentation, increased human activity and visual disturbances, increased dust, and nighttime lighting.

Noise and Ground Vibrations

Noise from activities associated with the implementation of the project has the potential to indirectly affect desert kit fox and American badger in the same way as described for MGS. Impacts to these species in the form of noise and ground vibrations are expected to be a temporary, indirect impact that would occur only during construction and periodic maintenance of Project Components and would be considered potentially significant. However, implementation of the mitigation measures BIO-4, BIO-5, and BIO-7 will reduce impacts to desert kit fox and American badger to a less than significant level.

Habitat Fragmentation and Degradation

The project has the potential to permanently fragment and degrade available habitat for desert kit fox and American badger in the same way as described for desert tortoise and MGS, above. Indirect impacts in the form of habitat fragmentation are potentially significant for location populations; however, implementation of mitigation measures BIO-2, BIO-4, BIO-5, and BIO-7 would reduce impacts to a less than significant level.

The desert kit fox is known to be highly mobile in nature, often traveling long distances in short periods of time in search of new den sites and/or foraging areas, and the species has been documented utilizing solar fields post-construction for foraging activities. Because of these behaviors, the project has the potential to fragment the desert kit fox's ability to travel freely in the area where the project resides. Indirect impacts in the form of altered behavior may result. However, impacts related to fragmented travel abilities would be reduced to a less than significant level through post-construction project design of elevated gates at the Solar Field Area where found necessary and as described in the project description.

Increased Human Activity and Visual Disturbances

Increased human activity and visual disturbances would be associated with construction and O&M of all Project Components and are expected to affect desert kit fox and American badger in the same way as described for MGS. Implementation of mitigation measures BIO-4, BIO-5, and BIO-7 would reduce impacts to desert kit fox and American badger to a less than significant level.

Increased Dust

A temporary increase in fugitive dust from construction activities within the project area will likely occur. Both of these species are most active at night (nocturnal) when construction activities would not be occurring. They are expected to remain in or near their burrows during most construction activities when

fugitive dust may be present. Potential impacts associated with fugitive dust are not expected to be significant to these species.

Lighting

Potential impacts to desert kit fox and American badger associated with lighting are similar to those described for burrowing owl and are not expected to be significant to these species.

3.7 Raptors and Nesting Birds

Active nests belonging to birds protected by the federal Migratory Bird Treaty Act (MBTA; USFWS 1918) were observed within and adjacent to the project area (ECORP 2018a). Potential nesting habitat for migratory birds was present throughout the entire project area and in the vicinity. Raptors and nesting birds are known to occupy the same habitats as burrowing owl, including desert saltbush scrub, disturbed rabbitbrush scrub, Mojave creosote bush scrub, Mojave creosote bush scrub (disturbed), and Mojave desert wash scrub vegetation communities. Disturbed and developed lands generally do not provide suitable habitat due to the lack of vegetation; however, some disturbed and developed lands may provide suitable nesting substrates for common species such as house finch (*Haemorhous mexicanus*) and mourning dove (*Zenaida macroura*). Shrubs, Joshua trees, and structures throughout the project area provide habitat for nesting birds. Raptors typically breed between February and August, while non-raptor birds generally nest between March and August. Native, non-game avian species are protected under the MBTA and California Fish and Game Code.

3.7.1 Direct Impacts

Direct impacts to nesting birds and raptors may occur in the form of habitat loss, mortality, injury, and predation. These impacts are described below.

Habitat Loss

Habitat that will be permanently or temporarily affected is considered suitable for foraging and nesting habitat for birds and raptors protected under the MBTA (USFWS 1918). Table 1, above, lists the acreage of each suitable vegetation community and land cover type that will be permanently and temporarily affected by project activities.

Permanent Impacts

Permanent impacts to potential nesting and foraging habitat for bird and raptor species are expected to be the same as those described for desert tortoise and may be significant. Implementation of mitigation measure BIO-2 for desert tortoise and MGS will protect suitable nesting and foraging habitat in perpetuity because nesting birds occupy the same habitats as these species.

Temporary Impacts

Temporary impacts to nesting and foraging habitat for bird and raptor species are expected to be the same as those described for desert tortoise and may be significant. Implementation of mitigation measure

BIO-2 for desert tortoise and MGS will protect in perpetuity suitable nesting and foraging habitat because nesting birds occupy the same habitats as these species.

Mortality and Injury

There is potential for construction-related injury or mortality to individual nesting birds and raptors during the construction and O&M for the project. Destruction of nests and mortality by vehicle strikes during vegetation removal, grading, and maintenance activities may occur during the project. Newly created roads and increased traffic from the project would result in an increased potential for injury and/or mortality to nesting birds and raptors associated with vehicle travel. Failure of active nests or mortality/injury to individual nesting birds or raptors as a result of the project may be a significant impact. Prior to the start of construction activities, a Nesting Bird Management and Bird Protection Plan will be prepared that includes details on, but is not limited to, survey methodology and timing, definitions of qualified biologists, monitoring of active nests, and disturbance limit buffer sizes. Implementation of mitigation measures BIO-4, BIO-5, and BIO-8 will reduce these impacts to a less than significant level.

The Interconnection Facilities and substations during O&M have the potential to electrocute nesting birds and raptors. Raptors and other large aerial perching birds are most susceptible to electrocutions because of their size, distribution, and behavior (APLIC 2006). Electrocution may take place when a bird touches two-phase conductors or one conductor and a grounded device simultaneously. Species frequently affected by electrocution seem to involve birds of prey, common ravens, and thermal soarers. The project would meet minimum clearance guidelines between phase conductors or between phase conductors and grounded hardware, as recommended by APLIC (2006) that is sufficient to protect even the largest birds and therefore would present little to no risk of bird electrocution. Therefore, any impacts to nesting birds and raptors would be minimal and considered less than significant.

There is potential for project related injury or mortality to individual birds and raptors during the construction and O&M for the project due to collision. Birds have the potential to collide with buildings, transmission and distribution lines, chain link fence, and other similar structures, Additionally, flat reflective surfaces (e.g. PV panels) polarize light and researchers hypothesize that birds may mistake these reflective surfaces for bodies of water, a phenomenon referred to as the lake effect. These types of collisions could cause blunt force trauma which could kill or severely injure individual birds and raptors. Fortunately, recent studies have demonstrated that avian collisions with manmade structures can be reduced substantially with the implementation of certain best management practices (BMPs) and installation of mechanisms that discourage bird use. Mortality or injury of individual birds and raptors as a result of the project may be a significant impact. Prior to the start of construction activities, a Nesting Bird Management and Bird Protection Plan will be prepared that includes details on implementing anti-perching devices and avian visual deterrents, trash abatement, and using emerging technologies such as antireflective film overlays on the panels and/or chemosensory and sonic deterrents. Implementation of mitigation measures BIO-4, BIO-5, and BIO-8 will reduce these impacts to a less than significant level.

Predation

The project may provide subsidized resources to (e.g., common raven, coyote, domestic dogs and cats. These impacts are permanent and may be significant to nesting birds. However, implementation of the

Project Design Features described in Appendix B will reduce the attraction of the site to predators and reduce these impacts to a less than significant level.

3.7.2 Indirect Impacts

Indirect impacts to nesting birds in the form of increased human and vehicular activity, noise and ground vibrations, habitat degradation and fragmentation, dust, and nighttime lighting may result in failure or abandonment of nests. These impacts are detailed below.

Noise and Ground Vibrations

Impacts to nesting birds and raptors in the form of construction-related noise and ground vibrations in all Project Components are expected to be the same as those described for burrowing owl. Exposure to these indirect impacts may temporarily displace nesting birds or raptors, prompt birds and/or raptors to abandon their nests and may affect foraging and reproduction activities. Impacts to nesting birds and raptors in the form of noise and ground vibrations are expected to be a temporary, indirect impact that would occur only during construction and periodic maintenance of Project Components. Impacts to nesting birds in the form of noise and ground vibrations may be significant; however, implementation of mitigation measures BIO-4, BIO-5, and BIO-8 will reduce these impacts to a less than significant level.

Habitat Fragmentation and Degradation

The project has the potential to permanently fragment and degrade habitat for nesting birds and raptors in the same way as described for burrowing owl, above. Indirect impacts in the form of habitat fragmentation are potentially significant; however, implementation of mitigation measures BIO-2, BIO-4, BIO-5, and BIO-8 would reduce impacts to a less than significant level.

Increased Human Activity and Visual Disturbances

Increased human activity and visual disturbances would be associated with construction and O&M of all Project Components and are expected to be the same as those described for burrowing owl. Implementation of mitigation measures BIO-4, BIO-5, and BIO-8 would reduce impacts to nesting birds and raptors to a less than significant level.

Increased Dust

A temporary increase in fugitive dust from construction activities within the project area will likely occur. Potential impacts to nesting birds and raptors from fugitive dust are similar to those described for desert tortoise and these impacts are not expected to be significant to these species.

Lighting

Potential impacts to nesting birds and raptors associated with lighting are similar to those described for burrowing owl and are not expected to be significant to these species.

3.8 Other Special-Status Species

Five additional special-status wildlife species were detected within the project area during focused survey efforts in 2017 and 2018 (ECORP 2018a). The following special-status wildlife species were observed: Swainson's hawk, northern harrier, peregrine falcon, loggerhead shrike, and yellow-headed blackbird. The Swainson's hawk is a state-listed threatened species, the peregrine falcon is a CDFW Fully Protected species; and northern harrier, loggerhead shrike, and yellow-headed blackbird are classified as CDFW SSC. The five sensitive bird species that were incidentally observed during the surveys are also protected under the MBTA. The project area provides foraging habitat for all five species observed; however, it only provides nesting habitat for loggerhead shrike and northern harrier.

Additional special-status species were found to have potential to occur on the project or in the vicinity and are discussed in the Comprehensive Biological Technical Report (ECORP 2018a). Project impacts to the five special-status species listed above and those found with potential to occur are expected to be the same as those analyzed for the species addressed in this document. Direct impacts may occur in the form of habitat loss, mortality, and injury. Indirect impacts may occur in the form of increased human and vehicular activity, noise, dust, ground vibrations, and habitat fragmentation and degradation. Implementation of the mitigation measures listed above for impacts to desert tortoise, MGS, burrowing owl, desert kit fox, and nesting birds will reduce impacts to less than significant levels.

3.9 Wildlife Corridors and Nursery Sites

The project area provides wildlife movement opportunities because it consists of open and relatively unimpeded land. However, it would not be considered a wildlife movement corridor that would need to be preserved to allow wildlife to move between important natural habitat areas due to the absence of conserved natural lands in the vicinity, presence of anthropogenic disturbances, and the project area's proximity to industrial and residential areas. The project area is also mostly surrounded by open unimpeded land, functioning as a single contiguous block of habitat rather than a corridor. The project area is exposed and does not contain any major features that would be considered critical movement corridors for wildlife. Although the dirt roads and desert washes located within the project boundaries are likely utilized by wildlife moving through the area, these features would not be considered necessary linkages between conserved natural habitat areas or critical for wildlife movement because of the nearby open space surrounding the project. Although the project area does not generally provide nursery site habitat, it does provide nesting habitat for birds protected under the MBTA. Potential impacts related to nesting birds are discussed in Section 3.8. Construction and O&M of the project would not impede or significantly affect any existing wildlife corridor or nursery sites.

3.10 HCPs and NCCPs

The project area is not located within the planning area of any existing Habitat Conservation Plan (HCP) or Natural Community Conservation Plan (NCCP). A Habitat Conservation Plan under Section 10 of the federal Endangered Species Act is currently being prepared to address project-related impacts to desert tortoise. Therefore, the project would not result in a significant impact to existing HCPs or NCCPs.

4.0 MITIGATION MEASURES

The following mitigation measures would reduce impacts to biological resources to a less than significant level.

BIO-1 Joshua Trees: Prior to seeking approval from the City's Director of Parks and Recreation (or the Director's designee) for Joshua tree removal, a Joshua tree health assessment and final inventory will be performed to document the size, location, and general health of all Joshua trees that will be affected by the project. Authorization to remove Joshua trees will be obtained in accordance with the City's Joshua Tree Ordinance (Ordinance Number 1224; Municipal Code Chapter 13.33; 2018).

BIO-2 Compensatory Mitigation for Impacts to Habitat for Listed Species: The project area provides suitable habitat in the native vegetation communities for both desert tortoise and MGS. A total of 567.75 acres of occupied desert tortoise and presumed occupied MGS habitat will be directly affected as a result of the project. Impacts to occupied desert tortoise and MGS habitat will be offset through acquisition of compensatory land within suitable and occupied desert tortoise and MGS habitat and/or monetary contributions to other recovery efforts in the West Mojave. Impacts to occupied MGS habitat will be mitigated for at a ratio of 2:1, occupied desert tortoise habitat will be nested within the MGS mitigation requirement, with occupied desert tortoise habitat mitigated for at a ratio of 1:1. Final mitigation acreage are subject to the approval of the state and federal wildlife agencies.

BIO-3 Desert Tortoise Translocation: Pre-construction desert tortoise clearance surveys will be performed prior to ground-breaking project activities occurring. All desert tortoises encountered during clearance surveys and subsequent monitoring efforts will be permanently removed from the project area and translocated to an off-site recipient site. The Applicant's site-specific Desert Tortoise Translocation Plan will provide details on the proposed recipient site, desert tortoise clearance surveys and relocation, definitions for Authorized Biologists and qualified desert tortoise biologists, exclusion fencing guidelines, protocols for managing desert tortoise found during active versus inactive seasons, protocols for incidental tortoise death or injury, and will be consistent with project permits and current USFWS guidelines (USFWS 2009; USFWS 2018a). The Plan will also include a requirement for communication and coordination with the BLM regarding the desert tortoise recipient site. Prior to construction, the Plan will be subject to the approval of the CDFW and the USFWS.

BIO-4 Biological Monitoring: A qualified biologist (biological monitor) with experience monitoring for and identifying sensitive biological resources known to occur in the area will be present during all ground-disturbing activities related to the project. As required by project permits, the qualifications of a biological monitor may need to be submitted to appropriate wildlife agencies for approval based on the resources the biologist will be monitoring. Biological monitoring duties will include, but are not limited to, conducting worker education training, verifying compliance with project permits, ensuring project activities stay within designated work areas, and inspection of desert tortoise exclusion fencing. The biological monitor will have the right to halt all activities in the area affected if a special-status species is identified in a work area and is in danger of injury or mortality. If work is halted in the area affected as determined by the biological monitor, work will proceed only after the hazards to the individual is removed and the animal is no longer at risk, or the individual has been moved from harm's way in

accordance with the project's permits and/or management/translocation plans. The biological monitor will take representative photographs of the daily activities and will also maintain a daily log that documents general project activities and compliance with the project's permit conditions. Non-compliances will also be documented in the daily log, including any measures that were implemented to rectify the issue.

BIO-5 Worker Environmental Awareness Program: Prior to the start of construction, a Worker Environmental Awareness Program (WEAP) will be developed by the Applicant. A qualified biologist with experience with the sensitive biological resources in the region will present the WEAP to all personnel working in the project area (either temporarily or permanently) prior to the start of project activities. The WEAP may be videotaped and used to train newly hired workers or those not present for the initial WEAP. The WEAP could include, but will not be limited to: discussions of the sensitive biological resources associated with the project, project-specific measures to avoid or eliminate impacts to these resources, consequences for not complying with project permits and agreements, and contact information for the lead biologist. Logs of personnel who have taken the training will be kept on the site at the construction or project office.

BIO-6 Burrowing Owl Management Plan: A Burrowing Owl Management Plan will be prepared in consultation with CDFW that will outline protection and avoidance and minimization measures that will be implemented for the project. These measures may include, but are not limited to, definition of qualified burrowing owl biologists, survey methodology and timing, methods for exclusion and burrow excavation, disturbance limit buffers, and seasonal restrictions for work activities in the vicinity of active burrows. The Burrowing Owl Management Plan will be subject to the approval of CDFW.

BIO-7 Desert Kit Fox and American Badger Management Plan: A Desert Kit Fox and American Badger Management Plan will be developed in consultation between the Applicant and CDFW and will be subject to approval by CDFW. The Plan could include, but may not be limited to, qualified desert kit fox/American badger biologist definitions, pre-construction clearance survey methods and timing, disturbance limit buffer distances around active burrows based on construction activity and sensitivity of dens/foxes, and measures for avoidance, exclusion, and/or passive relocation.

BIO-8 Nesting Bird Management and Bird Protection Plan: A Nesting Bird Management and Bird Protection Plan will be developed in consultation between the Applicant, CDFW, and USFWS and will be subject to the approval of CDFW and USFWS. The Plan could include but may not be limited to: pre-construction clearance survey methods and timing, buffer distances based on construction activity and sensitivity of nests/birds, measures for avoidance of impact during nesting season (e.g., seasonal work restrictions), implementation of construction noise and dust minimization measures, biological monitoring, acceptable methods for nest deterrents (i.e., netting/covering equipment, supplies, or perches), implementing anti-perching devices and avian visual deterrents, and using emerging technologies such as antireflective film overlays on the panels and/or chemosensory and sonic deterrents. The Plan will be in compliance with the MBTA and California Fish and Game Code Sections 3503, 3503.5 and 3513.

5.0 REFERENCES

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LIST OF APPENDICES

APPENDIX A

Complete Project Description

HIGH DESERT SOLAR PROJECT

PROJECT DESCRIPTION

OCTOBER 2018

This Project Description document from HDSI, LLC (Applicant) is submitted in support of the development of the High Desert Solar Project (High Desert Solar, or project). High Desert Solar will be a nominal 108 megawatt (MWac) solar photovoltaic (PV) power facility and related substation with an integrated battery energy storage system (BESS), located in the City of Victorville, San Bernardino County, California. High Desert Solar will provide renewable energy and critically needed flexibility attributes needed to advance California's Renewable Portfolio Standard (RPS) goals, climate policies, and to enhance electrical grid reliability.

This project description is organized as follows:

- **Section 1:** Project Objectives
- **Section 2:** Project Site Description
- **Section 3:** Site Selection Criteria
- **Section 4:** Project Components
- **Section 5:** Site Design and Engineering
- **Section 6:** Interconnection and Network Upgrades
- **Section 7:** Project Construction
- **Section 8:** Project Operations and Maintenance
- List of Acronyms and Abbreviations

1.0 PROJECT OBJECTIVES

High Desert Solar's basic project objectives are to construct and operate a renewable energy resource with integrated energy storage that will help California achieve its ambitious RPS and greenhouse gas (GHG) reduction goals and enhance grid reliability through the provision of key operational flexibility and dispatchability attributes. Additional basic project objectives are discussed throughout this document and summarized as follows:

- ***Maximize renewable energy generation through construction of a large-scale, nominal 108 MW solar energy facility to help meet California's renewable energy and climate goals.*** California's stated RPS goal is to serve 33 percent of its electric load with renewable energy by 2020, 50 percent by 2026, and 60 percent by 2030. The new RPS bill (SB 100) also requires that retail sellers (investor-owned utilities, publicly owned utilities, electric service providers, and community choice aggregators) procure a minimum quantity of electricity products from eligible renewable energy resources so that the total kilowatt hours of those products sold to their retail end-use customers achieve 44 percent of retail sales by December 31, 2024, 52 percent by December 31, 2027, and 60 percent by December 31, 2030. The RPS was established in 2002

under Senate Bill 1078, accelerated by Senate Bill 107 (2006), expanded by Senate Bill 2(1x) (First Extraordinary Session 2011), expanded to increase procurement from eligible renewable energy resources to 50 percent of total procurement by 2026 by Senate Bill 350 (2015) as modified by Senate Bill 100 (2018), and further expanded to increase procurement from eligible renewable energy resources to 60 percent of total procurement by 2030 by Senate Bill 100 (2018). Additionally, in 2006, the state legislature passed the California Global Warming Solutions Act (AB 32), which mandates, for the first time ever in the U.S., the reduction of GHG emissions to 1990 levels by 2050. High Desert Solar will advance California's RPS and GHG reduction policy objectives by providing renewable energy and storage.

- ***Help enhance grid reliability through construction of a power facility that provides local area capacity BESS for electrical system reliability.*** The BESS will allow for the storage of electricity during non-peak hours to allow for quick response when the regional electricity demand is at a peak. The BESS storage component of High Desert Solar will enhance grid reliability by adding rapid response dispatchable electricity, ancillary services, and preferred resources capacity that are much needed for grid operations, thereby enhancing grid reliability and enabling increasing amounts of intermittent renewable energy generating sources to be integrated. High Desert Solar will help meet the needs for new energy sources for voltage support, frequency regulation, and power quality, ancillary services (regulation up and regulation down), and peak shaving. High Desert Solar will provide flexible, preferred resource capacity to the grid that will store energy during times of over-generation and deliver it back to the grid when needed.

- ***Locate the facility in a high solar resource area.*** The siting of a renewable facility is critical to its success. Average year-round levels of direct normal solar radiation greater than or equal to 5 kilowatt hours per square meter per day (kWh/m^2/day) are generally required for the viability of utility-scale solar PV systems according to the U.S. Environmental Protection Agency (USEPA) and the National Renewable Energy Laboratory (NREL), a laboratory of the U.S. Department of Energy (USEPA 2017). The solar resource at the High Desert Solar site is rated at 5.9 kWh/m^2/day. The high solar resource means that during times of peak solar energy production, High Desert Solar will be able to store excess energy in the BESS system for later use.

- ***Minimize potential environmental impacts by locating the facility on a site with access to existing infrastructure, including access to available transmission.*** The California Public Utilities Commission (CPUC) has identified transmission congestion as a major barrier to achieving the RPS goal. Renewable resources are often far from the grid and load centers, requiring extensive and expensive transmission upgrades. Because of this identified transmission barrier, locating renewable facilities on sites that have access to existing electrical transmission lines with available capacity is an important component of the viability of a solar facility. A Southern California Edison (SCE) 230 kilovolt (kV) transmission line is located less than 2 miles from the High Desert Solar site and has available 100 MW of excess capacity to connect to the SCE, California Independent System Operator (CAISO)-controlled grid. The project also provides Victorville Municipal Utility Services (VMUS) with access to RPS-qualifying renewable energy and storage.

- ***Minimize potential impacts on the community and the environment by locating the facility in an undeveloped location, on previously disturbed land with compatible topography, and outside of sensitive habitat and conservation areas.*** The most efficient large-scale solar PV requires relatively level and flat land; thus, it is desirable to have topography with less than a 3 percent slope. Siting a solar PV project on previously disturbed land away from urban population

centers, sensitive receptor uses, and outside of parkland and designated habitat conservation areas would reduce or eliminate potential environmental effects.

- ***Achieve commercial operations as soon as practicable (targeted for the end 2020).*** The Applicant's goal is to complete construction on schedule to ensure the timely delivery and procurement of renewable energy to California utilities.

2.0 PROJECT SITE DESCRIPTION

The project is located in the City of Victorville, in Township 6 North, Range 5 West of the San Bernardino Meridian. The project site would be located mostly east of Helendale Road and west of Floreate Road directly north of the Southern California Logistics Airport (SCLA) and the Victor Valley Wastewater Reclamation Authority (VVWRA) properties (Figure 1).

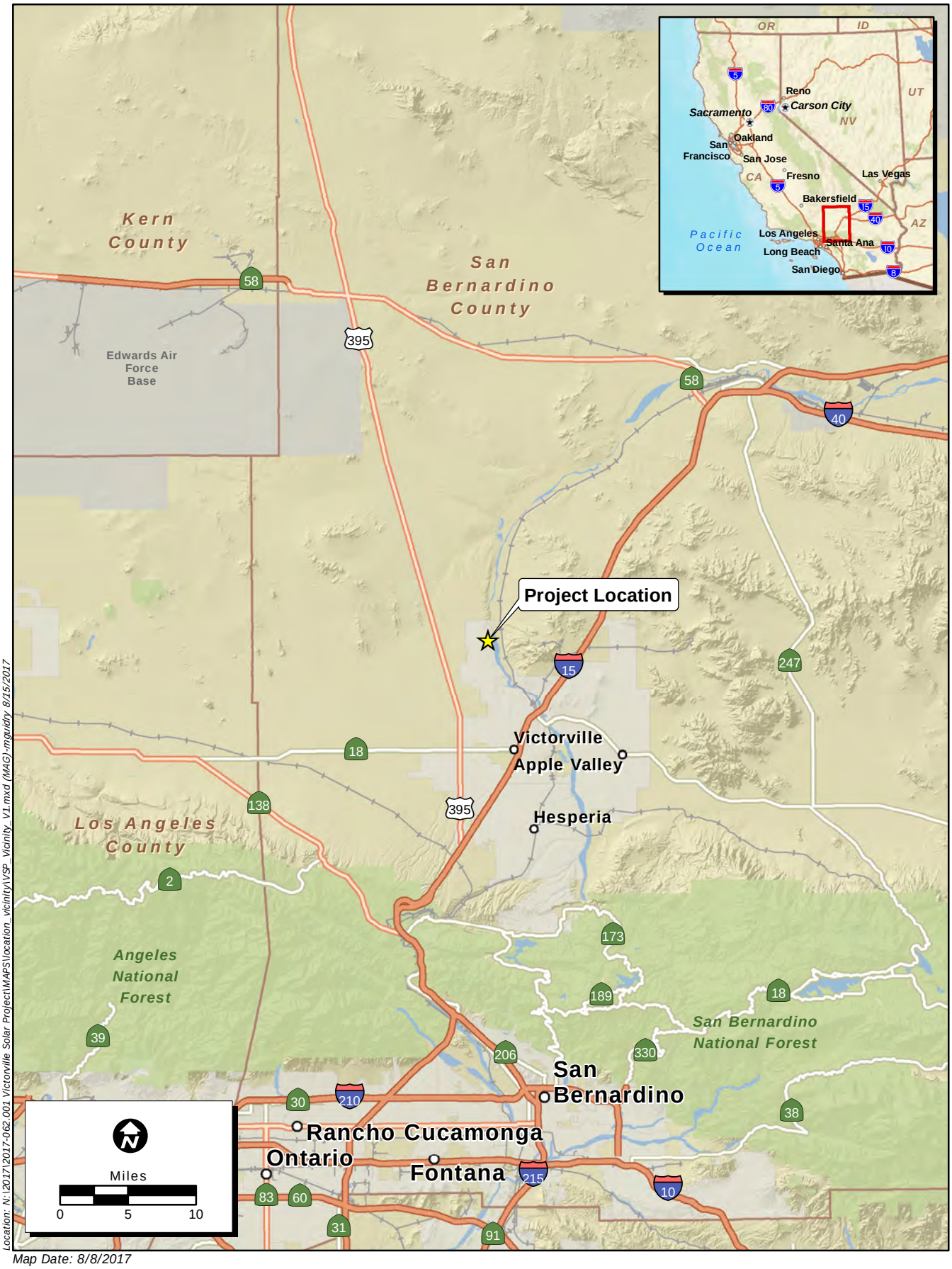
The project will be developed on a total of approximately 614 acres (project site) consisting of an approximately 579 acre solar PV field, BESS, substation, and balance of system, collectively referred to as the **Solar Field Area**, and an approximately 35 acre corridor consisting of a 2.3 mile 230kV generation tie (Gen-Tie) line that will run east and then south in a defined and studied corridor to connect to the existing Victor-Caldwell 230kV line, upstream of the first pole on the SCE system. Additionally, a 1.7 mile 12.47kV service line will connect to the VMUS system. This line will run as underbuilt with the 230kV line for the first mile and then diverge to the west and run on standard distribution utility poles to connect to VMUS at the Victorville Industrial Wastewater Treatment Facility south of the Solar Field Area. The Gen-Tie line and service line are collectively referred to as the **Interconnection Facilities**. The Interconnection Facilities will be located within linear corridors, 120 feet and 40 feet wide respectively, covering a total area of approximately 35 acres of which only a small portion will actually be disturbed. Figure 2 illustrates the location of Solar Field Area and Interconnection Facilities.

2.1 Existing Conditions, Specific Plan, Zoning, and Land Use Designations

The High Desert Solar site is located within the SCLA Specific Plan (SP1-92). "Power or Power Generating Plant" is a permitted use allowed through a Conditional Use Permit (CUP) process in areas designated as Industrial in the SCLA Specific Plan. The 230kV Gen-Tie will also traverse areas zoned as "Exclusive Agricultural". Power lines of 100kV or more are a permitted use with a CUP in the Exclusive Agricultural zone per Table 7-1 of the City's Development Code.

Currently the site contains several previously disturbed areas consisting of old, abandoned structures and concrete foundations, illegal dumping sites, and large areas of undeveloped land. Figures 3 and 4 depict the existing site conditions.

There are currently identified underground utilities that cross and/or run adjacent the Solar Field Area or the Interconnection Facilities, including: a natural gas pipeline, a petroleum products pipeline, reclaimed water pipeline(s), and telecom communications cables.



Map Date: 8/8/2017
Service Layer Credits: Sources: USGS, ESRI, TANA, AND

Figure 1. Project Vicinity

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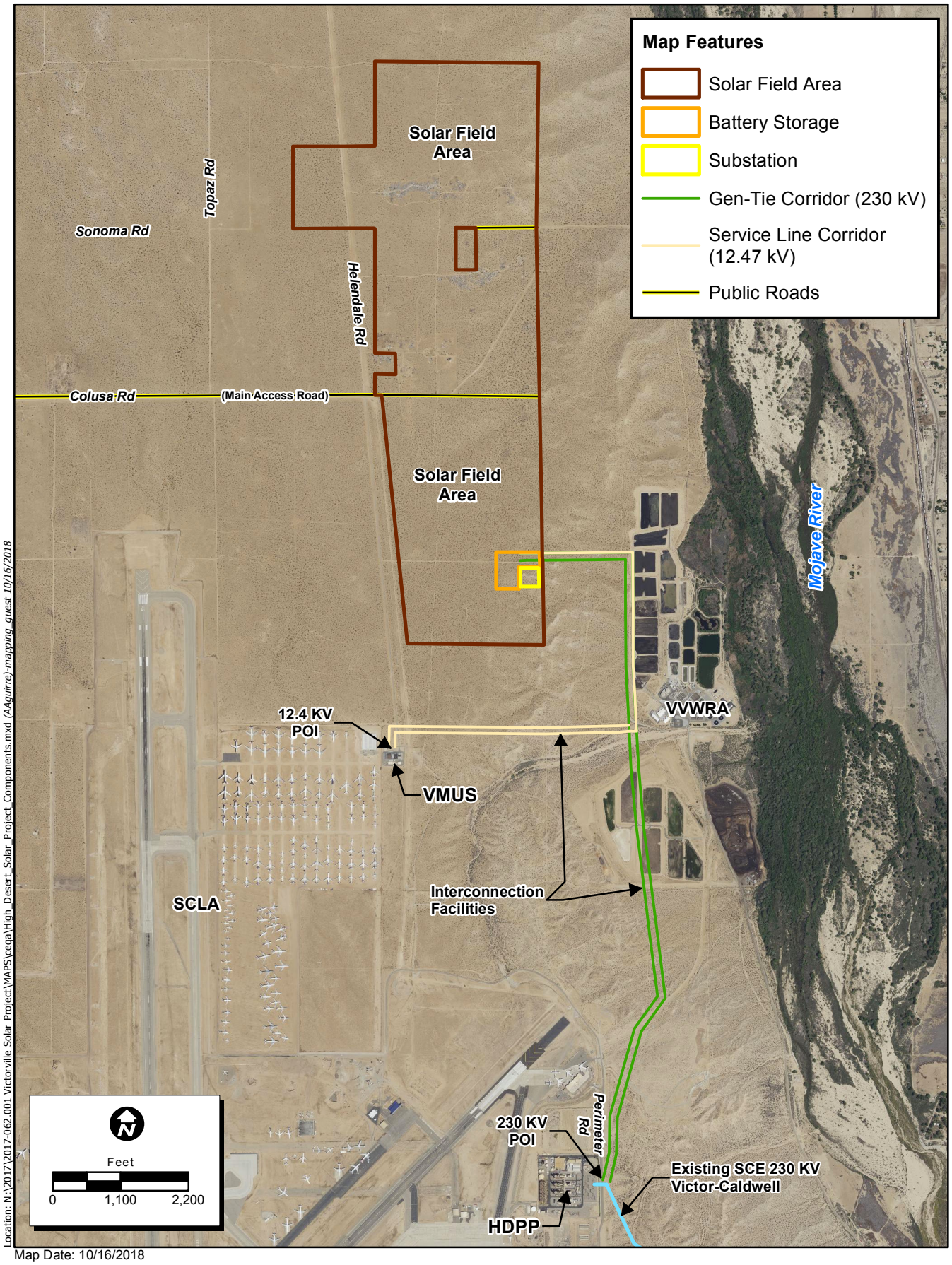
ENVIRONMENTAL CONSULTANTS



Location: N:\2017\2017-062.001 Victorville Solar Project\MAPS\ceqa\High_Desert_Solar_Project_Components.mxd (AAguirre)-mapping_guest 10/16/2018

Map Date: 10/16/2018
Photo Source: NAIP 2016

Figure 2. Project Components

ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS

Figure 3. Looking Southeast towards Solar Field Area from Helendale Road

Figure 4. Looking South at Refuse Dump Site within Solar Field Area

3.0 SITE SELECTION CRITERIA

The primary site-selection criterion for High Desert Solar was access to available electrical transmission capacity within SCE's service territory. Additional site-selection considerations included solar resource availability, land/topography suitability, and the feasibility of acquiring site control.

- **Transmission Line Access and Capacity**. The Applicant is affiliated with the High Desert Power Plant (HDPP), a natural gas-fired combined cycle power plant which owns an interconnection facility that currently has available capacity. Based on various System Studies and discussions with HDPP, CAISO, and SCE (the transmission line owner), the Applicant has confirmed that High Desert Solar can be safely and reliably interconnected to the SCE system.
- **Solar Resource Availability**. The solar resource is determined by the amount of insolation (solar radiation energy) received on a given unit surface area per unit time. Factors that influence the amount of solar energy available include the following:
    - Latitude – solar energy increases as one moves south towards the equator. Lower latitudes have a higher inclination angle to the sun resulting in higher insolation.
    - Elevation – at higher elevations there is less atmosphere to absorb and scatter sunlight, so available solar energy is greater than at lower elevations.
    - Climate – in drier climates with fewer cloudy, foggy, and humid days, more solar energy is available at ground level.
    - Haze – in remote areas with little intensive agriculture or industrial operations there are less dust particles and fewer aerosols in the air, which allows more solar energy to reach the ground.

The High Desert Solar site is at a latitude of 34 degrees, which is in the range of latitudes within which large-scale PV systems operate efficiently. The High Desert Solar site ranges in elevation from approximately 2,700 feet to 2,900 feet above mean sea level (amsl). The Solar Farm Area is generally at an elevation of 2,800 and is relatively flat. The High Desert Solar site is located within an undeveloped area. There are no agricultural operations within the project vicinity. These conditions are well-suited for solar PV generation requirements.

- **Land Use**. An ideal site for a large solar facility would be relatively flat and with no intensive land uses. The High Desert Solar site is located on nearly flat terrain, aiding constructability. In addition, no subsurface mineral resources are located at the site. Based on landowner interviews, the site has primarily been vacant for the past several decades. None of the parcels on the High Desert Solar site are under contract for agriculture under the Williamson Act. High Desert Solar is consistent with the City's land use and zoning designations.
- **Feasibility of Site Control**. In order to proceed with the project, the Applicant needed to acquire site control. As set forth in the CUP Application, the Applicant has site control through a combination of a letter of intent from the City of Victorville for leased lands and purchase options for privately owned parcels.

4.0 PROJECT COMPONENTS

High Desert Solar will be comprised of the following project components located within an approximate footprint of 614 acres:

- Approximately 320,000 to 370,000 solar PV modules
- A single axis tracker system
- Electrical inverters and transformers
- Battery energy storage system (BESS)
- On-site electrical substation
- Meteorological stations
- Remote monitoring system (SCADA)
- Site access roads and maintenance access roads
- Security fencing and desert tortoise exclusion fencing
- Gen-Tie Line structures to interconnect with the SCE 230kV transmission line south of the site and a and 12.47kV service line to interconnect to the VMUS electrical system southwest of the site

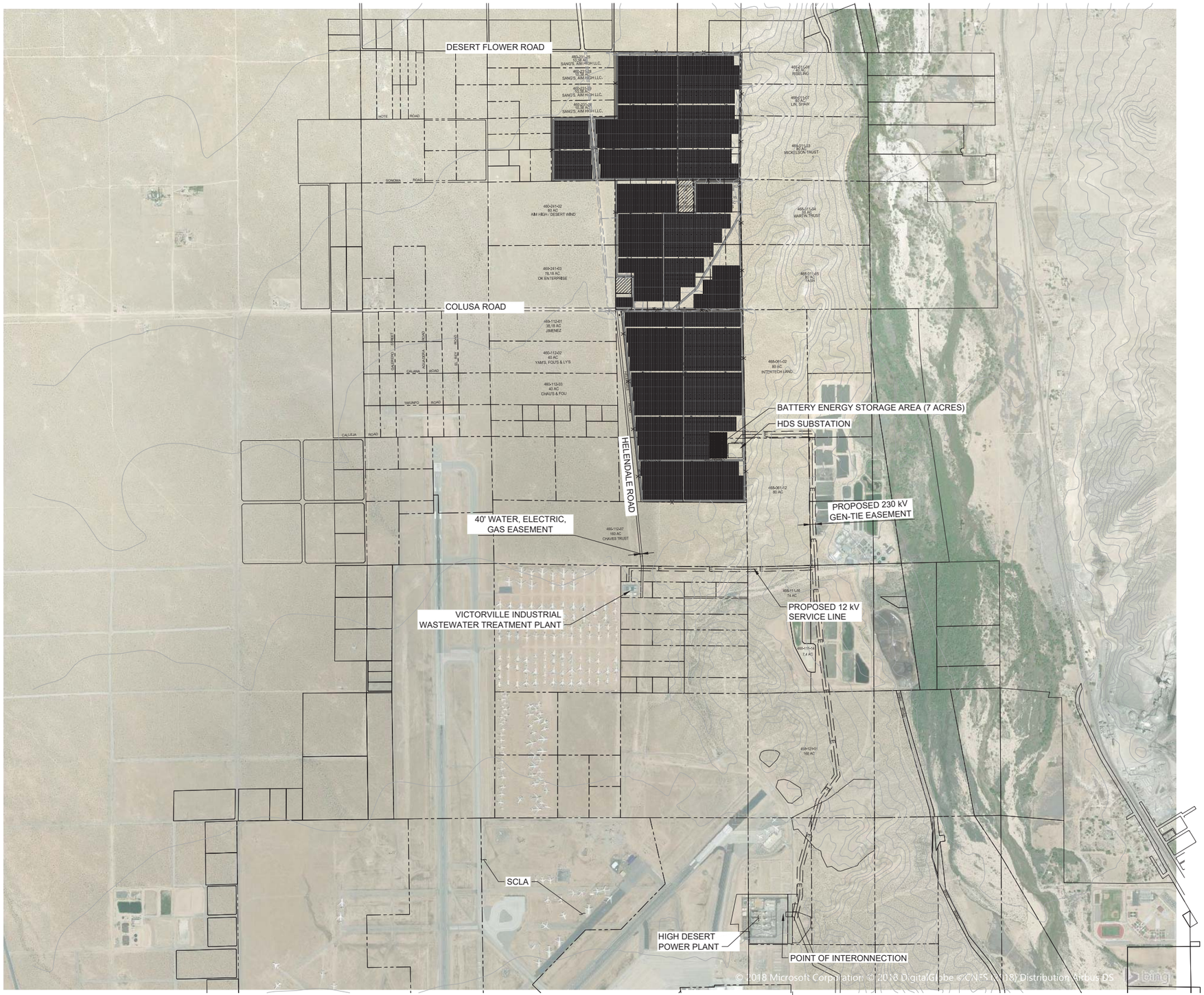
Each of these components is described in more detail below. The Site Plan is included as Figure 5.

4.1 PV Modules and Tracker System

High Desert Solar will require installation of approximately 320,000 to 370,000 PV modules. The total number of PV panels will depend on the technology ultimately selected for the project during final design. While all technologies would have similar potential environmental effects as discussed herein, the technology ultimately selected will depend on market conditions, economic considerations, and environmental factors.

Technologies that may be used include, but are not limited to:

- Crystalline silicon PV technology: various silicon technologies may be used; all would be reviewed for future recyclability.
- Single axis tracking technology: would allow solar modules to move and track the sun; this would allow for greater efficiency of land used for the Solar Field Area. Tracking technology would require tracker units that would track the sun daily from east to west.
- Each PV module is expected to be approximately 3.25 feet by 6.5 feet. Tracker rows will run in a north-south orientation such that the PV modules will track the daily sun movement from east to west to maximize solar energy production efficiency. Module surfaces would be non-reflective and black or blue in color.
- Rows of trackers/modules would be spaced between 15 and 30 feet apart depending on tracker technology selected, terrain, and other site conditions to optimize energy production and minimize shading of adjacent rows. Rows of modules would be ordered into strings and power blocks with a centrally located inverter-transformer station (or Skid) located at each block. Each power block is estimated to be 600 feet by 1,100 feet and would contain sufficient modules required to match the inverter station power rating. The number of modules would depend on the wattage of the modules ultimately selected for the final design. The number of rows per power block is estimated to be between 110 and 130.



OVERALL SITE PLAN

0 1000' 2000'

SCALE IN FEET

NORTH

no.	date	by	ckd	description
A	08-20-18	DGK	BNS	ISSUED FOR REVIEW
B	10-05-18	BCV	BNS	ISSUED FOR PERMIT

ISSUED FOR PERMIT

PRELIMINARY - NOT FOR CONSTRUCTION

BURNS McDONNELL

1850 N. CENTRAL AVENUE, SUITE 800
PHOENIX, AZ 85004
(602) 977-2623
LICENSEE NO. 000165

date	detailed
MAY 12, 2017	D. KOPER
designed	checked
T. DOWELL	B. SVOR

Figure 5

HDS1, LLC
HIGH DESERT SOLAR PROJECT
OVERALL SITE PLAN

project	contract
98975	-

drawing C003 – rev. B

sheet - of - sheets

file 98975C003.DWG

Millimeters
Inches
Scale For Microfilming

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- The normal operating temperature of the PV module face would be 10 to 15 degrees Fahrenheit (°F) above ambient air temperature; thus, a typical summer day at 85°F would result in module face temperatures of approximately 100°F.
- The single axis trackers would be mounted on direct-driven steel support piles that will be embedded in the ground to a depth that will be determined during the detailed engineering phase. The top of the piles will be between 4 and 8 feet above grade. The steel support structures would be fabricated using corrosion-resistant galvanized coating. The piles will be inserted/driven directly into the ground so concrete foundations would not be required. A small number of piles may require an alternative method of installation such as pilot hole or drilled hole and grout due to unknown subsurface conditions.

4.2 Electricity Collection System and Inverter Stations (Skids)

Solar energy is converted into electrical energy in the form of direct current (DC) by the PV modules. The PV modules will be organized into "blocks." Each block will encompass approximately 15 acres of PV modules (approximately 3 to 5 MW [DC] each) and will include an inverter station (Skid). The size of each block will depend upon the capacity of the block's inverter station, which in turn will depend upon the type and size of inverters available for purchase and other detailed electrical design considerations. Within each block, the PV modules are connected in series which are called "strings." Typically, a string will have between 27 and 32 modules connected together to reach the 1,500V (DC) operating voltage of the system.

The modules in each string are connected in series by prefabricated electrical cables that are hung under the PV modules and extend, in some cases, underground to a combiner box. A combiner box is an electrical enclosure, which would be mounted on, or next to, the PV tracking system and would allow multiple strings to be connected in parallel, increasing the amount of current going to the inverter without increasing the voltage. Multiple strings will then be combined in combiner boxes and routed in cable-trays and/or underground to the block central inverter station (Skid). Inverters take the DC output of the PV modules in the solar field and convert it to alternating current (AC) for delivery to the transmission grid via the project medium voltage AC collection system. The inverter Skid will also contain tracker controls, monitoring/communication equipment, and a step up transformer specific to each block. The Skid step-up transformer will be liquid insulated and cooled, outdoor rated, and will step up the AC electricity voltage from the inverter output level to the AC collection system voltage level (e.g., 480V to 34.5kV). Transformer liquid will be vegetable based environmentally benign FR3 type.

From each inverter Skid transformer electricity will be conveyed via the AC collection system circuits to the project's substation. Inverter Skids will be centrally located at each block and internal access roads will be constructed for maintenance access. The project would use between 15 and 25 combiner boxes per power block depending on the technology used. The project would also have approximately 20 to 25 inverter Skids. Each Skid would be mounted on concrete piers or footings, with the entire structure being approximately 12 feet wide by 35 feet long by 15 feet high.

4.3 Battery Energy Storage System (BESS)

The purpose of the BESS is to store excess energy during peak production and deliver it later during peak demand. The BESS will provide grid operators with flexibility to manage peak loads and provide a fast response to power shortages or brownouts and enhance grid stability and reliability. The BESS will be designed to deliver up to approximately 50 MW and store up to 200 megawatt hours (MWh) of electricity for delivery into the local SCE grid via the existing nearby Victor Substation.

The BESS will be comprised of power conversion hardware, including battery charging controller, storage batteries, DC to AC (bi-directional) inverters/rectifiers, MV/HV power transformers and reactive power (VAR) management equipment. The BESS will likely be located in fully enclosed containers that would each house battery modules mounted in racks, associated electrical and electronic battery management equipment, as well as integrated heating, ventilation, and air conditioning (HVAC) and fire suppression system. BESS containers will likely be made from converted International Organization for Standardization (ISO) shipping containers, and would measure approximately 20 to 50 feet in length, 8 feet in width, and 9 feet in height. Each battery container would be accessible by a drive aisle. An alternate design of the BESS will be housing the batteries and associated balance of system in one or more large building(s). The decision whether to use containers or building(s) will depend on final detailed engineering design and project economic considerations. The entire BESS site would occupy approximately 5 to 7 acres and would be fenced for security and to restrict access. The BESS modules and associated infrastructure (e.g., inverters, switches, transformers) would be serviced on an "as needed" basis by qualified technicians.

4.3.1 Battery Modules, Lithium-Ion Battery Technology, and Fire Protection

Each battery module rack would be located within a metal storage container, retrofitted to add insulation, air-conditioning, and fire suppression with separate enclosures for the electronic controls, inverters, and rectifiers. Due to the positive pressure required within each storage container to ensure functionality of the fire suppression system, the containers would not be vented. Each storage container would utilize a supply and return air conditioning system; this system has a fresh air closed loop system. The mechanics of this type of air conditioning system make it compatible with a positive pressure environment and do not require venting. The primary storage components would consist of self-contained electrochemical battery systems (e.g., lithium-ion) using conventional storage technologies with proven safety and performance records. The battery storage containers are designed such that the periodic maintenance and replacement of underperforming battery components can be easily performed on an as-needed basis without replacing the entire module. Since the battery storage containers are not vented, to enhance worker safety, an Occupational Safety and Health Administration (OSHA) approved Enclosed Space Entry Procedure will be used whenever service technicians have to go in to the containers.

The lithium-ion battery is a high energy-density battery that is rechargeable. Due to the energy density levels of lithium-ion batteries along with their charge and discharge profiles, these batteries are ideal for a project of this size due to space constraints and commercial viability. These batteries will allow a safe and effective installation into a shipping container or similar structures and perform well under rigorous demand to provide grid stability. The containers would include a built-in fire protection system, utilizing suppression through cooling, isolation, and containment. Each battery storage container would likely include a gaseous fire suppressant agent (e.g., 3M™ Novec™ 1230 Fire Protection Fluid) and an automatic fire extinguishing system with sound and light alarms. The system would be designed in accordance with National Fire Protection Association (NFPA) safety standards, and approved by the Authority Having Jurisdiction (AHJ), including an automatic shut-down system for fans that keep the container sealed when the fire extinguishing system is activated. The fire suppressant agent is deployed by a releasing panel that uses an aspirating smoke detection system. In addition, each container will also have a manual release. A disable switch would be provided for maintenance to prevent accidental discharge while the system is being serviced.

DC electricity would be collected from the batteries via a battery management system (BMS) and conveyed to the inverters. Each battery module would be connected with a BMS to form a rack mountable module assembly. Multiple module assemblies are then combined into a rack, or battery-integrated cabinet (BIC) to optimize battery voltage and battery current. A number of series circuits are combined together to form an individual parallel circuit; parallel circuits are grouped together in individual BICs

which are sized appropriately and each BIC contains a rack-level BMS. The number of BICs would vary according to final project specifications and can be sized to accommodate electrical design. BICs combine multiple parallel circuits through a fused bus system to collect the energy into one set of direct current collection cables. The fuses within the BIC cables provide additional protection from overcurrent. These cables run from the BICs to the inverters, where they would terminate in the direct current side of the inverter. The BESS would have a Supervisory Control and Data Acquisition (SCADA) system that would allow for remote monitoring and control of inverters and other system components. The SCADA would be able to monitor BESS output and availability, and to run diagnostics on the equipment. The BESS would also have a local overall plant control system (PCS) that would provide monitoring as well as control of the balance of plant systems.

4.4 Project Electrical Substation

The electrical substation is the central hub for the 34.5kV, AC collection system and where the produced solar electricity voltage would be stepped up from 34.5kV to 230kV to match the transmission grid voltage at the point of interconnection (POI). The project's substation would be located inside the Solar Field Area (see Figure 2 for solar substation location). A new, on-site, access road would be constructed to serve the substation. The substation would cover approximately 2 acres area and will include the following major components:

- 34.5kV bus and associated switchgear and protection devices;
- 230kV bus and associated switchgear and protection devices;
- 125 MVA, 34.5/230kV Generator Step-up Transformer (GSU);
- 34.5kV capacitor bank;
- Revenue meter and protection equipment;
- Steel support and dead-end structures up to 90 feet in height;
- Grounding grid;
- Prefabricated modular control building (unoccupied); and
- Perimeter chain link fence topped with 3 strands of barbed wire per AHJ/SCE specifications.

The substation equipment would range in height from 8 feet to 30 feet; the dead end steel structure may be up to 90 feet tall. The substation area would be graded and compacted to an approximately flat and level grade. Precast and/or cast in place concrete pads would be used as foundations for substation equipment, and the remaining area would be graveled per industry standards. Electrical transformers, switchgear, and related substation facilities would be designed and constructed to transform medium-voltage power from the project's collection system 34.5kV to the 230kV transmission grid voltages. The substation GSU transformer would contain approximately 10,000 gallons of environmentally benign, vegetable based (FR3) insulating oil, and the transformer foundation would be designed to accommodate an accidental spill of transformer oil by the use of secondary containment. No polychlorinated biphenyl (PCB) laden fluids would be used. A modular prefabricated control building will be installed in the substation, where metering, control, communications, protection equipment, and battery backup systems will be located.

4.5 Meteorological (Met) Stations

Meteorological stations (Met Stations) are used to collect weather and solar radiation data. Met Station information will be used to optimize the energy production of the project. Typical instrumentation on a Met Station includes sensors for ambient air temperature, relative humidity, wind speed and direction, barometric pressure, a rain gauge, and global horizontal and plane of array solar irradiance using pyranometers in a horizontal position and at an orientation consistent with the solar modules. A PV reference cell may also be installed at the Met station(s) to be used for performance optimization. Met Stations can have an instrument mast approximately 20 feet tall and will be located across the site. Up to four Met Stations are anticipated to be installed for this project.

4.6 Monitoring System

4.6.1 Solar Facility Monitoring

A monitoring system is an essential part of a solar PV project. Automatic data acquisition and monitoring technology is utilized during the operational phase in order to maintain a high level of performance, reduce downtime, and ensure rapid detection of faults or system/component failure. For High Desert Solar the monitoring will be done using a remote monitoring station that will likely be located in the nearby HDPP.

The monitoring system allows the actual yield of the project to be monitored and compared with theoretical calculated yield on a real-time basis and if performance is not meeting expectations issues can be detected and performance optimized quickly before they have an appreciable effect on production. Without a reliable monitoring system it could take months for a poorly performing system or element to be identified.

The key to a reliable monitoring and fault detection methodology is to have good simultaneous measurements of the solar irradiance, environmental conditions, and plant power output. This monitoring is achieved by incorporating one or more meteorological (met) station(s) on site to measure the plane of array irradiance, module temperature, and global horizontal irradiance, ambient air temperature, relative humidity, wind speed, and direction. Actual voltage and current will typically be monitored at the inverter, combiner box or string level, each offering more granularity than the previous.

Data from the met station(s), inverters, combiner boxes, meters, and transformers will be collected in data loggers and transmitted, in real time, to the remote monitoring station, typically via wireless or fiber-optic link. A separate SCADA system will be installed at the project's substation to monitor and control the required revenue metering and transmission system protection equipment. This system will be specified and monitored by the transmission provider (SCE) and the CAISO.

4.7 Access Roads and Site Maintenance Roads

4.7.1 Solar Field Area Roads

Three types of roadways will be designed for the Solar Field Area: entrance road, interior access/maintenance roads, and perimeter roads. The site entrance road will connect to Colusa Road and will be the primary point of access to the site. The site entrance road, perimeter road, and central fire road will be 26 feet wide and constructed of compacted native soil per the City's specifications and approved engineering drawings. A security gate will be installed. The interior access/maintenance roads will be designed to meet City requirements for emergency vehicles, which consists of in-situ soil, compacted to a minimum of 85 percent standard proctor. See detailed site plan for proposed alignments, width, and

cross-sections for the on-site roadways. Table 1 includes the estimated areas and lengths of the various access roads for High Desert Solar.

Perimeter access roads will be located inside the Solar Field Area and adjacent to the perimeter fence surrounding the site and will also run north/south through the middle of the site. These perimeter and center roads are required by the City's fire department which will allow them to readily access all areas of the site. The perimeter roads will be 26 feet wide and constructed of compacted native soil. Internal access roads will be provided to access critical equipment for ongoing operations and maintenance activities. These roadways will be 20 feet wide and constructed of compacted native soil. Site access roads would provide adequate ingress and egress to and from the project site for emergency vehicles.

Table 1. Area and Length of Access Roads

Item	Length (feet)	Width (feet)	Area (Acres)
Main access (entrance) road	8,000	26	4.8
Interior access roads	34,200	20	16.7
Internal Perimeter roads	35,300	26	23.3
New Gen-Tie maintenance roads	12,000	12	3.3
Total	89,500	-	4.49

4.7.2 Gen-Tie Roads

Access roads are required to each Gen-Tie structure/pole. Foundation auger equipment, loaded materials trucks, cranes, and specialized line construction equipment will be required for construction, maintenance, and emergency restoration activities. Periodic ground based inspections require vehicular access using 4x4 trucks or 4x4 all-terrain vehicles (ATVs) to each structure site. To accommodate the necessary equipment, the road specifications require a 12-foot-wide travel way and up to 20-foot-wide road width in turns. The road and travel way in areas of rolling to hilly terrain may require additional cuts and fills for travel and turning radii, and/or where vehicles are required to pass one another while traveling in opposite directions.

Gen-Tie access roads will consist of compacted native soil surface. Where localized conditions require, a road base or temporary Geo-Mats may be used. The following summarizes the road types needed for the Gen-Tie line structure access:

- **Existing roads requiring routine maintenance** – Well maintained paved or gravel roads that have sufficient width and integrity to support construction and operation. The roads are typically maintained by other entities. Routine road repairs may be required within the existing roads.
- **Existing roads requiring improvement** – Existing roads of varying condition that may require blading and widening to allow safe and suitable construction access. After construction, these roads will be restored to the extent that they remain suitable for safe travel for period inspections with 4x4 trucks or 4x4 ATV's. During infrequent maintenance or repair events that require heavier construction equipment, these roads may require additional improvements for construction access.

- **New spur roads** – New roads will be constructed and graded as necessary in order to travel from the existing roads to pole sites. After construction, these roads will only be maintained to a level that is suitable for safe travel for periodic inspections with 4x4 trucks or 4x4 ATV's. During infrequent maintenance events that require construction equipment, these roads may require additional improvements for temporary construction access, then again only maintained to the level required for period inspections.
- **Temporary roads** – Required to access temporary use areas including wire stringing sites, work areas, and staging areas. Temporary roads will be restored after use.

Gen-Tie access road construction will minimize disruption to natural drainage patterns. For analysis purposes, there are two types of crossings considered – drive through and dry wash crossings. Culverts are not anticipated for Gen-Tie access roads.

- **Drive through –** Crossing washes with only minimal vegetation trimming and no cut or fill needed. This is typical for areas that are improved to the point where topographic modifications are not necessary for crossing. Geo-mats may be used to stabilize the crossing and reduce disturbance.
- **Dry wash crossing –** Crossing of an ephemeral stream channel that includes grading and potentially stabilization. Approaches would be graded to allow more efficient vehicle passage and may be stabilized with rock or other erosion control devices including geo-mats, if needed. In some areas, the crossings may be reinforced with coarse rock material to support vehicle loads, prevent erosion, and minimize sedimentation. The rock would be installed so as to not block natural storm water flow, thus allowing continued movement of water. There will be no wet stream crossings. No stream crossings would occur during storm events.

4.8 Site Security and Fencing

Primary ingress/egress for the Solar Field Area will be from Colusa Road, which is a public roadway. Secondary or emergency access will be from Helendale Road, which is an existing road along a public utility right-of-way (ROW) easement.

The Solar Field Area will be surrounded by a perimeter chain link security fence with a gate at each site entrance. The fencing will consist of chain link fence topped with a one foot high (3 strands) barbed wire section per AHJ specifications. Storm water runoff will flow through the fencing. Additionally, the project will install desert tortoise exclusion fencing including Agency approved desert tortoise grates at access gates to prevent tortoises from entering the site. Fencing may also include elevated gates to facilitate desert kit fox access post-construction if required.

Security lighting for the Solar Field Area will be minimal. Shoebox type light fixtures mounted on poles will be installed at the primary site entrance as well as at the substation entrance. There will be no lighting within the solar arrays or around the perimeter fence. Portable lights will be used for maintenance activities at inverter Skids that occur at night. Additional fencing would be constructed around the substation per SCE and AHJ standards, and temporary fencing would be placed around construction staging areas. All materials would be industrial-grade galvanized steel.

4.9 Fire Protection

The Applicant has met with the San Bernardino County Fire Department, Victorville Division. The Pre-Submittal Notes from that meeting include the following recommendations: 1) The project shall comply with all current Building and Fire Code requirements based on occupancy classification; 2) The project

should provide a twenty-six foot wide fire access road down the center and around perimeter of project and twenty foot interior around array blocks; 3) The project's minimum road construction shall be native material or gravel, compacted to a minimum of 85 percent; and 4) High Desert Solar shall provide a twelve inch address sign on the main gate, provide a Knox-Box or switch at the main access gates, and provide a secondary emergency egress gate with Knox-Box. These recommendations are now included in the project design.

4.10 Gen-Tie Line and Service Line (Interconnection Facilities)

The 230kV electricity from the High Desert Solar site facilities will be conveyed to the POI near the existing HDPP using an overhead Gen-Tie line. The Gen-Tie poles will be tubular steel structures approximately 130 feet tall placed approximately 800 feet to 900 feet apart along the Gen-Tie route. Gen-Tie line routing will ensure that the SCLA retains sufficient clearances to not restrict any flight operations. A manual disconnect (air) Switch will be located on the last pole of the Gen-Tie to provide means of manually isolating the Gen-Tie and solar facility.

A 12.47kV service line will also be built to connect to the VMUS system at the industrial wastewater treatment plant on Helendale Road south of the Solar Field Area. This service line will be constructed partially as an underbuilt, sharing poles where feasible with the 230kV Gen-Tie. The 12.47kV service line will have its own poles from the point where it diverges from the 230kV, to the POI. The 12.47kV service poles will be standard wood distribution utility poles at a height of 30 to 40 feet installed approximately 400 feet apart.

5.0 SITE DESIGN AND ENGINEERING

5.1 Site Disturbance

Permanent disturbance to the site would result from construction of roads, the substation, the BESS, equipment pads, PV tracker steel piles, and grading of areas with slopes greater than 5 percent within the Solar Field Area. Temporary disturbance to the site would result from trenching for electrical conductors, construction staging areas, and temporary access roads.

The project design confines the solar arrays, BESS, substation, and access roads to a footprint of approximately 579 acres, for a total disturbance of approximately 95 percent. The remaining areas within the project boundary would be left undeveloped. Undeveloped areas would include on-site drainages and riparian buffer zones.

Only limited grading is expected to be required because of the low impact development (LID) approach and nearly flat terrain. Grading would be required on slopes greater than 5 percent for PV power blocks. Project grading requirements are anticipated to be approximately 135 acres, mainly along the eastern side of the Solar Field Area and in the locations of the substation, BESS, and laydown areas, resulting in approximately 310,000 cubic yards of cut-and-fill and no cubic yards of export. The project may utilize some or all of the old concrete foundation slabs that will be removed during site clearing, as road base aggregate.

5.2 Erosion Control

A Storm Water Pollution Prevention Plan (SWPPP) outlining the various Best Management Practices (BMPs) for minimizing erosion and runoff would be prepared prior to project construction. Typical erosion control BMPs would be used. The site will be stabilized according to the SWPPP requirements. Existing vegetation would be mowed and kept to a height of less than 18 inches.

5.3 Utilities

Electricity during construction and operations would be obtained by a metered tap of the local existing 12kV power grid and/or from portable, fuel-powered on-site generators, if needed during construction. Water would be trucked in from nearby water agencies. Portable sanitary facilities would be required during construction. Sanitary waste would be hauled off site to appropriate treatment facilities by a properly licensed contractor. Solid waste/rubbish would be hauled to appropriate recycling centers or landfills by the contractor. Hazardous waste is described in further detail in Sections 5.7 (Hazardous Materials/Waste Handling). A SCADA/monitoring system would be used for project communications. This system would allow for complete control and access to the Inverter Skids, weather stations, site security, solar substation, telecom system, and all other systems of communication.

5.4 Water

5.4.1 Construction Water Requirements

Water usage for the project site for construction related activities will be approximately 200 acre feet during the 10 to 14 month construction period with most of it being used for dust control, grading, and compaction purposes including dust control for the main access road. To the extent feasible, the project will use reclaimed water for dust control and earthwork purposes and all other uses except for drinking and sanitation.

Potable water will be trucked in to the site during the construction period for drinking water, hand washing, and other personal uses. It is estimated that approximately 1,000 gallons/day will be needed for about 200 workers during the peak construction period. Potable water will be provided for personnel use only.

- Drinking water – 4 gallon/person/day (800 gallons/day at peak)
- Hand washing/miscellaneous – 1 gallon/person/day (200 gallons/day at peak)

Portable toilets will be used for sanitary facilities during construction.

5.4.2 Operational Water Requirements

Water use during facility operation will be for cleaning of the PV modules. It is anticipated that cleaning will occur once annually, if warranted, due to excessive soiling resulting in degrading performance. Module cleaning would use approximately 175,000 gallons of potable water per cycle, assuming approximately 350,000 modules and would be trucked to the site. Since the facility will be unmanned, there will be no restrooms or need for a permanent water supply to the site. Module cleaning requires water that is low in minerals and dissolved solids to prevent spotting and hazing on module surfaces to keep module efficiency at optimal level. Module cleaning water will be delivered to the site by truck. No module cleaning water will be stored on site.

5.4.3 Potential Water Sources

Possible water sources for construction include:

- Reclaimed and potable water agencies in the project vicinity and trucked to the project site.

Estimated total water consumption during construction and operation is shown in Table 2.

Table 2. Water Usage During Construction and Operation			
	Daily Demands (gallons)	Monthly Demand (gallons)	Annual Water Demand (acre-feet/year)
Construction Phase			
Site preparation and improvement	350,000	8,750,000	80
Solar field installation	174,000	4,350,000	60
Start-up and commissioning	174,000	4,350,000	60
Operational Phase			
1 (108 MW nominal)	0	0	0.5

5.5 Site Traffic Circulation

The design and construction of all internal maintenance roads (perimeter and interior) would be approved by the City: a total of (26 and 20 feet respectively) in width, native soil compacted to 85 percent. Internal power block aisle ways would be 12 feet in width. Overhead obstructions, if any, would have a minimum vertical clearance of 15 feet. The enclosed site plan depicts permanent site access and internal roads.

Outside of the perimeter fence for the Solar Field Area the project will improve a section of Colusa Road to be used as the main access road. This road will be 26 feet wide and will be 85 percent compacted native soil and aggregate base or gravel surface. Existing roads that are currently used for the groundwater monitoring program implemented by the United States Air Force will be used to service and maintain the Interconnection Facilities. All road and access designs would be reviewed and approved by the AHJ and the Fire Department prior to final design submittal/approval. As part of the project construction, an approximately 1,300 feet of Helendale Road within the Solar Field Area will be abandoned for use as part of the solar field. Other public access and service easements within the Solar Field Area may also be vacated as part of the project.

5.6 General Safety

Site specific emergency response plans would be developed for construction and operations. On-going training for construction, materials handling, and operations would occur per OSHA regulations. All emergency response plans would be developed in consultation with the Fire Department, City of Victorville Public Health Department, and any additional local, State, or federal agencies with jurisdiction over emergency response at the project site.

5.7 Hazardous Materials / Waste Handling

A Spill Prevention, Control, and Countermeasure (SPCC) Plan for project construction and for facility operation will be prepared for the project. The SPCC Plan for project construction will address fuels, lubricants, and hydraulic fluids expected to be used for construction equipment. Such equipment will be properly maintained to minimize leaks, and to prevent spills, vehicle service and repair will be performed off-site at an appropriate facility. The SPCC Plan for facility operation will address the oil that may be contained in each transformer. The SPCC Plan for facility operation will be updated on a regular basis as new equipment is commissioned and turned over from construction to operations. The oil contained in each transformer will be FR3, vegetable based, environmentally benign and does not require regular replacement. If needed, replacement will be accomplished by either transporting the entire transformer

off-site or by transferring the FR3 oil to a tanker truck for transport off-site. Oil disposal will be managed in accordance with Department of Toxic Substances Control hazardous waste regulations.

The PV modules and inverters produce no waste during operation. However, the PV panels may include solid materials that are considered to be hazardous. To address management of such materials, the Applicant's contract with the selected PV panel manufacturer will include a provision requiring the manufacturer to receive and recycle or dispose of any broken or defective modules. Because such materials are in a solid and non-leachable state, broken PV panels will not be a source of pollution to storm water.

Similar to the PV modules, the BESS batteries produce no waste during operation, but may contain solid materials that are considered hazardous. Also, the fire suppressant agent used for the BESS enclosures may be considered hazardous, although most commonly used suppressant agents in the marketplace today are considered to be environmentally friendly. To address management of such materials, the Applicant's contract with the selected BESS vendors and suppliers will include a provision requiring the vendor or supplier to receive and recycle or properly dispose of any such components or materials that were taken out of service for any reason.

The facility does not present significant potential for introducing pollution to storm water, and operation of a solar PV facility is not subject to stormwater permitting authority.

All use, storage, transport, and disposal of hazardous materials used in construction or operation of the solar facility will be in strict accordance with federal, State, and local laws, ordinances, regulations, and standards (LORS). No extremely hazardous materials (i.e., governed under 40 CFR 335) are anticipated to be produced, used, stored, transported, or disposed of as a result of the project. During construction and operation of the project, Material Safety Data Sheets (MSDS) for all applicable materials present on-site will be kept on site and made readily available to on-site personnel and regulatory agencies and inspectors.

During construction of the facility, non-hazardous construction debris will be generated. Such debris will be recycled or disposed in local facilities and landfills consistent with required salvage and recycling LORS. During construction of the facility, sanitary waste will be managed using portable toilets and hand washing stations located at reasonably accessible on-site locations.

5.8 Fire Safety

5.8.1 Project Substation

Substation building fire suppression shall follow the SCE or HDPP standard for fire suppression, subject to local permit official approval.

5.8.2 BESS Enclosures

All battery, electrical, and instrumentation enclosures and structures will be provided with an integral (built-in) fire suppression system that is appropriate for the type of equipment inside. Fire suppression systems will be subject to review and approval of the AHJ.

6.0 INTERCONNECTION AND NETWORK UPGRADES

6.1 Overview of Interconnection Process

High Desert Solar would interconnect to the regional electricity grid at the Victor-Caldwell 230kV

transmission line near the High Desert Solar site. Since the project will utilize available capacity at the existing interconnection, no upgrades to the SCE system would be required to accommodate the electrical generation of High Desert Solar. The interconnection process is described below.

The CAISO, the electricity grid operator in California, in combination with the interconnecting utility, SCE, are responsible for ensuring grid reliability. These two entities are tasked with determining the potential transmission system impacts of High Desert Solar and any measures needed to ensure system conformance with utility reliability criteria. The CAISO is currently processing the interconnection request submitted by the Applicant for High Desert Solar. The Applicant submitted a Generator Interconnection Request (GIR) to interconnect the nominal 100 MW of the project's output to the SCE 230kV HDPP transmission line.

Under the GIR process, the CAISO is conducting a System Impact Study (SIS) which is a more detailed study to determine whether the interconnections are physically feasible, to identify the facilities that would be required to interconnect the energy source, to evaluate the potential impact of the interconnections on the reliability of the grid, and to identify any network upgrades that may be required to accommodate the new generation. Because the Applicant's GIR has been assigned to an already existing capacity, no system upgrades are anticipated. SCE will then conduct a Facilities Study on the transmission facilities identified in the SIS, estimating the cost of equipment, engineering, procurement, and construction work required to allow grid interconnection of the project. The Applicant would be required to post financial securities as a part of the GIR process. CASIO has already completed a Feasibility Study as the first step in the GIR process which has determined there are no system impacts. CAISO has also recently completed a SIS, which confirms the findings of the Feasibility Study.

In addition to the 230kV interconnection to the SCE grid, High Desert Solar will also connect, with a separate dedicated circuit, to the VMUS distribution system at 12.47kV. The VMUS connection will be at the City's industrial wastewater treatment facility located just south of the Solar Field Area. The 12.47kV circuit will be routed as an underbuilt with the 230kV for about a mile, at which point it will diverge and have its own route to the POI.

6.2 Interconnection Facilities

The primary interconnection facility for this project would be a 230kV line tap to the existing 230kV line at a location near the HDPP (Caldwell) substation south of High Desert Solar. Routing the Gen-Tie circuit to the substation would require approximately 18 new Gen-Tie tubular steel poles, each of which would be between 90 and 130 feet in height and placed 800 to 900 feet apart. A new 12.47kV service line will also be built to connect to VMUS system at the industrial water treatment plant on Helendale Road south of the Solar Field Area. This service line will be constructed partially as an underbuilt, sharing poles where feasible with the Gen-Tie. The service line will have its own poles from the point where it diverges from the 230kV, to the POI. The 12.47kV service poles will be standard wood utility pole at a height of 30 to 40 feet installed at approximately 400 feet apart.

The design details of the Interconnection Facilities will be developed in consultation with SCE. The substation is likely to cover an area of approximately 2 acres within the Solar Field Area fence line. The substation would be built to accommodate the entire project production with the nominal 100 MWac connecting to the SCE 230kV system and approximately 8 MW connecting to the VMUS 12.47kV system.

At project build-out, the solar substation would include 230kV circuit breaker(s) and related equipment arranged in a "Tap, single breaker" configuration. The substation would also include a GSU transformer, switchgear, a prefabricated substation control building, and dead-end steel structures that would be approximately 90 feet in height. Additionally, the substation will include a step-down transformer and

associated 12.47kV bus, switchgear, and protection equipment for the VMUS service line.

6.3 Transmission System Upgrades

The CAISO conducted a SIS for the project. The study showed that the transmission system has adequate capacity and concluded that *"the Project causes no overloads or voltage violations. Dynamic stability study results indicated that the transmission system's transient performance would not be significantly impacted by the Project."* Also *"the downstream substation evaluation found no overstressed equipment by the interconnection of the Project."* The SIS did not identify any needed network upgrades.

7.0 PROJECT CONSTRUCTION

7.1 Pre-Construction

Prior to construction there will be activities occurring at the site to support detailed design and to prepare for construction. Geotechnical study will be performed at the Solar Field Area and along the Interconnection Facilities approximately 8 months prior to construction and will include borings up to depths of 50 feet, thermal and electrical resistivity testing, possibly a few test pits about 10 feet deep, some potholing to verify exact locations of existing underground utilities and services, and pile pull tests. Topographic and boundary surveys of the same areas will be performed approximately 12 months prior to construction. A few weeks prior to commencement of grading activities the following pre-construction activities will be performed:

- A pre-construction meeting that includes safety and environmental training will be held on-site for pertinent project staff, all construction personnel, and environmental monitors.
- The site will be surveyed and marked/staked for construction.
- Biological and cultural monitors will be present in the immediate vicinity of all work outside of exclusion fencing, as appropriate.

7.2 Construction Sequence

Construction of the facility is estimated to be completed over a 10 to 14 month period and will require a peak workforce of approximately 200 management, supervisory, and craft workers. Temporary construction staging/laydown will include craft parking, office trailers, storage conex boxes, and equipment laydown areas. Temporary workspaces will be graded and graveled to mitigate fugitive dust and mud during rain events. Temporary sanitary facilities (portable toilets) will be provided during construction. The sanitary facilities will be serviced by a licensed contractor and waste will be disposed off-site. The temporary construction workspaces will likely be located near the primary site entrance off Colusa Road; additional temporary staging areas may be located throughout the Solar Field Area to facilitate a phased construction approach. As construction of the site is nearing completion, the temporary construction facilities will be removed and the area(s) will be utilized as part of the solar field.

During the estimated 10 to 14 month construction period, activities would include:

- Installation of perimeter security fence and desert tortoise exclusion fence.
- Construction of substation and Gen-Tie line.
- Simultaneous grading of the site to include: construction of staging areas, grading of access roads, solar field, and substation, BESS, as well as stormwater facilities.

- Shakeout and insertion of the steel support piles.
- Shakeout and installation of tracker system.
- Shakeout and installation of PV modules.
- Installation of the AC and DC collection system and monitoring system.
- Installation of central inverter and transformer stations (one per block).
- Start-up, commissioning, and testing activities.
- Restoration of temporary laydown areas.
- Restoration of temporary Gen-Tie construction roads.

All materials for construction of the project will be delivered to the site by trucks. The majority of truck traffic will occur on designated truck routes and major streets in consultation with the City's Public Works Department. It is anticipated that delivery trucks traveling south along Interstate 15 would exit at North D Street and travel to Colusa Road via major streets. Delivery trucks traveling north along Interstate 15 would exit at Highway 395 which will take them directly to Colusa Road. All deliveries would enter the project site from Colusa Road. It is anticipated that there could be up to 30 deliveries per day during the peak of construction.

Construction activities will generally be performed Monday through Friday from 6 AM to 6 PM; work over the weekend may be performed as well in order to meet the project schedule. Construction will be conducted block by block and will be sequenced or staggered to allow multiple crews to work simultaneously on the site.

Following are the anticipated number of pieces of major equipment that will be delivered to the site:

- PV modules – 320,000 to 370,000
- Trackers – 4,000
- Steel support piles – 65,000
- Inverter Skids with associated equipment – 34
- Combiner boxes – 500
- 34.5/230kV transformer – 1
- 34.5/12.47kV transformer – 1
- Pre-fabricated substation control building – 1

7.3 Substation Construction

The substation would be constructed by a contractor selected by the Applicant in accordance with its Engineering, Procurement, and Construction (EPC) contract specifications. The substation will occupy an area of approximately 2 acres and will be graded flat and level. Four to 6 inches of gravel will be installed on the entire area to keep down dust and mud and make for easier housekeeping. Precast or cast in place concrete foundations will be built for the substation equipment and structures. Foundation will be drilled pier or spread footing. Foundations type and size will be determined during the detailed engineering phase. The substation will be enclosed with a security fence and will be within the Solar Field Area.

7.4 Battery Energy Storage System (BESS)

The BESS would be constructed by a contractor selected by the Applicant in accordance with its EPC contract specifications. The BESS will occupy an area of approximately 5 to 7 acres and will be graded flat and level. Precast or cast in place concrete foundations will be built for the BESS equipment and container/structures. Foundations type and size will be determined during the detailed engineering phase. The BESS will be enclosed with a security fence, within the Solar Field Area.

7.5 Tracker and Modules Installation

The tracking system components would arrive on site, at an estimated rate of approximately 10 to 20 MW per month, to be assembled and installed at the site. PV modules would arrive on site and be placed in a staging area inside shipping containers. Modules would be distributed out to the blocks and put in place manually, and secured to the tracker per vendor specifications and approved engineering plans. Each tracker would be populated with modules, wired in series, to create strings, and connected to a DC combiner box, which would deliver DC power to the block's inverter station.

7.6 Laydown Areas

The main laydown area would be near the main site entrance at Colusa Road and will have the contractor site trailers/offices as well as fabrication areas, worker break area, sanitation and parking, material staging area, and storage (conex) boxes. This area will cover approximately 10 to 15 acres. Temporary power for the main laydown area will be provided by a temporary drop from the nearby 12kV VMUS system or from temporary mobile generators. Potable water for drinking and sanitation will be trucked in as needed. Secondary materials staging/laydown areas may be located closer to work areas and will be moved periodically as the site builds out.

7.7 Construction Personnel

Construction personnel over the 10 to 14 month construction period would include:

- Civil/earthwork personnel;
- Fencing personnel;
- Tracker support pile driver personnel;
- Tracker and PV mechanical installation personnel;
- PV electrical personnel;
- Monitoring system personnel;
- Project management personnel;
- Biological and archaeological monitors;
- Start-up, commissioning, and testing personnel;
- Substation mechanical personnel;
- Substation electrical personnel; and
- Substation start-up and testing personnel.

The workforce projection is based on assembling and installing arrays at an average rate of approximately 10 MW per month. The peak number of construction personnel is expected to be approximately 200 workers per day. Table 3 presents the anticipated on-site construction workforce for each quarter.

Table 3. Estimated Construction Workforce

Quarter	Workers
1	50-95
2	155-200
3	155-200
4	50-75

On-site work hours would generally be daylight hours, typically 6:00 AM to 7:00 PM, or as specified by the building permit and according to applicable city ordinance. During the installation period, construction would be performed five days per week (weekend work may occur occasionally if construction milestones are not met on schedule), year-round, except for standard U.S. holidays. Security personnel would be on site 24/7 during construction, working in 8 or 10 hour shifts. High Desert Solar could be operational (block by block) as early as 9 months into the installation period, with each subsequent block coming online as start-up and commissioning activities progresses. There would be no on-site temporary workforce housing, and parking of employee recreational vehicles or trailers would be prohibited.

7.8 Construction Traffic

Construction of the project substation may require temporary street closure, or partial closure, of Perimeter Road around the HDPP line tap site.

7.8.1 Personnel Traffic

An average construction workforce of 158 workers per day is anticipated, and the peak number of workers is estimated at 200 workers. If all construction personnel were to use personal vehicles, construction-related traffic would include an estimated one round trip per worker per day on average during the 10 to 14 month construction period. The Applicant will work with the EPC contractor to encourage worker carpooling to the extent possible.

It is anticipated that the majority of construction jobs for the project would be filled by workers from the High Desert region (Adelanto, Apple Valley, Barstow, Hesperia, and Victorville) with some specialty trade contractors likely coming from the Inland Empire or Los Angeles region. This assumption is based on labor and demographic data showing the High Desert region having a construction workforce surplus. Furthermore, approximately 71 percent of the High Desert labor force commutes outside of the region for job opportunities in the greater Inland Empire, Los Angeles, and San Diego areas because of the jobs-housing imbalance of the region (City of Hesperia Economic Development Department 2016). This data shows that the High Desert has the capacity to supply workers for the temporary construction jobs that would be created by the Proposed Project.

Commute distances for construction workers originating from within the High Desert region can be up to 25 miles (one-way). Commute distances for construction workers originating from out of region workers (Inland Empire and Los Angeles) can be approximately 50 miles (one-way).

The main project staging area would accommodate employee parking, delivery trucks, construction equipment, office trailer, and other activities. Ingress and egress to the site would be located at each laydown area along Helendale Road and Colusa Road.

7.8.2 Delivery Traffic

Routes for trucks hauling materials and construction equipment would primarily follow the Highway 395 corridor to Colusa Road, allowing for safe travel by larger container trucks and wide-load trucks carrying heavy equipment. Material delivery would include all components of the substation, control building, fencing, PV modules, support piles, tracker components, inverters, and additional miscellaneous items. Material deliveries would originate at manufacturing sources within California and neighboring states, and from shipping ports along California's coast. Some specialty equipment may be sourced throughout the country and possibly Canada or Mexico and will be delivered to the site overland via truck or rail. It is anticipated that material deliveries would occur via Interstate 15, Highway 395, and surface streets.

Material deliveries would be on-going throughout construction. Much of the heavy construction equipment would arrive to the site early and stay for the duration of construction. Table 4 describes the delivery truck type for each project component. Table 5 describes the projected number and length of daily truck deliveries. Table 6 describes the daily and average traffic trips during construction for each project component that would require transport to or from the High Desert Solar site.

Table 4. Delivery Truck Type by Project Component

Project Component	Truck Type
Solar panels	Standard width, 53' van/container
Inverters	Standard width, 48' flatbed /lowboy trailer
Steel mounts	Standard width, 48' flatbed trailer
Gen-Tie poles	Standard width, 48' flatbed trailer/oversize
Substation steel	Standard width, 48' flatbed trailer
Substation circuit breakers	Standard width, 48' flatbed trailer
Substation transformers	48' lowboy trailer with pilot cars
Auxiliary substation equipment	Standard width 48' flatbed trailer
Crane (35-ton)	48' lowboy trailer with pilot cars
Crane (60- to 100-ton)	Wide-load self-propelled trucks with 2 jib companion flat beds
Ready-mix concrete	Concrete mixer

Table 5. Projected Number and Length of Daily Truck Deliveries Estimated Daily

Description and Purpose (Miles)	Approximate Distance (Miles)	One-Way Trips Per Day (Trips)
Material Delivery	40-500	30
Worker Vehicle	10-60	310-400

Table 6. Construction Traffic Specifications

Traffic Type	Total One-Way During Construction	Average Daily One-Way Construction	Remote ≥ 40 miles
Water trucks, dust control	16,500	47	Local
Concrete raw material	495	1.5	Local
PV panel delivery	2,063	6	Remote
Substation equipment	300	1	Remote
Electrical materials	825	2.5	Remote
Total During Construction	20,183	58	—

7.8.3 Onsite Vehicle Movement During Installation

Vehicles Entering and Traversing the Site. During construction, traffic would enter the site at the specified areas access along Helendale Road and Colusa Road. Table 7 describes construction vehicles and equipment that would generate emissions.

Table 7. Construction Vehicles and Equipment

Vehicle Traffic Use	Vehicle Type	Max Weight (lbs)	Max Power (hp)	Tread Type	Frequency of Use (hrs/day)	Quantity Onsite
On-road equipment (grading & travel on main roads)	Scraper	77,800	313	Dual Axle	8	1
	Grader	30,000	174	Dual Axle	6	1
	Dozer	44,582	357	Tractor	6	1
	Backhoe loader	13,046	108	Dual Axle	8	1
	Roller	27,340	95	Dual Axle	8	1
	4,000-gallon water truck	55,000	189	Triple Axle	8	3
Off-road equipment (between PV power blocks and for panel installation)	Excavator	36,000	168	Tractor	8	4
	Roller	27,340	95	Dual Axle	8	1
	Backhoe loader	13,046	108	Tractor	8	1
	Trencher	5,500	63	Dual Axle	8	1
	Pile driver	55,000	291	Track	8	4
	Crane	28,800	399	Dual Axle	8	1
	Forklifts	20,000	93	Dual Axle	8	4
	Generators	n/a	549	n/a	8	3
	Multiple Grader	30,000	174	Dual Axle	6	1
	Plate compactor	n/a	8	Pad	8	2
	Pickup trucks	10,000	250	Dual Axle	16-24	8
	Welders	n/a	45	n/a	8	2

Solar Field Installation. Vehicles needed for installation of solar field components would travel on both permanent and temporary site roads of compacted native soil. These vehicles would include buggies, pickup trucks, bobtail flatbed trucks, pile-driver rigs, fork-lifts, water trucks, and cranes for lifting inverters onto piers/foundations.

7.8.4 Drainage Crossing

Roads that require a drainage crossing would be engineered to the specifications that allow for the weight of vehicles to cross without causing destabilization in the drainage areas and riprap would be placed on the downstream side of the road to minimize erosion. Drainage crossings would be kept to a minimum.

8.0 PROJECT OPERATIONS AND MAINTENANCE

The entire project is expected to be operational in late 2020 or early 2021, and would require an estimated 3 to 5 permanent employees. The project is expected to be in operation for at least 25 to 35 years.

8.1.1 Operations

Operations Personnel. The project as proposed would utilize the existing Control Room Operation (CRO) at the HDPP to monitor and operate both the HDPP and High Desert Solar facilities. Some synergies exist in the operating profiles of the two sister facilities where the solar PV facility will run during daylight hours and the HDPP mostly runs over night when solar generation drops off the grid. The BESS will operate after daylight hours and will be operated together with the HDPP.

The full-time staff of High Desert Solar is expected to consist of one electrical engineer to plan and coordinate operations and maintenance (O&M) activities, and two to three instrumentation and controls technicians to perform maintenance and troubleshooting/repair activities. Facility management duties will be performed by existing HDPP management. Periodic module cleaning will be contracted to a specialty contractor as well as any high voltage work in the High Desert Solar substation. The operations staff would consist of approximately three to five persons.

The current plan is for High Desert Solar to operate seven days per week to produce electricity during daylight hours and using the BESS to keep sending energy to the grid during peak demand time after daylight hours. Operational activities would consist of monitoring system operational status, performance, and diagnostics from the solar facility control console, at the HDPP control room. System production forecasting and scheduling with SCE and CAISO would also likely occur at HDPP, along with operational planning and required reporting for all federal and state agencies. Operations activities would include meter reading and production reporting by the monitoring system/SCADA, production analytics, troubleshooting, along with updating O&M manuals and periodic predictive maintenance (PM) activities.

Security. The Solar Field Area would be fenced to prevent public access to ensure public safety and protect equipment from theft and vandalism. Gates would be installed at all site access roads. The Applicant would provide maintenance personnel capable of responding to any upset conditions or other emergencies. High Desert Solar would be equipped with security measures appropriate for the site conditions, such as day/night closed-circuit security cameras. All security monitors will be in the HDPP control room.

8.1.2 Maintenance

Once construction is complete and the site is operational, all traffic would enter the site at the main site

access along Colusa Road. Access to the facility would be restricted to O&M staff, authorized contractors, and security personnel only. The O&M staff would use light-duty vehicles and all-terrain vehicles for traversing the site along on-site access roads.

Preventative Maintenance. The solar PV field would be inspected quarterly for degrading wires, modules, and combiner boxes. The SCADA/monitoring system would also identify underperforming system components; these components would be inspected and repaired as required. Industry standard measures, like forward-looking infrared imaging (FLIR), would also be used to detect hot spots in the solar field and point out electrical issues not visible to operators. There will also be preventative maintenance on the substation equipment (e.g., transformers, breakers, inverters, and batteries).

Routine Maintenance. Damaged or underperforming PV modules and mechanical fasteners would be replaced as required. Under-performing inverters would be repaired or replaced as required. Inverters are generally guaranteed by their manufacturers for ten years; however, inverters are expected to be operational for a longer duration.

Module cleaning. To optimize performance of High Desert Solar, the PV modules surfaces are expected to be cleaned annually during the dry season. Performance monitoring may prompt more frequent module cleaning in case of adverse atmospheric events such as dust storms or other conditions that may increase soiling. The module cleaning will be performed by an outside specialty contractor. Cleaning crews would traverse the site in small all-terrain vehicles, or light pickup trucks which would be fitted with a water tank and pump to operate a high-pressure sprayer.

Lighting. During construction, localized, portable lighting (light plants) would be used when work has to be done at night. Lighting would be powered by portable generators. During operation, constant low-level lighting may be required at the solar substation per safety requirements. This would include a single lamp source near the entrance and at the control building, which would be activated by a timer and/or photocell. All lighting would include a power switch to conserve energy when the lighting is not required. All lighting would point downward and be shielded to preserve dark skies, and would adhere to the City of Victorville's Lighting Ordinance. For any maintenance work done at night a temporary work light will be used.

LIST OF ACRONYMS AND ABBREVIATIONS

°F	Fahrenheit
AC	Alternating current
AHJ	Authority Having Jurisdiction
amsl	Above mean sea level
Applicant	HDSI, LLC
ATVs	All-terrain vehicles
BESS	Battery energy storage system
BIC	Battery-integrated cabinet
BMPs	Best Management Practices
BMS	Battery management system
CAISO	California Independent System Operator
CRO	Control Room Operation
CUP	Conditional Use Permit
DC	Direct current
EPC	Engineering, Procurement, and Construction
FLIR	Forward-looking infrared imaging
Gen-Tie	Generation tie
GHG	Greenhouse gas
GIR	Generator Interconnection Request
GSU	Generator Step-up Transformer
HDPP	High Desert Power Plant
High Desert Solar	High Desert Solar Project
HVAC	Heating, ventilation, and air conditioning
ISO	International Organization for Standardization
kV	Kilovolt
kWh/m^2/day	Kilowatt hours per square meter per day
LID	Low impact development
LORS	Laws, ordinances, regulations, and standards
met	Meteorological
Met Stations	Meteorological stations
MSDS	Material Safety Data Sheets
MWac	Megawatt
MWh	Megawatt hours
NFPA	National Fire Protection Association
NREL	National Renewable Energy Laboratory
OSHA	Occupational Safety and Health Administration
O&M	Operations and Management
PCB	Polychlorinated biphenyl
PCS	Plant control system
PM	Predictive maintenance
POI	Point of interconnection
PV	Solar photovoltaic
ROW	Right-of-way
RPS	Renewable Portfolio Standard
SCADA	Supervisory Control and Data Acquisition
SCE	Southern California Edison
SCLA	Southern California Logistics Airport

LIST OF ACRONYMS AND ABBREVIATIONS

SIS	System Impact Study
SPCC	Spill Prevention, Control, and Countermeasure
SWPPP	Storm Water Pollution Prevention Plan
USEPA	U.S. Environmental Protection Agency
VMUS	Victorville Municipal Utility Services
VVWRA	Victor Valley Wastewater Reclamation Authority

APPENDIX B

Project Design Features

Appendix B
High Desert Solar Project
Description of Project Design Features

The following are detailed descriptions of project design features (PDFs) for the High Desert Solar Project. These PDFs are measures and actions that will be implemented to address specific impacts that may result from project implementation. PDFs that will be implemented for the project and are applicable to desert tortoise include the following:

- Storm water pollution prevention,
- Hazardous substance management,
- Weed management, and
- Common raven (*Corvus corax*) management.

Storm Water Pollution Prevention

A Storm Water Pollution Prevention Plan (SWPPP) or equivalent document will be prepared that outlines best management practices (BMPs) for the management of storm water to minimize impacts to water quality, including those impacts associated with erosion and sediment transport. Anticipated BMPs that will be incorporated to minimize impacts are summarized below.

Erosion and Sediment Control

Erosion and sediment control BMPs will be used throughout implementation activities to reduce the potential for erosion and sedimentation. These BMPs will include placing straw waddles, silt fencing, and/or gravel bags around disturbance areas; energy dissipation devices at flow channels (e.g. rip rap); hydroseeding or otherwise stabilizing areas where vegetation is removed; and providing a stabilized entrance/exit to the site to clean vehicle wheels prior to exiting the construction areas. The Project will also adhere to the required project SWPPP or equivalent document that specifies BMPs for the purposes of controlling wet weather erosion.

Source Control

Implementation of the Project will also require the use of gasoline- and diesel-powered heavy equipment such as bulldozers, graders, backhoes, excavators, water pumps, dump trucks, and air compressors. Chemicals such as gasoline, diesel fuel, lubricating oil, hydraulic oil, lubricating grease, automatic transmission fluid, and other substances may be used during implementation. An accidental release of any of these pollutants could impact surface waters.

In addition to the erosion and sediment control BMPs discussed above, additional source control BMPs will be implemented during the construction phase of the Project to help minimize pollutant runoff to surface waters. Source control BMPs will include the following:

- employee training program,
- good housekeeping practices,
- preventive maintenance programs,
- equipment and vehicle management practices,
- spill prevention and response programs,
- inspection programs,
- trash abatement program,
- established parking and staging areas, and
- street sweeping (paved roads only where applicable).

Parking areas for construction personnel and staging and laydown areas for construction materials will be located inside the solar facility, with the exception of the gen-tie laydown that will be located at the southern end of the gen-tie line. Temporary containers with equipment will be placed in the staging and laydown areas. There may be a temporary project construction office on-site during the construction phase of the Project. Additionally, a small staging area for construction of the gen-tie line will occur outside of the solar facility and outside any desert tortoise fencing.

Site Design

The Project will also minimize impacts to the surrounding environment through measures incorporated into the site design during construction activities. Grading of the solar facility is proposed to remove existing vegetation, preserving the root mass where possible. Although general grading will occur as needed across the site, the general slopes of the topography will remain the same, and flows will be allowed to continue across the site along the same general contours and flow paths. Structures will be designed to handle the anticipated flow velocities and depths based on flow models presented in the Drainage Study (Burns and MacDonald 2018). It is expected that existing watercourses will reestablish their original channels after each storm. The site design approach and regular maintenance by the facility owner is expected to keep the incising within reestablished channels to a minimum.

Operations Phase

In addition to construction phase BMPs, the Project will require post-construction or operations phase BMPs to help minimize impacts to water quality and the surrounding area. Operations phase BMPs will include the following:

- employee training program,
- good housekeeping practices,
- preventive maintenance programs,
- equipment and vehicle management practices,
- spill prevention and response programs,
- inspection programs, and
- trash abatement program.

On-Site Retention

Construction of the Project will result in a small increase in storm water runoff. To avoid potential downstream and off-site impacts, increased runoff volume will be retained on-site. This will be achieved by incorporation of downstream retention basins per San Bernardino County standards for added storage capacity and dissipation to control flows and reduce flow velocity, thereby reducing erosion and sediment transport. The basins will be shallow and will be located within perimeter fencing (i.e., security and desert tortoise exclusion fencing) surrounding the solar facility. Additionally, the PV panels will be placed above the existing ground, allowing infiltration to occur beneath each panel. The panels are also within an effective height range (less than 30 feet) to assist in reducing splash erosion on the soil surface.

Revegetation

Construction of the Project will remove vegetation, resulting in higher velocity flows. Flow velocity will be slowed by reestablishing on-site vegetation. The Project area will be hydroseeded with a native seed mix, to be reviewed by the applicable agencies including the USFWS and CDFW, following project construction, to slow water flows through the site and maintain hydrologic conditions similar to pre-construction conditions.

Hazardous Substance Management

Hazardous materials may be used and stored at the solar facility; however, hazardous materials will not be used or stored along the gen-tie line. Hazardous materials spill kits will be maintained on-site for small spills. Hazardous materials will not be disposed of or released onto the ground, underlying groundwater, or any surface water. Totally enclosed containment will be provided for all trash. All construction waste, including trash, other solid waste, petroleum products, and other potentially hazardous materials will be removed to a hazardous waste facility permitted or otherwise authorized to treat, store, or dispose of such materials.

Weed Management

Vegetation at the solar facility may require occasional management. A vegetation management and weed abatement program will be implemented to control vegetation within work zones and access roads, and to minimize potential impacts from invasive plants. Based on the aridity of the area and the overall low densities of vegetation present, it is not likely that vegetation will encroach upon the solar facility in such a manner that access will be impaired. However, noxious weeds could create a fire hazard if allowed to become established, and invasive weeds could also become problematic from a biological perspective. Therefore, weed management will be implemented as needed to minimize the potential establishment of new weeds.

Weed management will include manual (hand), mechanical (mechanized equipment), and chemical (herbicide) control. Manual control of weeds will involve use of hand tools such as shovels or hoes. Mechanical control will primarily involve the use of line trimmers for mowing weeds where appropriate. Typically, mowing will only be used if weed species have flowered and it is too late to use herbicides. At

that point, mowing will be used to cut and remove vegetation before seeds are released into the environment.

Herbicides will be necessary to minimize the spread of invasive weeds following construction disturbance as part of an integrated weed management strategy. Herbicides used on the Project will be applied by a licensed applicator and consist of those approved by BLM and consulted on by the Service (BLM 2007; BLM 2016; USFWS 2015) and the State of California. Further, herbicides will be applied directly to the treatment area and broadcast treatment would not be used; therefore, application of herbicides will not affect tortoises if there are individuals that remain the surrounding area. Herbicides used along the gen-tie will not affect tortoises as individuals in the vicinity will have been translocated offsite.

Raven Management

The Permittee will implement measures to reduce the attraction of common ravens (hereafter raven) to the Permit Boundary. Specifically, the Permittee will reduce attraction of ravens by limiting food and water subsidies, perch sites, roost sites, and nest sites within the Permit Boundary. The Permittee will implement appropriate measures during implementation to control new food and water subsidies, perch sites, roost sites, and nest sites. Construction-phase impacts are considered more temporary in nature than operational impacts and will therefore require temporary management practices to avoid or minimize the potential to attract ravens. Construction-phase conditions of concern include long-term ponded water (created by open water storage areas such as equipment wash stations), creation of potential nest and roost sites, food and waste management, and food sources from soil disturbance (i.e., wildlife that is killed or injured during construction). Since the Project is located adjacent to the Mojave River and a water treatment facility, and no evaporation ponds are necessary for the Project, short-term ponded water (from panel washing and periodically filled stormwater retention basins) is not anticipated to attract ravens to the Project. Construction phase impacts will also be applicable to decommissioning and restoration phases of the Project. O&M-phase impacts are considered ongoing impacts and will therefore require ongoing management practices to avoid or minimize the potential to attract ravens. O&M-phase conditions of concern include perching, roosting and nesting sites, and food subsidy and waste management.

Since all resident desert tortoises are to be removed from the Project Area and translocated to a recipient site, the Permittee will not be required to contribute to the comprehensive Regional Raven Management and Monitoring Program (Raven Program) in the California Desert Conservation Area, which was established to address the regional threat that increased numbers of ravens pose to desert tortoise recovery efforts (USFWS 2010c). Although the Project may contribute to a regional increase in raven numbers post-construction, negative effects to desert tortoise within the Permit Boundary are unlikely due to the lack of individuals remaining on site following the translocation effort and the already low presence of desert tortoises in the Project Area.

Perching, Roosting, and Nesting Sites

If ravens are identified roosting or nesting on building materials, equipment, waste piles, or other construction debris, hazing may be employed as deemed necessary to limit habitual use of the Permit by the species.

To avoid introducing new subsidies after construction by minimizing the attractiveness of Project components, the Permittee may use physical bird deterrents such as, but not limited to, bird spikes, Bird-B-Gones, WhirlyBirds, and green lasers (operated by trained personnel to target problem ravens). If ravens are observed constructing a nest on a Project component, the Permittee will contact the CDFW and USFWS to assist with nest removal if deemed necessary.

Ponded Water

To minimize the occurrence of ponding water from Project activities during construction, the application rates of water for dust suppression activities will be predetermined to minimize excessive application. The application rate will consider soil infiltration and evaporation rates. The site will be patrolled to ensure water does not puddle for long periods (more than 1 day) and recommendations will be made for reduced water application rates where necessary. Any fill stations or equipment wash stations will be designed to prevent water from ponding longer than one day. If equipment wash-out stations contain water at the end of the day, they may need to be covered or enclosed to prevent access by ravens.

Food Subsidies and Waste Management

A trash abatement program will be established throughout Project implementation. Trash and food items will be contained in closed, secured containers and removed at least weekly to reduce the attractiveness to opportunistic predators such as ravens. The construction site and access roads will be monitored to expedite proper disposal of roadkill. In addition, a Worker Environmental Awareness Plan (WEAP) will assist in verifying that no trash or roadkill is available that might attract desert tortoise predators.

To minimize attraction of ravens to the Project, dead or injured wildlife found during Project implementation (within the Project and access routes) will be removed and disposed of or taken to a rehabilitation facility. Removal of dead and injured wildlife will be conducted in accordance with the requirements of any applicable permits and plans.

APPENDIX C

Biological Survey Results of the Gen-Tie Laydown Yard

BIOLOGICAL RECONNAISSANCE SURVEY RESULTS OF LAYDOWN YARD

In November 2018, a laydown yard for the Interconnection Facilities was added to the project design after the Comprehensive Biological Technical Report had been completed. The results of the biological reconnaissance survey of the laydown yard are presented in this section.

The proposed laydown yard is 11.43 acres in size and located between the High Desert Power Plant and a taxi way belonging to SCLA (Figure 2). A reconnaissance-level survey was conducted by biologists experienced in conducting surveys for and identifying sensitive biological resources in the Mojave Desert. ECORP biologists Lauren Simpson and Torrey Rotellini conducted the survey on November 14, 2018. The survey was conducted outside of the protocol survey periods for desert tortoise, MGS, and burrowing owl; however, the biologists documented sign of these species if present. The survey was conducted between 0800 and 1015, and weather conditions during the survey were mild, with temperatures ranging from 44 to 59 degrees Fahrenheit, calm winds, and 15- to 30-percent cloud cover.

The proposed laydown yard contained flat, undeveloped terrain. Detention basins are located east of the proposed laydown yard and north of the proposed access route to the laydown yard. Vegetation communities and land cover types present were disturbed rabbitbrush scrub, disturbed, and developed. Rabbitbrush scrub typically occurs in well-drained soils at elevations ranging from 0 to 10,500 feet above msl. This community comprises shrubs of less than 9 feet tall with a canopy that is open to continuous and a sparsely vegetated or grassy understory. Dominant shrubs identified in the disturbed rabbitbrush scrub community within the proposed laydown yard were rabbitbrush (*Ericameria nauseosa*), buckwheat (*Eriogonum* sp.), creosote bush (*Larrea tridentata*), and Russian thistle (*Salsola tragus*). Dirt roads, trash dumping, and evidence of human-related disturbances were present throughout the site. A drainage was present in the laydown yard; however, details about location and project-related impacts to this feature will be presented under a separate cover (ECORP 2018b).

Suitable habitat for burrowing owl and desert kit fox was present within the proposed laydown yard area. The laydown yard area does not provide suitable habitat for desert tortoise or MGS due to its isolated location from contiguous habitat in the area. Furthermore, the level of disturbance at the laydown yard likely precludes desert tortoise and MGS from occurring there. No Joshua trees or special-status plant or wildlife species were observed during the survey. One potential burrowing owl burrow (suitable size and shape but not containing any sign of use by burrowing owl) was identified in the northern portion of the proposed laydown yard and another was located northeast of that location along the eastern boundary of the laydown yard. Two other potential burrowing owl burrows were located just outside of the proposed laydown yard boundaries. One known desert kit fox burrow complex consisting of two burrow entrances were present along the berm of a detention basin located east of the laydown yard boundary and contained old desert kit fox scat. These burrows were also found to be suitable for burrowing owl and were classified as potential burrowing owl burrows.

Figure 2. Gen-Tie Laydown Yard Survey Results

Map Features

Gen-tie Laydown Area and Access Road

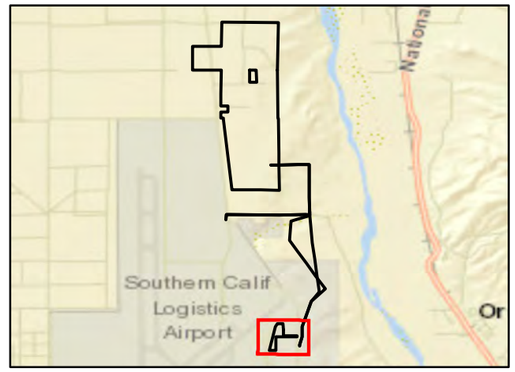
Burrowing Owl Results

Potential Burrow (No Sign)

Desert Kit Fox

Known Den

Service Layer Credits: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, © OpenStreetMap contributors, and the GIS User Community



ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS

Location: N:\2017\2017-062.001 Victorville Solar Project\MAPS\sss_survey_and_mapping\BUOW\VSP_BUOW_Results_Laydown_V1.mxd (MAG) -mguidry 12/3/2018

2017-062 Victorville Solar Project

Scale in Feet
0 100 200

Photo Source: NAIP 2016

Map Date: 12/3/2018

APPENDIX D

Desert Tortoise Density and Abundance Estimates

DESERT TORTOISE DENSITY AND ABUNDANCE ESTIMATES

USFWS 2018 Methods

Due to the minimal amount and linear nature of impact areas associated within the Interconnection Facilities and Access Roads, and in consultation with the USFWS, desert tortoise density and abundance calculations were only based on the impact area associated with the Solar Field Area. The survey results associated with the Interconnection Facilities and Access Roads were not included because tortoises move around too much in those small areas to complete a valid estimate, however a brief discussion of both project components is included below. Following the USFWS methods described in *Preparing for Any Action that May Occur within the Range of the Mojave Desert Tortoise* (USFWS 2018), tortoise abundance estimates were calculated for the Solar Field Area. Table 2, taken directly from the 2018 USFWS Desert Tortoise Pre-Project Survey Guidance, has been filled out for the Solar Field Area and is included as Attachment 1 for additional information, but the equation below calculates the estimate.

Two desert tortoises larger than 180-millimeter (mm) mid-carapace length (MCL) were observed during the protocol surveys in the Solar Field Area during two different survey periods. The probability that a desert tortoise is visible (P_a) relative to the previous winter's rainfall is 0.85 because there was 1.61 inches (41mm) of rainfall at the Victorville weather station (Western Regional Climate Center) between October 2017 and March 2018. The probability of detecting a tortoise if it is visible (P_d) is 0.63. At the time of the survey, the action area included a 300-foot buffer surrounding the footprint of the Solar Field Area. 100 percent of the action area (764 acres) was surveyed. Based on the calculation below, 3.7 desert tortoises larger than 180mm are estimated within the action area associated with the Solar Field Area, giving a density estimate of 1.2 tortoises per square kilometer (km^2) in the surveyed area. Within the project footprint of the Solar Field Area (excluding the 300-foot survey buffer), 2.8 desert tortoises larger than 180mm were estimated (Attachment 1). Table 2 from the 2018 USFWS Desert Tortoise Pre-Project Survey Guidance uses the average density of the West Mojave Recovery Unit from USFWS 2015.

$$\text{3.7 tortoises estimated within action area} = \frac{\text{(2 desert tortoises >180mm MCL)}}{[0.850\ (P_a)]} \quad \frac{\text{(764-acre action area)}}{[0.63\ (P_d)]\ \text{(764 acres surveyed)}}$$

Turner et al. (1987) determined that desert tortoises smaller than 180mm comprised approximately 87 percent of a population of desert tortoises. To determine the number of non-hatchlings smaller than 180mm, the estimated number of adult tortoises is multiplied by 5.2 (the annual population multiplier; USFWS 2017). In the Solar Field Area action area, it is estimated that there are 19.3 (3.7x5.2) tortoises smaller than 180mm, which brings the total estimate to 23 desert tortoises. In the Solar Field Area project footprint, 14.8 (2.8x5.2) tortoises smaller than 180mm are estimated to occur, which brings the total estimate to nearly 18 desert tortoises within the Solar Field Area footprint.

For discussion purposes, the same number of tortoises larger than 180mm (2) were observed during protocol surveys within the Interconnection Facilities and Access Roads Project Components. Although the USFWS stated that those Project Components and survey areas are too small from which to obtain a valid estimate, the equation used for the Solar Field Area would result in the same estimate of tortoises larger and smaller than 180mm because 100 percent of the action area (212 acres, comprising the

footprint of the Interconnection Facilities and Access Roads plus a 300-foot buffer) was surveyed even though the project footprint is approximately 41 acres. In the Interconnection Facilities and Access Roads action area, it is estimated that there are 19.3 (3.7x5.2) tortoises smaller than 180mm, which brings the total estimate to 23 desert tortoises. However, because the Interconnection Facilities and Access Roads project footprint is much smaller, 0.7 desert tortoises larger than 180mm are estimated and 3.6 (0.7x5.2) tortoises smaller than 180mm are estimated, which brings the total estimate to 4 desert tortoises within the actual footprint of the Interconnection Facilities and Access Roads. In summary, if the Project Components are combined (which the USFWS has not requested), 46 desert tortoises are estimated in the action area and 22 desert tortoises are estimated in the project footprint. Table 2, taken directly from the 2018 USFWS Desert Tortoise Pre-Project Survey Guidance, has been filled out for the Interconnection Facilities and Access Roads and is included as Attachment 2 for additional information.

Alternative Density Estimates

For discussion purposes, desert tortoise density estimates from the Desert Tortoise Recovery Office's annual range-wide line distance monitoring surveys were used to calculate the number of tortoises potentially within each Project Component based on amount of suitable habitat in the project footprint. The nearest study stratum to the project that contains similar habitat is the Fremont-Kramer Stratum of the West Mojave Recovery Unit. Estimated densities from the three most recent survey years, 2014, 2015, and 2017 (Fremont-Kramer was not surveyed in 2016) were averaged and are shown in Table D-1 (USFWS 2015, 2016, 2018).

Table D-1. Western Mojave Recovery Unity/Fremont-Kramer Stratum Desert Tortoise Density Calculations (for tortoises of MCL ≥180mm)

Year	Area (km2)	Number of tortoises	Density (number of tortoises per km2)
2014	2,417	11,359.9	4.7
2015	2,417	10,876.5	4.5
2017	2,417	9,909.7	4.1
Average	*2,417*	*10,715.37*	*4.43*

*Fremont-Kramer Stratum was not surveyed in 2016.

Tortoise density calculations for the Project Components using the averaged estimated density in the Fremont Kramer Stratum are presented below.

Solar Field Area: A total of 547.23 acres of desert tortoise habitat exists in this Project Component.

$$\frac{\text{X desert tortoises in footprint}}{\text{4.43 desert tortoises on 1 km}^2} = \frac{\text{547.23 acres in footprint}}{\text{247 acres in 1 km}^2} = \text{9.81 desert tortoises larger than 180mm}$$

This was rounded to 10 desert tortoises larger than 180mm (7 inches [in]) in the Solar Field Area.

Turner et al. (1987) determined that desert tortoises smaller than 180mm comprised approximately 87 percent of a population of desert tortoises. To account for desert tortoises smaller than 180mm, the following equation was applied:

$$\frac{\text{10 desert tortoises > 180mm in footprint}}{\text{X total desert tortoises in footprint}} = \frac{\text{13\% of total}}{\text{100\%}} = \text{76.92 desert tortoises smaller than 180mm}$$

This was rounded to 77 desert tortoises smaller than 180mm in the Solar Field Area.

A total of 87 desert tortoises are estimated to occur within the Solar Field Area.

Interconnection Facilities and Access Roads: A total of 20.52 acres of desert tortoise habitat exists in these Project Components.

$$\frac{\text{X desert tortoises in footprint}}{\text{4.43 desert tortoises on 1 km}^2} = \frac{\text{20.52 acres in footprint}}{\text{247 acres in 1 km}^2} = \text{0.37 desert tortoise larger than 180mm}$$

This was rounded to 1 desert tortoise larger than 180mm in the Interconnection Facilities and Access Roads.

$$\frac{\text{1 desert tortoise > 180mm in footprint}}{\text{X total desert tortoises in footprint}} = \frac{\text{13\% of total}}{\text{100\%}} = \text{7.69 desert tortoises smaller than 180mm}$$

This was rounded to 8 desert tortoises smaller than 180mm in the Interconnection Facilities and Access Roads.

A total of 9 desert tortoises are estimated to occur within the Interconnection Facilities and Access Roads.

In summary, if the Project Components are combined, 96 desert tortoises are estimated to occur in the project footprint.

Attachment 1. Solar Field Area Calculations

Table 2. USFWS Desert Tortoise Pre-Project Survey Guidance

What is the estimated number of tortoises in the action area and project footprint?

INSTRUCTIONS ***Use this tab when your transects were of differing lengths.***

Enter the appropriate values from the survey into the yellow cells below. The number of tortoises for the action area and project footprint will be calculated.

	Action area	Project footprint
N =	3.7	2.8
Lower 95%CI =	1.21	0.92
Upper 95%CI =	11.50	8.75
Number of hatchlings (young-of-year) =	4.9	3.7
Number of tortoises < 180 mm MCL, not young-of-year =	19.4	14.8
Total action area (acres)	764	581
D (tortoises/km^2) in surveyed area =	1.209	
Average density in Recovery Unit =	2.8	
Probability that a tortoise is visible given winter rainfall (Pa in Table 1) =	0.850	
var(Pa) (from Table 1) =	0.002	
Probability of detecting a tortoise, if visible (Pd) =	0.630	
var(Pd) =	0.010	
var(n) (assume various transect lengths)	1.447	
var(D)	0.569	
C for N	3.078	
Project/site name	High Desert Solar (Solar Field Area)	
Desert tortoise Recovery Unit	West Mojave	
Survey start date	April 6, 2017	
Survey end date	October 9, 2018	
Pre-survey Oct-March rainfall (mm)	41	
Total length of transects walked (km) =	309	
Number of transects walked =	142	
Number of tortoises found during surveys (n) =	2	

Transects of various lengths			
Transect	**Length (km)**	**Tortoises within 5m of centerline**	
1	0.272	0	
2	0.489	0	
3	0.52	0	
4	0.541	0	
5	0.557	0	
6	0.569	0	
7	0.578	0	
8	0.584	0	
9	0.587	0	
10	0.589	0	
11	0.589	0	
12	0.589	0	
13	0.589	0	
14	0.589	0	
15	0.589	0	
16	0.589	0	
17	0.589	0	
18	0.589	0	
19	0.589	0	
20	0.589	0	
21	0.589	0	
22	0.589	0	
23	0.589	0	
24	0.589	0	
25	0.589	0	
26	0.589	0	
27	0.589	0	
28	0.589	0	
29	0.589	0	
30	0.589	0	
31	0.589	0	
32	0.589	0	
33	0.589	0	
34	0.589	0	
35	0.589	0	
36	0.589	0	
37	0.589	0	
38	0.589	0	
39	0.589	0	
40	0.589	0	
41	0.589	0	
42	0.814	0	
43	1.358	0	
44	1.655	0	
45	1.741	0	
46	1.773	0	
47	1.792	0	
48	1.843	0	
49	1.943	0	
50	2.042	0	
51	2.140	0	
52	2.236	0	

Transects of various lengths			
Transect	**Length (km)**	**Tortoises within 5m of centerline**	
53	2.332	0	
54	2.427	0	
55	2.522	0	
56	2.535	0	
57	2.617	0	
58	2.712	0	
59	2.807	0	
60	2.902	0	
61	2.962	0	
62	2.964	0	
63	2.965	0	
64	2.965	0	
65	2.965	0	
66	2.965	0	
67	2.965	0	
68	2.965	0	
69	2.965	0	
70	2.965	0	
71	2.965	0	
72	2.966	1	
73	2.966	1	
74	2.966	0	
75	2.966	0	
76	2.966	0	
77	2.966	0	
78	2.966	0	
79	2.966	0	
80	2.966	0	
81	2.966	0	
82	2.966	0	
83	2.966	0	
84	2.966	0	
85	2.966	0	
86	2.966	0	
87	2.966	0	
88	2.966	0	
89	2.966	0	
90	2.966	0	
91	2.966	0	
92	2.966	0	
93	2.966	0	
94	2.966	0	
95	2.966	0	
96	2.966	0	
97	2.966	0	
98	2.966	0	
99	2.966	0	
100	2.966	0	
101	2.966	0	
102	2.966	0	
103	2.966	0	
104	2.966	0	

Transects of various lengths			
Transect	**Length (km)**	**Tortoises within 5m of centerline**	
105	2.966	0	
106	2.966	0	
107	2.966	0	
108	2.966	0	
109	2.966	0	
110	2.966	0	
111	2.966	0	
112	2.966	0	
113	2.966	0	
114	2.966	0	
115	2.966	0	
116	2.989	0	
117	3.001	0	
118	3.005	0	
119	3.014	0	
120	3.022	0	
121	3.027	0	
122	3.035	0	
123	3.037	0	
124	3.044	0	
125	3.044	0	
126	3.050	0	
127	3.050	0	
128	3.054	0	
129	3.056	0	
130	3.058	0	
131	3.058	0	
132	3.058	0	
133	3.058	0	
134	3.058	0	
135	3.058	0	
136	3.058	0	
137	3.058	0	
138	3.058	0	
139	3.058	0	
140	3.058	0	
141	3.058	0	
142	3.058	0	

Attachment 2. Interconnection Facilities and Access Roads Calculations

Table 2. USFWS Desert Tortoise Pre-Project Survey Guidance

What is the estimated number of tortoises in the action area and project footprint?

INSTRUCTIONS ***Use this tab when your transects were of differing lengths.***

Enter the appropriate values from the survey into the yellow cells below. The number of tortoises for the action area and project footprint will be calculated.

	Action area	Project footprint
N =	3.7	0.7
Lower 95%CI =	1.08	0.21
Upper 95%CI =	12.81	2.46
Number of hatchlings (young-of-year) =	4.8	0.9
Number of tortoises < 180 mm MCL, not young-of-year =	19.4	3.7
Total action area (acres)	212	41
D (tortoises/km^2) in surveyed area =	4.352	
Average density in Recovery Unit =	2.8	
Probability that a tortoise is visible given winter rainfall (Pa in Table 1) =	0.850	
var(Pa) (from Table 1) =	0.002	
Probability of detecting a tortoise, if visible (Pd) =	0.630	
var(Pd) =	0.010	
var(n) (assume various transect lengths)	1.836	
var(D)	9.226	
C for N	3.437	
Project/site name	High Desert Solar (Interconn. Facilities and Roads)	
Desert tortoise Recovery Unit	West Mojave	
Survey start date	April 6, 2017	
Survey end date	October 9, 2018	
Pre-survey Oct-March rainfall (mm)	41	
Total length of transects walked (km) =	86	
Number of transects walked =	145	
Number of tortoises found during surveys (n) =	2	

Transects of various lengths			
Transect	**Length (km)**	**Tortoises within 5m of centerline**	
1	0.095	0	
2	0.116	0	
3	0.157	0	
4	0.176	0	
5	0.183	0	
6	0.183	0	
7	0.183	0	
8	0.183	0	
9	0.183	0	
10	0.183	0	
11	0.183	0	
12	0.183	0	
13	0.183	0	
14	0.183	0	
15	0.183	0	
16	0.183	0	
17	0.183	0	
18	0.183	0	
19	0.183	0	
20	0.183	0	
21	0.183	0	
22	0.183	0	
23	0.183	0	
24	0.183	0	
25	0.183	0	
26	0.183	0	
27	0.183	0	
28	0.183	0	
29	0.183	0	
30	0.183	0	
31	0.183	0	
32	0.183	0	
33	0.183	0	
34	0.183	0	
35	0.183	0	
36	0.183	0	
37	0.183	0	
38	0.183	0	
39	0.183	0	
40	0.183	0	
41	0.183	0	
42	0.183	0	
43	0.183	0	
44	0.183	0	
45	0.183	0	
46	0.183	0	
47	0.183	0	
48	0.183	0	
49	0.183	0	
50	0.183	0	
51	0.183	0	
52	0.183	0	

Transects of various lengths			
Transect	**Length (km)**	**Tortoises within 5m of centerline**	
53	0.183	0	
54	0.183	0	
55	0.183	0	
56	0.183	0	
57	0.183	0	
58	0.183	0	
59	0.183	0	
60	0.183	0	
61	0.183	0	
62	0.188	0	
63	0.189	0	
64	0.197	0	
65	0.203	0	
66	0.208	0	
67	0.211	0	
68	0.213	0	
69	0.214	0	
70	0.214	0	
71	0.214	0	
72	0.214	0	
73	0.214	0	
74	0.215	0	
75	0.215	0	
76	0.215	0	
77	0.215	0	
78	0.232	0	
79	0.271	0	
80	0.308	0	
81	0.343	0	
82	0.364	0	
83	0.376	0	
84	0.409	0	
85	0.442	0	
86	0.462	0	
87	0.473	0	
88	0.496	0	
89	0.501	0	
90	0.528	0	
91	0.551	0	
92	0.556	0	
93	0.584	0	
94	0.611	0	
95	0.64	0	
96	0.673	0	
97	0.682	0	
98	0.683	0	
99	0.683	0	
100	0.69	0	
101	0.706	0	
102	0.745	0	
103	0.76	0	
104	0.766	0	

Transects of various lengths			
Transect	**Length (km)**	**Tortoises within 5m of centerline**	
105	0.768	0	
106	0.768	0	
107	0.771	0	
108	0.771	0	
109	0.783	0	
110	0.8	0	
111	0.815	0	
112	0.829	0	
113	0.841	0	
114	0.854	0	
115	0.866	0	
116	0.879	0	
117	0.892	0	
118	0.902	0	
119	0.913	0	
120	0.95	0	
121	0.957	0	
122	0.985	0	
123	1.232	0	
124	1.254	0	
125	1.266	0	
126	1.274	2	
127	1.393	0	
128	1.585	0	
129	1.647	0	
130	1.672	0	
131	1.695	0	
132	1.913	0	
133	1.988	0	
134	2.006	0	
135	2.018	0	
136	2.029	0	
137	2.041	0	
138	2.051	0	
139	2.061	0	
140	2.069	0	
141	2.076	0	
142	**2.082**	**0**	
143	**2.086**	**0**	
144	**2.093**	**0**	
145	**2.093**	**0**	