Presence/Absence Survey for the Desert Tortoise *(Gopherus agassizii),* on the proposed Silver State Solar Project in Ivanpah Valley, Clark County, Nevada

October 2009

Prepared for:

CH2M HILL, Inc.

2485 Natomas Park Drive, Suite 600

Sacramento, California 95833

Prepared by:

Sundance Biology, Inc.

179 Niblick Rd. PMB 272

Paso Robles, CA 93446

Mercy Vaughn • (928) 380-5507 • manydogs10@aol.com

Stephen Boland • (928) 380-8850 • spboland@aol.com

EXECUTIVE SUMMARY

As recommended in the US Fish and Wildlife Service (USFWS) *Survey Protocol for any Non-Federal Action that may Occur within the Range of the Desert Tortoise, January 1992,* a desert tortoise *(Gopherus agassizii)* presence or absence survey was conducted on the Nextlight Renewable Power, LLC proposed Silver State Solar Project site in Ivanpah Valley, Clark County, Nevada. The solar site was surveyed for presence of desert tortoise using a modified TRED sampling configuration consisting of three 1.5-mile transects per square mile. Sections 1-3, 9-12, 14-16, 22, 23, and 26 or portions thereof were surveyed in October 2008. Sections 4, 5, 13, 24, and 25 or portions thereof were surveyed in August 2009. One live tortoise in a soil burrow was observed within the proposed project boundary in the southeast ¼ of Section 11 in 2008. Three live tortoises in two cover sites were observed within the proposed project boundary in the northwest ¼ of Section 25 in 2009. Desert tortoise sign was observed in all Sections comprising the proposed solar site except Section 12. Between the two surveys all size/age classes were represented in the recent tortoise sign observed, one indicator of a healthy population. Reproduction appears to be occurring as well.

Calibration transects were not conducted for this project. Based on old calibration values for over 1,000 transects conducted throughout the west and east Mojave Desert between 1990 through the present, tortoise density estimates for the proposed project area are approximately 20 or fewer tortoises per square mile in Sections 1, 2, 11, 12, 13, 14, 23, 24, and 26; and 20 to 50 tortoises per square mile in Sections 3, 4, 5, 10, 15, 16, 22, and 25.

Suitable habitat for translocation can be found immediately adjacent to the proposed project site to the north, east, and west. If tortoises are moved immediately adjacent to the project site, corridors through the project site in undeveloped areas should be left open to allow for movement from lower bajada to the mountains to allow increased foraging opportunities along the slope of the bajada and increased interaction opportunities between tortoises.

TABLE OF CONTENTS

EXECUTIVE SUMMARY ii

INTRODUCTION 4

METHODOLOGY 4

SURVEY METHODOLOGY 4

DATA RECORDED 4

BIOLOGICAL FIELD TEAM 4

RESULTS 5

SURVEY AREA 5

DESERT TORTOISE 5

DISCUSSION 6

DESERT TORTOISE 6

TABLES

1. Dominant Plant Species 7
2. Desert Tortoise and Sign Locations 8
3. Mammal Species 13
4. Reptile Species 13
5. Bird Species 13

FIGURES

1. Proposed Location of the Silver State Solar Project Site in Ivanpah Valley, NV.
2. Desert Tortoise 2008 and 2009 Survey Area and Sign Encountered on the Proposed Silver State Solar Project Site in Ivanpah Valley, NV.
3. Area Photos and Tortoise Sign Photos on the Proposed Silver State Solar Project Site In Ivanpah Valley, NV.

INTRODUCTION

This report presents the results of a presence/absence survey for the desert tortoise on the proposed Silver State Solar Project in Ivanpah Valley, Clark County, Nevada. The purpose of this study was to estimate the desert tortoise population densities on the proposed site.

The proposed project is located approximately 4 miles east of Primm, Nevada (Figure 1). The project will be constructed in 2- to 5-MW blocks that will begin generating power as soon as the project substation is completed. In addition to the PV panels, on site facilities and equipment include the operations and maintenance facility, access road, transmission lines, and switchyards. The survey area includes Sections 1-3, 9-11, 14-16, 22, 23, and 26 or portions thereof that were surveyed in October 2008; and Sections 4, 5, 13, 24, and 25 or portions thereof that were surveyed in August 2009. All Sections are within T27S, R59E Mount Diablo Base and Meridian, (Desert, CA-NV and Roach, NV quadrangles, 7.5-minute series). The elevation of the survey area is between 2,600 to 3,500 feet above mean sea level.

METHODOLOGY

SURVEY METHODOLOGY

Two experienced desert tortoise biologists conducted 13 modified TRED sampling configurations for a total of 39 transects in 2008 and 5 modified TRED sampling configurations for a total of 13 transects in 2009, each 1.5 miles in length and 30 feet wide. These were conducted over approximately 15 square miles on the proposed solar site. Calibration transects were not conducted. This was a modified TRED methodology using three transects per square mile instead of four transects per square kilometer. Additionally, Section 5 is bisected by Interstate 15, which necessitated that the transect shape be modified to fit in the available habitat. Transects were conducted on October 20-31, 2008 and August 26-28, 2009.

All transect routes were generated prior to conducting the field work and uploaded into a Lowrance iFinder handheld global positioning system (GPS) unit. The GPS unit was used to navigate transects.

DATA RECORDED

Any tortoise or large mammal burrows encountered that could potentially be used by tortoises were visually inspected. Very small burrows that could be potentially used by juvenile tortoises but are much more often rodent burrows were also visually checked when encountered. Also, scat, tracks, drinking depressions, and shell-skeletal remains of desert tortoises were recorded. Only definitive tortoise sign was recorded. All other plant and wildlife species encountered were noted.

BIOLOGICAL FIELD TEAM

Site assessment, transect planning, and field work were conducted by Mercy Vaughn and Stephen Boland. Each has conducted over 1,000 triangle transects throughout the Mojave Desert since 1990.

RESULTS

SURVEY AREA

The survey area ranged in elevation from 2,600 feet on the northwestern corner to 3,500 feet on the southeastern edge, and is characterized by creosote-bursage desert scrub. Plant species diversity was generally very high.

The geomorphology of the survey area ranges from playa and lower bajada in the northwestern portion of the site with predominantly clay and sandy loam soils respectively to upper bajada in the southeastern portion of the site with predominantly sandy loam to gravel-cobble soil. Steep rocky slopes are found on the eastern edge of Section 25 where the bajada ends and the Lucy Gray Mountains begin.

Human impacts throughout the survey area are generally low. Impacts observed include a dirt road through Sections 3, 10, 11, 12, and 13. This road is a desert race track up the bajada and through the Lucy Gray Mountains to the east. Sections 4 and 5 have numerous dirt roads, some associated with power transmission lines, with moderate levels of off-highway-vehicle tracks as well as Interstate 15 in Section 5. A power plant is located in Sections 9 and 10 with power transmission lines and associated roads in Sections 3-5, 9, 10, and 16. Trash throughout was negligible.

The condition of the desert scrub is very good. Plants seen on the site are shown in Table 1. Dominant perennials include creosote bush, (*Larrea tridentata*), white bursage (*Ambrosia dumosa*), and Mohave yucca (*Yucca schidigera*). Annual vegetation production was moderate due to recent monsoonal rains.

Desert tortoise sign observed is listed in Table 2 and shown in Figure 2. Plants identified in the survey area are listed in Table 1. Wildlife sightings are listed in Tables 3 through 5.

DESERT TORTOISE

Four live adult tortoises were observed on site. One desert tortoise was observed inside a soil burrow in Section 11 in 2008. In 2009, three live adult desert tortoises were observed in Section 25. Two tortoises were in one caliche cave approximately two feet inside and the other was in a soil burrow approximately two feet inside (Figure 3). Nine sets of tortoise tracks were observed associated with burrows. A tenth set was observed in a sandy area that looked to be a mating ring. An eleventh set of tortoise tracks was observed in Section 11 in a wash. Eight drinking depressions were observed, three onsite within ½ mile of the state border and one just south of the state border. One drinking depression was observed in Section 2, one in Section 13, and two in Section 25.

Eighteen shell-skeletal remains were observed onsite. Time since death for seven of the remains was greater than 4 years, 2-4 years for eight others, 1-2 years for an immature and a subadult, and < 1 year for one adult observed during the 2008 survey. Remains were observed throughout the study area. The adult female observed during the 2008 survey in Section 11 had been marked from a previous study in the area. Notches were observed on the 1st, 3rd, and 9th right marginal scutes; and on the 1st and 9th left marginal scutes. A faded epoxied tag was on the 2nd right costal scute but was unreadable.

Ninety-five desert tortoise cover sites were identified in the survey area. These comprised eighty-one soil burrows, eight caliche caves, four pallets, and two rock shelters. Four of the soil burrows appeared old while the remainder of the cover sites appeared to have been more recently used. All of the cover sites were adult size class except for two subadult, one immature size class, and two juvenile size class. Cover sites were observed throughout the site. The rock shelters were observed on the steep slopes in the eastern portion of Section 25 indicating that the tortoises are using the hills to some extent. Most of the burrows recorded were in good condition, indicating some use in the years they were observed.

Twenty-eight independent scat events were identified not including those associated with cover sites. Twenty of these were laid down within the year they were observed. The scat was observed throughout the survey area.

DISCUSSION

DESERT TORTOISE

The proposed Silver State Solar Project site lies well within the desert tortoise's geographic range. Recent tortoise sign was observed throughout the site. All size classes were represented in the tortoise sign observed including two juvenile burrows and four live adult tortoises. Based on the amount of tortoise sign, this site supports a moderate density tortoise population.

Calibration transects were not conducted for this project. Based on old calibration values for over 1000 transects conducted by Stephen Boland and Mercy Vaughn throughout the west and east Mojave Desert between 1990 through the present, tortoise density estimates for the proposed project area are as follows:

TORTOISES PER SQ. MI	SECTION																	
	1	2	3	4	5	9	10	11	12	13	14	15	16	22	23	24	25	26
≤ 20	•	•				•	•	•	•	•	•				•	•	•	•
20-50			•	•	•							•	•	•				

The proposed Silver State Solar Project would have both direct and indirect impacts on desert tortoises on the site and tortoises in the area. Since tortoises use the site, indirect impacts would occur through loss of habitat. Direct impacts could occur during construction if a tortoise wanders onto the site and is either injured or killed.

In addition to loss of habitat, the tortoises located onsite would have to be translocated to an appropriate area out of the construction area. In doing so, both the translocated tortoises as well as the tortoises located on the recipient site will be affected. This effect could be minimized by translocation within the current home range of tortoises cleared from the developed areas on-site. The long-term use of the site may pose a risk to any tortoises wandering into the area if permanent tortoise-proof fencing is not installed and maintained.

TABLE 1. DOMINANT PLANT SPECIES	
Latin Name	**Common name**
ASTERACEAE	**Composite Family**
Ambrosia dumosa	White bursage
Bebbia juncea	Sweetbush
Encelia farinosa	Brittlebush
Ericameria linearifolia	Interior goldenbush
Hymenoclea salsola	Cheesebush
Lasthenia californica	California goldfields
Stephanomeria pauciflora	Wire lettuce
Xylorhiza tortifolia	Mojave aster
BRASSICACEAE	**Mustard Family**
Lepidium fremontii	Desert alyssum
CACTACEAE	**Cactus Family**
Echinocactus polycephalus	Cottontop cactus
Echinocerus engelmannii	Hedgehog cactus
Escobaria vivipara	Beehive cactus
Ferocactus cylindraceus	California barrel cactus
Opuntia basilaris	Beavertail cactus
Cylindropuntia acanthocarpa	Buckhorn cholla
Cylindropuntia echinocarpa	Golden cholla
Cylindropuntia ramosissima	Diamond cholla
CHENOPODIACEAE	**Goosefoot Family**
Atriplex confertifolia	Shadscale saltbush
Atriplex polycarpa	Allscale saltbush
Grayia spinosa	Spiny hop-sage
Krascheninnikovia lanata	Winter Fat
Suaeda moquinii	Ink-blite
CUCURBITACEAE	**Gourd Family**
Cucurbita palmata	Coyote melon
EPHEDRACEAE	**Ephedra Family**
Ephedra californica	California joint-fir
Ephedra nevadensis	Nevada joint-fir
EUPHORBIACEAE	**Spurge Family**
Chamaesyce albomarginata	Rattlesnake weed
FABACEAE	**Legume Family**
Acacia greggii	Catclaw
Lotus strigosus	Stiff-haired lotus
KRAMERIACEAE	**Rhatany Family**
Krameria grayi	White rhatany

TABLE 1. DOMINANT PLANT SPECIES	
LAMIACEAE	**Mint Family**
Salazaria mexicana	Bladder sage
LILIACEAE	**Lily Family**
Yucca schidigera	Mohave yucca
MALVACEAE	**Mallow Family**
Sphaeralcea ambigua	Desert globemallow
OLEACEAE	**Olive Family**
Menodora spinescens	Spiny menodora
POACEAE	**Grass Family**
Acnatherum hymenoides	Indian Ricegrass
Achnatherum speciosum	Needle grass
Erioneuron pulchellum	Fluffgrass
Pleuraphis rigida	Big galleta
POLYGONACEAE	**Buckwheat Family**
Chorizanthe rigida	Rigid spiny herb
Eriogonum fasciculatum	California buckwheat
Eriogonum inflatum	Desert trumpet
SOLANACEAE	**Nightshade Family**
Lycium cooperi	Peach-thorn
Physalis crassifolia	Thick-leaved ground-cherry
ZYGOPHYLLACEAE	**Caltrop Family**
Larrea tridentata	Creosote

TABLE 2. DESERT TORTOISE AND SIGN LOCATIONS				
TORTOISE SIGN	CLASS	EASTING	NORTHING	COMMENTS
Cover site	Adult	650982	3939579	Caliche cave
Cover site	Adult	650892	3937265	Caliche cave
Cover site	Adult	650687	3937272	Caliche cave, with scat
Cover site	Adult	650252	3940659	Caliche cave
Cover site	Adult	652169	3940216	3 scat in caliche cave
Cover site	Adult	652925	3938696	Caliche cave
Cover site	Adult	651965	3938504	Caliche cave
Cover site	Adult	652340	3937633	2 adult tortoises in caliche cave
Cover site	Adult	650749	3942849	With tracks
Cover site	Adult	650354	3944371	
Cover site	Adult	650457	3944253	
Cover site	Adult	652633	3943145	Two burrows
Cover site	Adult	650014	3943798	
Cover site	Adult	650054	3943668	

TABLE 2. DESERT TORTOISE AND SIGN LOCATIONS				
TORTOISE SIGN	CLASS	EASTING	NORTHING	COMMENTS
Cover site	Adult	650148	3943517	
Cover site	Adult	650421	3943113	
Cover site	Adult	650893	3944500	With tracks
Cover site	Adult	649685	3944318	
Cover site	Adult	649679	3944327	Two burrows
Cover site	Adult	649177	3944595	
Cover site	Adult	649185	3944554	
Cover site	Adult	649200	3943492	
Cover site	Adult	649209	3943429	
Cover site	Adult	649595	3943228	Next to road
Cover site	Adult	648485	3944041	
Cover site	Adult	650931	3940564	Under Yucca
Cover site	Adult	650925	3940322	With tracks
Cover site	Adult	651001	3938930	
Cover site	Adult	650269	3937075	
Cover site	Adult	650846	3937059	Pallet
Cover site	Adult	650502	3938620	Two burrows
Cover site	Adult	651656	3939271	With scat
Cover site	Adult	651056	3938887	With tracks
Cover site	Adult	651384	3940245	Two burrows, with scat
Cover site	Adult	650237	3940483	
Cover site	Adult	651533	3941001	With tracks
Cover site	Adult	649219	3942144	
Cover site	Adult	648589	3940255	
Cover site	Adult	648983	3940712	
Cover site	Adult	649918	3940118	
Cover site	Adult	649489	3939816	Two burrows. One immature
Cover site	Adult	649469	3939801	
Cover site	Adult	649941	3938199	With tracks
Cover site	Adult	650270	3937821	With tracks
Cover site	Adult	649217	3938982	
Cover site	Adult	649022	3939346	9 Scat and tracks
Cover site	Adult	648850	3938863	
Cover site	Adult	649304	3938977	
Cover site	Adult	649301	3939097	
Cover site	Adult	649287	3939461	
Cover site	Adult	649685	3944318	

TABLE 2. DESERT TORTOISE AND SIGN LOCATIONS				
TORTOISE SIGN	CLASS	EASTING	NORTHING	COMMENTS
Cover site	Adult	649679	3944327	Two burrows
Cover site	Adult	649177	3944595	
Cover site	Adult	649185	3944554	
Cover site	Adult	649200	3943492	
Cover site	Adult	649209	3943429	
Cover site	Adult	649595	3943228	Next to road
Cover site	Adult	648485	3944041	
Cover site	Adult	647963	3940238	3 burrows, Kit fox den
Cover site	Adult	647822	3940169	Scat and tracks
Cover site	Adult	648420	3939900	Two
Cover site	Adult	648415	3941101	
Cover site	Adult	648405	3941283	
Cover site	Adult	648403	3941459	Scat and tracks
Cover site	Adult	647758	3943674	
Cover site	Adult	647562	3943825	
Cover site	Adult	647807	3944272	
Cover site	Adult	648200	3943802	
Cover site	Adult	645990	3944387	
Cover site	Adult	646055	3944317	
Cover site	Adult	652073	3938400	
Cover site	Adult	652080	3937706	Adult tortoise in burrow
Cover site	Adult	652913	3940266	pallet
Cover site	Adult	652360	3938126	pallet
Cover site	Adult	651064	3941848	Adult tortoise in wash bank burrow
Cover site	Immature	652526	3943138	
Cover site	Immature	651622	3938726	
Cover site	Immature	648576	3940615	Pallet
Cover site	Immature	649795	3939407	
Cover site	Immature	650103	3938211	With tracks
Cover site	Juvenile	649756	3940281	
Cover site	Juvenile	649957	3939309	
Cover site	Subadult	653132	3944045	
Cover site	Subadult	649583	3944383	
Cover site	Subadult	648563	3941909	
Cover site	Subadult	649583	3944383	
Cover site	Subadult	647778	3940962	
Cover site	Adult	653170	3937789	2 rock shelters close together, shallow

TABLE 2. DESERT TORTOISE AND SIGN LOCATIONS				
TORTOISE SIGN	CLASS	EASTING	NORTHING	COMMENTS
Drinking depression		650399	3936973	
Drinking depression		651040	3937177	
Drinking depression		651275	3937298	
Drinking depression		648861	3939505	
Drinking depression		650814	3943760	
Drinking depression		652231	3940265	
Drinking depression		652929	3937929	
Drinking depression		652335	3937598	
Scat	Not this year	648671	3940193	
Scat	Not this year	649450	3939592	
Scat	Not this year	650104	3938210	
Scat	Not this year	649191	3944231	
Scat	Not this year	650518	3942736	
Scat	Not this year	649191	3944231	
scat	Not this year	652746	3940355	Not laid down this year
scat	Not this year	652562	3938305	Not laid down this year
Scat	This year	651652	3939099	
Scat	This year	651192	3940360	
Scat	This year	650434	3940203	
Scat	This year	651442	3941087	
Scat	This year	648728	3941649	
Scat	This year	649705	3940809	
Scat	This year	648691	3940203	
Scat	This year	648573	3940820	Two
Scat	This year	649397	3940485	Three
Scat	This year	649440	3939598	
Scat	This year	648813	3939428	
Scat	This year	649342	3943869	
Scat	This year	649372	3943692	
Scat	This year	647779	3940147	
Scat	This year	648363	3939749	Two
Scat	This year	650834	3942154	

TABLE 2. DESERT TORTOISE AND SIGN LOCATIONS				
TORTOISE SIGN	CLASS	EASTING	NORTHING	COMMENTS
Scat	This year	649342	3943869	
Scat	This year	649372	3943692	
scat	This year	646324	3943302	Laid down this year
scat	This year	645992	3944375	2 scat. Laid down this year
Shell-skeletal remains	Adult	650927	3940015	Bone fragments, 2-4 yrs TSD
Shell-skeletal remains	Adult	651171	3936951	Bone fragments, >4 yrs TSD
Shell-skeletal remains	Adult	651647	3939293	Bone fragments, 2-4 yrs TSD
Shell-skeletal remains	Adult	648575	3940448	Bone fragments, >4 yrs TSD
Shell-skeletal remains	Adult	648813	3940790	Bone fragment, 2-4 yrs TSD
Shell-skeletal remains	Adult	649603	3939896	Plastron, 2-4 yrs TSD
Shell-skeletal remains	Adult	649550	3939862	Female, depredated, <1 yr TSD
Shell-skeletal remains	Adult	649958	3938892	Bone fragments, >4 yrs TSD
Shell-skeletal remains	Adult	650159	3937640	Bone fragments, >4 yrs TSD
Shell-skeletal remains	Adult	650118	3937560	Bone fragments and scutes, >4 yrs TSD
Shell-skeletal remains	Adult	649275	3939618	Female, >4 yrs TSD
Shell-skeletal remains	Adult	650103	3942079	Female with notches in marginal scutes
Shell-skeletal remains	Adult	652716	3943869	Female, 2-4 yrs TSD
Shell-skeletal remains	Immature	650735	3937284	Bone fragments, 1-2 yrs TSD
Shell-skeletal remains	Immature	651662	3937079	Bone fragments, 2-4 yrs TSD
Shell-skeletal remains	Subadult	648572	3941889	1-2 yrs TSD
Shell-skeletal remains	Subadult	649881	3937899	Female, >4 yrs TSD
Shell-skeletal remains	Subadult	653077	3939986	2-4 years since time of death, single scute
Tracks		648744	3939303	Possible mating ring
Tracks		650778	3942042	In wash

NOTE: DATUM NAD 83 CONUS

TABLE 3. MAMMAL SPECIES	
Scientific Name	**Common name**
Neotoma lepida	Desert woodrat
Ammospermophilus leucurus	White-tailed antelope ground squirrel
Lepus californicus	Black-tailed jackrabbit
Canis latrans	Coyote
Vulpes macrotis	Kit fox

TABLE 4. REPTILE SPECIES	
Scientific Name	**Common Name**
Gopherus agassizii	Desert tortoise
Uta stansburiana	Side-blotched lizard
Gambelia wislizenii	Long-nosed leopard lizard

TABLE 5. BIRD SPECIES	
Scientific Name	**Common Name**
Buteo jamaicensis	Red-tailed hawk
Zenaida macroura	Mourning dove
Corvus corax	Common raven
Eremophila alpestris	Horned lark
Amphispiza bilineata	Black-throated sparrow
Amphispiza belli	Sage sparrow

FIGURE 1. PROPOSED LOCATION OF THE SILVER STATE SOLAR PROJECT SITE IN IVANPAH VALLEY, NV.

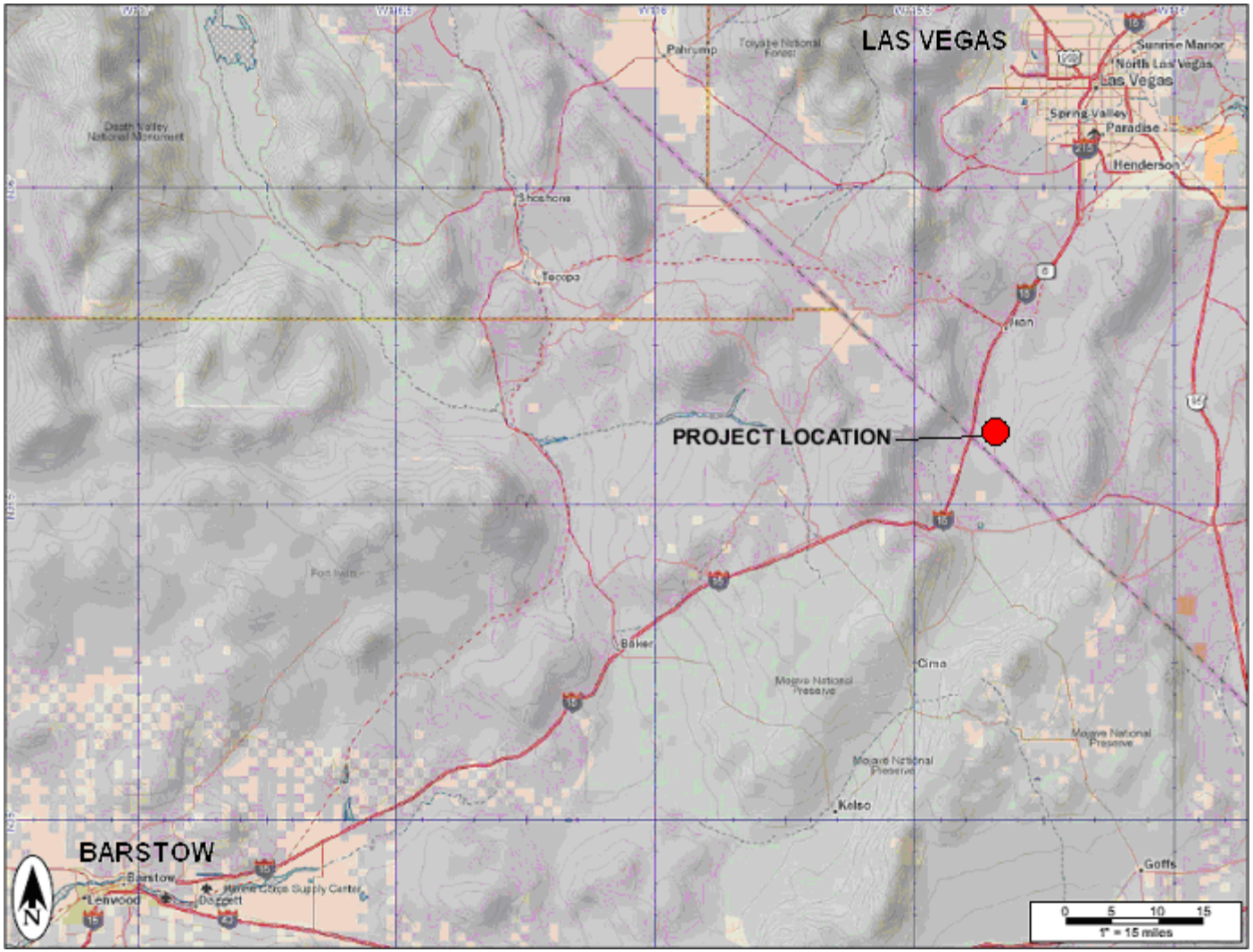

FIGURE 2. DESERT TORTOISE 2008 AND 2009 SURVEY AREA AND SIGN ENCOUNTERED ON THE PROPOSED SILVER STATE SOLAR PROJECT SITE IN IVANPAH VALLEY, NV.

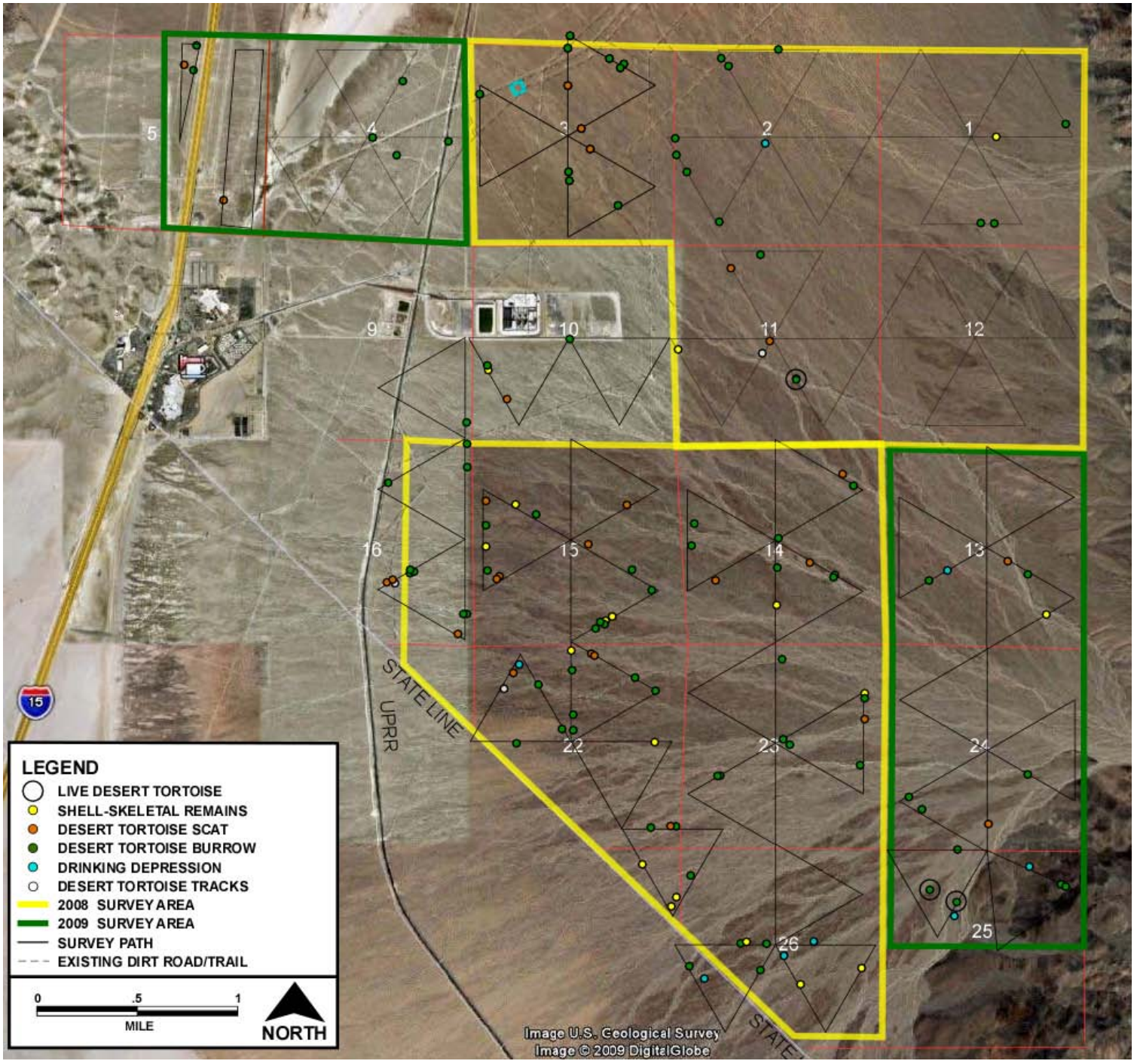

FIGURE 3. AREA PHOTOS AND TORTOISE SIGN PHOTOS ON THE PROPOSED SILVER STATE SOLAR PROJECT SITE IN IVANPAH VALLEY, NV.

Section 1-View to the east
UTM-652529 E, 3943808 N

Section 2-View to the southeast
UTM-650829 E, 3943760 N

Section 3-View to the east
UTM-649246 E, 3943760 N

Section 4-View to the southeast
UTM-647523 E, 3943734 N

Section 5-View to the southeast
UTM-646420 E, 3943361 N

Section 10-View to the northeast
UTM-648406 E, 3941345 N

Section 11-View to the south
UTM-650848 E, 3942186 N

Section 12-View to the north
UTM-652517 E, 3942214 N

Section 13-View to the west
UTM-652577 E, 3940503 N

Section 14-View to the north
UTM-650917 E, 3940567 N

Section 15-View to the north
UTM-649255 E, 3940528 N

Section 16-View to the southwest
UTM-648419 E, 3940564 N

Section 22-View to the east
UTM-649339 E, 3938880 N

Section 23-View to the north
UTM-650930 E, 3938883 N

Section 24-View to the east
UTM-652585 E, 3938892 N

Section 25-View to the southeast
UTM-652588 E, 3938114 N

Section 26-View to the north
UTM-650998 E, 3937341 N

Section 11-View to the west
Desert Racetrack

Section 10-View to the west
Power line access road

Section 25-Two desert tortoises in a caliche cave

Section 25-Desert tortoises in a soil burrow

Section 24-Desert tortoise scat

Section 22 –Tracks from tortoise mating ring

Section 11- Marked desert tortoise remains

Section 10- Subadult female shell-skeletal remains