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08-12010

Public Utilities Commission of Nevada

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Filed For: Great Basin Transmission LLC

In accordance with NRS Chapter 719,
this filing has been electronically signed and filed
by: /s Kathleen Drakulich

By electronically filing the document(s),
the filer attests to the authenticity of the electronic signature(s) contained therein.

This filing has been electronically filed and deemed to be signed by an authorized agent or
representative of the signer(s) and
Great Basin Transmission LLC

FILED WITH THE PUBLIC UTILITIES COMMISSION OF NEVADA - 12/24/2014

McDONALD·CARANO·WILSON LLP

Sylvia Harrison
sharrison@mcdonaldcarano.com

Reply to: Reno

December 23, 2014

Breanne Potter
Assistant Commission Secretary
Public Utilities Commission of Nevada
1150 East William Street
Carson City, Nevada 89701

Re: Docket No: 08-12010 – Amended Application of Great Basin Transmission, LLC for a Permit to Construct the Harry Allen to Eldorado Project Pursuant to the Utility Environmental Protection Act

Dear Ms. Potter:

Accompanying this letter, for filing with the Public Utilities Commission of Nevada in the above-referenced docket, and pursuant to the Utility Environmental Protection Act (UEPA), is the Amended Application of Great Basin Transmission, LLC for authority and a permit to construct the Harry Allen to Eldorado Project Pursuant to the Utility Environmental Protection Act. A Draft Notice is attached to the Application.

Please contact me at (775) 326-4360 if you have any questions or require additional information.

Sincerely,

Sylvia Harrison

SH/ajb
Enclosures

PUBLIC UTILITIES COMMISSION OF NEVADA
DRAFT NOTICE
(APPLICATIONS, TARIFF FILINGS, COMPLAINTS, AND PETITIONS)

Pursuant to Nevada Administrative Code ("NAC") 703.162, the Commission requires that a draft notice be included with all applications, tariff filings, complaints and petitions. Please complete and include ONE COPY of this form with your filing. (Completion of this form may require the use of more than one page.)

A title that generally describes the relief requested (NAC 703.160(4)(a)):

Amended Application of Great Basin Transmission, LLC for authority under the provisions of the Utility Environmental Protection Act for a permit to construct and operate a 500 kilovolt electrical transmission facility and ancillary facilities to be known as the "Harry Allen to Eldorado Project".

The name of the applicant, complainant, petitioner or the name of the agent for the applicant, complainant or petitioner (NAC 703. 160(4)(b)):

The applicant is Great Basin Transmission, LLC.

A brief description of the purpose of the filing or proceeding, including, without limitation, a clear and concise introductory statement that summarizes the relief requested or the type of proceeding scheduled AND the effect of the relief or proceeding upon consumers (NAC 703.160(4)(c)):

Based on the Application and any amendment or supplement thereto, Great Basin Transmission, LLC respectfully requests that the Public Utilities Commission of Nevada grant it a Permit to construct the Harry Allen to Eldorado Project. Great Basin Transmission, LLC is developing the proposed facility to produce 500 kV of electrical power to meet the growing demand for such power in Nevada and the Western U.S.

A statement indicating whether a consumer session is required to be held pursuant to Nevada Revised Statute ("NRS") 704.069(1)[1]:

A consumer session is not required.

If the draft notice pertains to a tariff tiling, please include the tariff number AND the section number(s) or schedule number(s) being revised.

The draft notice does not pertain to a tariff filling.

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[1] The Commission shall conduct a consumer session to solicit comments from the public in any matter pending before the Commission pursuant to NRS 704.061 to 704.110 inclusive, in which: (a) A public utility has filed a general rate application, an application to recover the increased cost of purchased fuel, purchased power, or natural gas purchased for resale or an application to clear its deferred accounts; and (b) The changes proposed in the application will result in an increase in annual gross operating revenue, as certified by the applicant, in an amount that will exceed $50,000 or 10 percent of the applicant's annual gross operating revenue, whichever is less.

BEFORE THE PUBLIC UTILITIES COMMISSON OF NEVADA

AMENDED APPLICATION OF GREAT BASIN TRANSMISSION, LLC FOR A PERMIT TO CONSTRUCT THE HARRY ALLEN TO ELDORADO PROJECT PURSUANT TO THE UTILITY ENVIRONMENTAL PROTECTION ACT

Docket No. 08-12010

_____/

AMENDED APPLICATION OF GREAT BASIN TRANSMISSION, LLC FOR A PERMIT TO CONSTRUCT THE HARRY ALLEN TO ELDORADO PROJECT PURSUANT TO THE UTILITY ENVIRONMENTAL PROTECTION ACT

VOLUME I-

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Exhibit 1 **Regional Map**
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Exhibit 5 **Final Environmental Assessment**
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Exhibit 7 **BLM Decision Record**
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Exhibit 10 **Affidavit of Publication**
Exhibit 11 **Proof of Service to Nevada State Clearinghouse**
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BEFORE THE PUBLIC UTILITIES COMMISSON OF NEVADA

AMENDED APPLICATION OF GREAT BASIN TRANSMISSION, LLC FOR A PERMIT TO CONSTRUCT THE HARRY ALLEN TO ELDORADO PROJECT PURSUANT TO THE UTILITY ENVIRONMENTAL PROTECTION ACT	/ / / / / / / / /	Docket No. 08-12010

AMENDED APPLICATION OF GREAT BASIN TRANSMISSION, LLC FOR A PERMIT TO CONSTRUCT THE HARRY ALLEN TO ELDORADO PROJECT PURSUANT TO THE UTILITY ENVIRONMENTAL PROTECTION ACT

Pursuant to the Nevada Utility Environmental Protection Act ("UEPA"), and the provisions of Chapter 704 of the Nevada Revised Statutes ("NRS") and Chapter 703 of the Nevada Administrative Code ("NAC"), Great Basin Transmission, LLC, a Delaware limited liability company ("Applicant"), hereby files its Amended Application with the Public Utilities Commission of Nevada ("Commission") for a permit to construct ("UEPA Permit") a 500-kilovolt ("kV") electrical transmission facility and ancillary facilities to be known as the "Harry Allen to Eldorado Project," sometimes referred to herein as "the Project". The Amended Application is made pursuant to Nevada Revised Statutes ("NRS") 704.820 to 704.900 and Nevada Administrative Code ("NAC") 703.415 to 703.427. Applicant submits the following information in support of its Amended Application.

I. INTRODUCTION

Applicant intends to construct, operate, and maintain a new 500kV overhead transmission line which will stretch between a northern terminus at NV Energy's existing 500 kV Harry Allen Substation (approximately 20 miles northeast of Las Vegas) and a southern terminus at the existing 500 kV Eldorado Substation in Eldorado Valley. The Project will be located entirely in Clark County, Nevada. The Project will cross federal lands managed by the Bureau of Land Management ("BLM"), requiring a right-of way ("ROW") grant, as well as federal lands

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managed by the Bureau of Reclamation ("Reclamation") which have been withdrawn for Reclamation project purposes, requiring a right-of-use ("ROU") authorization. The BLM and Reclamation determined that an environmental assessment ("EA") was required pursuant to the National Environmental Policy Act of 1969 ("NEPA") to assist with identification of any potentially significant impacts that could result from implementation of the Project. BLM acted as the lead agency in the preparation of the EA, with Reclamation acting as a cooperating agency. The Final EA was issued on November 25, 2014. The EA, the BLM's Decision Record ("DR"), BLM's Finding of No Significant Impact ("FONSI"), and Reclamation's FONSI are attached hereto as Exhibits 5, 6, 7, and 8.

Nevada has established a two-step procedure for applying for a UEPA permit to construct a utility facility when a federal agency is required to conduct an environmental analysis for the facility. Pursuant to the requirements of NRS 704.870 in effect when Applicant initiated the process to secure the ROW and ROU, Applicant filed its initial application for a UEPA Permit with the Commission on December 5, 2008 ("Initial Application"). The Commission assigned the Initial Application Docket Number 08-12010. NRS 704.870 formerly required an amended application ("Amended Application") for a UEPA Permit to be filed within thirty (30) days of the issuance of the final environmental assessment. Accordingly, Applicant is now submitting this Amended Application in compliance with NRS 704.870 and NAC 703.423.

II. INFORMATION REGARDING THE APPLICANT

Great Basin Transmission, LLC is a Delaware limited liability company and an affiliate of LS Power Development, LLC, a Delaware limited liability company ("LS Power"). LS Power is a privately held company that, together with its affiliates, is focused on the development, investment and management of reliable and environmentally responsible power generation and transmission assets in the United States. Applicant advises that it may file a request with the

Commission to assign this application and its rights under this docket to another affiliate of LS Power prior to issuance of a compliance order in this docket to preserve all commercial opportunities as described herein.

All correspondence related to this Application (copy of all pleadings, notices, orders and discovery requests) should be sent to the undersigned agents:

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III. RESPONSES TO REQUIRED DISCLOSURES

The information required by NAC 703.421 and NAC 703.423 is provided as follows:

A. NAC 703.423(1). Description of Location

1. ***A general description of the location of the proposed utility facility, including a regional map that identifies the location of the proposed utility facility (NAC 703.423(1)(a)).***

The transmission line will stretch between a northern terminus at NV Energy's existing 500 kV Harry Allen Substation (approximately 20 miles northeast of Las Vegas) and a southern terminus at the existing 500 kV Eldorado Substation in Eldorado Valley, operated by Southern California Edison; both in Clark County, Nevada (see Exhibit 1). The proposed alignment is approximately 60 miles long and would be located parallel and adjacent to existing transmission facilities and within designated utility corridors for the majority of the alignment. The project will exit the Harry Allen Substation to the

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northeast, following an adjacent 500 kV transmission line for approximately 5 miles across Dry Lake Valley to the area of the Crystal Substation, but will not interconnect at Crystal. The project alignment would then turn south and parallel up to three existing 500 kV transmission lines in the utility corridor along the eastern side of the Dry Lake Range and Sunrise Mountains, past Lava Butte, and enter the City of Henderson near the Las Vegas Wash. The project would continue south through eastern Henderson and parallel up to four existing high voltage lines along the western side of the River Mountains down to the Boulder Highway crossing. From Boulder Highway crossing, the project would parallel three high voltage lines southwest through the Dutchman Pass area and enter the northwestern part of Eldorado Valley. The project then turns south in Eldorado Valley and runs within a major utility corridor along the eastern side of the McCullough Range down to the southern terminus at the Eldorado Substation. A regional map is provided in Exhibit 1.

2. A legal description of the site of the proposed utility facility, with the exception of electric lines, gas transmission lines, and water and wastewater lines, for which only a detailed description of the site is required (NAC 703.423(1)(b)).

The northern terminus will be located at the Harry Allen Substation in Section 35, Township 17 S., Range 63 E. From the northern terminus, the project will traverse Sections 25, 35, and 36 of Township 17 S., Range 63 E.; Sections 15, 16, 17, 19, 20, 22, 27, 30, and 34 of Township 17 S., Range 64 E.; Sections 3, 10, 15, 21, 22, 28, 32, and 33 of Township 18 S., Range 64 E.; Sections 4, 5, 8, 17, 18, 19, 30, and 31 of Township 19 S., Range 64 E.; Section 36 of Township 19 S., Range 63 E.; Sections 1, 11, 12, 13, 14, 23, 26, 27, and 34 of Township 20 S., Range 63 E.; Sections 3, 4, 9, 16, 21, 27, 28, and 34 of Township 21 S., Range 63 E.; Sections 3, 10, 14, 15, 23, 26, and 35 of Township 22 S., Range 63 E.; Sections 2, 3, 4, 8, 9, 17, 18, 19, 30, and 31 of Township 23 S., Range

63 E.; Sections 13, 24, 25, and 36 of Township 23 S., Range 62 E.; Sections 1, 12, 13, 24, 25, and 36 of Township 24 S., Range 62 E.; and Sections 1 and 2 of Township 25 S., Range 62 E. The southern terminus will be located at the Eldorado Substation in Section 2, Township 25 S., Range 62 E.

3. Appropriately scaled site plan drawings of the proposed utility facility, vicinity maps, and routing maps (NAC 703.423(1)(c)).

A vicinity and route map is provided in Exhibit 1.

B. NAC 703.423(2). Description of Facility

1. The size and nature of the proposed utility facility (NAC 703.423(2)(a).

The Project consists of an approximately 60 mile 500 kV single-circuit overhead electric transmission line, interconnection facilities at the Harry Allen and Eldorado Substations, fiber optic communication equipment, series compensation equipment, access roads, temporary work areas, and other associated project components and equipment. The transmission line will typically be located inside a 200-foot wide (100 feet on either side of center) ROW that consists primarily of federal lands with some private easements. The majority of the transmission line will be constructed 200 feet from the closest parallel transmission line. Engineering or topographic constraints may require deviations from this 200-foot separation in certain areas along the alignment.

The Project will primarily utilize self-supporting or guyed steel lattice towers made of galvanized steel with dulled finish. Other tower types including steel H-frames, steel monopoles, and guyed-V structures may be selected. Tower heights will range between approximately 90 and 172 feet with tower spans averaging about 1,200 to 1,600 feet. Self-supporting steel poles may be used at points requiring heavy angles or dead-end structures. H-frame and monopole heights will be between about 120 and 160 feet,

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with average spans of approximately 1,200 to 1,600 feet. The size and configuration of tower foundations are dependent on tower selection and soil conditions. Self-supporting, steel-lattice towers require four footings, while the steel-lattice or tubular guyed towers require one footing for the tower base and four anchor rods for guy cables. Some foundation and guy anchors would consist of pre-cast concrete footings approximately four feet in diameter and six feet deep. Due to site-specific characteristics, some foundation and guy anchors would require cast-in-place footings. Self-supporting lattice towers would have cast-in-place concrete footings three to four feet in diameter and 12 to 24 feet deep. Final footing/foundation configurations will be developed as part of the final design.

The 500kV circuit will consist of three phases with a bundle of three sub-conductors per phase arranged in an equilateral triangle, approximately 18 inches per side. Minimum conductor height above the ground for the 500kV line will be 31 feet at 212 degrees Fahrenheit based on National Electrical Safety Code ("NESC") standards. The exact tower height and conductor clearance at each location will be governed by topography and applicable safety requirements.

A fiber optic component will be incorporated into the transmission system that could be used for voice and data communication, protective relay telemetering, and for supervisory control and data acquisition. A redundant communications method may also be employed using fiber optic or microwave systems. It is likely that the fiber optic component will be integrated with the overhead groundwire.

To protect the 500 kV transmission lines from direct lightning strikes, two overhead groundwires, ½-inch in diameter, would be installed on the top of the

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structures. Current from lightning strikes would be transferred through the groundwires and structures into the ground.

The Project will interconnect with the existing Harry Allen 500 kV Substation at the northern terminus and the existing Eldorado 500 kV Substation at the southern terminus. The interconnection of the project to the existing substations will require the addition of facilities at the substation. While it is currently not anticipated that either substation will require expansions to accommodate the interconnection facilities, final design details may require expansion of the Harry Allen Substation to incorporate series compensation equipment. If it is determined that the location of the series compensation equipment should not be placed within the existing Harry Allen Substation, the equipment could be placed with the proposed 200-foot ROW near the northern terminus.

The Project will be able to utilize numerous existing access roads leading to and within the utility corridor. Some existing roads may require improvement or maintenance work to support construction activities. Where work areas are not immediately accessible from existing roads, short routes of non-graded overland access where feasible will be located in order to access the site. The construction of new spur roads will occur as necessary, to access structure sites that lack direct access from existing roads or where topographic conditions (e.g., steep terrain, rock outcrops, and drainages) prohibit safe overland access to the site.

The Project will involve crossings of multiple existing electrical distribution and transmission lines, pipelines, roadways, railroads, and other transportation and utility facilities. All applicable health and safety requirements will be incorporated into the final design and construction of the Project.

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2. The natural resources that will be used during the construction and operation of the proposed utility facility (NAC 703.423(2)(b)).

During construction of the Project water will be used to control dust and minimize impacts to air and soils. Water will be trucked in from a commercial vendor or purchased locally from private sources using existing water rights, so no new water appropriations will be required. Because site conditions will vary along the route, water volume requirements will be determined on an as-needed basis during construction.

Fuel for construction vehicles will also be trucked in from a commercial vendor or purchased locally from private sources. Some blading and blasting of soils and rocks will be required to accommodate access roads and tower structure sites. Any excess foundation spoils are expected to be put to use within the ROW. Restoration of select roads and construction sites may be required by BLM using appropriate techniques and seed mixtures.

Natural resources will also be utilized by the manufacturers of Project equipment and hardware. Manufacturers will source the required raw materials through various supply chains, which could originate from any number of mining operations.

3. Layout diagrams of the structures at the* proposed utility facility *and its associated equipment (NAC 703.423(2)(c)).

Exhibit 1 provides an overview of the project alignment. Detailed layout diagrams which indicate the location of specific transmission towers and other facilities will be developed as part of the Final Plan of Development for BLM and Reclamation.

4. Scaled diagrams of the structures at the proposed utility facility (NAC703.423(2)(d)).

Appropriately scaled structure diagrams are provided in Figures 2-3, 2-4, and 2-7 of Exhibit 5.

5. A statement concerning whether the proposed utility facility is an electric generating plant or the associated facilities of an electric generating plant that uses renewable energy as its primary source of energy to generate electricity.

While the Project is not an electric generating facility, this new transmission link will create new access in Southern Nevada to the regional electricity market for existing and proposed power generation facilities, and offer economical transmission service to foster the development of new renewable energy resources.

C. NAC 703.423(3) A Copy and Summary of Environmental Studies

The following environmental analyses and studies that have been conducted are relevant to the Project and are included as exhibits to this application.

- *Southern Nevada Intertie Project, Draft Environmental Assessment, May 2012* (see Exhibit 2)
- *Southern Nevada Intertie Project, Biological Assessment, August 2014* (see Exhibit 3)
- *Southern Nevada Intertie Project, Biological Opinion, November 2014* (see Exhibit 4)
- *Southern Nevada Intertie Project, Final Environmental Assessment, November 2014* (see Exhibit 5)
- *Southern Nevada Intertie Project, BLM Finding of No Significant Impact, November 2014* (see Exhibit 6)
- *Southern Nevada Intertie Project, BLM Decision Record, November 2014* (see Exhibit 7)
- *Southern Nevada Intertie Project, Bureau of Reclamation Finding of No Significant Impact, November 2014* (see Exhibit 8)

In response to Applicant's applications to the BLM for a ROW and to Reclamation for a ROU, BLM and Reclamation determined that an EA would be prepared in compliance with NEPA to assist in the identification of any potentially significant impacts that could result from implementing the Project. Reclamation participated as a cooperating agency for this effort. Since the Project would traverse

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habitat of species that are protected under the Endangered Species Act ("ESA"), a Biological Assessment ("BA") was prepared to characterize the conditions of the existing environment and the level of disturbance that would occur from Project implementation. Formal consultation with the U.S. Fish and Wildlife Service ("USFWS") was initiated pursuant to Section 7 of the ESA, and the USFWS rendered a Biological Opinion ("BO") that determined the Project is not likely to jeopardize the continued existence of the Mojave desert tortoise. BLM and Reclamation released a Draft EA for review and comment by agencies and the general public in May 2012. Comment letters were received from the Nevada Department of Wildlife ("NDOW") and Nellis Air Force Base, resulting in minor clarifications to the text of the EA. In November 2014, BLM and Reclamation released the Final EA. Concurrent with the release of the Final EA, BLM and Reclamation each issued a FONSI, and BLM released a DR. These documents concluded that the implementation of either the Proposed Action or Alternative 1 would not result in significant environmental impacts, and the DR approved the Proposed Action. In the event Alternative 1 is to be used to construct the Harry Allen to Eldorado Project, the Applicant would seek a corresponding change to the appropriate approvals from the federal agencies and the Commission.

The environmental studies are further summarized in Section G below in response to NAC 703.423.7.

D. NAC 703.423(4). Reasonable Alternative Locations.

Since designated land use planning utility corridors and existing utility facilities occur along nearly the entire pathway between the Harry Allen and Eldorado Substations, and it is the preference of land management agencies that proposed utility facilities are

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located within these designated corridors, no extensive alternative locations outside of the utility corridors were analyzed in the environmental analysis. The EA did analyze several minor routing alternatives associated with the Proposed Action. In addition, a reasonable alternative that was located within the same utility corridor (known as "Alternative 1") was analyzed in the EA. For Alternative 1, the EA analyzed an arrangement where Applicant would utilize approximately 18 miles of open position on existing double-circuit transmission towers associated with NV Energy's previously approved and constructed Harry Allen to Mead 500 kV transmission line project. This alternative includes the construction of approximately 42 miles of new transmission structures for a total length of approximately 60 miles (the same as the Proposed Action). Approximately 26.5 miles of new transmission alignment would be constructed from the Harry Allen Substation to a point in the Rainbow Gardens Area of Critical Environmental Concern ("ACEC") (approximately mile marker 26.5), where the existing Harry Allen to Mead 500 kV transmission line double-circuit structures begin. At this location, the Harry Allen to Eldorado 500 kV conductors would be placed on the existing double-circuit structures for approximately 18 miles. Upon exiting the Harry Allen to Mead double circuit structures, approximately 14.5 miles of new transmission alignment would be constructed for the remainder of the route south to the Eldorado Substation.

The FONSI's issued by BLM and Reclamation both conclude that the implementation of either the Proposed Action or Alternative 1 will not result in significant environmental impacts, and the DR approved the Proposed Action. In the event Alternative 1 is to be used to construct the Harry Allen to Eldorado Project, the Applicant would seek a corresponding change to the appropriate approvals from the federal agencies and the Commission. The contractual arrangement that currently

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enables the use of the existing structures in Alternative 1 is the "SNIP Option" as defined in the Transmission Use and Capacity Exchange Agreement (see Docket 10-02009) with NV Energy (the "TUA"). If the Applicant identifies the Project as the "SNIP" (as defined in the TUA) and the Project therefore ultimately forms part of the "Great Basin Segments" under the TUA, it could either be constructed in accordance with the Proposed Action or alternatively it could be constructed in accordance with Alternative 1 which would involve use of the SNIP Option as defined in the TUA. Alternatively, the Applicant (or another LS Power affiliate to which this application is assigned) may elect to construct the Project as a separate and independent project, such as pursuant to a CAISO competitive solicitation, in which case the Project would not be identified as the SNIP and would not form or be constructed as part of the Great Basin Segments pursuant to the TUA.

E. NAC 703.421(5). Proof of Public Notice

A copy of the Public Notice is included as Exhibit 9 and the Proof of Publication is included as Exhibit 10.

F. NAC 703.423(6). Proof of Submittal to the Nevada State Clearinghouse

A copy of proof of service to the Nevada State Clearinghouse is attached as Exhibit 11.

G. NAC 703.423(7) Probable Effect on Environment

1. A reference to any studies described in Subsection 3, if applicable (NAC 703.423(7)(a)).

The applicable environmental studies including the Environmental Assessment are referenced above in Section G (NAC 703.423(3)).

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2. An environmental statement that includes:

(a) The name, qualifications, professions, and contact information of each person with primary responsibility for the preparation of the environmental statement (NAC 703.423(7)(b)(1)).

The Project's EA was prepared by the BLM as the lead agency, with the participation of the Bureau of Reclamation as a cooperating agency. EPG, Inc. is an environmental consulting firm that assisted the federal agencies with the preparation of the environmental studies. The names and associated information for those individuals with the primary responsibility for the preparation of the EA are found in Chapter 6 of the EA (Exhibit 5). The contact information for the BLM Las Vegas Field Office is 4701 North Torrey Pines Drive, Las Vegas, Nevada, 89130, (702) 515-5000. The contact information for EPG, Inc. is 4141 North 32nd Street, Suite 102, Phoenix, Arizona, 85018, (602) 956-4370.

(b) The name, qualifications, professions, and contact information of each person who has provided comments or input in the preparation of the environmental statement (NAC 703.723(7)(b)(2)).

The names and associated information for those individuals who provided comments or input in the preparation of the EA are also found in Chapter 6 of the EA (Exhibit 5). The contact information for these individuals is the same as provided above.

(c) A bibliography of materials used in the preparation of the environmental statement (NAC 703.423(7)(b)(3)).

A bibliography of materials used in the preparation of the EA is provided in Chapter 7 of Exhibit 5.

(d) A description of the following (NAC 703.423(7)(b)(4)).

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(i) The environmental characteristics of the project area existing at the time the application or amended application is filed with the Commission.

Chapter 3 of the EA (Exhibit 5) provides a detailed description of the environmental characteristics of the project area as it currently exists.

The Project is located within a designated utility corridor adjacent to existing transmission lines. For the majority of the route, the Project will be next to two adjacent 500 kV AC transmission lines, and one 500 kV HVDC transmission line. The existing condition of the corridor is highly modified by the numerous existing electrical facilities and other industrial facilities.

The Project alignment generally traverses rural open desert areas and foothills. The soils in the project area are characterized as moderately to highly susceptible to water and wind erosion. One of the five air quality regions crossed by the project is designated as a maintenance area for particulate matter less than 10 microns (PM_{10}), ozone (O_3) (1997 8 hour standard), and carbon monoxide (CO), under the applicable National Ambient Air Quality Standards (NAAQS). The only notable surface water feature crossed by the Project is the Las Vegas Wash.

The Project area is located within the sparsely vegetated Mojave Desert scrub biome. Certain plant species that are considered Special Status Species by state and federal agencies occur in the Project area. No ESA-listed plant species are present in the Project area. There are occurrences of invasive plant species and noxious weeds in the corridor. Wildlife species that are designated as special status by federal and state agencies are present in the region, and include mammals, birds,

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invertebrates, and reptiles and amphibians. ESA-protected wildlife species, such as the Mojave desert tortoise, also occur in the Project area.

There are known National Register of Historic Places ("NRHP")-eligible cultural sites in the Project area. These consist of 11 known historic sites including the Old Spanish Trail, and 16 prehistoric sites. The Project also has the potential to impact paleontological resources present in the area.

The majority of the Project alignment crosses lands managed by the BLM and Reclamation, with shorter segments that cross private, municipal, and county owned lands. On BLM managed lands, the project will cross the Rainbow Gardens ACEC, the River Mountains ACEC, and will be adjacent to the Sloan Canyon National Conservation Area. The Project will also cross the far eastern portion of the Clark County Wetlands Park, and the River Mountains Loop trail which is managed by the City of Henderson. The existing visual resource setting of the Project area has been highly modified by the existing transmission and other utility facilities.

(ii) and (iii) The environmental impacts that the construction and operation of the proposed utility facility will have on the project area before and after mitigation.

BLM and Reclamation evaluated the anticipated environmental impacts that would result from the implementation of the Project and identified prudent mitigation measures to minimize or avoid the expected Project impacts. In an effort to reduce impacts, Applicant also proactively committed to an extensive list of protective design features including

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generic and specific environmental protection and mitigation measures as part of the Project description. Additional mitigation and minimization measures were developed through the formal ESA consultation process with USFWS.

Chapter 4 of the EA (Exhibit 5) provides a thorough discussion of the anticipated environmental impacts and the mitigation measures intended to minimize or avoid those impacts. The BA and BO (Exhibits 3 and 4, respectively) also provide detailed discussions of anticipated project impacts and required mitigation measures. A summary of the Project's anticipated impacts for each affected resource is provided below.

Air Quality: Air emissions associated with the Project are primarily short-term and chiefly associated with engine exhaust due to combustion of fossil fuel in construction equipment and fugitive dust during the construction period. While vehicles will be used to drive the Project alignment for periodic maintenance, impacts to air quality from vehicle emissions will be negligible. Before construction can commence, Applicant or its construction contractor would need to obtain a Clark County Department of Air Quality ("DAQ") Dust Control Permit for Construction Activities, and related Dust Mitigation Plan. As a result of the temporary nature of air emissions and through adherence to Clark County DAQ regulations, impacts to air quality will be minimal.

Geology and Minerals: The Project may result in small amounts of excess mineral materials through excavation for structure foundations. Any excess materials will be used as backfill and spread around structure

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locations or put to use within the right-of-way. Although the potential for geologic hazards, including seismic, landslides, and subsidence, is low throughout the project area, there is always a chance these events could occur. Potential impacts would be mitigated through the selective placement of towers and access roads.

Soils: The Project area contains certain soils that are moderately to highly susceptible to water and wind erosion. The placement of tower sites and temporary access roads would be selected to avoid soils that are moderately or highly sensitive to accelerated rates of water or wind erosion. Additional mitigation measures could be required during construction of the Project in order to avoid or minimize damage resulting from erosion and prevent acceleration of natural-erosion processes.

Water Resources: After implementation of site-specific Best Management Practices (BMPs), impacts to surface water, groundwater, and water quality are expected to be negligible to minimal. Impacts related to floodplains for individual structures and roads would be negligible.

Vegetation: Applicant-proposed environmental protection measures were developed to avoid and minimize potential impacts to botanical resources from construction, operation, and maintenance of the proposed Project. Existing roads and previously disturbed areas would be used for the proposed Project alignments to the extent reasonably possible to minimize new surface disturbance. Five sensitive plant species were observed along the proposed alignment. Preconstruction surveys would be performed to flag sensitive plant species for avoidance, as well as to flag

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work areas. As part of the mitigation for impacts to sensitive plant species, Applicant will contribute to a BLM administered compensatory mitigation fund that is intended to reduce the level of project specific impacts to special status plant species throughout the project alignment. While project activities may facilitate the introduction or spread of noxious weeds and invasive plants, a Noxious Weed and Invasive Plant Management Plan would be prepared in consultation with BLM and Reclamation to minimize the likelihood of noxious weed propagation.

Wildlife: The Project has the potential to impact several wildlife species that are protected under the ESA. BLM requested formal consultation with the USFWS pursuant to Section 7 of the ESA regarding the Project's potential impact to the Mojave desert tortoise. USFWS rendered a BO that determined the Project is not likely to jeopardize the continued existence of the Mojave desert tortoise and no critical habitat will be affected. Through a combination of Applicant proposed protective design features, avoidance and minimization measures set forth in the BA, and the terms and conditions of the BO, impacts to the Mojave desert tortoise should be effectively avoided or minimized. Examples of these protective measures include the requirement for preconstruction surveys, active monitoring of construction activities, limits on the speed and movement of project vehicles, an employee education program, protocols for handling encounters with desert tortoise, and other specifications.

Informal consultation with USFWS pursuant to Section 7 of the ESA was also requested for concurrence that the Project may affect but is

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not likely to adversely affect the southwestern willow flycatcher and the western yellow-billed cuckoo. Habitat for these two avian species occurs in the Las Vegas Wash which is part of the Project area. Since the Project features will span the wash and no habitat will be affected, and certain monitoring and avoidance protocols will be implemented, the USFWS concurred that the Project may affect but is not likely to adversely affect the southwestern willow flycatcher or western yellow-billed cuckoo.

For those portions of the Project that are located on non-federal lands, Applicant will be required to comply with the applicable measures set forth in the Clark County Multi-Species Habitat Conservation Plan.

Various other wildlife species may be impacted in the Project area due to construction activities. Implementation of protective design features and minimization measures such as use of existing access roads and work areas, preconstruction surveys, monitoring during construction, and post-construction restoration should effectively minimize or avoid impacts.

Cultural Resources: The Project will be located adjacent to multiple existing facilities within a previously modified setting. Large portions of the Project area have been previously surveyed for cultural resources and there are known NRHP-eligible cultural sites within the direct and indirect areas of potential effect for this project. However, as specified in the EA, a Class III cultural resources survey, NRHP eligibility determinations for identified cultural resources, and treatment to avoid and/or mitigate adverse direct and indirect effects to cultural resources,

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would be required prior to construction. In addition, a Programmatic Agreement ("PA") among BLM, Reclamation, Nevada State Historic Preservation Office, and Applicant includes provisions for consultation, unanticipated discoveries, and monitoring of sensitive cultural areas. Given these survey and treatment requirements, as well as the ongoing monitoring requirements of the PA, the Project is not expected to have a significant adverse effect or cause the loss or destruction of scientific, cultural, or historic resources, including those listed in or eligible for listing in the NRHP.

Paleontological Resources: The Project may impact paleontological resources present in the Project area. A Paleontological Resources Treatment Plan will be developed and include a pre-construction survey, on-site paleontological monitoring during construction in areas containing known fossil locations, and mitigation of paleontological resources that may be discovered during construction. The scientific and educational value of the fossils and their associated contextual data constitute the chief significance of the resource. Their collection, therefore, mitigates the impacts to paleontological resources.

Land Use, Recreation, and Access: The majority of the length of the Project is on federal land, within designated utility corridors, and adjacent to existing utility facilities. Operation and maintenance of the proposed transmission line would not conflict with existing federal, state, or county land use plans, policies, or regulations applicable to the Project area. The proposed transmission line would cross the Rainbow Gardens

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and River Mountains ACECs within the designated utility corridor. The construction and operation of the Project is not anticipated to interrupt dispersed recreational activities on adjacent public lands. Vacant public lands are used for low-density informal recreation such as hiking, picnicking, off-road driving, and driving on existing paved and unpaved roads. The Project would not preclude the use of these areas, but rather would temporarily displace recreational users to surrounding recreation areas if access roads are restricted due to construction.

Visual Resources: Visual resource values would not be affected by the Project because the local setting in which the Project is proposed has been highly modified by existing transmission line facilities.

Socioeconomics: Given the large and diverse population of the Las Vegas area, the economic effects of constructing the transmission line would have little discernible effect on the overall levels of personal income and employment in the region. However, some positive effects would result during construction, not only in the form of direct employment, but also from procurements of construction materials and services from local suppliers and businesses.

Environmental Justice: On average, the census tracts along the proposed route do not contain minority or low-income population groups significantly greater than Clark County or the state of Nevada as a whole; therefore, there would be no environmental justice impacts from implementation of the Project.

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Cumulative Impacts: The analysis of cumulative impacts presented in the EA did not identify any significant cumulative impacts of the Project with related actions that might require the preparation of an EIS. The effects of the Project would not be significant, individually or cumulatively, when considered with the effects of other actions. The Project is located adjacent to many of the existing and reasonably foreseeable facilities identified in the EA. Most of the cumulative transmission projects presented will be co-located with this project in designated utility corridors. Consolidating these facilities within a common corridor should minimize the cumulative effects to all environmental resources. By consolidating these facilities within an established corridor, future facilities will be located in a well-planned and previously modified setting, and will likely benefit from multiple projects utilizing a common set of access routes.

Upon analyzing the anticipated environmental impacts that would result from the implementation of the Project, and considering the mitigation measures and protective design features that will be applied, both BLM and Reclamation determined that there will not be significant direct, indirect, or cumulative impacts.

H. NAC 703.423(8) An Explanation of the Extent to Which the Proposed Utility Facility is Needed to Ensure Reliable Utility Service to Customers in this State

The Project is exempt from this requirement pursuant to paragraph (b) of subsection 1 of NRS 704.890 as it is not a generation facility and does not emit greenhouse gases.

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I. NAC 703.423(9) An Explanation of How the Need for the Proposed Utility Facility Balances any Adverse Effects on the Environment

Section L of this Amended Application identifies the need and benefits of the Project both for Nevada and adjacent markets. Section G of this Amended Application identifies the impacts to the environment which have been determined to be not significant by the BLM and Reclamation, including prescribed mitigation measures. Furthermore, the Project is located substantially within designated utility corridors. The BLM policy of identifying utility corridors specifically acknowledges that there is the need for new facilities, and the adverse effects on the environment are balanced when the new facilities are located within the designated utility corridors. Given the need has been clearly established and the environmental impacts have been determined to be insignificant, not requiring the more rigorous Environmental Impact Statement, and through the use of designated utility corridors and prescribed mitigations, the impacts to the environment are clearly balanced by the need and the significant economic benefits.

J. NAC 703.423(10 An Explanation of How the Proposed Utility Facility Represents the Minimum Adverse Effect on the Environment

1. ***The state of available technology (NAC 703.423(10)(a)).***

The state of available technology to meet the need of connecting two 500 kV substations is limited to construction of a 500 kV transmission line. There are various tower types that were studied by BLM, all of which were deemed acceptable resulting in environmental impacts that are not significant. This is primarily because of the location of the Project adjacent to multiple extra-high-voltage transmission lines primarily within BLM-designated multimodal

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utility corridors containing portions of a number of existing utility facilities, including 500 kV, 230 kV, and lower voltage transmission lines, and a number of underground water and natural gas pipelines. Alternative transmission technologies (i.e., voltages other than the proposed 500 kV, direct current, underground construction, microwave, laser, super conductors, etc.), are not considered to be viable due to substantially higher costs, increased environmental impacts and technological feasibility. The selected technology is modern in nature and will result in minimal environmental impacts.

2. ***The nature of various alternatives (NAC 703.423(10)(b)).***

The main alternative to the Proposed Action considered utilizing approximately 18 miles of existing double circuit structures (Alternative 1). As outlined in BLM's and Reclamation's FONSIs, the implementation of either the Proposed Action or Alternative 1 would not result in significant environmental impacts. While implementation of Alternative 1 would result in relatively fewer disturbance acres, other factors including private commercial arrangements would negate the incremental environmental advantage of Alternative 1. Applicant's ability to utilize the existing transmission structures is provided in a time-limited commercial arrangement, which carries the risk of expiration prior to implementation of the Project. The Proposed Action provides more certainty that the Project can be built to meet the purpose and need, and therefore the Proposed Action was approved in the DR. In the event Alternative 1 is to be used for the Harry Allen to Eldorado Project, the Applicant would seek a corresponding change to the appropriate approvals from both BLM and the Commission.

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The nature of the minor routing alternatives analyzed in the EA was to avoid topographic constraints, avoid existing structures, reduce line length, minimize capital cost, and utilize designated corridors. The analysis of these minor routing alternatives found that the level of impact between these minor alternatives was nearly identical, and in all cases were at a level considered insignificant by BLM and Reclamation. Ultimately BLM issued a Decision Record affirming a selected a route that would result in environmental impacts that are not significant and that meet other criteria established by BLM such as maximizing use of designated corridors.

3. ***The economics of various alternatives (NAC 703.423(10)(c)).***

In considering the economics between the Project's Proposed Action and Alternative 1, as mentioned above, the ability to utilize the existing transmission structures is provided in a time-limited commercial arrangement which carries the risk of expiration prior to Project implementation. The Proposed Action provides more certainty that the Project can be built to meet the purpose and need. While the economics of the commercial arrangement associated with Alternative 1 could ultimately be a factor in which Project configuration is ultimately constructed, at this time the certainty of Project execution provided by the Proposed Action is weighted more heavily.

Among the minor routing alternatives analyzed in the EA, each resulted in minor cost differences due to different topographic and line crossing requirements. Ultimately BLM issued a Decision Record affirming a selected a route that would result in environmental impacts that are not significant and that

meet other criteria established by BLM such as maximizing use of designated corridors. While economics were a consideration, the environmental impacts and BLM policy requirements were the key drivers in the approved alternative identified in the Decision Record.

K. NAC 703.423(11) An Explanation of How the Location of the Proposed Utility Facility Conforms to Applicable State and Local Laws and Regulations

The Project will conform to applicable state and local laws and regulations, as illustrated by the list of studies and permits and approvals which have been secured or are pending approval. Lists of federal, state, regional, and local environmental approvals anticipated to be necessary for the Project are provided in Exhibits 12 and 13. The design, construction, operation, and maintenance of the Project will meet or exceed the requirements of the NESC and U.S. Department of Labor, Occupational Safety and Health Standards.

Transmission lines and associated electrical facilities are routinely studied, approved, and operated in the Project area. The Project does not represent a threat to any violation of federal, state, or local law or requirements imposed for the protection of the environment. The proposed Project and the EA were prepared in accordance with the following statutes and implementing regulations, policies, and procedures:

- National Environmental Policy Act (NEPA) of 1969, as amended (Public Law 91-190, 42 U.S.C. 4321 et seq.);
- 40 CFR 1500 et seq.: Regulations for Implementing the Procedural Provisions of NEPA;
- BLM NEPA Handbook (H-1790-1) (BLM 2008a);
- Federal Land Policy and Management Act, as amended, Sections 103(c) and 501 (a)(4);
- National Historic Preservation Act, as amended (16 USC 40 et seq.);
- Boulder City Master Plan (Boulder City 2003)

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- Clark County Multiple Species Habitat Conservation Plan (Clark County 2000); and
- Las Vegas Resource Management Plan (RMP) and Final Environmental Impact Statement (BLM 1998).

With regard to the NDOW Energy Planning and Conservation Fund and the Fund for Recovery of Costs as set forth in N.R.S. 701.600 – 701.640, on January 18, 2013 Applicant filed a response to the Procedural Order issued by the PUCN in Docket 08-12010 conveying the determination of the Attorney General's Office that since Applicant's applications for the Project with the Commission and BLM predate the law becoming effective, Applicant was not required file an application with NDOW.

1. ***All permits, licenses, and approvals the applicant has obtained, including copies thereof (NAC 703.423(11)(a)).***

Permits, licenses, and approvals that Applicant has obtained are listed in Exhibit 12.

2. ***All permits, licenses and approvals the applicant is in the process of obtaining to commence construction of the proposed utility facility. The applicant must provide an estimated timelines for obtaining these permits, licenses, and approvals (NAC 703.423(11)(b)).***

Permits, licenses, and approvals that the Applicant is in the process of obtaining to commence construction of the Project, as well as the estimated timing of completion, are listed in Exhibit 13.

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L. (NAC 703.423(12) An Explanation of How the Proposed Utility Facility will Serve the Public Interest

1. ***The economic benefits that the proposed utility facility will bring to the applicant and this state (NAC 703.423(12)(a)).***

The Project brings benefits to the applicant through long term capital returns and recovery of project development costs, capital costs, and operating costs. Importantly the Project brings numerous benefits to the state of Nevada including:

- Enables the development of new renewable energy resources including wind, solar, hydro and geothermal, that otherwise may remain untapped.
- Enables the development of new base load and intermediate load resources in the State.
- Provides opportunities for the export of power generated in Nevada.
- Increases opportunities to grow the new Energy Imbalance Markets, including the export of flexible generation resources from Nevada.
- Provides improved reliability for Nevada and the Western Grid by increasing overall transmission capacity and acting as a hedge against potential contingency or alternative scenarios (e.g., major forced outages of generation or transmission, abnormally high peak periods, fossil fuel price spikes, abnormal weather conditions, high CO2 prices).
- Enables the Western Grid to operate more efficiently, reducing congestion and costs for consumers.
- Provides deliverability options for new solar development in the Harry Allen and Boulder City areas.
- Brings direct economic benefits to Clark County and surrounding counties in the form of construction activity, property taxes and sales/use tax revenues.
- Fosters future economic development in the state and region by increasing access to affordable and reliable electricity, availability of bulk transmission capacity, and renewable resource development.
- Enhances the ability of Nevada to benefit from periods of over-generation in California due to an excess of renewable generation through stronger ties with the CAISO.

- Demonstrates that Nevada is a leader in progressive transmission and renewable energy development in the west.

The importance and need for this Project and the resulting benefits have been cited by:

- Governor Brian Sandoval (see Exhibit 14)
- California Independent System Operator (see Exhibit 15)
- Senator Harry Reid (see Exhibit 16)

2. ***The nature of the probable effect on the environment in this state if the proposed utility facility is constructed (NAC 703.423(12)(b)).***

Section G of this Amended Application describes the nature of the probable effect on the environment in this state if the proposed utility facility is constructed. BLM concluded that the impacts of the Project will be not significant and determined that a more rigorous Environmental Impact Statement was not required.

3. ***The nature of the probable effect on the public health, safety, and welfare of the residents of this state if the proposed utility facility is constructed (NAC 703.423(12)(c)).***

As outlined in Section G of this Amended Application and further described in the Environmental Assessment, Finding of No Significant Impact and Decision Record, the nature of the probable effect on the public health, safety, and welfare of the residents of this state if the proposed utility facility is constructed are not significant. Implementation of the Project would not result in potentially substantial or adverse impacts to public health and safety. The design, construction, and operation of the Project will be required to be in compliance with the National Electric Safety Code and all other applicable health and safety regulations and requirements. Transmission lines

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and associated electrical facilities are routinely studied, approved, and operated in the region. In general, the effects of these facilities are not considered to be highly uncertain or involve unique risks, especially when constructed within utility corridors. The analysis in the EA has not shown that there would be any unique or unknown risks to the human environment.

4. ***The interstate benefits expected to be achieved by the proposed electric transmission facility in this state, if applicable (NAC 703.423(12)(d)).***

In addition to the benefits for Nevada, the Project will provide increased export capacity from Nevada to benefit adjacent states in the Western Grid through a new 500 kV path between Eldorado and Harry Allen. Furthermore, as described by the CAISO in their memo dated December 10, 2014, a new path from Harry Allen to Eldorado would provide significant benefits to California ratepayers through reducing congestion on the CAISO electrical system resulting in production cost savings and capacity cost savings (see Exhibit 15). California is expected to experience periods of over generation during certain parts of the day given the mismatch between load and the installed solar generation resources. The Project will aid in Nevada being well positioned to benefit from this situation by creating additional transmission capacity between Nevada and California.

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IV. CONCLUSION AND REQUEST FOR RELIEF

Based upon the Initial Application and Amended Application, and any other amendment or supplement thereto, Applicant respectfully requests the Commission approve and issue a permit to construct under UEPA for the Project. Applicant reserves the right to amend and supplement this Amended Application as permitted and contemplated pursuant to NRS 704.820 to 704.900 and NAC 703.415 to 703.427.

DATED: This 23 day of December, 2014.

McDONALD CARANO WILSON LLP

By _____

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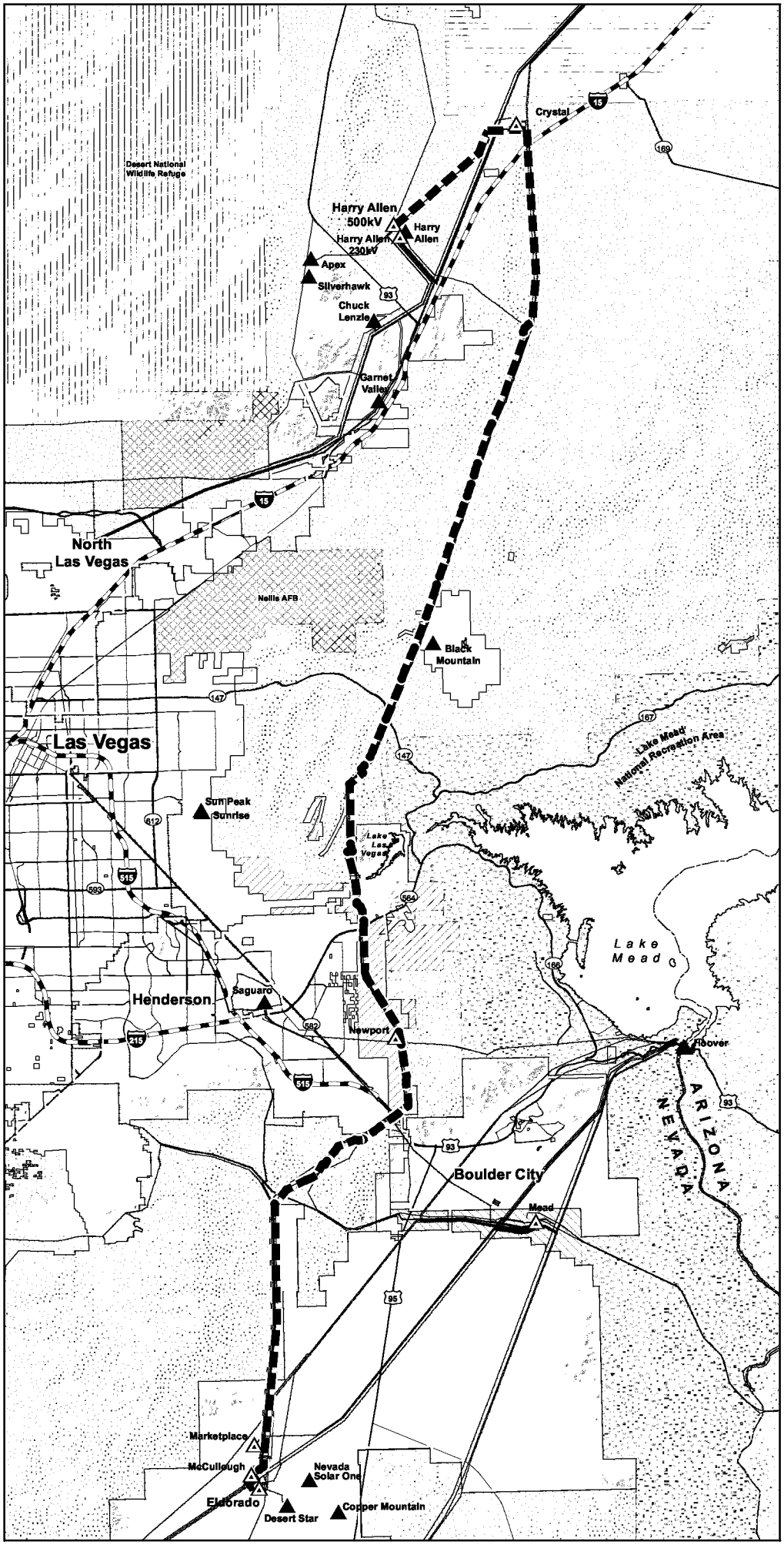
EXHIBIT 1

EXHIBIT 1



Southern Nevada Intertie Project
500kV Transmission Line

Great Basin Transmission, LLC

Project Features

- Proposed Transmission Line
- Substation
- Generation Station

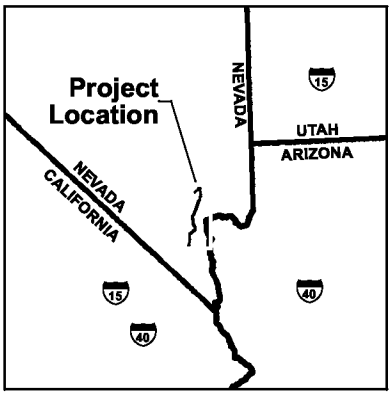
Transmission Lines

- Transmission Line > 230kV

Land Ownership and Designations

- Tribal Land
- Bureau of Land Management
- Bureau of Reclamation
- Department of Defense
- Department of Energy
- Fish and Wildlife Service
- National Park Service
- Private
- City Boundary

REGIONAL LOCATION



0 4 8 Miles

December 2014

Sources
USGS, 30-meter pixel elevation data
Great Basin Transmission LLC, Transmission line, generation station, and substation data
BLM, Land ownership and land management data

S:\EPG\GeospatialProjects\LS_Power\SNIPI\2012\MXD\Project_Area_ProposedAction_BW_8_11_full.mxd

EXHIBIT 2

EXHIBIT 2

BLM

U.S. Department of the Interior
Bureau of Land Management

Draft Environmental Assessment
DOI-BLM-NV-S010-2010-0091-EA
May 2012

Southern Nevada Intertie Project

APPLICANT

Great Basin Transmission, LLC

GENERAL LOCATION

Clark County, Nevada

BLM CASE FILE SERIAL NUMBER

NVN-086359

PREPARING OFFICE

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Bureau of Land Management
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CHAPTER 1. INTRODUCTION

Great Basin Transmission, LLC (Great Basin), a Delaware limited liability company, has filed joint right-of-way (ROW) applications with the Bureau of Land Management (BLM) – Southern Nevada District Office and U.S. Bureau of Reclamation (Reclamation) for the construction, operation, and maintenance of a new 500-kilovolt (kV) overhead transmission line (Proposed Action). The transmission line would stretch between a northern terminus at NV Energy's 500 kV Harry Allen Substation (approximately 20 miles northeast of Las Vegas) and a southern terminus at the existing 500 kV Eldorado Substation in Eldorado Valley; both in Clark County, Nevada. The proposed project, known as the Southern Nevada Intertie Project (SNIP), would interconnect existing and planned transmission facilities in southern Nevada in order to provide:

- New access in Southern Nevada to the regional electricity market for existing and proposed power generation facilities
- Economical transmission service to foster the development of new renewable energy resources
- A new energy pathway to reduce congestion on the existing transmission grid and increase regional transmission system reliability
- Increased import and export capacity for regional transmission systems in Nevada to help place downward pressure on electricity prices

The SNIP would cross unreserved federal lands managed by the BLM, requiring a ROW grant, and federal lands withdrawn for Reclamation project purposes and managed by Reclamation, requiring a right-of-use (ROU) authorization. The BLM has identified the Southern Nevada District Office as the lead office for processing Great Basin's BLM ROW application and for associated compliance with the National Environmental Policy Act of 1969 (NEPA); Reclamation will be a NEPA cooperating agency. The BLM and Reclamation have determined that an environmental assessment (EA) will be prepared to assist with identification of any potentially significant impacts that could result from implementation of the Proposed Action, and in making the final determination for any federal action.

The EA provides a site-specific analysis of environmental impacts that could result from the implementation of the Proposed Action, and from any reasonable alternatives to the Proposed Action. The EA also considers the No Action alternative.

If the BLM and Reclamation determine that "no significant impact" would result from the Proposed Action (and taking into account any committed mitigation measures), each agency would issue its own Finding of No Significant Impact (FONSI). If the BLM issues a FONSI, it would also issue a decision record (DR), either approving or denying the requested authorization. Reclamation does not issue DRs. Reclamation's approval of the project would be granted by signing the FONSI and by the execution of an ROU authorization. If significant impacts are identified, an environmental impact statement (EIS) would be prepared.

1.1. Identifying Information

1.1.1. Title, EA Number, and Type of Project

Southern Nevada Intertie Project, DOI-BLM-NV-S010-2010-0091-EA, Right-of-Way Project.

1.1.2. Location of Proposed Action

The proposed project is a 500 kV transmission line stretching between a northern terminus at the Harry Allen Substation located in Dry Lake, Nevada (approximately 20 miles northeast of Las Vegas) and a southern terminus located at the existing Eldorado Substation located in Eldorado Valley, Nevada (a total project distance of approximately 60 miles). The northern terminus will be located in Section 35, Township 17S, Range 63E, and the southern terminus will be located in Section 12, Township 25S, Range 62E.

The project alignment will generally follow existing transmission facilities and designated utility corridors, including the West-wide Energy Corridor (a 3,500-foot-wide multimodal corridor that passes through most of the project area) and the Sunrise Corridor (an area where West-wide Energy Corridor narrows to approximately 500 feet as it passes through the Sunrise Mountain Instant Study Area [ISA] just east of Las Vegas). The Proposed Action will be located within Clark County, Nevada, primarily on public lands managed by the BLM and Reclamation. Approximately 7.6 miles of the line would pass just inside the eastern boundary of the city limits of Henderson, while approximately 4.0 miles would pass just inside the western boundary of the city limits of Boulder City.

1.1.3. Name and Location of Preparing Office

Southern Nevada District – Las Vegas Field Office
4701 N. Torrey Pines Drive
Las Vegas, Nevada 89130

1.1.4. Identify the Case File Number

Case file number NVN-086359

1.1.5. Applicant Name

Great Basin Transmission, LLC

1.2. Purpose and Need for Action

1.2.1. Background

Great Basin submitted an amended ROW application to the BLM – Southern Nevada District Office on March 10, 2010, and to the Reclamation – Lower Colorado Region on April 21, 2010. The applications requested authorization to use federal lands (BLM and Reclamation) for the construction, operation, and maintenance of a 500 kV transmission line that would provide a new

energy pathway to support current and future electrical demands by establishing a high-voltage electrical interconnection between the Harry Allen and Eldorado substations. According to Great Basin, the Proposed Action would create (1) new access in Southern Nevada to the regional electricity market for existing and proposed power generation facilities; (2) economical transmission service to foster the development of new renewable energy resources; (3) a new energy pathway to reduce congestion on the existing transmission grid, increasing regional transmission system reliability; and (4) increased import and export capacity for regional transmission systems to help place downward pressure on electricity prices.

1.2.2. BLM Purpose and Need

The BLM's proposed action is approval of Great Basin's ROW application, which would authorize construction, operation, and maintenance of a 500 kV transmission line as described above. The purpose and need for the BLM's proposed action arises under Title V of the Federal Land Policy and Management Act of 1976 (FLPMA), which gives the Secretary of the Interior authorization to grant, issue, or renew ROWs for systems for generation, transmission, and distribution of electric energy (43 United States Code [USC] § 1761). The BLM is required by FLPMA and other legislation to consider and respond to Great Basin's application for a ROW across public land. In considering the application, the BLM must apply a *multiple-use* management approach, generally defined as "management of the public lands and their various resource values so that they are utilized in the combination that will best meet the present and future needs of the American people." The BLM's purpose and need, and its consideration of Great Basin's ROW application, is further guided by the Energy Policy Act of 2005 (EPAct), which recognized the need to improve domestic energy production, develop renewable resources, and enhance the infrastructure (e.g., transmission lines) for collection and distribution of energy resources across the nation.

1.2.3. Reclamation Purpose and Need

Reclamation's proposed action is approval of an ROU authorization to Great Basin to construct, operate, and maintain a 500 kV transmission line as described above. Similar to the BLM, the purpose and need for Reclamation's proposed action arises under the need to respond to Great Basin's application for an ROU authorization on Reclamation managed lands. It is Reclamation's responsibility under the Act of Congress of June 17, 1902 (32 Stat.388), the Act of Congress approved August 4, 1939 (53 Stat. 1187), Section 10, and 43 Code of Federal Regulations (CFR) Part 429 to respond to a request for ROU authorization on Reclamation-administered federal lands.

1.3. Decisions to be Made

This EA provides the information and environmental analysis necessary to inform the BLM, Reclamation, and the public about the potential environmental consequences of the Proposed Action and alternatives. If the EA results in a FONSI, the BLM's decision will be to:

- Issue DRs that approve all or a portion of the Proposed Action or alternative, and issue a ROW grant and ROU to the applicant;

- Issue DRs that approve all or a portion of the Proposed Action or alternative, and issue a ROW grant and ROU with additional mitigation measures; or
- Issue a DR that denies the ROW/ROU application.

Reclamation's decision will be to:

- Issue an ROU to the applicant that includes all or a portion of the Proposed Action, with any applicable mitigation.

If the BLM or Reclamation determines that impacts of the Proposed Action or alternative would be significant, despite the application of reasonable mitigation, an EIS would be prepared.

1.4. BLM and Reclamation Policies, Plans, Authorizing Actions, and Permit Requirements

1.4.1. BLM

Applications for commercial electric power transmission lines on BLM-administered lands are processed as a ROW authorization under Title V of FLPMA. Title V states that in "...designating right-of-way corridors and in determining whether to require that the right-of-way be confined to them, [BLM] shall take into consideration national and state land use policies, environmental quality, economic efficiency, national security, safety, and good engineering and technological practices." The FLPMA further directs that each ROW grant contain terms and conditions to protect federal property and economic interests, protect lives and property, and otherwise protect the public interest in the lands traversed by the ROW or adjacent to them (43 USC § 1765). These FLPMA Title V ROW provisions are implemented by the BLM through regulations codified at 43 CFR Part 2800.

The Proposed Action must be consistent with the BLM Las Vegas Resource Management Plan (RMP)/EIS, which was approved by Record of Decision (ROD) on October 5, 1998 (BLM 1998). The RMP/EIS has been reviewed, and it has been determined that the Proposed Action conforms with land use plan decision RW-1, RW-1-e, RW-1-h, under the authority of Section 28 of the Mineral Leasing Act of 1920, as amended (30 USC 185); and the FLPMA, as amended (43 USC 1761 et seq.).

1.4.2. Reclamation

Applications for the placement, construction, and use of infrastructure, including utility facilities on Reclamation-managed lands, are processed through an ROU authorization per 43 CFR 429. In reviewing applications for a use authorization, Reclamation will consider 43 CFR 429. A Reclamation ROU authorization includes terms and conditions intended to protect the interests of the United States and reserve the rights of Reclamation to construct, operate, and maintain public works as authorized by Congress.

The Proposed Action will be located within a designated West-wide Energy Corridor across Reclamation-managed lands. West-wide Energy Corridors were established on certain federal lands pursuant to Section 368 of the EPAct (Public Law 109-58). The EPAct directs that

applications to construct certain utility facilities, including electrical transmission and distribution facilities, within these corridors be expedited.

1.4.3. NEPA Regulations and Guidance

This EA was prepared in compliance with: Council for Environmental Quality (CEQ) regulations for implementing the NEPA (40 CFR § 1500-1508); Department of the Interior regulations for implementing NEPA (43 CFR Part 46); BLM NEPA Handbook, H-1790-1; BLM Land Use Planning regulations (43 CFR § 1600); BLM Land Use Planning Handbook (BLM Handbook H-1601-1); and Reclamation's 2012 NEPA Handbook.

In addition to conformance with the NEPA, FLPMA, and Las Vegas RMP, the Proposed Action would comply with other applicable federal, state, and local statutes, regulations, and plans. Table 1-1 identifies the federal and state agencies with potential jurisdiction over the Proposed Action, and the potential permits that may be needed based on final design.

Table 1-1. Permits Potentially Required for the Proposed Action

Action Requiring Permit, Approval, or Review	Permit/Approval	Accepting Authority/ Approving/ Consulting Agency	Statutory/Regulatory Reference
FEDERAL			
ROW over land under federal management	ROW Grant	BLM	FLPMA 43 USC 1761-1771 and 43 CFR Part 2800
	ROU	Reclamation	Acts of June 17, 1902 and August 4, 1939, as amended and 43 CFR Part 429
NEPA compliance to grant ROW	EA/FONSI/DR	BLM and Reclamation	NEPA, 42 USC 4321-4327; CEQ 40 CFR Part 1500
BLM grant of ROW, Reclamation ROU	NHPA Compliance	Nevada SHPO	NHPA, 16 USC 47 (Section 106), 36 CFR Part 800,
BLM grant of ROW, Reclamation ROU	ESA Compliance by BLM (lead) and Reclamation; consultation with USFWS, Biological Opinion	USFWS	ESA, 16 USC 1539, 50 CFR Part 17,)
Tower location and height relative to air traffic	"No Hazard Declaration" required if structure is more than 200 feet in designated airport areas	Federal Aviation Administration	49 USC 1501 14 CFR Part 77
Dredge or fill activities in waters of the United States	Clean Water Act Section 404 Permit	USACE	Clean Water Act, 33 USC 1344 (Section 404)
STATE OF NEVADA			
Construction of Utility Facilities	Utility Environmental Protection Act – Permit to Construct	Public Utilities Commission of Nevada	NRS 704.870 NAC 703.423

Table 1-1. Permits Potentially Required for the Proposed Action			
Action Requiring Permit, Approval, or Review	**Permit/Approval**	**Accepting Authority/ Approving/ Consulting Agency**	**Statutory/Regulatory Reference**
Handling of protected Wildlife	Desert Tortoise and Gila Monster Handling Permit/Authorization	Nevada Department of Wildlife	NAC 503.093
Disturbance or destruction of critically endangered plants	Conditional Permit	Nevada Division of Forestry	NAC 527.17
Impacts to water quality associated with discharges of dredged or fill materials in waters of the United States	401 Water Quality Certification, Clean Water Act	NDEP	33 USC 1344
Construction activities that result in the discharge of stormwater to waters of the state	Compliance with Stormwater General Permit	NDEP Bureau of Water Pollution Control	40 CFR Section 122.26(b)(14)
Crossing state or US highways	Encroachment Permit	NDOT	NRS 408.423(1); NAC 408.403, 408.427
LOCAL			
Construction and Operation	Special Use Permit	Clark County Board of Commissioners	Clark County Code
	Special Use Permit	City of Henderson Board of Commissioners	City of Henderson, Development Code
	Excavation Permit	City of Boulder City	City Code, Title 9
Construction/Fugitive Dust (PM_{10})	Dust Control Permit	Clark County Department of Air Quality and Environmental Management	Clean Air Act of 1977 and Amendments NRS 321.001, 40 CFR Subpart C, 42 USC 7408, 42 USC 7409
ESA – Endangered Species Act NAC – Nevada Administrative Code NDEP – Nevada Division of Environmental Protection NDOT – Nevada Department of Transportation NHPA – National Historic Preservation Act of 1966		NRS – Nevada Revised Statutes SHPO – State Historic Preservation Office USACE – U.S. Army Corps of Engineers USFWS – U.S. Fish and Wildlife Service	

1.4.4. Indian Trust Assets

Indian Trust Assets (ITA) are legal interests in property held in trust by the United States for Indian tribes or individuals. The Secretary of the Interior, acting as the trustee, holds many assets in trust. Examples of objects that may be trust assets are lands (including tribal trust, fee title, and allotted lands); minerals; hunting and fishing rights; and water rights. While most ITAs are on reservations, they may also be found off reservations. The United States has a trust responsibility to protect and maintain rights reserved by or granted to Indian tribes or Indian individuals by treaties, statutes, and executive orders. These are sometimes further interpreted through court decisions and regulations. No ITAs have been identified in the proposed ROW area.

1.4.5. Indian Sacred Sites

Executive Order 13007 and 512 DM 3 require federal executive branch agencies with statutory or administrative responsibility for the management of federal lands to accommodate access to and ceremonial use of Indian sacred sites by Indian religious practitioners, and avoid adversely affecting the physical integrity of such sacred sites. A "sacred site" is a "specific, discrete, narrowly delineated location on federal land that is identified by an Indian tribe, or Indian individual determined to be an appropriately authoritative representative of an Indian religion, as sacred by virtue of its established religious significance to, or ceremonial use by, an Indian religion; provided that the tribe or appropriately authoritative representative of an Indian religion has informed the agency of the existence of such a site" (512 DM 3: Section 3.3C). If a sacred site is identified (e.g., during tribal consultation), the federal agency must identify and analyze the potential effects its proposed actions, decisions, or activities may have with regard to the physical integrity of sacred sites or that may affect use of and/or access to known sites.

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CHAPTER 2. PROPOSED ACTION AND ALTERNATIVES

2.1. Introduction

This chapter includes a detailed description of the Proposed Action and alternatives carried forward or eliminated from detailed consideration. Considerations for siting the alignment of the proposed project included use of existing BLM-designated utility corridors, most direct pathways, existing access roads and trails, and avoiding sensitive environmental resources. Because it is possible to locate the project within existing BLM utility corridors adjacent to other high-voltage transmission lines and existing access roads, for the majority of its length, no alternatives were evaluated outside of this corridor. Field investigations have been conducted by Great Basin to determine potential resource impacts as a result of the proposed project. The Proposed Action, Alternative 1, and the alternative routing areas are illustrated on figures 2-1 and 2-2.

2.2. No Action Alternative

Evaluation of the No Action alternative is addressed in 40 CFR 1500-1508. Under the No Action alternative, the new 500 kV electrical transmission line and associated infrastructure would not be constructed, and a new high-voltage electrical transmission line between the Harry Allen and Eldorado substations would not be constructed as part of this project. Without construction and operation of the proposed project, the conditions of the project area would remain the same and the potential environmental impacts associated with construction, operation, and maintenance of the proposed project would not occur. The new pathway to access the regional electricity market would not be available to foster development of new renewable energy resources.

2.3. Proposed Action

The proponent's Proposed Action is the construction and operation of a 500 kV single- or double-circuit alternating current (AC) transmission line stretching between a northern terminus at the Harry Allen Substation located in Dry Lake, Nevada (approximately 20 miles northeast of Las Vegas) and a southern terminus located at the Eldorado Substation located approximately 14 miles southwest of the city center of Boulder City, Nevada (a total project distance of approximately 60 miles) (see figures 2-1 and 2-2).

With minor exceptions, the proposed project alignment will be inside the existing 3,500-foot-wide multimodal BLM utility corridor (West-wide Energy Corridors on Federal Lands Final Programmatic EIS and ROD 2008) that contains a number of existing utility facilities. Specifically, portions of the utility corridor contain two 500 kV AC transmission lines, one 69 kV transmission line, one 500 kV direct current (DC) transmission line, and a number of underground water and natural gas pipelines. The proposed project alignment would parallel these existing facilities to the extent viable for the length of the proposed project. Due to the configurations of the existing transmission lines within the corridor, Great Basin has identified three routing areas in which site-specific routing would be necessary to accommodate the existing utility facilities within the corridor. These areas are described in sections 2.5 through 2.7 below.

The Proposed Action consists of approximately 60 miles of new single- or double-circuit 500 kV transmission structures from the Harry Allen Substation to the Eldorado Substation. The transmission line would be located inside a 200-foot-wide (100 feet on either side of center) ROW that consists primarily of federal lands with some private easements. The new structures would parallel, to the extent practicable, the existing electric transmission facilities within the utility corridor, and the majority of the transmission line is proposed to be constructed approximately 200 feet from the closest parallel transmission line. Engineering constraints may require deviations from this 200-foot separation in certain areas along the transmission line; these specific areas would be determined as part of final engineering. A 400-foot separation from approximately mile 13.5 to 29.5 is intended to allow for a future transmission line to be constructed between the Harry Allen to Mead and SNIP 500 kV lines, and utilize the open position on the 18 miles of existing double-circuit Harry Allen to Mead structures through the Sunrise ISA, Rainbow Gardens Area of Critical Environmental Concern (ACEC), and portions of Henderson, Nevada.

2.4. Alternative 1 – Using 18 Miles of Open Position on the Existing Harry Allen to Mead Double-circuit Structures

Great Basin has executed an agreement with NV Energy that would allow Great Basin to utilize the open position of the double-circuit transmission towers associated with NV Energy's previously approved and constructed Harry Allen to Mead 500 kV transmission line project, in the event that Great Basin is unable to obtain a new BLM ROW in the 500-foot-wide utility corridor that bisects the Sunrise ISA. This alternative includes the construction of approximately 42 miles of new single- or double-circuit structures. Approximately 26.5 miles of new transmission alignment would be constructed from the Harry Allen Substation to a point north of the Sunrise ISA, where the existing Harry Allen to Mead 500 kV transmission line double-circuit structures begin. At this location, the SNIP 500 kV conductors would be placed on the existing double-circuit structures for approximately 18 miles. Upon exiting the Harry Allen to Mead double-circuit structures, approximately 14.5 miles of new transmission alignment would be constructed for the remainder of the route south to the Eldorado Substation. The new structures would parallel, to the extent practicable, the existing electric transmission facilities within the utility corridor, and the line is proposed to be constructed approximately 200 feet from the closest parallel transmission line. Engineering constraints may require deviations from this 200-foot separation in certain areas along the transmission line; these specific areas would be determined as part of final engineering.

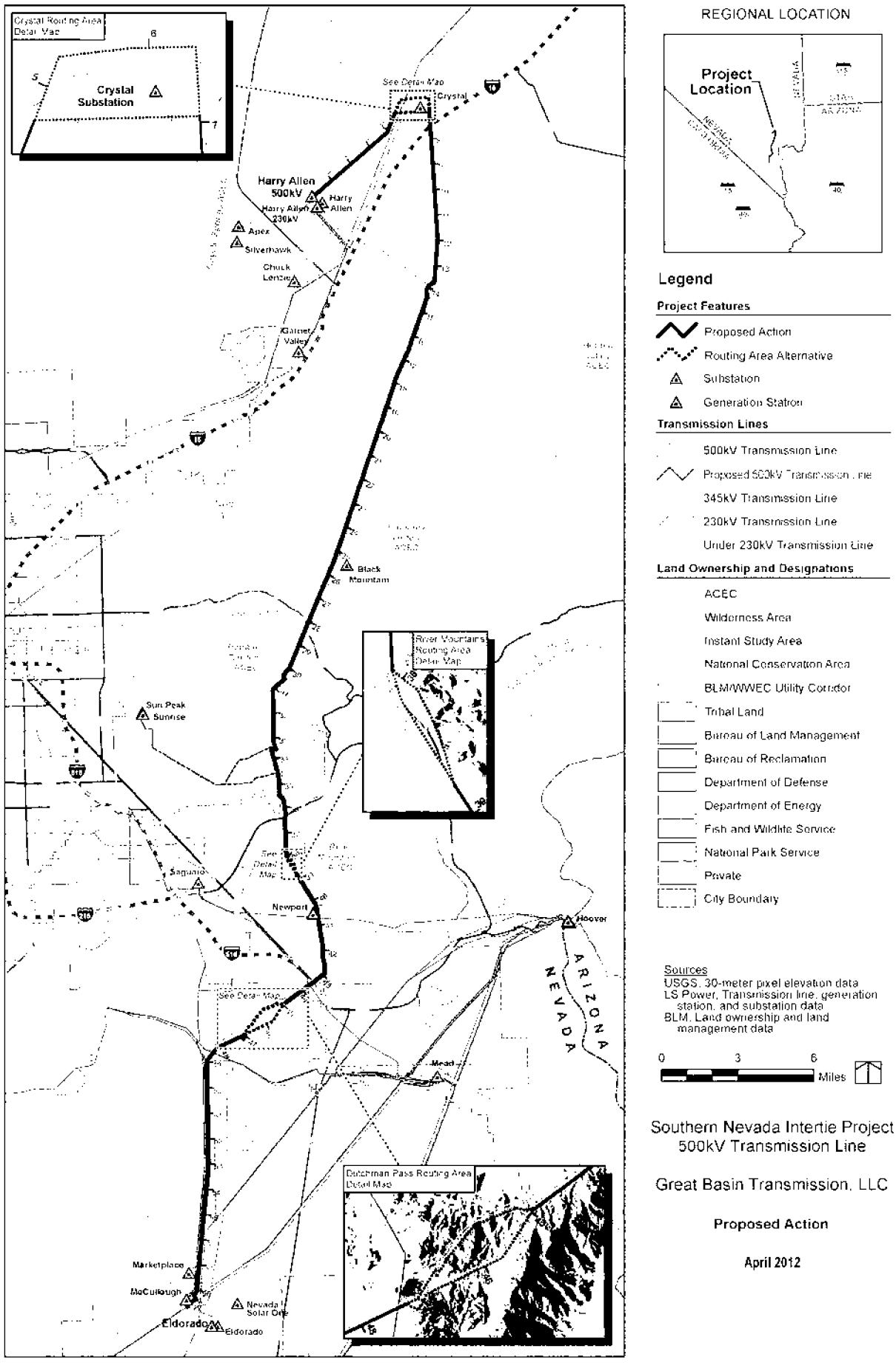

Figure 2-1. Project Area – Proposed Action

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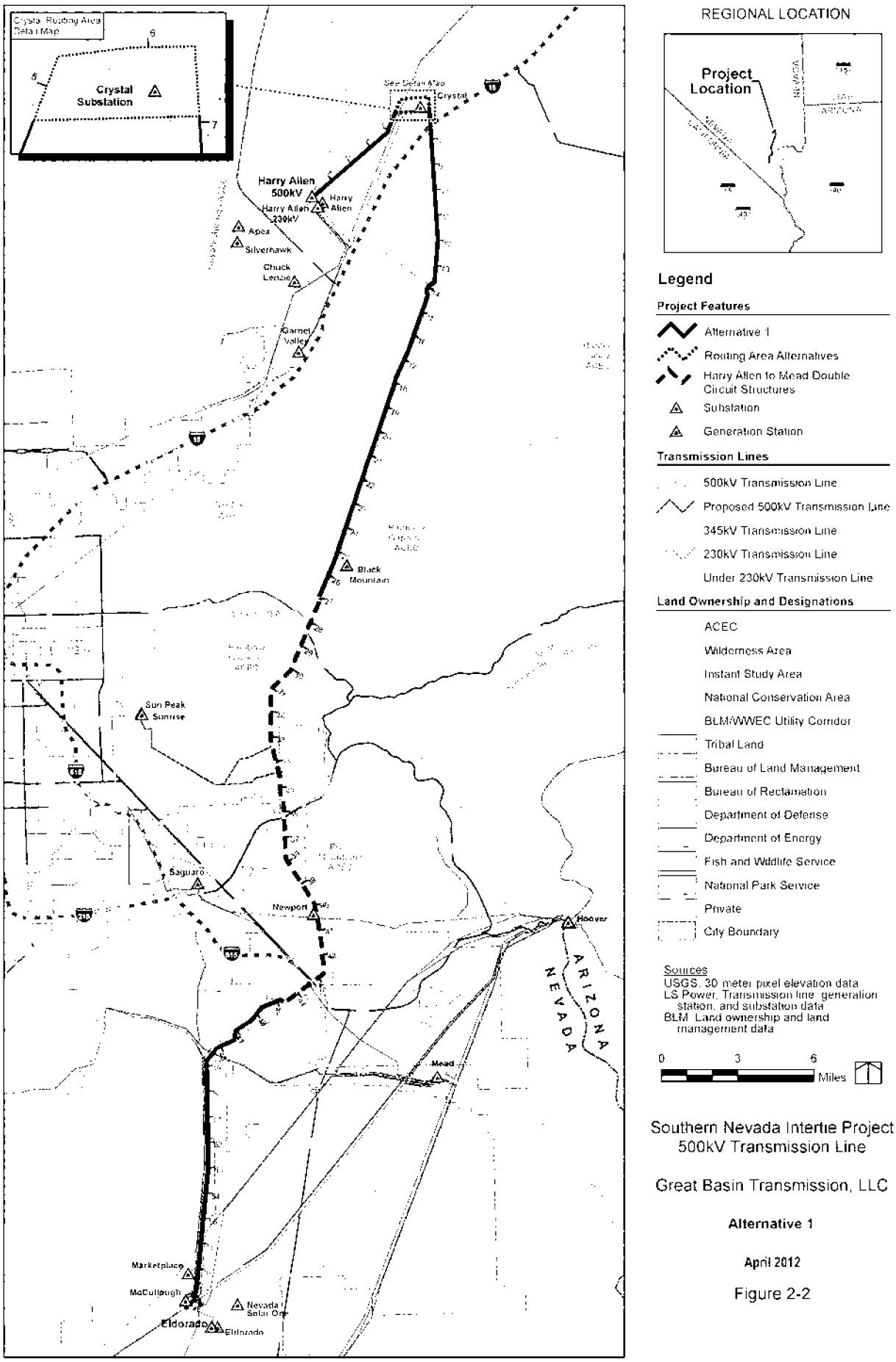

Figure 2-2. Project Area – Alternative 1

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2.5. Crystal Substation Alternative Routing Area

The Crystal Substation Alternative Routing Area is located on BLM land approximately 5 miles from the northern terminus. The proposed transmission line leaves Harry Allen Substation and goes northeast towards the Crystal Substation, paralleling existing transmission lines (see figures 2-1 and 2-2). While no interconnection at Crystal Substation is planned, the project must pass near the Crystal Substation in order to remain adjacent to existing transmission facilities and enter the main north-south utility corridor. Due to multiple existing parallel transmission lines in this area, the final design of the SNIP line may dictate an alignment on either the north or the south side of Crystal Substation. This routing area is relevant to the Proposed Action and Alternative 1.

2.6. River Mountains Alternative Routing Area

The River Mountains Alternative Routing Area is located on land managed by Reclamation at approximately mile marker 38 (see Figure 2-1). A stormwater channel and detention basin has been constructed within the utility corridor immediately east of the existing transmission facilities. The infrastructure of the stormwater channel and detention basin and its associated spoil pile may hinder the placement of the SNIP line 200 feet from the adjacent Harry Allen to Mead line; final engineering will determine whether the SNIP line will be placed on the east or west side of this detention basin. The River Mountains routing alternatives would only be considered as a part of the Proposed Action, as they are located along the Harry Allen to Mead existing double-circuit structures, and Alternative 1 would utilize these structures.

2.7. Dutchman Pass Alternative Routing Area

The Dutchman Pass Alternative Routing Area is located on BLM land at approximately mile marker 45 (see Figure 2-1). The routes of the existing transmission lines within this area diverge for approximately 2 miles: the Crystal to McCullough 500 kV line follows a route higher in elevation through Dutchman Pass; the Los Angeles Department of Water and Power (LADWP) 500 kV line and the Harry Allen to Mead 500 kV line follow a route lower in elevation through Dutchman Pass. The proposed alignment of the SNIP line is parallel to the Crystal to McCullough 500 kV line (higher in elevation), as this alignment will only require one major transmission line crossing within this Routing Area. If it is determined that the SNIP line should follow the LADWP 500 kV line and the Harry Allen to Mead 500 kV line (lower in elevation) within the Routing Area, three major transmission line crossings would be required, which would lead to increased project costs. The Dutchman Pass routing alternatives would only be considered as a part of the Proposed Action, as Alternative 1 would be limited in its physical location based on the Harry Allen to Mead double-circuit structures.

2.8. Alternatives Considered But Eliminated

The following alternatives were considered but eliminated from further analysis.

2.8.1. Alternative Paralleling the Northern 5 Miles of the Harry Allen to Mead 500 kV Line

An alternative paralleling the Harry Allen to Mead 500 kV line from the Harry Allen Substation southeast was initially considered. This alternative would be approximately 7 miles shorter than the proposed route and parallels the Harry Allen to Mead 500 kV transmission line southeast from the Harry Allen Substation through the Dry Lake Mountains to the designated utility corridor. Upon examination of this alternative, it was determined that it was not feasible due to physical constraints from the multiple existing transmission lines near the Harry Allen Substation and the topography in the canyon through the Dry Lake Mountains. This alternative was eliminated from further consideration.

2.8.2. Southwest Intertie Project Interconnection Alternative

Great Basin originally considered an alternative that connected the proposed SNIP line to the southern terminus of the Southwest Intertie Project (SWIP), effectively shifting the electrical interconnection of SWIP with NV Energy's transmission system from Harry Allen Substation to Eldorado Substation. The alternative would begin at the southern terminus of the SWIP transmission line and continue south past the Crystal Substation to the designated utility corridor, where it would continue to the Eldorado Substation. This alternative was considered prior to the final results of electrical studies and commercial analyses for the SWIP. However, the electrical studies and commercial arrangement have now been finalized and established for the Southern Portion of the SWIP (now known as "ON Line"), and this alternative for the SNIP line is no longer being considered.

2.8.3. Mead Substation Alternative

Great Basin originally considered an alternative that targeted the Mead Substation as the southern terminus of the SNIP line. The Mead Substation is located approximately 3.5 miles south of Boulder City, Nevada. This alternative would begin at the point where the Harry Allen to Mead 500 kV line diverts from the utility corridor south of Dutchman Pass, and would parallel the Harry Allen to Mead 500 kV line from that point east to the Mead Substation. Based upon the results of electrical and commercial analyses, Great Basin filed an updated Plan of Development (POD) in March 2010 that removed this alternative from further consideration.

2.9. Project Elements Common to the Proposed Action and All Action Alternatives

2.9.1. Facilities Associated with the Proposed Project and Action Alternatives

Typical design characteristics for the project are listed in tables 2-1 through 2-2.

Table 2-1. Proposed Action – Transmission Line Design Specification Summary	
Feature	**Description**
Line Length	Approximately 60 miles of new structures
Type of Structure	Single- or double-circuit
ROW Width	200 feet
Structure Height	90 to 175 feet (single-circuit); 150 to 190 feet (double-circuit)
Average Span Length	Approximately 1,400 feet (single-circuit); 1,000 feet (double-circuit)
Number of Structures	approximately 235 (single-circuit); 305 (double-circuit)
Land Temporarily Disturbed (Estimate)	
Structure Work Area	200 x 200 feet
Wire Pulling/Tensioning Sites (tangent and angle structures, and at certain mid-span locations)	200 x 500 feet
Guard Structures	Minimum area needed to construct guard structures adjacent to roads/electrical lines
Access Roads (Estimate)	
New and Upgraded Roads Required	Up to 24 feet wide (may require additional cut and fill in steeper terrain)
Electrical Properties	
Nominal Voltage	500 kV
Circuit Configuration	Single- or double-circuit
Conductor	Aluminum Conductor Steel Reinforced
Ground Clearance of Conductors	31 feet per National Electrical Safety Code requirements

Table 2-2. Alternative 1 – Transmission Line Design Specification Summary	
Feature	**Description**
Line Length	Approximately 42 miles of new structures and 18 miles of existing structures
Type of Structure	Single- or double-circuit
ROW Width	200 feet
Structure Height	90 to 175 feet (single-circuit); 150 to 190 feet (double-circuit)
Average Span Length	Approximately 1,400 feet (single-circuit); 1,000 feet (double-circuit)
Number of Structures	approximately 155 (single-circuit); 215 (double-circuit)
Structure Work Area	200 x 200 feet
Wire Pulling/Tensioning Sites (tangent and angle structures, and at certain mid-span locations)	200 x 500 feet
Guard Structures	Minimum area needed to construct guard structures adjacent to

Table 2-2. Alternative 1 – Transmission Line Design Specification Summary	
Feature	**Description**
	roads/electrical lines
Access Roads (Estimate)	
New and Upgraded Roads Required	Up to 24 feet wide (may require additional cut and fill in steeper terrain)
Electrical Properties	
Nominal Voltage	500 kV
Circuit Configuration	Single- or double-circuit
Conductor	Aluminum Conductor Steel Reinforced
Ground Clearance of Conductors	31 feet per National Electrical Safety Code requirements

Transmission Line Design

Structures

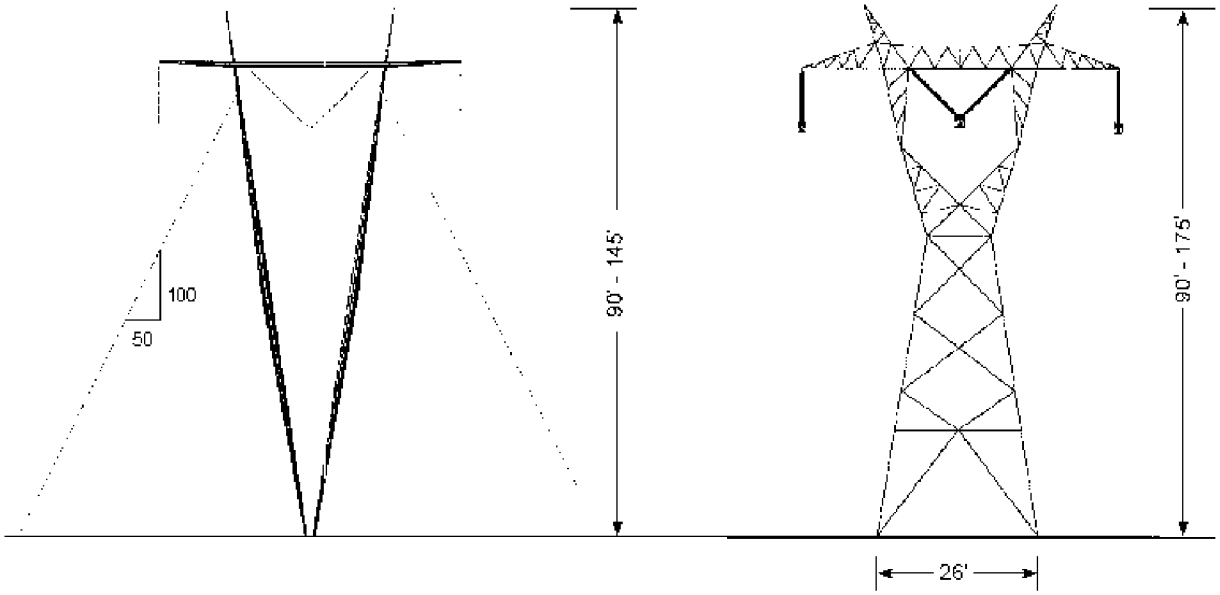
Transmission structures proposed for this project are self-supporting or guyed "V" lattice structures fabricated from unpainted galvanized or Corten steel, and self-supporting or guyed "V" tubular steel structures. Figures 2-3 through 2-7 depict the types of towers under consideration for the project. Structure heights are expected to range between 90 and 190 feet.

Foundations

Self-supporting, steel-lattice towers require four footings, while the steel-lattice or tubular guyed towers require one footing for the tower base and four anchor rods for guy cables. Some foundation and guy anchors would consist of pre-cast concrete footings approximately 4 feet in diameter and 6 feet deep. Due to site-specific characteristics, some foundation and guy anchors would require cast-in-place footings. Self-supporting lattice towers would have cast-in-place concrete footings 3 to 4 feet in diameter and 12 to 24 feet deep.

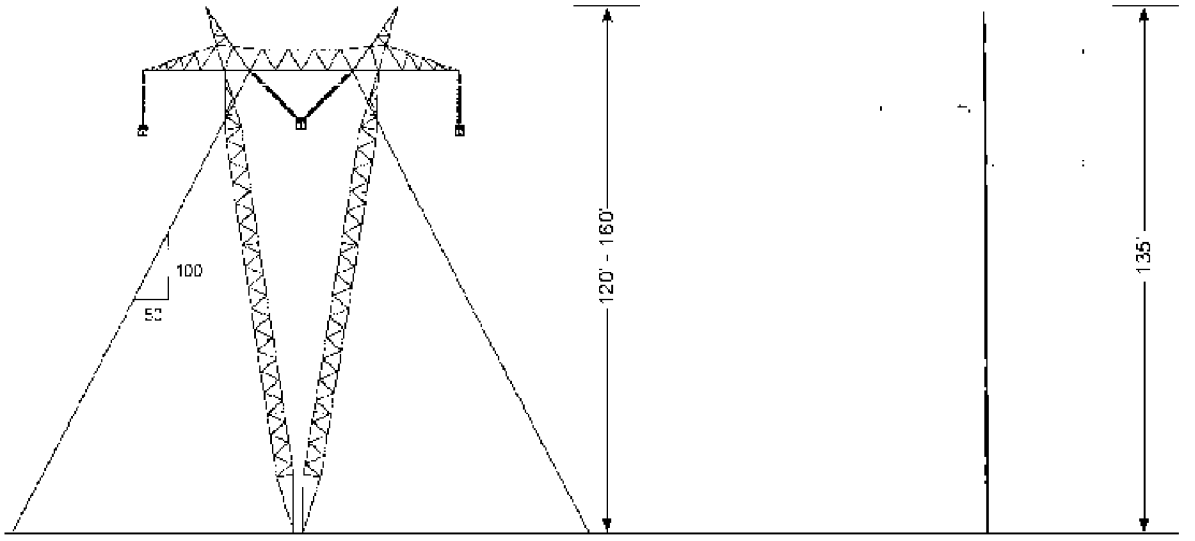
Conductors

The conductor for a circuit would consist of three phases, with a two or three conductor bundle for each phase. The configuration of the conductor bundle would be determined during the engineering design of the project. Spacing between subconductors in a bundle would be approximately 18 inches. Aluminum-trapezoidal or aluminum-stranded nonspecular conductors with a steel-stranded reinforced core would be used. The aluminum carries the majority of the electrical current, and the steel provides tensile strength to support the aluminum strands. Minimum conductor height above the ground for the 500 kV lines would be 31 feet at 212 degrees Fahrenheit in accordance with the National Electrical Safety Code (NESC). The exact height of each tower would be governed by topography and safety requirements for conductor clearance. Alternate materials or designs may be selected to optimize efficiency, reliability, and/or economics.



500kV Transmission Line
Typical Single-Circuit, Guyed V
Tubular Tangent Tower

500kV Transmission Line
Typical Single-Circuit, Self-Supporting, Tangent Tower



500kV Transmission Line
Typical Single-Circuit, Guyed V, Tangent Tower

500kV Transmission Line
Typical 500kV Single Circuit Tangent Steel Pole

Figure 2-3. Typical Single-circuit Tangent Structure

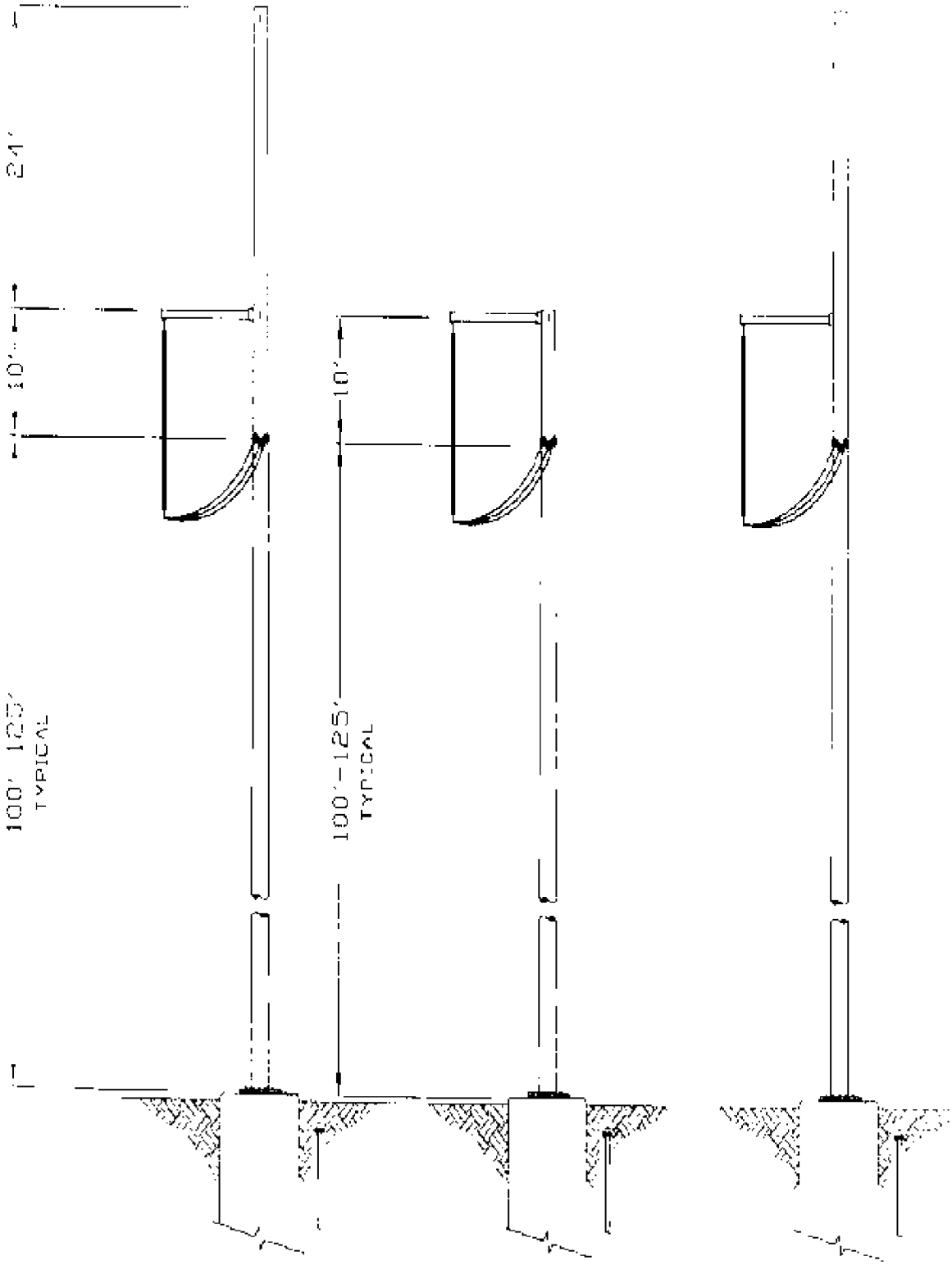


Figure 2-4. Typical 500 kV Monopole Crossing Structures

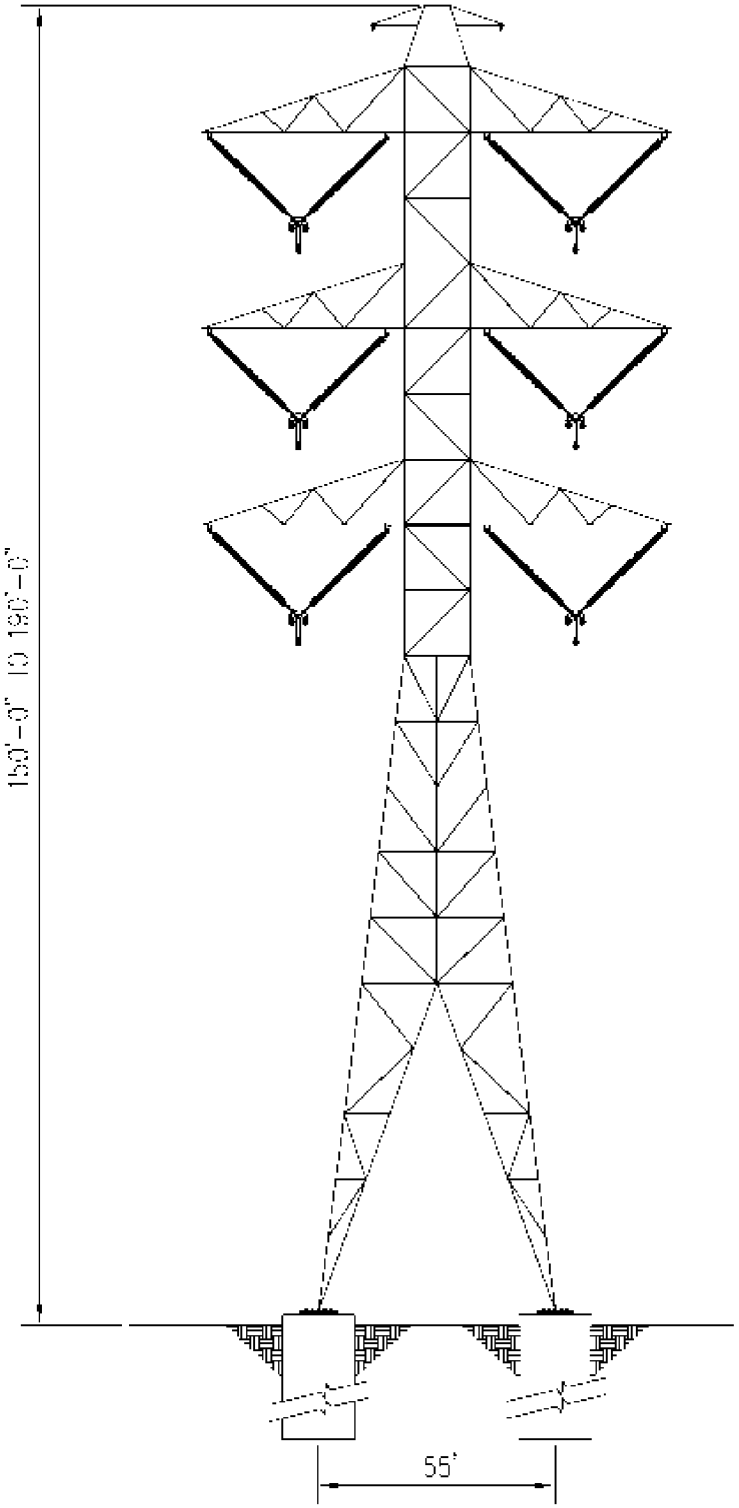


Figure 2-5. Typical 500 kV Double-circuit Lattice Tower

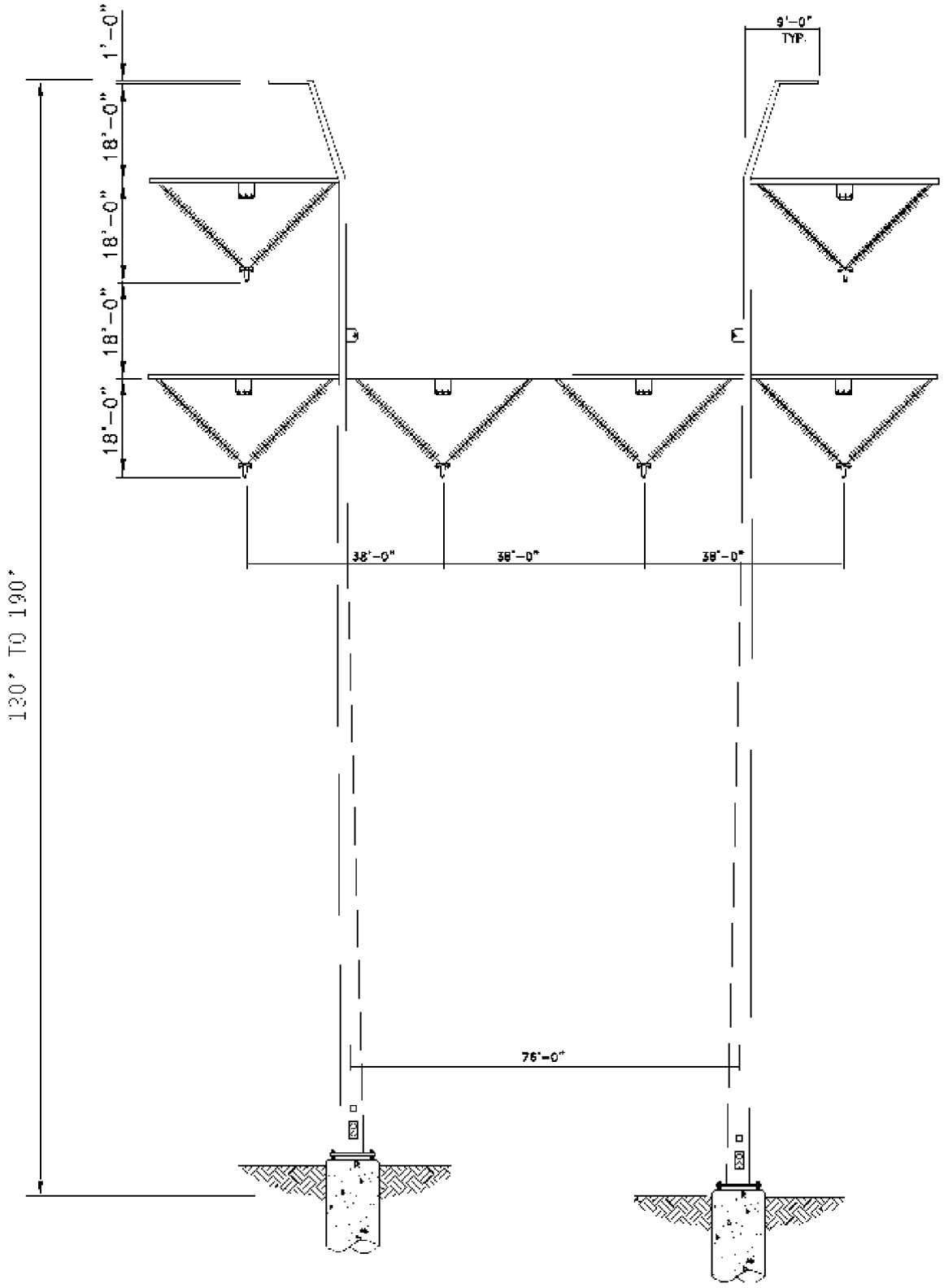


Figure 2-6. Typical 500 kV H-Frame Double-circuit Crossing Structure

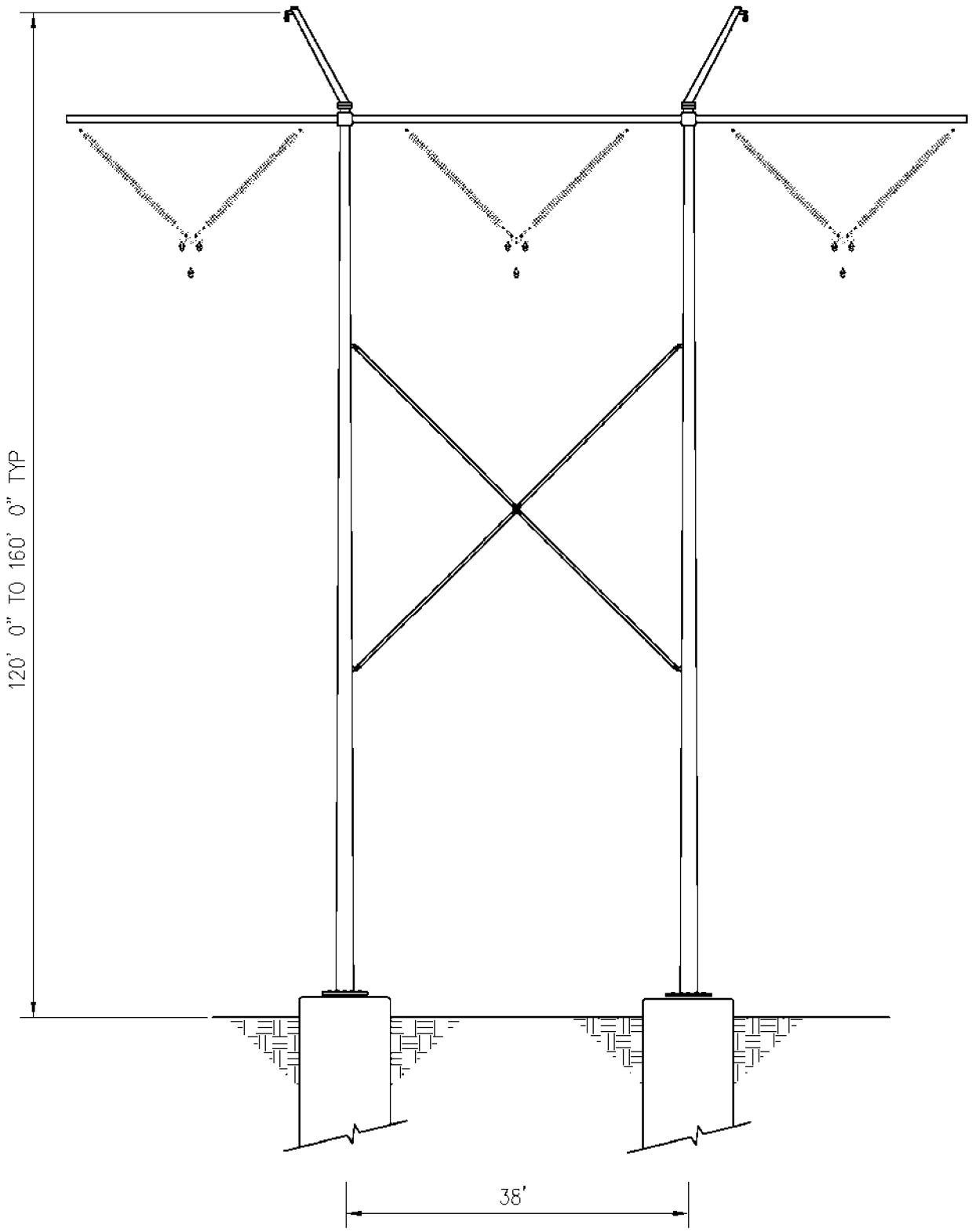


Figure 2-7. Typical 500 kV Single-circuit H-Frame Structure

Insulators and Associated Hardware

Three assemblies of insulators in the form of a "V" or "I" would be used to position and support each of the conductor bundles, while maintaining electrical design clearances between the conductors and the tower. Typically, "V" form insulators will be used for typical 500 kV tangent tower structures, while "I" form insulators will be used for 500 kV dead-end tower structures and double-circuit tangent towers. Some towers may use a combination of both insulator forms.

Fiber Optic Communications

A fiber optic component will be incorporated into the transmission system that could be used for voice and data communication, protective relay telemetering, and for supervisory control and data acquisition. While the project proponent is not seeking to conduct or lease commercial telecommunication services at this time, the system will be designed to accommodate such requests. Given the length of the proposed project, it is not anticipated that regeneration stations will be required. A redundant communications method may also be employed using fiber optic or microwave systems.

Overhead Groundwires

To protect the 500 kV transmission lines from direct lightning strikes, two overhead groundwires, ½-inch in diameter, would be installed on the top of the structures. Current from lightning strikes would be transferred through the groundwires and structures into the ground.

Substations

The proposed project is planned for interconnection at the existing Harry Allen 500 kV Substation at the northern terminus and the existing Eldorado 500 kV Substation at the southern terminus. Expansion will not be required at either substation.

Temporary Construction Yards

Temporary construction yards would be located near the transmission line right-of-way as necessary to support construction activities. These would be up to approximately 40 acres in size and located in previously disturbed sites or in areas of minimal vegetative cover, where possible. All sites would be determined through discussions with land owners or the land management agencies.

The construction yards would serve as field offices, reporting locations for workers, parking space for vehicles and equipment, sites for material storage, and stations for equipment maintenance. Facilities would be fenced and their gates locked. Security guards would be stationed where needed.

Conductor Tensioning and Pulling Sites

Typically, conductor tensioning and pulling sites are located at angle locations and at substation locations for stringing the conductor. However, distances between each site would vary depending on the geography and topography and environmental sensitivity of the specific area, the length of the conductor pull, and the accessibility by equipment. Pulling sites would be located along the transmission line centerline. At each pulling site, stringing equipment would be set up approximately 400 feet from the initial structure for leveraging the conductor pull safely. When construction occurs in steep and rough terrain, these sites may require larger, less symmetrical pulling and tensioning sites. The actual location of these pulling sites would be determined following final engineering design.

2.9.2. Construction

This section briefly describes the construction activities associated with the Proposed Action or action alternatives. Construction of a transmission line follows the sequence of surveying the centerline, access road identification and construction, tower sites and ROW clearing (including construction yards), installing foundations, assembling and erecting the towers, installing groundwires and conductors, installing counterpoise/ground rods, and cleanup and site reclamation. Various phases of construction would occur at different locations throughout the construction process. Typical transmission line construction activities are depicted on Figure 2-8 and Figure 2-9.

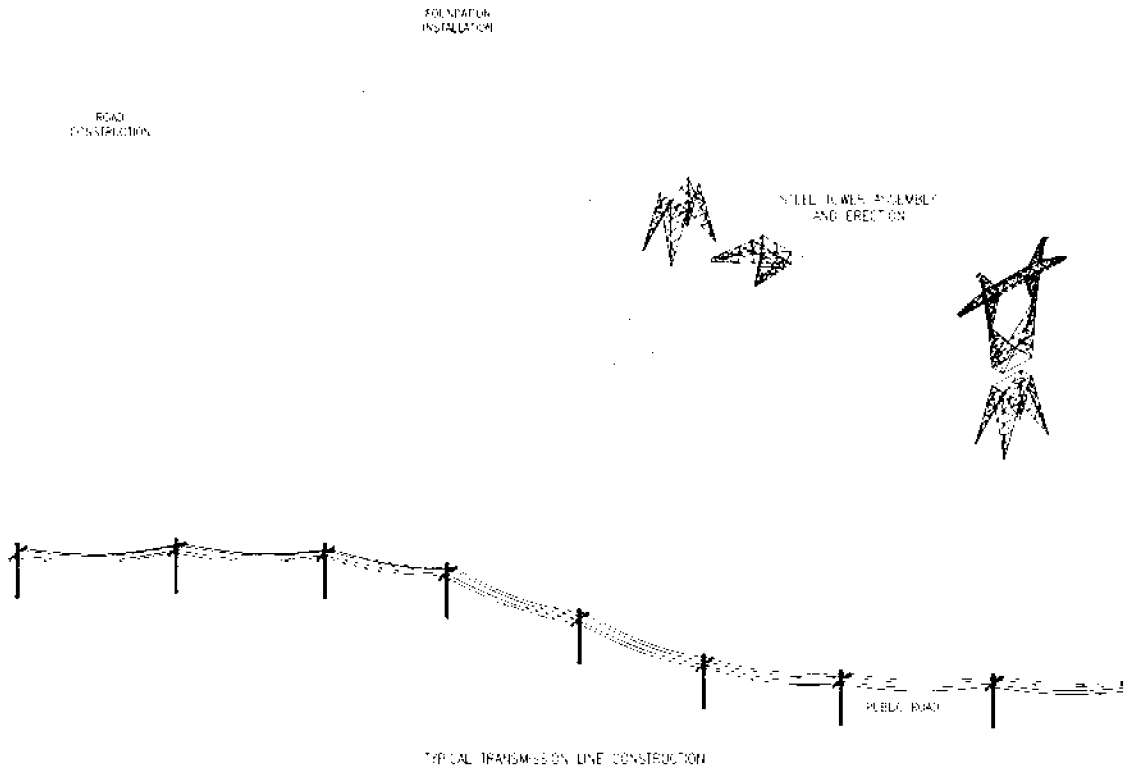


Figure 2-8. Foundation Installation, Tower Assembly and Tower Erection

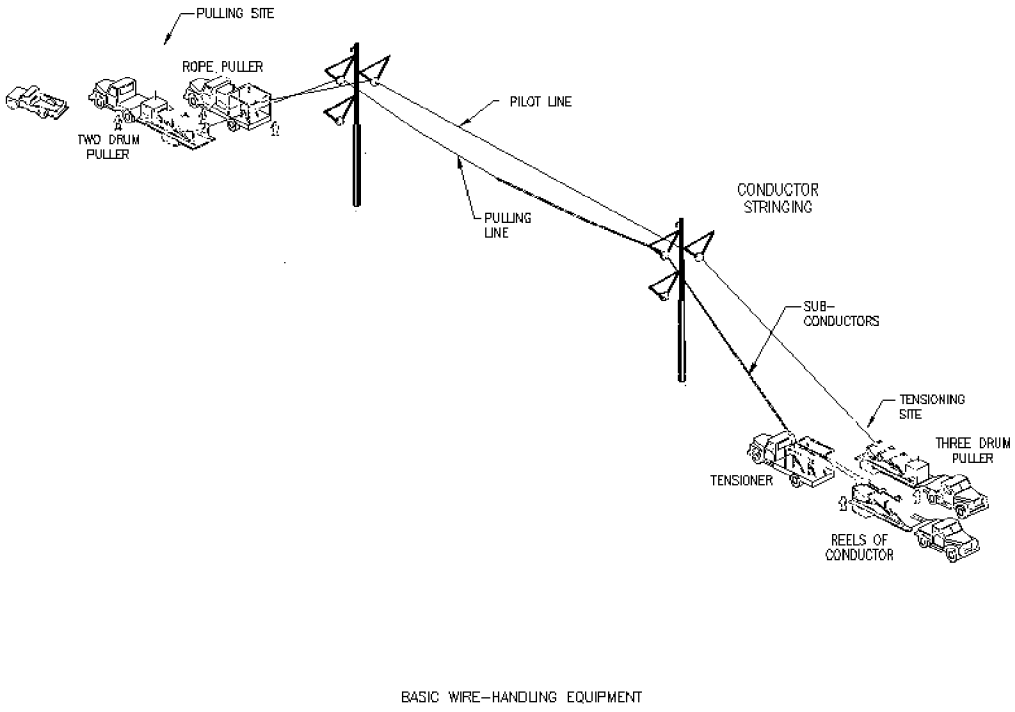


Figure 2-9. Typical Transmission Line Conductor Stringing Activities

Construction Work Force and Schedule

The estimated number of personnel and equipment required to construct the proposed project are presented in Table 2-3. Great Basin estimates that the majority of the total workforce would be hired locally. The project is expected to take up to approximately 2 years to construct. Some transmission facilities owned by other utilities may need to be temporarily taken out of service to allow for safe construction, especially in areas of line crossings. A detailed outage and construction schedule would be developed by Great Basin, in consultation with the utility owners, during final project design.

Table 2-3. Estimated Personnel and Equipment

Activity	People	Quantity of Equipment
Survey	4	2 pickup trucks
Geotechnical Investigations	6	3 pickup trucks 3 truck- or track-mounted drill rigs
Access Road and Structure Work Area Construction	4-8	2 bulldozers (D-8 Cat) 2 motor graders 2 pickup trucks 4 water trucks (for construction and maintenance)

Table 2-3. Estimated Personnel and Equipment		
Activity	**People**	**Quantity of Equipment**
Footing/Foundation Installation	28	6 hole diggers 2 bulldozers 1 truck 6 concrete trucks 2 dump trucks 4 pickup trucks 1 carry all 1 hydro crane 1 wagon drill 2 water trucks
Structure Steel Haul	8-10	4 steel haul trucks 2 pickup trucks 2 yard and field cranes 1 fork lift 1 water truck
Structure Assembly (per crew)	10-12	1 pickup truck 2 carry alls 1 crane (rubber tired) 1 truck (2 ton) 1 water truck
Structure Erection (per crew)	8-10	1 crane (120 ton) 1 truck (2 ton) 2 pickup trucks 1 carry all 1 water truck
Conductor Installation and Counterpoise	36	6 wire reel trailers 6 diesel tractors 4 cranes (2 19-ton, 2 30-ton) 2 trucks (5 ton) 4 pickup trucks 4-6 large bucket trucks 2 splicing trucks 4 3-drum pullers (2 medium, 2 heavy) 1 single drum puller (large) 1 double bull-wheel tensioner (heavy) 2 sagging equipment (D-8 Cat) 4 carry all 2 static wire reel trailer 2 water trucks
Site Cleanup	8-10	3 trucks 1 pickup truck 1 D-6 Cat 1 water truck
ROW Restoration	4	1 bulldozer 1 motor grader 2 pickup trucks 1 water truck

Surveying Activities

Before construction surveying begins, it would be necessary to obtain either a survey permit on federal lands, or rights-of-entry for private lands. Construction survey work would consist of locating the centerline, tower center hubs, ROW boundaries, work area boundaries, and tower access roads. All of these activities would begin prior to the start of construction.

Geotechnical Investigations

Before construction surveying begins, it would be necessary to obtain geotechnical samples. This may require appropriate authorization for sites on federal lands or rights-of-entry for sites on private lands. Geotechnical investigations would consist of drilling at pre-identified sample locations to obtain core samples. Drilling would be performed by a truck or track mounted drill. Geotechnical investigations would begin prior to the start of construction.

Access Road Construction

The construction, operation, and maintenance of the proposed transmission lines would require that heavy equipment and vehicles are able to access tower sites along the ROW. Existing paved and unpaved roads along existing utility corridors would be used where possible to minimize new access road construction. Where existing roads can be used, only spur roads to the tower sites may be required.

Where structure sites are not immediately accessible from existing roads, short routes of nongraded overland access where feasible will be located in order to access the site. The construction of new spur roads will occur as necessary, to access structure sites that lack direct access from existing roads or where topographic conditions (e.g., steep terrain, rock outcrops, and drainages) prohibit safe overland access to the site. New spur roads will be located within the ROW whenever practical and will be located to minimize visual and biological impacts. The number of new spur roads will be held to a minimum, consistent with their intended use (e.g., structure construction or conductor stringing and tensioning).

Typical access roads will be constructed to a 24-foot travel way (20-foot road surface with 2 feet of berm or ditch on either side). New access and spur roads that are constructed in rough or steep terrain will likely exceed 24 feet in width to allow for safe use. Portions of the existing road network will require upgrading and maintenance, including improvements such as clearing overgrown vegetation, regrading, and/or installation of drainage structures.

Specific actions will be implemented to reduce construction impacts. Standard design techniques, such as installing water bars and dips to control erosion, will be included. In addition, measures will be taken to minimize impacts in specific locations and during certain periods of the year. For example, construction activities will not occur when weather or other conditions increase potential environmental impacts to unacceptable levels, as determined by the agencies. Such conditions could arise during heavy rains or high winds. To prevent impacts during such periods, construction activities will be restricted or curtailed.

The number of new roads would be consistent with their intended use and would be part of the permanent ROW for maintenance.

ROW Clearing

The clearing of some natural vegetation along the proposed ROW may be required. However, selective clearing would be performed only when necessary to provide for surveying, electrical safety clearances, line reliability, and maintenance. Topping or removal of mature vegetation, under or near the conductors, would be done to provide adequate electrical clearance as required by NESC standards. After line construction, all work areas not needed for normal transmission line maintenance would be graded to blend, as near as possible, with the natural contours, and revegetated and restored where required.

Foundations, Structure Assembly, and Erection

Excavations for foundations would be made with power drilling and/or excavating equipment. Where the soil permits, a vehicle-mounted power auger or backhoe would be used. In rocky areas, the foundation holes may be excavated by drilling and blasting, or special rock anchors may be installed. Safeguards (e.g., blasting mats) would be employed when adjacent areas need to be protected. In extremely sandy areas, soil stabilization by water or a gelling agent may be used prior to excavation. After excavations are completed, precast or cast-in-place footings would be installed.

The precast footing would be lowered into the excavated foundation hole, positioned, and backfilled. The cast-in-place footing would be installed by placing reinforcing steel and a tower stub into the foundation hole, positioning the stub, and encasing it in concrete. Spoil material would be used for fill, where suitable. The foundation excavation and installation would require access to the site by a power auger or drill, a crane, material trucks, and ready-mix trucks.

Conductor Installation

After the towers are erected, insulators, hardware, and stringing sheaves may be delivered to each tower site. The towers would be rigged with insulator strings and stringing sheaves at each groundwire and conductor position.

For public protection during wire installation, guard structures would be erected over highways, railroads, power lines, structures, and other obstacles. Guard structures would consist of H-frame poles placed on one or both sides of an obstacle. These structures would prevent groundwire, conductor, or equipment from falling on an obstacle. Equipment for erecting guard structures would include augers, line trucks, pole trailers, and cranes. Guard structures may not be required for small roads. In such cases other safety measures such as barriers, flagmen, or other traffic control would be used.

Pilot lines would be pulled (strung) from tower to tower by a helicopter and threaded through the stringing sheaves at each tower. Following pilot lines, a larger diameter steel cable line would be attached to conductors to pull them onto towers. This process, called the pulling line, would be repeated until the groundwire or conductor is pulled through all sheaves.

Groundwire and conductors would be strung using powered pulling equipment at one end and powered braking or tensioning equipment at the other end of a conductor segment. Sites for tensioning equipment and pulling equipment would be approximately 2 to 5 miles apart. If a fiber optic groundwire is installed, rather than conventional groundwire, the construction methods would be the same. The appearance of a fiber optic groundwire is the same as conventional groundwire.

The tensioning and pulling sites would encompass an area approximately 200 feet by 500 feet. Tensioners, line trucks, wire trailers, and tractors needed for stringing and anchoring the groundwire or conductor would be located at this site. The tensioner in concert with the puller would maintain tension on the groundwire or conductor while they are fastened to the towers. A puller, line trucks, and tractors needed for pulling and temporarily anchoring the counterpoise/groundwire and conductor would be located at this site.

Ground Rod Installation

Part of standard construction practices prior to wire installation would involve measuring the resistance of tower footings. If the resistance to remote earth for each transmission tower is greater than 10 ohms, counterpoise (grounds) would be installed to lower the resistance to 10 ohms or less. Counterpoise would consist of a bare copper clad or galvanized steel cable buried a minimum of 12 inches deep, extending from one or more tower legs for approximately 200 feet in line with the linear transmission line ROW.

Cleanup

Construction sites, material storage yards, and access roads would be kept in an orderly condition throughout the construction period. Refuse and trash would be removed from the sites and disposed of in an approved manner. Oils and fuels would not be dumped along the line. Oils or chemicals would be hauled to a disposal facility authorized to accept such materials. No open burning of construction trash would occur without agency approval.

Hazardous Materials within Corridor

Petroleum products such as gasoline, diesel fuel, crankcase oil, lubricants, and cleaning solvents would be present within the transmission line corridor during construction. These products would be used to fuel, lubricate, and clean vehicles and equipment, and would be contained in fuel trucks or in approved containers. When not in use, hazardous materials would be properly stored to prevent drainage or accidents. Hazardous materials would not be drained onto the ground or into streams or drainage areas. Totally enclosed containment would be provided for all trash. All construction waste, including trash and litter, garbage, other solid waste, petroleum products, and other potentially hazardous materials would be removed to a disposal facility authorized to accept such materials. All construction, operation, and maintenance activities would comply with applicable federal, state, and local laws and regulations regarding the use of hazardous substances. The construction or maintenance crew foreman would ensure that all applicable laws are obeyed. In addition, an on-site inspector would be present during construction to make sure that all hazardous materials are used and stored properly. A health and

safety plan would be developed as part of the Final POD during the final engineering and preconstruction phase of the project.

Site Reclamation

The ROW would be restored, as required by the property owner or land management agency. All reasonable means would be made to restore the land to its original contour and to restore natural drainage patterns along the ROW. Because revegetation would be difficult in many areas of the project where precipitation is minimal, it would be important to minimize disturbance during construction. All reasonable means would be made to increase the chances of vegetation reestablishment in disturbed areas. The total construction period is anticipated to be approximately 2 years.

Fire Protection

All applicable fire laws and regulations would be observed during the construction period. All personnel would be advised of their responsibilities under the applicable fire laws and regulations, including taking practical measures to report and suppress fires.

2.9.3. Operation and Maintenance

Operational Characteristics

The nominal voltage for the transmission line would be 500 kV AC. There may be minor variations in voltage of up to 5 percent, depending upon load flow.

Permitted Uses

After the transmission line has been energized, land uses that are compatible with safety regulations would be permitted adjacent to the ROW; existing land uses such as grazing and recreation trail use are generally permitted within the ROW. Incompatible land uses within the ROW include construction and maintenance of inhabited dwellings, and any use requiring changes in surface elevation that would affect electrical clearances of existing or planned facilities.

Land uses that comply with local regulations would be permitted adjacent to the ROW. Compatible uses of the ROW on public lands would have to be approved by the appropriate agency; permission to use the ROW on private lands would have to be obtained from Great Basin.

Safety

Safety is a primary concern in the design of this 500 kV transmission line. An AC transmission line would be protected with power circuit breakers and related line relay protection equipment. If conductor failure occurs, power would be automatically removed from the line. Lightning protection would be provided by overhead groundwires along the line. Electrical equipment and

fencing at the substation would be grounded. All fences, metal gates, pipelines, etc., that cross or are within the transmission line ROW would be grounded to prevent electrical shock. If applicable, grounding outside of the ROW may also occur.

Maintenance

The 500 kV transmission line would be inspected on a regular basis by both ground and air patrols. Maintenance would be performed as needed. When access is required for nonemergency maintenance and repairs, Great Basin would adhere to the same precautions that were taken during the original construction.

Emergency maintenance would involve prompt movement of repair crews to repair or replace any damaged equipment. Crews would be instructed to protect crops, plants, wildlife, and other resources of significance. Restoration procedures following completion of repair work would be similar to those prescribed for normal construction. The comfort and safety of local residents would be provided for by limiting noise, dust, and the danger caused by maintenance vehicle traffic. Details would be provided in the Final POD prior to line construction.

Long-term Access to and along the ROW

Authorized access roads will only be used for maintenance purposes upon completion of construction.

2.9.4. Termination and Restoration

Should the ROW and facilities no longer be needed, a termination and Restoration Plan would be developed by the ROW grant holder for agency approval. One year prior to termination of the ROW, the holder shall contact the appointed BLM and Reclamation authorized officer to arrange a joint inspection of the ROW. This inspection would be held in order to agree to an acceptable termination and rehabilitation plan. The BLM-authorized officer must approve the plan in writing prior to commencement of any termination activities. Restoration and termination procedures would attempt to restore and reclaim the landscape as near to original conditions as reasonably possible. The termination and restoration plan would be reviewed and approved by the appointed authorized officer and would include the following information:

- What facilities and access routes are to be removed, restored, and/or rehabilitated
- How facilities and access routes would be removed, and the disturbed areas restored
- The time of year the facilities and access routes would be removed
- Stabilization and reclamation techniques to be used during restoration

CHAPTER 3. AFFECTED RESOURCES

This chapter describes the current resource conditions and environmental trends in the project area for the Proposed Action and alternatives. The affected environment discussed in this chapter will be the same for the Proposed Action and alternatives.

In considering the Affected Resources Form (ARF) dated May 7, 2010 (See Appendix A), and other NEPA documents and environmental reports completed for the project area, the following resources were determined to be present and potentially affected by the proposed project:

- Air Quality
- Geology/Mineral Resources
- Soils
- Water Resources
- Vegetation, Excluding Federally Listed Species
- Threatened, Endangered, or Candidate Plant Species
- Wildlife, Excluding Federally Listed Species
- Threatened, Endangered, or Candidate Wildlife Species
- Cultural Resources
- Paleontological Resources
- Land Use, Recreation, and Access
- Visual Resources
- Socioeconomics
- Environmental Justice

The resources above will be considered in the evaluation of the Proposed Action and alternatives.

Existing published and unpublished environmental data, maps, reports, and statements prepared for previous transmission line-related actions in the area were reviewed and evaluated to determine their applicability and adequacy for use in the environmental studies. The most relevant information was incorporated from the following reports:

- Southwest Intertie Project Environmental Impact Statement, 1993
- Southwest Intertie Project Environmental Assessment, 2008
- Interstate Intertie, Centennial Plan, Environmental Assessment; Harry Allen – Mead 500 kV Transmission Line Project, DOE/EA-1470, 2004
- Harry Allen – Crystal 500 kV Transmission Line Project Environmental Assessment, 2001
- Sunrise Tap Transmission Line Project Environmental Assessment, 2008
- Copper Mountain Solar III Project Environmental Assessment, 2011

In the following sections, the term "project area" refers to the area that encompasses the proposed ROWs and associated project components, including access roads and any other areas of disturbance. The study area varies depending on the resource being analyzed and the predicted locations of direct and indirect impacts from the Proposed Action or alternatives. Each resource

section identifies the resource-specific study area. The area of potential effect (APE), as used in the Cultural and Historic Resources section, is synonymous with the project area.

3.1. Air Quality

3.1.1. Environmental Setting

The project is located within Clark County, Nevada and crosses five hydrographic basins or air quality regions: Apex Valley (previously referred to as Garnet Valley), Black Mountains Area, California Wash, Eldorado Valley, and Las Vegas Valley (Nevada Division of Water Resources [NDWR] 2006). These basins and regions make up the air quality study area. The state of Nevada and Clark County Department of Air Quality and Environmental Management (DAQEM) use hydrographic basins to delineate air quality management areas for planning purposes. Hydrographic areas represent natural and man-made stream drainage areas or basins (DAQEM 2004).

3.1.2. Regulatory Framework

Pursuant to the federal Clean Air Act of 1970, 42 USC 7401 et seq. as amended in 1990, the U.S. Environmental Protection Agency (EPA) has established primary and secondary National Ambient Air Quality Standards (NAAQS) for six criteria air pollutants: ozone (O_3), nitrogen dioxide (NO_2), lead (Pb), carbon monoxide (CO), particulate matter less than 10 microns (PM_{10}), and particulate matter less than 2.5 microns ($PM_{2.5}$).

The Nevada Division of Environmental Protection (NDEP), Bureau of Air Quality is charged with maintaining and improving the air quality for citizens of the state of Nevada. The state of Nevada's air pollution statutes (Chapter 445B of Nevada Administrative Code) seek to achieve and maintain levels of air quality that will protect human health and safety, prevent injury to plant and animal life, prevent damage to property, and preserve visibility and scenic, aesthetic, and historic values. The statutes require the use of reasonably available methods to prevent, reduce, or control air pollution throughout Nevada.

The Clark County DAQEM is responsible for monitoring air, developing proper control measures, enforcing those measures, and educating the citizens of Clark County on how they can choose clean air. DAQEM regulates all stationary and nonvehicular sources, including construction sources, of fugitive dust. According to Section 17 of Clark County's Air Quality Regulations, a plan-specific permit is required for construction activities involving surface disturbances greater than 0.25 acre, such as grading and trenching. This permit would include conditions requiring control of fugitive dust emissions, as defined in Section 41 of the regulations.

3.1.3. Ambient Air Quality Standards and Pollutants of Concern

Ambient air quality is primarily a result of the type and amount of pollutants emitted into the atmosphere, the size and topography of the air basin, and the regional meteorological conditions. The EPA has developed primary and secondary NAAQS areas that are in attainment or in nonattainment with each NAAQS.

In the project study area, the Clark County DAQEM operates and maintains an ambient air monitoring network throughout the county that measures the ambient concentrations of EPA criteria pollutants, including the five pollutants included in Table 3-1. The closest air quality monitoring stations to the study area are located in Apex Valley and Boulder City, Nevada. Under the 1997 NAAQS, Clark County is designated a serious nonattainment area for CO and PM_{10} and as a basic nonattainment area for O_3. The major air pollutants that are in nonattainment for Clark County are CO and PM_{10}. On May 3, 2004 the EPA approved the Clark County PM_{10} state implementation plan (SIP), in which the county adopted a series of rules to control fugitive dust sources.

Table 3-1. Clark County NAAQS Compliance Status

Pollutant	Status	Duration
Carbon Monoxide	In nonattainment[1]	2000 – 2009
Nitrogen Oxides	No designation	
Ozone	In nonattainment[2]	2009
PM_{10}	In attainment	1/1/2006 – 2009
$PM_{2.5}$	Presumed in attainment[3]	1/1/2006 – 2009

[1] DAQEM is requesting re-designation from the EPA.
[2] In attainment of the 1997 NAAQS based on 2006-2008 data. In nonattainment of 2008 NAAQS and expecting EPA designation in March 2010.
[3] DAQEM reported 1 exceedance in 2006, 1 exceedance in 2007, 2 exceedances in 2008, 0 exceedances in 2009 and 2010, and 1 exceedance in 2011
[4] DAQEM is currently assessing Federal Reference Method data to confirm.
Source: Clark County DAQEM Annual Network Plan Report, June 2010.

Carbon monoxide is produced primarily by incomplete fuel combustion in motor vehicles and has a toxic potential to human health. The significant sources of CO have been found to be vehicles, coal, and industrial processes. The DAQEM is in the process of requesting redesignation to attainment status.

Particulate matter is the term used for a mixture of solid particles and liquid droplets found in the air. Particulate matter pollution consists of very small liquid and solid particles floating in the air, including dust, metals, smoke, soot, and acids. Coarse particles (larger than 2.5 micrometers) often come from a variety of sources, including windblown dust.

3.2. Geology and Minerals

This section presents an overview of the geologic landscape and conditions that occur within the proposed ROW corridor. The main purpose of this overview is to identify mineral resources that could be affected by project construction or operation.

3.2.1. Environment Setting

The project area is located in the southern portion of the Basin and Range Province, a large geographic and geologic region that covers most of Nevada and parts of adjacent states. Basin and Range geomorphology is characterized by north to northeast trending mountain ranges separated by valleys filled with alluvial deposits from the mountain ranges.

The majority of lands crossed by the proposed ROW corridor are either open desert or the alluvial areas and foothills associated with the Arrow Canyon Range, Dry Lake Range, Sunrise Mountain, Frenchman Mountain, River Mountains, McCullough Range, and the Eldorado Mountains. The surrounding mountains are composed predominantly of Paleozoic carbonates, Mesozoic sedimentary rocks, and Tertiary volcanic and sedimentary rocks, including limestone, siltstone, sandstone, and basalt.

The route is underlain by unconsolidated Quaternary alluvium, Quaternary playa deposits, the Muddy Creek Formation, the Horse Spring Formation, and Tertiary volcanic rocks. These geological units, and those within 1 mile of the centerline, are described further in the Paleontological Resources, Section 3.10

3.2.2. Mineral Resources

Mineral resources on federal land can be categorized as follows: locatable minerals, leasable minerals (includes fluid minerals and solid minerals), and salable minerals. Locatable minerals include all "valuable mineral deposits" such as metallic minerals (gold, silver, lead, etc.) and nonmetallic minerals (fluorspar, asbestos, mica, etc.); and uncommon varieties of sand, gravel, stone, pumice, pumicite, cinders, and exceptional clay (BLM 1998).

The largest, currently active, locatable, mineral activities near the ROW corridor are the PABCO and Pioneer gypsum mines, which are located approximately 1 mile east of mile marker 25. Additional mining claims are located along the proposed corridor, and are detailed below in Table 3-2. These mining claims are mostly related to gypsum, limestone, or borate deposits (Longwell et al. 1965; Quade and Tingley 1985).

Table 3-2. Mining Claims in Project Area

Claim #	Name	Mile Marker	Acreage	Location Date	Location
NMC674013	Red Earth #3	26-27	160	12/23/1992	NE ¼ Sec. 14, T. 20S, 63E
NMC664130	Red Earth #2	26-27	160	10/7/1992	SE ¼ Sec. 14, T. 20S, 63E
NMC827208	3 Brothers #26	29-30	60	10/19/2001	NE ¼ Sec. 34, T. 20S, 63E
NMC827209	3 Brothers #27	29-30	60	10/19/2001	NE ¼ Sec. 34, T. 20S, 63E
NMC827205	3 Brothers #23	29-30	60	10/19/2001	NWSW ¼ Sec. 34, T. 20S, 63E
NMC827202	3 Brothers #20	29-30	60	10/19/2001	SW ¼ Sec. 34, T. 20S, 63E
NMC827203	3 Brothers #21	29-30	60	10/19/2001	SW ¼ Sec. 34, T. 20S, 63E
NMC767444	Crystal Colt #2	40-41	160	1/18/1997	SE ¼ Sec. 23, T. 22S, 63E
NMC789405	Jay Colt #1	41-42	160	2/21/1998	NE ¼ Sec. 26, T. 22S, 63E
NMC789403	Caireen Colt #1	41-42	160	2/21/1998	SE ¼ Sec. 26, T. 22S, 63E

Source: BLM 2012

3.3. Soils

This section describes soil conditions within the proposed ROW corridor. Soil data were obtained from the United States Department of Agriculture's (USDA) Natural Resources Conservation Service (NRCS) Soil Survey Geographic Database, and from the following surveys: NV605 (Virgin River Area, Nevada and Arizona; NV788 (Las Vegas Valley Area, part of Clark County); and NV755 (Clark County Area) (USDA–NRCS 2012).

The proposed ROW corridor crosses 31 soil map units (NRCS 2012) (Table 3-3). These soils generally include poorly sorted, unconsolidated-to-cemented gravel and sandy gravel; deep, well-drained alluvial soils; and shallow soils on hills and mountains interspersed with rock outcrops and badland. Most of the soils in the project area can be generally described as having a permeability ranging from moderately slow to moderately rapid, low to moderate shrink-swell potential, and low to moderately high potential for wind and water erosion.

The soil map units along the proposed ROW corridor are listed below, with a brief description of their characteristics. Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. The estimates are based primarily on percentage of silt, sand, and organic matter and on soil structure and saturated hydraulic conductivity. Values of K range from 0.02 to 0.069. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water.

A wind erodibility group (WEG) consists of soils that have similar properties affecting their susceptibility to wind erosion. The soils assigned to group 1 are the most susceptible to wind erosion, and those assigned to group 8 are the least susceptible.

3.4. Water Resources

This section describes the affected environment for water resources, including groundwater, surface water, floodplains, and water quality.

3.4.1. Surface Water

The proposed ROW corridor crosses four separate hydrographic basins from north to south. These include the Garnet Valley (Basin No. 216), Las Vegas Valley (Basin No. 212), Black Mountain Area (Basin No. 215), and the Eldorado Valley (Basin No. 167). These hydrographic areas are also part of the Colorado River Basin Hydrographic Region (Region 13).

The only major wash crossed by the proposed ROW corridor is the Las Vegas Wash, which is a 12-mile-long channel that feeds most of Las Vegas Valley's excess water into Lake Mead. The watershed encompasses approximately 1,550 square miles, and is generally bounded on the north by the Sheep Mountains, on the west by the Spring Mountains, on the south by the McCullough Mountains, and on the east by the River and Frenchman mountains (Clark County Regional Flood Control District 2002). The terrain in the watershed includes steep mountain slopes that transition to alluvial fans, which in turn drain to braided washes, sheet flow areas, and incised washes. There are many small ephemeral washes in the area that drain into the Las Vegas Wash.

The Las Vegas Wash is fed by urban runoff, groundwater, treated wastewater discharge, urban and agricultural irrigation, and stormwater. Due to constant inflow of treated wastewater, the Las Vegas Wash has become a perennial waterway with an average flow of 153 million gallons per day or 220 cubic feet per second (Las Vegas Wash Coordination Committee 2010).

3.4.2. Groundwater

The proposed ROW crosses portions of four hydrographic basins, in which extensive groundwater resources are located. The basins are a complex sequence of interfingered and intermixed deposits of boulders, gravels, sands, silts, and clays with depths up to 3,000 feet in some portions of the valleys. Groundwater occurs in four general aquifer systems: (1) shallow aquifers defined as waters from 0 to 50 feet below ground surface (bgs), with the water table less than 20 feet bgs; (2) near surface aquifers defined as 0 to 200 feet bgs, with the water table greater than 20 feet bgs; (3) principal aquifers, generally greater than 200 feet bgs; and (4) regional carbonate aquifers, normally occurring at depths of several thousand feet bgs (BLM 1998, 1990).

3.5. Vegetation, Excluding Federally Listed Species

3.5.1. Environmental Setting

The project area is located within the Mojave Desertscrub biome, the smallest of the four desert biomes in North America, and is intermediate between Sonoran Desertscrub and Great Basin Desertscrub. Plants and animals occupying Mojave Desertscrub are similar to those observed in the Lower Colorado River Subdivision of Sonoran Desertscrub, within the creosote bush series, *Larrea tridentata-Ambrosia dumosa* association. These open-plant communities occupy areas characterized by gravelly bajadas and inconspicuous low plains. Other plants associated with this biome include box-thorn (*Lycium andersonii*), Mormon tea (*Ephedra* spp.), and ratany (*Krameria* spp.). The Joshua tree (*Yucca brevifolia*), one of the few Mojave endemics, is arguably the most representative symbol of the Mojave Desert (Turner and Brown 1994).

Table 3-3. Soil Map Units Crossed by Project ROW Centerline						
Soil Map Unit	Slope (%)	Geomorphic Feature	Erosion Potential		K Factor	WEG
			Water	Wind		
Akela-Rock outcrop complex	15-50	Low ridges and ridges and cliffs	Moderate	Moderate	0.43	6
Arizo, Caretal association	2-8	Inset fans and fan remnants	Low	Low	0.28	8
Arizo: very gravelly fine sandy loam	0-4	Fan pediments	Low	Low	0.10	3
Arizo: very gravelly fine sandy loam, gypsiferous substratum	2-8	Inset fans	Very low	Very Low	0.15	6
Badland soils	Steep	Badlands topography	Moderate-High	Moderate-High	Not rated	Not rated
Bard: gravelly fine sandy loam	2-8	Fan remnants	Low-Moderate	Low-Moderate	0.37	5
Baseline-Callville-Badland association	2-30	Fan remnants and pediments	Very low-Moderately low	Low	0.32	8
Baseline-Guardian association	2-8	Fan remnants	Moderate	Low	0.32	8
Caliza-Pittman-Arizo complex	2-8	Fan remnants	Moderate	Low	0.37	8
Caliza: extremely cobbly fine sandy loam	Not rated	Inset fans	Low	Moderate-High	0.24	3
Caliza: very gravelly sandy loam	2-8	Fan remnants	Moderate	Moderate	0.37	6
Carrizo-Carrizo-Riverbend association	2-8	Inset fans	Low	High	0.10	2
Colorock-Tonopah association	2-8	Fan remnants	Moderate	Low-Moderate	0.43	6
Guardian-Baseline-Guardian association	2-8	Pediments	Low-Moderate	Moderate-High	0.32	3
Gypwash-Callville-Carrizo association	0-30	Fan remnants	Low	Low	0.32	8
Haleburu-Crossgrain-Rock outcrop association	30-50	Mountainous areas, cliffs, and fan remnants	Low	Low	0.28	8
Hypoint: gravelly sandy loam	0-4	Fan aprons, fan skirts, and alluvial fans	Moderate	Moderate	0.32	5
Land: very fine sandy loam, wet soils	0-2	Alluvial flats	Moderate-High	Moderate-High	0.43	6
Nickel: very gravelly fine sandy loam	2-8	Fan remnants	Low-Moderate	Low-Moderate	0.32	6

Table 3-3. Soil Map Units Crossed by Project ROW Centerline						
Soil Map Unit	Slope (%)	Geomorphic Feature	Erosion Potential		K Factor	WEG
			Water	Wind		
Nipton-Haleburu-Rock outcrop	15-50	Mountainous areas	Low-Moderate	Low	0.32	8
Playas:, hydric soils	0-1	Lakebeds	Moderate	High	Not rated	Not rated
Rock land-St. Thomas association	15-50	Mountainous areas	Moderate	Moderate	0.43	6
Rock outcrop-Redneedle-Helweiser association	15-50	Cliffs and hills	Low-Moderate	Low-Moderate	0.32	6
St. Thomas-Iceberg-Rock outcrop association	15-50	Mountainous areas	Low	Low	0.32	8
St. Thomas association	8-30	Mountainous areas	Low	Low	0.37	8
Sunrock-Callville-Badland association	2-30	Fan remnants and pediments	Low-Moderate	Low-Moderate	0.37	6
Sunrock-Haleburu-Rock outcrop association	30-75	Mountains and cliffs	Low	Low	0.28	8
Tonopah-Arizo	2-8	Fan remnants and fan pediments	Low-Moderate	Low	0.32	8
Upperline: very gravelly sandy loam	8-30	Rock pediments	Low-Moderate	Low-Moderate	0.28	6
Wechech: very gravelly soils	8-30	Fan remnants	Moderate	Low	0.43	8
Weiser-Arizo association	2-8	Fan remnants	Moderate	Low	0.32	8

In addition to the upland Mojave Desertscrub biome, riparian areas occur along narrow communities along streams and marshes. The largest riparian corridor in the project area is the Las Vegas Wash, a 12-mile-long channel, which drains northeasterly into the western arm of Lake Mead, which in turn drains into the Colorado River. The project would cross the Las Vegas Wash approximately 3 miles northeast of Henderson on the east side of Las Vegas. Typical vegetation found within this wetland biome generally comprises cottonwoods (*Populus* sp.), willows (*Salix* sp.), and southern cattail (*Typha domingensis*); but at the project crossing, the vegetation is dominated by salt cedar (*Tamarix spp.*), an exotic species that has replaced many native plants as the dominant vegetation type along extensive reaches of riparian habitat.

3.5.2. Botanical Inventory Methods

Botanical field surveys conducted in spring/summer 2009 were used for this analysis. Surveys were conducted along the entirety of the project corridor per BLM survey protocols. The BLM provided a list of sensitive species with the potential of occurring in the proposed project corridor. Other technical information on rare plants was requested from the Nevada Natural Heritage Program (NNHP) database (2009), and the results were used to develop information on the botanical resources in the proposed corridor. Surveys were conducted in accordance with the BLM Las Vegas Field Office Rare Plant Survey Protocols.

3.5.3. Botanical Inventory Results

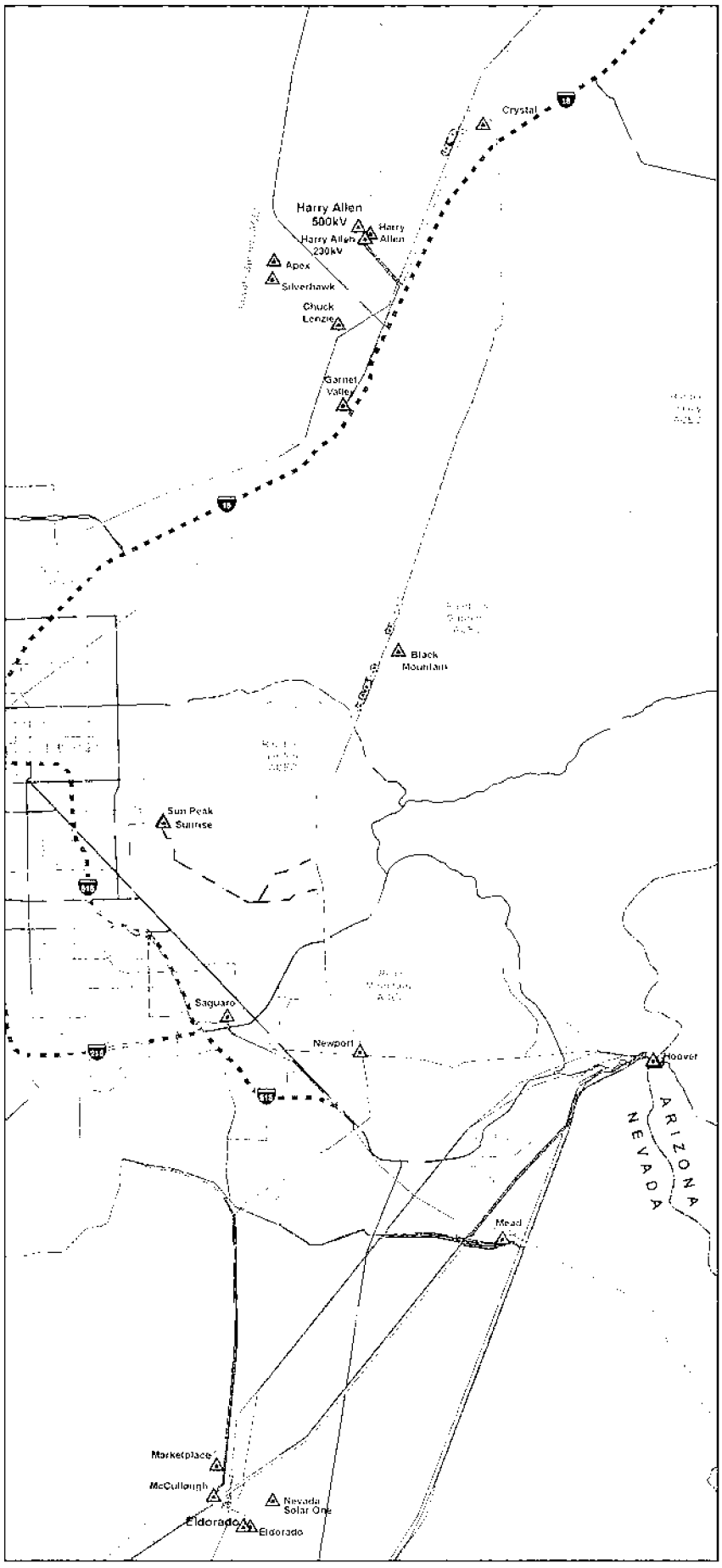
Special Status Species is a term that refers to species that are not listed as threatened or endangered under the ESA, but which the U.S. Fish and Wildlife Service (USFWS) believes might be in need of concentrated conservation actions, or are considered sensitive or protected by the BLM and/or the Nevada Department of Forestry (NDF). Nevada state protected species are categorized by NDF as (1) critically endangered, (2) critically imperiled, (3) recommended for listing, or (4) protected as a cactus, yucca, or Christmas tree. The BLM also considers plants given special status by Clark County's Multi Species Habitat Conservation Plan (MSHCP) as sensitive. The MSHCP was developed through Section 10 consultation with the USFWS to allow for the incidental take of species on nonfederal lands within Clark County, Nevada. Table 3-4 below lists the special status species that have the potential of occurring in the proposed project corridor. A description of those species found within the project corridor during the 2009 surveys follows. Figure 3-1 depicts the locations of the sensitive plants identified during these surveys.

Table 3-4. Plant Species of Concern that May Occur within the Proposed Project Corridor

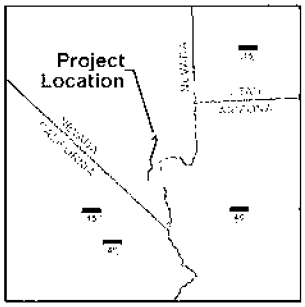
Scientific Name	Common Name	BLM Status	NDF State Status	USFWS Status	MSHCP Status	Detected in 2009 Surveys
Anulocaulis leiosolenus var. leiosolenus	Southwestern (=sticky) ringstem	Sensitive Species	None	None	Covered	Yes
Arctomecon californica	Las Vegas bearpoppy	Sensitive Species	Critically Endangered	Species of Concern	Covered	Yes

Table 3-4. Plant Species of Concern that May Occur within the Proposed Project Corridor						
Scientific Name	**Common Name**	**BLM Status**	**NDF State Status**	**USFWS Status**	**MSHCP Status**	**Detected in 2009 Surveys**
Arenaria stenomeres	Meadow Valley sandwort	None	None	None	Medium Priority Evaluation Species	No
Astragalus geyeri var. triquetrus	Threecorner milkvetch	Sensitive Species	Critically Endangered	Species of Concern	Covered	No
Astragalus preussii var. laxiflorus	Littlefield milkvetch	None	Critically Imperiled	None	None	Yes
Astragalus nyensis	Nye milkvetch	Sensitive Species	None	Species of Concern	None	No
Enceliopsis argophylla	Silverleaf sunray	Sensitive Species	None	Sensitive	None	Yes
Eriogonum corymbosum var. glutinosum	Las Vegas buckwheat	Sensitive Species	Nominated as Critically Endangered	Species of Concern	High Priority Evaluation Species	No
Eriogonum viscidulum	Sticky buckwheat	Sensitive Species	Critically Endangered	Species of Concern	Covered	No
Pediomelum castoreum	Beaver Dam breadroot	Sensitive Species	None	Species of Concern	Watch List	Yes
Penstemon bicolor ssp. bicolor	Yellow two-toned beardtongue	Sensitive Species	None	Species of Concern	High Priority Evaluation Species	No
Penstemon bicolor ssp. roseus	Rosy two-toned beardtongue	Sensitive Species	None	Species of Concern	Watch List	No
Phacelia parishii	Parish phacelia	Sensitive Species	None	Species of Concern	Covered	No
Trichostomum sweetie	Sweet moustache moss	None	None	None	Medium Priority Evaluation Species	No

Southwestern (=sticky) ringstem (*Anulocaulis leiosolenus var. leiosolenus*). Southwestern ringstem has no federal or state protection, but is an MSHCP covered species. Sticky ringstem is a perennial herb that grows up to 1.5 meters in height. Flowers are greenish-bronze on the tube and white or pale pink on the limb. In Nevada, this species has been found on the eastern edge of Mojave desertscrub on gypsiferous soils on rolling hills and terrace, and is often associated with Las Vegas bearpoppy. The project includes large areas of gypsum habitat (particularly in the vicinity of the PABCO Mine and Lava Butte area) and small scattered gypsum outcroppings. During field surveys, two rare species—Las Vegas bearpoppy and sticky ringstem—were abundant in this habitat; with a total of 1,101 and 288 plants recorded respectively.



REGIONAL LOCATION



Legend

Project Features

- Substation
- Generation Station
- Project Centerline

Rare Plants

- Southwestern Ringstem
- Las Vegas Bearpoppy
- Littlefield Milkvetch
- Beaver Dam Breadroot

Special Designations

- ACEC
- Designated Wilderness Area
- Instant Study Area
- National Conservation Area

Transmission Lines

- 500kV Transmission Line
- Proposed 500kV Transmission Line
- 345kV Transmission Line
- 230kV Transmission Line
- Under 230kV Transmission Line

Sources
USGS 30 meter pixel elevation data
LS Power, Transmission line, generation station, and substation data
BLM Land ownership and land management data

0 3 6 Miles

Southern Nevada Intertie Project
500kV Transmission Line

Great Basin Transmission, LLC

Rare Plant Survey Results

April 2012

Figure 3-1

Figure 3-1. Rare Plant Survey Results

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Las Vegas bearpoppy (*Arctomecon californica*). The Las Vegas bearpoppy is a species of concern by the USFWS, and is included as a critically endangered species in Nevada. This species is a perennial herb with short stems and stout taproot found on gypsiferous outcrops similar to that of sticky ringstem. During field surveys in 2009, this species was found growing abundantly in gypsum habitat with two other rare species—sticky ringstem and Las Vegas buckwheat.

Littlefield milkvetch (*Astragalus preussii var. laxiflorus*). Littlefield milkvetch is critically imperiled in Nevada, with no other federal or state status. Little information is available regarding the habitat requirements for Littlefield milkvetch, but the NNHP considers this species to be dependent upon dune or deep sand habitats (NNHP 2004). During rare plant surveys, Littlefield milkvetch was found with 63 plants recorded. The dominant associated species were indigo bush, white bursage, desert alyssum (*Lepidium fremontii),* creosote bush, and Torrey's ephedra.

Silverleaf sunray (*Enceliopsis argophylla*). Silverleaf sunray is included as a special status species by the BLM and is on the watch list by the Northern Nevada Native Plant Society (NNNPS). A member of the sunflower family, this sunray is a long-lived perennial that flowers continually throughout the year. It is found in Arizona and Utah, and in Nevada is restricted to the Lake Mead area in Clark County at elevations 1,165 to 2,380 feet in dry, open, relatively barren areas on gypsum badlands, volcanic gravels, and loose sands in the creosote-bursage zone (NNHP 2001). During rare plant surveys conducted in 2009, sunray was found in areas of gypsum habitat and scattered gypsum outcroppings.

Beaver Dam breadroot (*Pediomelum castoreum*). Beaver Dam breadroot is a species of concern by the U.S. Forest Service (USFS), and is on the watch list by the NNNPS. A member of the legume family, this species is a low-growing perennial herb that blooms from early April to mid-May and sets fruit by June. It grows on dry sandy soils or sandy-clay soils in a creosote bush dominated community at elevations ranging from 1,280 to 5,000 feet. The range of Beaver Dam breadroot includes northwest Arizona, eastern California, and Clark County, Nevada. It occurs in similar habitats as threecorner milkvetch. During rare plant surveys conducted for the project, botanists found 397 individuals in the northern portion of the project area (Dry Lake, Crystal substation area).

3.5.4. Invasive Species/Noxious Weeds

The BLM defines noxious weeds as "a plant that interferes with management objectives for a given area of land at a given point in time." The state of Nevada defines noxious weeds as "any species of plant which is, or liable to be, detrimental or destructive and difficult to control or eradicate." Noxious weeds are opportunistic plant species that readily flourish in disturbed areas, thereby preventing native plant species from re-establishing communities.

The most common non-native species known to occur within the proposed project corridor are red brome (*Bromus madritensis* ssp. *rubens*), Mediterranean grass (*Schismus* sp.), Sahara mustard (*Brassica tournefortii*), filaree (*Erodium cicutarium*), and tumbleweed (*Salsola* sp.). Cheatgrass (*Bromus tectorum*) occurs in small patches. Halogeton (*Halogeton* sp.) was detected at several locations. African mustard (*Malcolmia africanus*) was common in each of the areas in

which it was recorded, including the sand habitats in the north and the gypsum/clay areas in the central portions of the project area.

A Noxious Weed Management Plan is being prepared for the proposed project. The plan will comply with the Draft Noxious Weed Plan, a Plan for Integrated Weed Management, Las Vegas Field Office, Bureau of Land Management, September 2006, and include discussion on the (1) plan purpose and goals and objectives, (2) noxious weed inventory, (3) noxious weed management practices, (4) monitoring, and (5) use of pesticides.

3.6. Threatened, Endangered, or Candidate Plant Species

Botanical field surveys conducted in spring/summer 2009 were used for this analysis. In order to determine the presence or absence of sensitive plant species, the BLM provided a list of sensitive species with the potential of occurring in the proposed project corridor. Other technical information on rare and listed plants was requested from the NNHP database (2009), and the results were used to develop information on the potential botanical resources in the proposed corridor. The botanical field surveys in 2009 took this information into account and were conducted in accordance with the BLM Las Vegas Field Office Rare Plant Survey Protocols.

The USFWS identified no threatened or endangered plant species with the potential of occurring in the proposed project corridor. The Las Vegas buckwheat (*Eriogonum corymbosum* var. *nilesii*) is designated as a Candidate species by the USFWS with the potential to occur in the project area. No listed plants and no Las Vegas buckwheat plants were found during surveys in 2009.

3.7. Wildlife, Excluding Federally Listed Species

This section includes wildlife expected to occur in the project area, and the results of general wildlife surveys and surveys for special status species. Special status is a term that refers to those species not listed as threatened or endangered under the ESA, but which the USFWS believes might be in need of concentrated conservation actions, or which are considered sensitive or protected by the BLM and/or Nevada Division of Wildlife (NDOW). Wildlife field surveys conducted in spring/summer 2009 were used for this analysis. The USFWS provided a list of sensitive species with the potential of occurring within the proposed project area. Other technical information on rare species was requested from the NNHP database (2009) and the results were used to develop information on rare wildlife resources potentially found within the proposed project area. Wildlife surveys included surveys for desert tortoise, which were conducted in accordance with the January 2009 USFWS's Pre-project Field Survey Protocol for Desert Tortoise.

Table 3-5 lists the special status wildlife species that have the potential of occurring in the proposed project area.

Table 3-5. Special Status Species that May Occur within the Proposed Project Area (based on NNHP Database, agency input, and literature review)					
Scientific Name	**Common Name**	**Habitat**	**ESA Status**	**State/BLM Status**	**MSHCP**
MAMMALS					
Euderma maculatum	Spotted bat	Diverse habitats; presence of cliffs appear to be important factor.	None	Protected/Sensitive	Watch List
Myotis californicus	California myotis	Diverse habitats	None	Sensitive	None
Myotis evotis	Long-eared myotis	Diverse habitats	None	Sensitive	Covered
Myotis ciliolabrum	Western small-footed myotis	Diverse habitats	None	Sensitive	Medium Priority Evaluation Species
Nyctinomops macrotis	Big free-tailed bat	Canyons, arroyos, desertscrub, woodlands, and riparian.	None	Sensitive	Watch List
Myotis thysanodes	Fringed myotis	Diverse habitats	None	Protected/Sensitive	Medium Priority Evaluation Species
Myotis yumanensis	Yuma myotis	Diverse habitats	None	Sensitive	Watch List
Ovis canadensis nelsoni	Desert bighorn sheep	Mojave desertscrub	None	Game/Sensitive (economically important as a big game species)	None
Pipistrellus hesperus	Western pipistrelle	Diverse habitats	None	Sensitive	None
Plecotus townsendii	Townsend's big-eared bat	Diverse habitats	None	Protected/Sensitive	High Priority Evaluation Species
Tadarida brasiliensis	Brazilian free-tailed bat	Lower elevations in desertscrub. Utilizes caves, mines, and bridges	None	Sensitive	None
BIRDS					
Aquila chrysaetos	Golden eagle	Diverse habitats	None	Sensitive	Watch List
Athene cunicularia hypugaea	Western burrowing owl	Primarily agriculture, desertscrub; patchy in sagebrush and grassland	None	Sensitive	High Priority Evaluation Species

Table 3-5. Special Status Species that May Occur within the Proposed Project Area (based on NNHP Database, agency input, and literature review)					
Scientific Name	**Common Name**	**Habitat**	**ESA Status**	**State/BLM Status**	**MSHCP**
Buteo regalis	Ferruginous hawk	Grasslands, desertscrub, agriculture, sagebrush	None	Protected/Sensitive	Watch List
Falco peregrinus anatum	American peregrine falcon	Diverse habitats; presence of cliffs appear to be important factor.	Delisted	Protected/Sensitive	Covered
Lanius ludovicianus	Loggerhead shrike	Mojave desertscrub, sagebrush	None	Sensitive	Low Priority Evaluation Species
Phainopepla nitens	Phainopepla	Mojave desertscrub	None	Protected	Covered
Pyrocephalus rubinus	Vermilion flycatcher	Riparian	None	Protected	Covered
Toxostoma crissale	Crissal thrasher	Mojave desertscrub, riparian	None	None	Low Priority Evaluation Species
Vireo bellii arizonae	Arizona Bell's vireo	Riparian	None	None	Covered
REPTILES AND AMPHIBIANS					
Bufo microscaphus microscaphus	Arizona (southwestern) toad	Riparian	None	None	High Priority Evaluation Species
Heloderma suspectum cinctum	Banded Gila monster	Mojave desertscrub	None	Protected/Sensitive	High Priority Evaluation Species
Sauromalus ater	Chuckwalla	Mojave desertscrub, associated with rocky hillsides and boulders	None	Sensitive	Covered

3.7.1. Mammals

Big Game

The desert bighorn sheep is state protected and managed as big game by NDOW. This species is present in the precipitous desert mountain ranges of northwestern and southern Arizona, southeastern California, southern Nevada, and southwestern Utah (Bighorn Institute, no date). These mountain ranges, particularly in the southern part of the state of Nevada, typically feature broken rock, with numerous gullies and relatively sparse vegetation.

The four primary requirements for the bighorn sheep are food, water, escape terrain, and open space (Valdez and Krausman 1999). Because forage is more limited in rocky, montane areas, bighorn sheep prefer large blocks of continuous habitat that allow for regular movement as they

forage. They spend little time on the flat land between ranges and will not readily range far from the safety of the steep, rocky terrain (Chapman and Feldhamer 1982).

Bighorn sheep are known to occur in most of the ranges in the vicinity of the proposed project corridor. Within the project area, bighorn sheep are known to occur in the River and McCullough mountains in the southern portion of the proposed route. They are unlikely to occur in other portions of the project area due to development and/or lack of water in these areas. Bighorn sheep were not observed during the 2009 surveys.

Bats

Ten special status species of bats are known to occur along the proposed Project corridor. All ten bat species forage for insects in a variety of habitats during the night hours and roost in caves, mines, buildings, crevices in cliffs or rocky outcrops, and in some cases, hollow trees during the daylight hours. As 2009 surveys were diurnal, bats were not observed.

3.7.2. Birds

Raptors

Four special status species of raptors may inhabit areas along the project corridor.

Suitable nesting habitat for the golden eagle may be present in mountain ranges adjoining the proposed project corridor, typically in rocky areas at moderate-to-higher elevations. The project area is located primarily in an open landscape, providing suitable habitat for foraging golden eagles. Surveys are currently being conducted for golden eagle nests within a 4-mile corridor (2 miles on either side of the alignment) of the proposed project alignments.

Burrowing owls could be present anywhere along the proposed project corridor in suitable habitat. Within the Mojave Desert, burrowing owls typically use burrows created by desert tortoise or mid-sized mammals. Surveys conducted in 2009 detected three burrowing owls. Two individuals were located between the Harry Allen and Crystal substations, and one was observed at its burrow immediately south of State Route (SR) 564 (Lake Mead Parkway).

Ferruginous hawks may be present anywhere along the proposed project corridor. The valley floors crossed by the project provide suitable foraging habitat, and existing transmission structures may provide suitable nesting and perching sites. No ferruginous hawks were observed during the 2009 wildlife surveys.

The peregrine falcon is typically found in open habitats in grasslands, rangeland, and agricultural areas where prey is abundant. This falcon is known to nest almost exclusively on sheltered cliffs, although they have been known to attempt nesting on buildings in the Las Vegas Valley. Nesting peregrine falcons are documented historically near the proposed project corridor along the Colorado River in the area of Black Canyon from Lake Mead downstream to Lake Mojave (Glinski and Garrison 1992). Foraging area for peregrine falcons includes the Colorado River and adjacent upland habitat for nearly 60 square miles during post breeding season shortly after young have fledged (*ibid*). No peregrine falcons were observed during the 2009 wildlife surveys.

Riparian Birds

All of the birds included in Table 3-5 have some level of dependency on riparian and/or wetland habitats during some phase of their life cycle, but there are three special status species that are considered true riparian dependent: vermilion flycatcher, crissal thrasher, and Arizona Bell's vireo. The only riparian corridor in the proposed project corridor is the Las Vegas Wash. Vegetation in the wash at the project crossing comprises patches of tamarisk, which is considered lower quality riparian nesting vegetation for the birds mentioned above; however, they may pass through during early spring and fall migration. American coots, double-crested cormorants, mallards, eared grebes, great blue herons, and red-winged blackbirds were observed at Las Vegas Wash during the 2009 surveys.

3.7.3. Migratory Birds

All nesting birds listed in Table 3-5, as well as most birds occurring in the vicinity of the project area, are protected under the Migratory Bird Treaty Act (MBTA). The MBTA of 1918 (16 USC 703) makes it unlawful to pursue, hunt, take, capture, kill, or possess any migratory bird, or part, nest, or egg of such bird listed in wildlife protection treaties among the United States and Great Britain (on behalf of Canada), Mexico, Japan, and the former USSR. This act also contains a clause that prohibits baiting or poisoning of these bird species. The MBTA applies to those bird species that may be affected during the construction phase of the project. Compliance with the MBTA will require surveying for and delineating nondisturbance buffers for nesting birds for construction that takes place during the breeding season. Twenty-three species of migratory birds were observed throughout the 2009 surveys.

3.7.4. Reptiles and Amphibians

The Arizona toad is a historic inhabitant of the Las Vegas Valley. However, recent surveys have failed to detect the species within the Las Vegas Valley, including the Las Vegas Wash (Bradford et al. 2005). Arizona toads were not observed during the 2009 surveys.

Banded Gila monsters and chuckwallas are found throughout the Mojave and Sonoran deserts in shrubby, grassy, and succulent areas. They are often found along rocky crags and rock piles. No Gila monsters were observed during the 2009 surveys. One chuckwalla was observed between mile marker 41 and mile marker 42.

3.8. Threatened, Endangered, or Candidate Wildlife Species

3.8.1. Wildlife Inventory Methods

Wildlife field surveys conducted in spring/summer 2009 and spring 2012 were used for this analysis. Surveys conducted in spring/summer 2009 were conducted along the entire length of the Proposed Action corridor. Surveys in spring 2012 were conducted along new build portions of Alternative 1 that were not covered by the 2009 surveys; this included approximately 360 feet immediately north of the Sunrise Mountain ISA, and where Alternative 1 crosses Dutchman Pass through the McCullough Mountains.

The USFWS provided a list of sensitive species with the potential of occurring within the proposed project corridor. Other technical information on rare species was requested from the NNHP database (2009), and the results were used to develop information on the rare wildlife resources in the proposed project corridor. Surveys were conducted in accordance with the January 2009 USFWS's Pre-project Field Survey Protocol for Potential Desert Tortoise Habitats. The following is a draft version still under review, but was approved for use on this project by the BLM.

3.8.2. Wildlife Inventory Results

The USFWS identified several threatened, endangered, and candidate wildlife species with the potential of occurring in the proposed project corridor. Table 3-6 lists these species and identifies corresponding protection status for BLM, NDOW, and Clark County MSHCP. A discussion of each species, including survey results, follows.

Table 3-6. Federally Listed and Candidate Wildlife Species that May Occur within the Proposed Project Corridor

Scientific Name	Common Name	Habitat	ESA Status	State of Nevada Status	BLM Status	MSHCP
Gopherus agassizii	Desert Tortoise (Mojave population)	Mojave desertscrub	Threatened	Threatened	Sensitive	Covered
Empidonax traillii extimus	Southwestern Willow Flycatcher	Lowland riparian	Endangered	Protected	Sensitive	Covered
Rallus longirostris yumanensis	Yuma Clapper Rail	Freshwater and brackish marshes	Endangered	Protected	Sensitive	Watch List
Coccyzus americanus	Yellow-billed Cuckoo	Riparian	Candidate	Protected	Sensitive	Covered

Desert Tortoise (Mojave population)

The Mojave population of desert tortoises was listed as Threatened under the ESA on April 2, 1990 (55 FR 12178-12191). In 1994, a recovery plan was published in addition to the designation of 6.4 million acres of critical habitat (59 FR 5820-5866). Since that time, a revised recovery plan designated five recovery units. These recovery units are similar to the six recovery units originally designated in the 1994 recovery plan, except that the Northern Colorado and Eastern Colorado recovery units were merged into a single Colorado Desert Recovery Unit (USFWS 2011a). The project area is located within the Northeastern Recovery Unit and does not cross any designated critical habitat.

Tortoises of the Mojave population are found primarily in Mojave desertscrub, but also in vegetation characteristic of the Lower Colorado River Subdivision of Sonoran desertscrub (Turner and Brown 1994). They are generally associated with communities dominated by creosote bush and other sclerophyll shrubs and small cacti (Germano et al. 1994). Some parts of

their range may contain Joshua trees in abundance. In the Mojave Desert, the terrain is generally gently rolling alluvial fans with sandy or gravelly soils (Ernst et al. 1994).

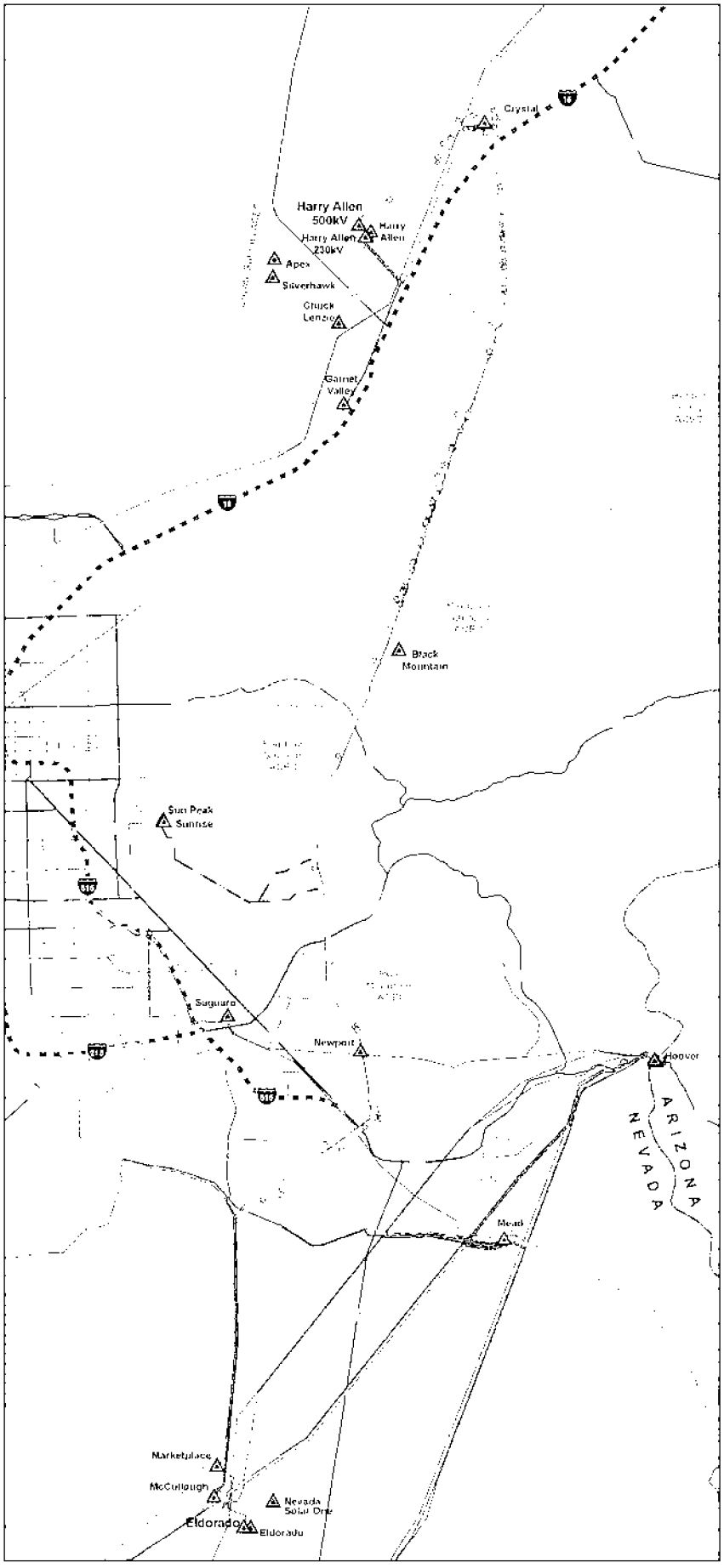
Adequate burrowing substrate and thermal cover species are a crucial habitat component for desert tortoises. In the Mojave region, desert tortoises will construct their own burrows to avoid extreme hot or cold temperatures. Mojave desert tortoises often excavate burrows under vegetation that can be up to 10 meters (33 feet) deep (Arizona Game and Fish Department 2001). Elevations at which tortoises occur in the Mojave range from below sea level in Death Valley, California, up to approximately 5,000 feet at Yucca Mountain, Nevada (*ibid*).

Desert tortoise surveys were conducted between April 23 and June 3 2009, and April 4 2012, including 27 days and a total of 645 transect miles. Within that time, 15 live tortoises and 187 signs were documented. Of the total signs, 105 burrows, 42 scat, 35 carcasses, 2 egg shells, 1 bone, and 2 sets of tracks were recorded. Figure 3-2 depicts the location of tortoises and sign observed during surveys conducted in 2009 and 2012.

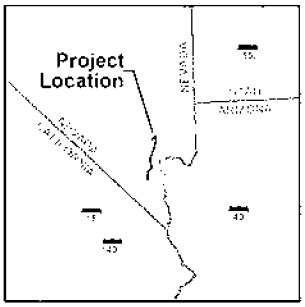
Southwestern Willow Flycatcher

The southwestern willow flycatcher was listed as endangered, without designated critical habitat, on February 27, 1995; primarily because of loss and modification of riparian habitats (60 FR 10695-10715). Critical habitat was later designated on July 22, 1997. A court decision in 2001 resulted in a subsequent final rule on critical habitat on October 19, 2005 (70 FR 60885). In addition to its protected status under the Endangered Species Act of 1973 (ESA), the flycatcher subspecies is classified as protected wildlife under Nevada Revised Statutes, Chapter 501. The Final Recovery Plan for the southwestern willow flycatcher was made available on March 5, 2003 (68 FR 10485). In Nevada, management units are identified for the Virgin River and Pahranagat Valley, and there is designated critical habitat for the southwestern willow flycatcher on the Virgin River, all of which are outside the boundaries of the project area. Critical habitat units had previously been designated by the 1997 rule at Upper and Lower Pahranagat Lake and at the Key Pittman Wildlife Management Area. However, the final rule designating critical habitat for this species excluded the habitat along the Pahranagat Wash and added habitat units on the Virgin River in Nevada and Utah (66 FR 51683-51684).

In the western United States, the southwestern willow flycatcher is often found on willow-covered islands, brush along watercourses, beaver meadows, and mountain parks, always in close association with riparian waters and lentic waters (USFWS 2002). It may be found as high as 2,400 meters (7,875 feet) elevation, and they also follow willow- or cottonwood-lined streams out into desert regions (Terres 1980). Southwestern willow flycatcher territories and nest sites are usually located near open water, cienegas, marshy seeps, or saturated soils (Sogge et al. 1997). In the semiarid and arid parts of the Southwest, hydrologic conditions can vary radically within a season and between years. Many sites have surface water or saturated soil only during the early part of the breeding season. Breeding habitat on the edge of a reservoir may have standing water during a wet year, or it may be farther from surface water during dry conditions.



REGIONAL LOCATION



Legend

Project Features

- Substation
- Generation Station
- Project Centerline

Desert Tortoise Sign

- Live Tortoise
- Carcass
- Burrow
- Scat
- Egg Shells
- Track
- Bone

Special Designations

- ACEC
- Designated Wilderness Area
- Instant Study Area
- National Conservation Area

Transmission Lines

- 500kV Transmission Line
- Proposed 500kV Transmission Line
- 345kV Transmission Line
- 230kV Transmission Line
- Under 230kV Transmission Line

Sources
USGS 30 meter pixel elevation data
LS Power Transmission line, generation station, and substation data
BLM Land ownership and land management data

0 3 6 Miles

Southern Nevada Intertie Project
500kV Transmission Line

Great Basin Transmission, LLC

Desert Tortoise Survey Results

April 2012

Figure 3-2

Figure 3-2. Desert Tortoise Survey Results

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The historic distribution of the southwestern willow flycatcher is unclear, but it apparently occurs only sporadically throughout the Mojave region of Nevada, in lowland riparian areas and wetlands (Finch and Stoleson 2000; USFWS 2002). Outside the project area, a dozen territories were observed along the Virgin River in 1997, and potential habitat included the Meadow Valley Wash, the Muddy River, and the Colorado River System (Hiatt and Boone 2003).

Within the proposed project area, the only potentially suitable habitat for southwestern willow flycatchers is along the Las Vegas Wash. During surveys conducted by SWCA in 2007, the first resident southwestern willow flycatcher was detected within the Las Vegas Wash. This individual was detected approximately 1.50 miles (2.40 kilometers) upstream from the proposed transmission line crossing (SWCA 2008). Surveys conducted in 2008 detected a resident west of the Pabco Road Weir, approximately 3 miles upstream of the proposed alignment (SWCA 2009). No residents were detected in 2009 or 2010, but an individual was confirmed in 2011, approximately 1.5 miles upstream from the proposed project alignment (Van Dooremolen 2011). Currently, there are no known nesting locations within the Las Vegas Wash. Southwestern willow flycatchers were not observed during the 2009 surveys.

Yuma Clapper Rail

The Yuma clapper rail (*Rallus longirostris yumanensis*) was originally described by Dickey (1923) as a new species of clapper rail (*Rallus yumanensis*), but Oberholser (1937) revised the taxonomy to include it as a subspecies.

The Yuma clapper rail was listed as endangered, without designated critical habitat, on March 11, 1967; primarily because of loss and modification of riparian habitats (USFWS 2006). The species was considered for downlisting in 1983; however, severe flooding of the Lower Colorado River that year and unstable population numbers since has resulted in the proposal not being reconsidered (*ibid*). In addition to its protected status under the ESA, the Yuma clapper rail is classified as protected wildlife under Nevada Revised Statutes, Chapter 501. The Final Recovery Plan for the bird was made available on February 4, 1983 (USFWS 1983), and a draft revised version of the recovery plan was made available on February 10, 2010 (USFWS 2010).

The historic distribution of the Yuma clapper rail is unclear, but it has recently been documented as far north as the Las Vegas Wash in Clark County, Nevada (SWCA 2008). SWCA delineated numerous sites within the Las Vegas Wash that have been identified as potentially suitable habitat for the Yuma clapper rail, including a site at the proposed project crossing.

During Southwestern Willow Flycatcher surveys along the Las Vegas Wash in 1998, a clapper rail was detected in the active floodplain of the Wash downstream from Pabco Road (SWCA 1998). Subsequent surveys for clapper rails resulted in a single individual detected in 2005 and a single individual detected in 2006. Systematic surveys for Yuma clapper rails conducted in 2000 and 2001 failed to detect any individuals (SWCA 2008). Surveys for marsh birds conducted from 2008-2011 have failed to detect any Yuma clapper rails within the Las Vegas Wash. The closest known breeding colonies exist along the Muddy River, approximately 40 miles northeast of the Las Vegas Wash (Van Dooremolen 2012). Yuma clapper rails were not observed during the 2009 surveys.

Yellow-billed Cuckoo

The yellow-billed cuckoo (*Coccyzus americanus*) was separated into eastern and western subspecies by Ridgway in 1887, based on physical attributes. However, in the late 1980s the USFWS initiated studies to determine the validity of this separation and determined that there were not significant differences phenologically or genetically between subspecies (USFWS 2011b).

The yellow-billed cuckoo was petitioned for listing as an endangered species on February 9, 1998. On July 25, 2001, the western distinct population segment of the yellow-billed cuckoo was found to warrant listing as threatened, but was precluded by higher priority listing actions (66 FR 38611-38626). This population segment currently has a listing priority number of 3 (USFWS 2011b).

The only location within the project area that provides potentially suitable habitat for the yellow-billed cuckoo is the Las Vegas Wash; a single individual was observed in 1998. However, the species has failed to be detected since then, despite systematic species-specific surveys. The Southern Nevada Water Authority, one of the primary partners in management of the Las Vegas Wash, assesses habitat on the Wash annually to determine whether cuckoo surveys should be conducted. Surveys were last conducted in 2004 (Great Basin Bird Observatory 2011; Van Dooremolen 2010; SWCA 2002). Yellow-billed cuckoo were not observed during the 2009 surveys.

3.9. Cultural Resources

3.9.1. Introduction

The term "cultural resource" refers to a broad category of historic property types that include prehistoric and historic archaeological sites, buildings, districts, structures, locations, or objects considered important to a culture or community for scientific, traditional, religious, or other reasons. Cultural resources deemed significant for their contribution to broad patterns of history, prehistory, architecture, engineering, or culture are eligible for listing on the National Register of Historic Places (NRHP) and afforded certain protections under the National Historic Preservation Act (NHPA) of 1966, as amended (16 U.S.C. 470 et seq.). Because the project is a federal undertaking, it is subject to compliance with Section 106 (16 U.S.C 470f) of the NHPA. Section 106 requires federal agencies to consider the effects of their undertakings on historic properties, and provide the Advisory Council on Historic Preservation a reasonable opportunity to comment with regard to such undertakings. The process for complying with Section 106 is outlined in the implementing regulations found at 36 CFR 800, and those regulations require consultation with the appropriate State Historic Preservation Officers (SHPO), Tribal Historic Preservation Officers (THPO), tribes, the public, and other interested parties with respect to the identification, evaluation, and treatment of historic properties that may be affected by an undertaking. In addition, Executive Order 13007 directs federal agencies to accommodate access to and ceremonial use of Indian sacred sites by Indian practitioners and avoid adversely affecting the physical integrity of such sacred sites.

Properties eligible for listing on the NRHP possess characteristics that are significant under one or more of the following evaluation criteria (36 CFR 60.4): they are associated with events that have made a significant contribution to the broad patterns of history; or are associated with the lives of persons significant in our past; or embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or have yielded, or may be likely to yield, information important in prehistory or history.

In addition to demonstrating significance in one or more of the categories listed above, a property must demonstrate integrity. The historic property must be a "preservable entity" that demonstrates the qualities that make it significant; integrity is most often judged on location, setting, design, materials, workmanship, feeling, and association. In general, properties less than 50 years of age, unless of exceptional importance, are not eligible for listing on the NRHP.

3.9.2. Definition of the Area of Potential Effect

As defined in Section 106, the APE refers to the "geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties," is "influenced by the scale and nature of an undertaking," and "may be different for different kinds of effects caused by the undertaking" (36 CFR 800.16[d]). As specified in the programmatic agreement (PA) for the project, the APE shall be defined to include the area within which there are potential direct and indirect effects to historic properties from activities associated with the undertaking. The 200-foot-wide transmission line ROW and the disturbance limit of all access roads and of all work areas or other facilities for this project is considered the "direct effects APE." Because access roads, work areas, and other facilities have not yet been delineated through final engineering, only the 200-foot ROW has been considered in this EA. The "indirect effects APE" for assessing indirect effects on historic properties outside of the transmission line corridor will extend at least 1 mile in all directions from the perimeter of the direct effects APE.

3.9.3. Affected Environment

A Class I cultural resources records and literature review was conducted to identify previously recorded properties and projects conducted within a Class I review area, defined as a 1-mile area surrounding the direct effects APE for the Proposed Action and alternatives. This inventory involved a review of the records maintained in the following repositories:

- Harry Reid Center for Environmental Studies
- NVCRIS database
- BLM Nevada State Office (General Land Office [GLO]) Maps

The records review identified a total of 208 cultural resource projects that have been conducted in the Class I review area. The majority of these projects were surveys conducted for utilities, including pipelines, transmission lines, and generation stations. Other surveys were for water projects, land sales, mining, recreation (all-terrain vehicle and motorcycle races), communications, and transportation. Surveyed acreages for prior cultural resource projects range

from less than 10 acres to more than 45,000 acres. As a result of these prior projects, approximately 36 percent of the combined direct effects APEs for the proposed project and alternatives have been surveyed in the past for projects such as the Harry Allen to Mead Transmission Line, the Dry Lakes Valley Transmission Corridor, and the Las Vegas Valley Disposal Boundary.

The records review also identified previously recorded sites in the Class I review area and in the direct effects APEs for the Proposed Action and alternatives. A total of 294 cultural resource sites have been recorded in the Class I review area, comprising 302 historic and/or prehistoric components. Of these, 59 sites with 60 components are likely to intersect the combined direct effects APEs of the Proposed Action and alternative routes. Table 3-7 summarizes the site types identified in the Class I review area, their eligibility, and the number of sites within the direct effects APE for the Proposed Action and alternatives.

Table 3-7. Cultural Resources in the Class I Review Area and Direct Effects APEs.

	Class I Review Area		Proposed Action Direct Effect APE		Alternative Route Direct Effects APE	
Component Type	NRHP Eligible/ Unknown	NRHP Ineligible	NRHP Eligible/ Unknown	NRHP Ineligible	NRHP Eligible/ Unknown	NRHP Ineligible
Historic Camp	3	1	1	-	(1)	-
Historic Mine/ Related	6	10	1	-	(1)	-
Historic Rail Road/ Related	1	2	1	1	(1)	1
Historic Structure	6	11	2	2	(2)	(1)
Historic Trail/Road	-	7	-	6	-	3 (2)
Historic Trash	-	16	-	1	-	(1)
Historic Utility	5	4	5	1	3 (1)	(1)
Prehistoric Artifact Scatter	2	1	1	1	1	(1)
Prehistoric Camp	1	2	-	-	-	(1)
Prehistoric Features	16	13	1	1	-	(1)
Prehistoric Fragile Pattern	11	8	5	-	(3)	-
Prehistoric Habitation	7	-	1	-	(1)	-
Prehistoric Lithic Scatter	21	43	4	8	2 (3)	1 (6)
Prehistoric Quarry	9	5	1	1	(2)	1 (1)
Prehistoric Rock Art	2	-	-	-	-	-
Prehistoric Rock Shelter	36	15	3	1	1 (1)	-
Isolated Find	1	26	-	1	-	1 (1)
Unknown Information	11	-	-	-	(1)	-
Totals	**138**	**164**	**26**	**24**	**7 (17)**	**7 (16)**

[1]Numbers in parentheses indicate site components intersecting the direct effects APE for the Alternative route in the 18-mile area of collocation on the existing NV Energy double-circuit transmission structures.

A high density of cultural resource sites identified in the Class I records review are located within the boundaries of the Las Vegas Wash Archaeological District designated in 1977 and as expanded in 2001. Site types within the district include fragile pattern sites, stone circle features,

rockshelters, historic and prehistoric artifact scatters, masonry structures, mining features, irrigation features, trails, and historic roads. Investigations in the area have revealed artifacts dating from the Paleoindian Period (as old as 12,000 years before present) through to historic times, including artifacts left by Spanish explorers and miners.

The density of known cultural resource sites is lower outside of the Las Vegas Wash Archaeological District. Site types identified north of the District include prehistoric rockshelters, lithic scatters, habitations, and features such as stone circles, as well as historic roads and railroads, a camp, and numerous trash scatters. Site types identified south of the District are similar to those present in the north, but also include prehistoric quarries, as well as historic homesteads and settlements, mining related sites, and numerous historic utilities related to irrigation and transmission lines originating at Hoover Dam.

Proposed Action

In the direct effects APE for the Proposed Action there are 26 cultural resource site components that are eligible for listing on the NRHP, or whose eligibility status is unknown or unevaluated. A total of 10 known historic components are present, consisting of a camp, a mining related site, a railroad related site, 2 sites with historic structures, and 5 historic utility related sites. A total of 16 known prehistoric components are present: 1 artifact scatter, 1 site with features, 5 fragile pattern sites, 1 habitation site, 4 lithic scatters, 1 quarry, and 3 rockshelters. It is likely that additional cultural resources sites are present in unsurveyed areas of the direct effects APE for the Proposed Action.

There are no known cultural resource sites eligible or potentially eligible for listing on the NRHP within the direct effects APE associated with the Crystal North, River Mountains East, or Dutchman Pass East routing options.

Alternative 1

In the direct effects APE for Alternative 1 there are 24 cultural resource site components that are eligible for listing on the NRHP, or whose eligibility status is unknown or unevaluated. Of the 24 components, 17 are located in the area where the transmission line would be collocated on the existing NV Energy transmission structures. Of these 17 components, a total of 6 known historic components are present: 1 camp, 1 mining related site, 1 railroad related site, 2 sites with historic structures, and 1 historic utility. A total of 10 known prehistoric components are present: 3 fragile pattern sites, 1 habitation site, 3 lithic scatters, 2 quarries, and 1 rockshelter. It is likely that additional cultural resources sites are present in unsurveyed areas of the direct effects APE for Alternative 1. Also present is a single cultural resource site for which no information could be obtained. The 7 components located outside of the collocation area are: 3 historic utility related sites, 1 prehistoric artifact scatter, 2 prehistoric lithic scatters, and 1 prehistoric rockshelter.

There are no known cultural resource sites eligible or potentially eligible for listing on the NRHP within the direct effects APE associated with the Dutchman Pass East routing option.

3.10. Paleontological Resources

Geological units within 1 mile of the project centerline were inventoried for their paleontological potential based on the Potential Fossil Yield Classification (PFYC) assigned to them by the BLM. The PFYC system is a five-tiered system with a PFYC of 1 assigned to geological units with low to no potential for containing paleontological resources (igneous and metamorphic rocks); whereas a PFYC of 5 is assigned to geological units that consistently contain significant paleontological resources. The project area contains six geological units that have a moderate to high paleontological potential (PFYC 3 or 4) (Table 3-8). Geological units that have a moderate paleontological potential include deposits of Permian age (Kaibab, Toroweap, and Coconino formations), deposits of Triassic age (undifferentiated Chinle and Moenkopi formations), the Aztec Sandstone of Jurassic age, and Quaternary lakebed deposits. Geological units that have a high paleontological potential include the Horse Spring and Muddy Creek formations, both of Tertiary age (all geological units from Stewart and Carlson 1978).

The deposits of Permian age do not contain any known paleontological localities within the project area. However, there are other Paleozoic geological units with a lower paleontological potential that do contain paleontological localities within the project area. These paleontological localities contain marine invertebrate fossils. The deposits of Triassic and Jurassic age do not contain any known paleontological localities within the project area.

The Horse Spring Formation of Oligocene to Miocene age has not produced any paleontological localities within the project area. Elsewhere in southern Nevada, the Horse Spring Formation contains fossils of Myotis sp. (bat) and fossil trackways of dogs, camels, and birds (Czaplewski 1993; Kissel-Jones and Rowland 2003). Mollusk and plant fossils have also been found (Longwell et al. 1965).

The Muddy Creek Formation of Miocene to Pliocene age contains a number of paleontological localities in Clark County, Nevada. These localities include a number of fossil trackways made by carnivores, camelids, and birds north of the project area (Varhalmi 2007). Fossil materials described from the Muddy Creek Formation include two carnivores (Aelurodon sp. cf. A. validus [bone-crushing dog] and ?Indarctos sp. [bear]); an equid [horse]; and five artiodactyls (Megatylopus sp. [camel], Alforjas sp. [camel], Hemiauchenia sp. [llama], Texoceros sp. [pronghorn], and Neotragoceras sp. [bovid]) (Longwell et al. 1965; Reynolds and Lindsay 1999; Tedford et al. 2004).

Table 3-8. Geological Units and Associated Paleontological Potential within 1 mile of the Project Centerline.					
Geological Unit	**Map Symbol**	**Geological Age**	**PFYC**	**Paleontological Potential**	**Survey/ Monitoring**
Quaternary Terrestrial Sediments					
Alluvium, undifferentiated	Qal	Quaternary	2	Low	No
Playa, lakebed, alluvial-flat deposits	Qpl	Quaternary	3	Moderate/ Undetermined	Yes
Tertiary Igneous Rocks					
Basalt	Tb3	Miocene	1	Low	No
Younger andesite and intermediate flows and breccias	Ta3	Miocene	1	Low	No
Younger rhyolitic flows and shallow intrusive rocks	Tr3	Miocene	1	Low	No
Andesite and basalt flows	Tba	Miocene –Oligocene	1	Low	No
Felsic phaneritic intrusive rocks	Tfi	Miocene – Eocene	1	Low	No
Tertiary Sedimentary Rocks					
Muddy Creek Formation	Ts3	Pliocene – Miocene	4	High	Yes
Horse Spring Formation	Ths	Middle Miocene – Upper Oligocene	4	High	Yes
Mesozoic Igneous Rocks					
Felsic phaneritic intrusive rocks	Kfi		1	Low	No
Mesozoic Sedimentary Rocks					
Eolian crossbedded sandstone including Aztec Sandstone	Jas	Jurassic	3	Moderate/ Undetermined	Yes
Continentally derived siltstone and clay	JTRch	Lower Jurassic – Upper Triassic	3	Moderate/ Undetermined	Yes
Marine siltstone, limestone, and conglomerate including Chinle and Moenkopi formations	TRmt	Middle – Lower Triassic	3	Moderate/ Undetermined	Yes
Paleozoic Marine Sedimentary Rocks					
Cherty limestone, dolomite, shale, and sandstone	Pc	Middle – Lower Permian	2	Low	No
Siltstone, sandstone, limestone, and dolomite including Bird Spring Formation	Psc	Lower Permian	2	Low	No
Bioclastic limestone including Callville Limestone	IPMbc	Pennsylvanian – Upper Mississippian	2	Low	No

The proposed alignment crosses surface exposures of Quaternary lake sediments in Dry Lake Basin northeast of the Harry Allen Substation. This lithologic unit, which was likely deposited during the Pleistocene Epoch (approximately 1.8 million to 11,000 years ago), has an undetermined potential for paleontological resources. Pleistocene lake sediments in the American Southwest commonly contain significant fossils. Although Quaternary deposits tend to have a low paleontological potential (PFYC of 2), there is a paleontological locality of Quaternary age within the project area. Previous excavations of this locality, Gypsum Cave, have found fossils of land mammals that include Camelops sp. (camel), Canis dirus (dire wolf), Nothrotheriops shastensis (Shasta ground sloth), Hemiauchenia sp. (llama), Equus sp. (horse), and Ovis canadensis (bighorn sheep) (NSM record search; UCMP record search; Stock 1931; Laudermilk and Munz 1934; Harrington 1933; Hendrick et al. 1998).

3.11. Land Use, Recreation, and Access

3.11.1. Environmental Setting and Methodology

The proposed project is located in portions of the Apex Valley and the eastern Las Vegas Valley. It is primarily within unincorporated Clark County, but portions of the line would also be located within the city limits of the City of Henderson and Boulder City. The proposed project is located adjacent to multiple high-voltage transmission lines and is primarily within a BLM-designated utility corridor.

Land use information, including land ownership and jurisdiction, existing land use, and planned land use were collected within the proposed project study area. The study area was defined by applying a 0.75-mile buffer on either side of the reference centerline (creating a 1.5-mile corridor) of the proposed alternatives. Information on land uses in the study area was derived from existing literature, communications with various agencies, aerial photography interpretation, and field reconnaissance activities conducted during April and May 2009.

3.11.2. Land Ownership and Jurisdiction

The land managing agencies within the study area include the BLM, Reclamation, Clark County, the City of Henderson, the National Park Service within the Lake Mead National Recreation Area, and the Moapa River Indian Reservation. The extent of lands within the study area is shown on Figure 2-1 and Figure 2-2, and is included in Table 3-9 and Table 3-10, below.

The BLM and Reclamation administer the majority of the public lands to be crossed by the proposed project. Land management mandates for the BLM stipulates that lands are to be managed in such a way as to foster multiple uses, including use of land and water resources, protecting fish and wildlife, preserving environmental and cultural values, providing for recreation, and managing energy and mineral resources. Reclamation is responsible for managing federal lands for Reclamation project purposes in accordance with all applicable laws, policies, and directives and standards.

Table 3-9. Land Ownership			
Proposed Action		**Alternative 1**	
Land Owner	**Miles Crossed**	**Land Owner**	**Miles Crossed**
BLM	46.2	BLM	46.2
Reclamation	6.4	Reclamation	6.4
Private	2.0	Private	2.0
Clark County	0.5	Clark County	0.5
Boulder City	4.0	Boulder City	4.0

Table 3-10. Local Government Jurisdiction			
Proposed Action		**Alternative 1**	
Land Jurisdiction	**Miles Crossed**	**Land Jurisdiction**	**Miles Crossed**
City of Henderson	7.6	City of Henderson	8.3
Boulder City	4.0	Boulder City	4.0
Clark County	47.5	Clark County	46.6

The Lake Mead National Recreation Area (NRA), managed by the National Park Service, is located approximately 1 mile east of the proposed ROW in the Lake Mead Boulevard/Highway 146 area. The Lake Mead NRA provides a variety of recreational opportunities, including boating, camping, hiking, fishing, water skiing, and wildlife viewing. The proposed route does not cross the Lake Mead NRA.

The portion of the study area under BLM jurisdiction is subject to the 1998 Las Vegas RMP. The RMP provides a comprehensive framework for managing approximately 3.3 million acres of public lands administered by the BLM Las Vegas Field Office. The RMP Management Objective and Directions applicable for the Proposed Action are Objective RW-1, and Management Directions RW-1-e and RW-1-h, which provide for ACEC, which are ROW avoidance areas.

Additionally, this RMP identifies utility corridors. In January 2009, the West-wide Energy Corridor Programmatic EIS was approved. The utility corridor identified as part of that EIS amended the RMP for inclusion of these corridors. Corridor 39-231 is a multimodal corridor ranging in width between 500 and 3,500 feet, containing portions of a number of existing utility facilities that include 230 and 500 kV AC transmission lines, a 500 kV DC transmission line, and underground water and natural gas pipelines. The majority of the project alignment is located within this corridor.

Lands within the study area that are owned by the state of Nevada are areas managed by the Nevada Department of Transportation.

Local governments that have the authority to plan and control land uses within their jurisdiction through the development of land use planning and zoning ordinances include the City of Henderson, the City of Boulder City, and Clark County.

Private lands within the study area generally consist of residential communities near the Lake Las Vegas and Henderson area, and commercial/industrial areas, with intermittent industrial and commercial uses throughout. These specific existing land uses are discussed in more detail below.

3.11.3. Special Management Areas

The following special management areas are located within the project study area.

BLM Rainbow Gardens ACEC

The Rainbow Gardens ACEC is located between mile markers 23 and 20 (see Figure 2-1 and Figure 2-2), and is managed to protect the geologic, scientific, scenic, and cultural resources and sensitive plants. Unique cultural resources can be found in the ACEC. Gypsum Cave has been nominated to the NRHP based on its traditional importance to Southern Paiute and Chemehuevi tribes, and its importance to the early history of North American archaeology through the work done at the cave. It contains deposits of gypsum and sandy soils that support sensitive plant species, including the Las Vegas bearpoppy. Commonly referred to as "badlands" by locals, this area has historically been used as off-highway vehicle (OHV) play areas. The soils are very friable when disturbed, and the cyptobiotic surface is easily damaged. The ACEC protects a portion of this habitat.

BLM River Mountains ACEC

The River Mountains ACEC is located between mile markers 34 and 43, and is managed to protect habitat for the River Mountains desert bighorn sheep herd and to protect the scenic viewshed for the Cities of Henderson and Boulder City. It contains rough, rocky, and steep terrain, broken up by canyons and washes that provide the steep slopes where bighorn sheep can escape from predators. It shares an eastern boundary with lands managed for the herd in the Lake Mead NRA. This herd has suffered from loss of habitat due to the increase of urban development in its range, from the expansion of Boulder City and Henderson and the widening of US 95 (BLM 2011).

BLM Sloan Canyon National Conservation Area

The Sloan Canyon National Conservation Area (NCA) is located adjacent to the utility corridor between mile markers 48 and 58, and features unique scenic and geologic features and extraordinary cultural resources. The landscape varies from lowland dry lake beds to volcanic rock peaks reaching heights over 5,000 feet. The centerpiece of the area is the Sloan Canyon Petroglyph Site, one of the most significant cultural resources in Southern Nevada. Archaeologists believe that the more than 300 rock art panels with 1,700 individual design elements were created by native cultures from the Archaic to the Historic era.

BLM Sunrise Mountain ISA

The Sunrise Mountain ISA, managed by the BLM, is located on the east side of the Las Vegas Valley and includes Frenchman and Sunrise mountains. The ISA contains approximately 10,240 acres; 10,070 acres of which are BLM lands and 170 acres are private holdings. In the early 1970s the area was designated as the Sunrise Mountain Natural Area, and it was identified as having unique geological, biological, and aesthetic values. A total of 29,475 acres were studied, and it was determined that the area lacked wilderness characteristics. As a result, the BLM recommended that the study area be dropped from the wilderness review process.

Subsequent to the BLM's recommendation, 9,952 acres of the original 10,240 acres of the Natural Area continue to be managed as an ISA, until such time that Congress either designates it as wilderness or releases it from further study. The other 288 acres, which run through the center of the ISA, have been released from further study through the Clark County Conservation of Public Land and Natural Resources Act of 2002, Public Law 107-282. A portion of these released acres have been designated as a 500-foot-wide utility corridor.

The ISA is located adjacent to the Proposed Action approximately between mile markers 27 and 28.5. There are currently three extra-high-voltage transmission lines within this area. The Proposed Action would be located within a 500-foot BLM utility corridor, in a new ROW outside of the ISA. The BLM is currently evaluating whether new additional ROW will be granted in this corridor. In the event that new ROW is not granted, Great Basin would place new conductors on the existing Harry Allen to Mead Transmission line structures.

3.11.4. Existing Land Use

This section describes BLM authorized projects and existing land uses (residential, commercial, etc.). The identification and verification of existing land uses was determined by using existing data sources, aerial interpretation, and field reconnaissance during April and May 2009.

Commercial

Commercial land uses within the study area include commercial development associated with Lake Las Vegas, and a mixture of commercial development in the City of Henderson. No commercial land use is crossed by the proposed route.

Industrial

The River Mountain Water Facility Treatment Plant is directly adjacent to the proposed route. A variety of industrial uses fall within the limits of the City of Henderson. The Apex Industrial Area, located within the City of North Las Vegas, is within a portion of the study area around the Harry Allen Substation.

There are a number of extraction and mining operations within the study area, including the PABCO Gypsum operation. Although no operations are directly crossed by the proposed route, several are adjacent to the proposed route. The PABCO Gypsum operation in the annexed industrial zone of the City of North Las Vegas is located in the central portion of the proposed

route, just south of the Lake Las Vegas development. Several other operations in the southern portion of the study area are located on both BLM and Boulder City lands.

Utilities

The proposed project is located in a designated utility corridor and parallels existing high-voltage transmission lines for almost the entire route. In addition, several electric generating stations and substations are in the vicinity of the study area.

Transportation

The transportation network in the project study area includes principal regional highways, paved and unpaved roadways, and the Union Pacific Railroad. Other transportation resources within the study area include nonmotorized transportation facilities such as bicycle paths, pedestrian sidewalks, hiking trails, and horse trails. The majority of the nonmotorized transportation facilities are located in the populated areas between mile markers 38 and 44.

3.11.5. Recreation

A variety of recreational opportunities exists within or adjacent to the study area, including golf courses, parks, hiking and biking trails, OHV use, shooting ranges, resorts and casinos, and boating facilities. In several locations along the proposed route, existing trails are crossed; but in these instances, the proposed route parallels existing high-voltage transmission lines and is within the BLM designated utility corridor.

Golf courses associated with Lakes Las Vegas are located within the study area, adjacent to mile marker 36. Three golf courses are within the boundaries of Lake Las Vegas. Two of the courses, The Falls and Reflection Bay, are located in the western and central part of Lake Las Vegas respectively, and were closed in 2009 as part of Lake Las Vegas' bankruptcy reorganization. The Golf Club at South Shore is a private golf club located in the eastern part of Lake Las Vegas that remains open. A driving range associated with the Falls Golf Course is crossed by the proposed alignment (Las Vegas Sun 2008, 2009).

The project area is located in hunting units 263 and 268, which allow for the hunting of mule deer and big horn sheep (NDOW 2010).

The River Mountains Loop Trail is a multi-agency, multi-use trail located on City of Henderson, Reclamation, and City of Boulder City lands. This trail is a well-used recreation opportunity in the River Mountains area. All of the entities referenced above, along with the National Park Service, partner in the management of the trail. The River Mountains Loop Trail segments located on Reclamation land are managed by the City of Henderson under contract with Reclamation, and are crossed by the Proposed Action in several locations.

The City of Henderson's Equestrian Park (South) is located approximately 0.5 mile from the project area, adjacent to mile marker 42. Equestrian Park (South) is a 5-acre park with a 1.8-mile dirt horse path, a lighted dog park, open grass areas, picnic tables, and a paved biking/walking

trail that connects to other trails along the transmission line corridor (City of Henderson, Parks and Recreation 2012).

3.11.6. Planned and Future Land Use

Land management for private lands is only restricted by local land use controls or state or federal laws pertaining to specific activities. The City of Henderson and Clark County Comprehensive Plans and Boulder City's Master Plan govern the development of private lands within the respective jurisdictions. Following is a description of the plans, and specific planned land use designations within the study area.

Clark County

The Clark County Comprehensive Plan describes land uses throughout the county, provides for regional services and facilities, and governs development within unincorporated areas. The land use element of the comprehensive plan includes numerous planning documents that provide guidance for land uses within communities throughout the county. Land use guidance has been prepared for the unincorporated towns/areas in the Las Vegas Valley and for the outlying areas of the county, as well as for rural areas outside the Las Vegas Valley, including the northeast, northwest, and south portions of the county. All planning documents are generally updated every 5 years.

With regard to electric transmission lines, the land use plan and development guidelines promote the combined use of corridors by utilities and the use of existing corridors whenever possible. There is a conceptual trail master plan system being developed for the greater Las Vegas area; however, the physical location of the trail has not been identified.

Planned industrial designations within the study area are generally associated with the Apex Industrial Park and the PABCO Gypsum operation in the central portion of the proposed route, between mile markers 24 and 27, within unincorporated Clark County (Clark County Department of Comprehensive Planning 2010).

City of Henderson

The City of Henderson Comprehensive Plan governs development within the incorporated area of the City of Henderson. The majority of the route through Henderson will run adjacent to areas with existing and planned low density residential development; however, the proposed route is on the opposite side of existing high-voltage transmission lines.

Planned residential land designations within the study area include low to medium density single-family residential development, within the incorporated boundaries of the City of Henderson, primarily within the Lake Las Vegas development. The Lake Las Vegas development is a 3,592-acre development built around Lake Las Vegas located north of SR 564 (Lake Mead Parkway), between mile markers 32 and 35. It consists of single-family residential development, three hotels, a casino, a marina, and three golf courses (two of which are currently closed).

The proposed Jericho Heights development project is a 752-unit multi-family residential development on 81 acres located just south of Highway 93, between mile markers 43 and 44. The development includes seven four-story residential structures, a boat storage facility, a tavern, and a restaurant with a drive-thru. The Jericho Heights development project was originally approved in 2008 and has had two approval extensions. There have been no building permits approved for the project (Barnes 2012).

The underlying zoning of the remaining City of Henderson parcels crossed by the project area is Development Holding Zone. A Development Holding Zone is defined as a district established to provide a suitable classification for limited service areas to avoid premature development; permitting only low-density development until utility and community services can be provided.

Planned commercial designations within the study area are located within the City of Henderson near Highway 93 and Lake Las Vegas. The project area also passes through a commercial planned land use corridor in the Lake Las Vegas area (City of Henderson 2010).

City of Boulder City

The Boulder City Master Plan governs development within the incorporated area of the City of Boulder City. The only City of Boulder City land that falls within the study area is the southernmost portion, between mile markers 49 and 58. The entire route through Boulder City will run adjacent to existing high-voltage transmission lines and is identified as BLM land in the planned land use section of the Master Plan (Boulder City 2009).

3.12. Visual Resources

This section of the EA addresses the affected environment associated with visual resources that includes Visual Resource Management classes, planning level Visual Resource Inventory (VRI), and key observation points (KOP). Visibility related to the construction, operation, and maintenance of the proposed transmission line and ancillary facilities is also addressed in this section, because visibility of the project is one of several criteria used to select KOPs.

The inventory considered visual resources potentially affected by the construction and operation of the proposed project. Consistent with methods based on the BLM's VRM System (Manual H-8410-1, 1986), the VRI focused on the identification of project-level KOPs and planning-level VRI information established to support BLM RMP decisions. Planning level VRI data characterizes the scenic value of BLM-administered land based on an evaluation of scenic quality, sensitivity levels, distance zones, and VRI and VRM classes. This visual assessment includes an inventory and assessment of visual resources within the study area for the Proposed Action and alternatives. Visual resource data was collected 2 miles on either side of the centerline of the route centerlines from existing and future land use plans, aerial photography, BLM data, and field review.

3.12.1. Environmental Setting

The study area is located entirely within the Basin and Range physiographic province in southeast Nevada (Fenneman 1931). This geographic province is characterized by its isolated

roughly parallel mountain ranges separated by closed (undrained) desert basins. The mountain ranges often run 50 to 70 miles in length and generally traverse north to south.

The major topographic features that define the scenic quality for the project include rock escarpments associated with the Dry Lake Range and the southeast extents of the Arrow Canyon Range in the northern portion; River Mountains, Sunrise Mountain, Frenchman Mountain, and the western edge of the Muddy Mountains in the central portion; and the McCullough Mountains and Sloan Canyon in the southern portion of the study area. The project is located entirely within the Mojave Desert, where vegetation is typically dominated by creosote, sagebrush, brittlebush, and cholla, with scattered occurrences of yucca on flat terrain. These communities may vary in density and size. Most of the foothills and mountainous areas are vegetated along their slopes with scattered creosote-bursage and other desertscrub, which become smaller and scarcer near the peaks. Greater density and diversity of vegetation is found along the Las Vegas Wash, including cottonwood, desert broom, reeds, riparian grasses, and invasive species such as tamarisk. The diversity of vegetation associated with the Las Vegas Wash along with the constant presence of surface water provides movement, texture, color, and interest in this otherwise arid and sparsely vegetated setting.

With minor exceptions, the project would be located adjacent to multiple extra-high-voltage transmission lines primarily within BLM-designated utility corridors on federal lands; hence the natural landscape setting has been heavily modified in the immediate vicinity of the Proposed Action and alternatives. The multimodal utility corridor contains portions of a number of existing utility facilities, including 500 kV, 230 kV, and less than 230 kV transmission lines, and a number of underground water and natural gas pipelines. The Crystal, Harry Allen, Marketplace, McCullough, and Eldorado substations, and the Nevada Solar One Power Plant are also located within the study area. Gravel extraction areas and the Northeast C-1 Detention Basin, which are highly visible, are located within the study area. The City of Henderson, a large community associated with the Las Vegas metropolitan area, is concentrated near the central portion of the study area.

3.12.2. Project-Level Inventory

Key Observation Points

KOPs represent a critical or typical viewpoint within, or along, an identified location, and are required by the BLM to assess and mitigate visual impacts of a proposed action and to demonstrate compliance with designated VRM classes. KOPs were identified in coordination with the BLM recreation/VRM specialist, resulting from land use investigations that included the identification of individual residences, communities, recreation areas, and travel routes. Agency-approved KOPs that will be used to describe the affected environment and demonstrate compliance with the RMP in Chapter 4 are referred to as KOPs 1 through 7. Following are characterizations of inventoried KOPs that have been organized by residences, recreation areas, and travel routes.

Residences

Residential development is concentrated in the central portion of the study area in the City of Henderson. The northern most residences in the study area are located within the Lake Las Vegas development in Henderson.

KOP 3 – Lake Las Vegas is located on the east side of the route alignments with varying residential densities. Some residences occur within 900 feet (approximately) of the project centerlines and have unobstructed, superior, or elevated views of the landscape. The landscape in this vicinity has been locally modified by an existing designated utility corridor that runs along the west side of the development on BLM VRM Class III lands.

KOP 4 – South of Lake Las Vegas, residences near Henderson are located on the west side of the route alignments, which are located within the utility corridor crossing BLM VRM Class IV lands. Other modifications near the utility corridor include a water treatment facility, a detention basin and associated drainage channel, and a number of underground water and natural gas pipelines. These residences are located within approximately 700 feet of the existing utility corridor and have unobstructed, level views of the landscape. BLM VRM Class IV lands would be viewed by these residences.

KOP 5 – Similar to KOP 4, residences in the southern portion of Henderson are located on the west side of the route alignments, which cross BLM VRM Class IV lands. An unobstructed, level view of the landscape, which has been modified by the existing utility corridor, is visible to these residences within 0.25 mile (approximately).

Recreation Areas

Sunrise Mountain ISA is a high sensitivity recreation area immediately adjacent to the Proposed Action and Alternative 1. Lake Mead is in proximity to the study area, although it is outside the 2-mile buffer and would not be affected by this project.

KOP 7 – Quo Vadis Trailhead and trail were formally designated or defined as high sensitivity trails/trailheads within the study area. The Quo Vadis trailhead is located along the segment of the proposed route that leads to the McCullough and Marketplace Substations. The trailhead itself is located immediately adjacent to a designated utility corridor that is occupied by three existing transmission lines and designated as VRM Class III lands. An unnamed trail leads from the Quo Vadis trailhead into the Sloan Canyon NCA.

Travel Routes

There are no formally designated scenic roads or parkways within the study area. Lake Mead is in proximity to the study area, and travel routes that provide primary access to this recreation destination were inventoried as high sensitivity.

KOP 1 – I-15 is one of the main regional transportation routes into the Las Vegas metropolitan area from the northeast. Travelers on I-15 are typically frequent (local) commuters, and therefore I-15 was inventoried as a moderate sensitivity travel route. The Proposed Action and

Alternative 1 would cross I-15 near the Crystal and Harry-Allen substations in a landscape setting that has been modified by three existing transmission lines. BLM VRM Class III lands are designated for this utility corridor.

KOP 2 – Lake Mead Boulevard leads into the Lake Mead NRA and was inventoried as a high sensitivity recreation destination travel route. The proposed route would cross the road within the Sunrise Mountain ISA; however, views of the project would be modified by three existing transmission lines within a BLM-designated utility corridor classified as VRM Class III land.

KOP 6 – Boulder Highway is a local transportation route between Las Vegas and Boulder City. This travel route is associated with moderate sensitivity because it is primarily used by local commuters. Similar to KOP 1, Boulder Highway would be crossed by the Proposed Action and Alternative 1 in a landscape setting that has been modified by three existing transmission lines within a designated BLM utility corridor classified as VRM Class IV land.

3.12.3. Planning-Level Inventory (BLM VRI)

The BLM VRM system requires the inventory of scenic values and the establishment of management objectives for those values through a VRM planning process. The VRI process and its resulting information provide the information necessary to characterize the existing or affected environment, and are required for management and project level decisions. BLM manual H-8410-1 defines the criteria that define VRI components of scenic quality, sensitivity levels, distance zones, and VRI classifications that are summarized below.

Scenic Quality Rating Units

Scenic quality as defined by the BLM is the measure of the visual appeal of a tract of land. In the VRI process, public land is given an A, B, or C rating, based on the evaluation of the following seven key factors: landform, vegetation, water, color, adjacent scenery, scarcity, and cultural modifications.

The Proposed Action and alternatives would primarily traverse Class C scenic quality associated with the undeveloped creosote flats in North Las Vegas and Henderson. Class B scenery traversed by the Proposed Action is associated with the Sunrise ISA area and Rainbow Gardens ACEC. Here, geologic variety results in color and texture variations, which contributes to the scenic quality of this landscape.

Sensitivity Level Rating Units

Sensitivity levels are a measure of public concern for the maintenance of scenic quality associated with a given tract of BLM land. Public lands are assigned high, medium, or low sensitivity by analyzing the various indicators of public concern, including type of user, amount of use, public interest, adjacent land uses, and special areas, among other factors.

The Proposed Action and alternatives would primarily traverse low sensitivity areas in North Las Vegas and Henderson. High sensitivity areas traversed by the project are associated with Sunrise ISA and the Dutchman's Pass area.

Distance Zones

Per BLM guidance, landscapes are subdivided into three distance zones based on relative visibility from KOPs. The three distance zones are foreground-middleground (0 to 5 miles), background (15 miles), and seldom seen (greater than 15 miles).

The Proposed Action and alternatives are located in the foreground-middleground distance zone from predominant travel routes, including I-15, Lake Mead Boulevard, and Boulder Highway.

Visual Resource Inventory Classifications

VRI classes are created using GIS, incorporating the following components: (1) scenic quality, (2) sensitivity levels, and (3) distance zones. VRI classifications represent the inventoried scenic values of BLM administered lands, and have similar objectives as compared to VRM classes.

The Proposed Action and alternatives would primarily cross VRI Class IV lands. VRI Class II lands crossed by the project are associated with the Sunrise ISA. It is important to note that at the scale in which the VRI classifications were derived, the existing extra-high-voltage transmission lines and designated BLM utility corridor were not taken into account in the Class II designation. VRI Class III lands crossed by the project are associated with BLM land near Dutchman's Pass.

Visual Resource Management Classifications

BLM VRM classifications are assigned to lands managed by the BLM through the RMP development (NEPA) process, and provide direction regarding levels of visual change as well as mitigation to decrease potential landscape change within each class. VRM classifications range from Class I, which is the most restrictive and typically assigned to wilderness areas; to Class 4, which is the least restrictive (i.e., assigned to areas planned for mines, infrastructure, etc.). VRM class designations are typically dictated by the scenic quality of the landscape, public concern for the maintenance of the scenic quality, distance zones and associated visibility, and specific management prescriptions based on land use, such as wilderness study areas or areas of critical concern (see Appendix A). Although the VRI provides important information that is used to make VRM class decisions, ultimately, other uses as described in the BLM RMP may dictate the final VRM classification.

VRM classes were inventoried within the study area using GIS data acquired from the BLM (Las Vegas Field Office, July 2008; BLM 2008). The majority of land crossed by the Proposed Action and alternatives is designated as Class III and is comprised of either open desert or the alluvial areas and foothills associated with the Dry Lake Range, Sunrise Mountain, River Mountain, or Eldorado Valley. Class IV areas that would be crossed are characterized by open desertscrub lands consisting of creosote-bursage. The Proposed Action and alternatives would not cross VRM Class I or Class II areas.

3.13. Socioeconomics

The socioeconomic analysis characterizes the human resources occupying the areas surrounding the proposed project. Human resources such as residences, places of work, schools, and other

facilities could be subject to potential changes due to the construction and operation of the transmission line. This section provides a brief inventory of the current status and trends of these resources. The study area considered for the proposed project includes census tracts crossed by the proposed centerline.

3.13.1. Demographics

Nine census tracts, as established by the 2010 U.S. Census Bureau, are crossed by the proposed project. The combined population of these tracts in 2010 was 28,541 people. Table 3-11 provides population figures for these tracts, the most populated of which are between the Las Vegas Wash and Highway 95 (from north to south: 56.13, 57.11, 53.60, and 54.35). Census tracts in these highly populated areas cover smaller areas than those tracts in less populated areas.

Table 3-11. Population by Census Tract

Census Tract	2010 Population	Percent of Total
53.60	4,111	14.4
54.35	3,415	12.0
54.37	2,981	10.4
56.13	4,657	16.3
57.03	1,440	5.0
57.11	4,348	15.2
59.02	1,433	5.0
61.04	3,399	11.9
78	2,757	9.7
Total Population	**28,541**	**100**
Source: U.S. Census 2010		

During the 2010 census, there were 13,137 housing units within the nine census tracts. Of these units, 2,976 (22.7 percent) were vacant. This is an increase from the 12 percent of vacant housing units during the 2000 census, another sign of the recent economic downturn.

3.13.2. Economic Characteristics

Data from Clark County Comprehensive Planning illustrates that the county's economy is dominated by the tourism industry. The largest sectors of employers are leisure and hospitality, casino hotels and gaming industries, and trade, transportation and utilities (Table 3-12). From 2000 to 2011, Las Vegas hosted more than 38,000,000 visitors annually (LVCVA 2012). Although resort hotel casinos are a major employer within the region, the single largest employer in Clark County in 2009 was the Clark County School District, which employed 39,611 employees. The Clark County Government (including the Las Vegas Metropolitan Police) and Nellis Air Force Base were also among the top employers in Clark County in 2009.

Table 3-12. County Labor Market Summary as of February 2009		
Job Type	**Number of Workers**	**Percent of Total**
Leisure and Hospitality	258,000	22.22
Casino Hotels and Gaming Industries	159,000	13.69
Trade, Transportation and Utilities	158,100	13.61
Professional and Business Services	108,700	9.36
Government	100,500	8.65
Retail	97,500	8.40
Construction	82,900	7.14
Education and Health Services	67,100	5.78
Financial Activities	45,600	3.93
Other Services	25,300	2.18
Manufacturing	24,400	2.10
Wholesale	23,400	2.01
Information/Telecommunications	10,400	0.90
Natural Resources and Mining	400	0.03
Total	**1,244,100**	**100.00**
Source: Clark County Department of Comprehensive Planning		

3.14. Environmental Justice

Executive Order 12898 (Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations) requires all federal agencies to assess whether their programs, policies, and activities have disproportionately high and adverse human health or environmental effects on minority and low-income populations in the United States. The criteria for a finding of possible environmental justice issues is the occurrence of more than 50 percent of the population affected by the Proposed Action being minority or low-income. Data was collected on the income and poverty status of the populations within the census tracts traversed by the proposed project.

Clark County and the Las Vegas Metropolitan Statistical Area have experienced tremendous growth over the past several decades. The population increased from 797,142 in 1990 to 1,428,690 in 2000, an increase of 79 percent over the decade; to 1,951,269 in 2010, an increase of 36.6 percent increase over the last decade. However, due to recent economic downturns, growth has slowed dramatically in the past few years. In 2008, there was a decrease in population; the first population decrease in decades.

The existing residential areas within the census tracts crossed by the project include a smaller proportion of minority (37.3 percent) populations when compared to the state (60.4 percent) and Clark County (68.3 percent); but a larger proportion when compared to the Boulder City population (14.8 percent). The existing residential areas within the census tracts crossed by the project have virtually the same minority populations when compared to the City of Henderson (38.0 percent) (Table 3-13).

The percentage of families living below the poverty line in the project study area in 2010 is estimated at 7.5 percent, which is similar to both the City of Henderson (8.2 percent) and Boulder City (7.3 percent), but below the percentage of families living below the poverty line in the state (11.9 percent) and Clark County (11.7 percent). The project study area represents a relatively diverse range of families living below the poverty line, ranging between 0.9 percent for Census Tract 57.11, located within Boulder City, and 18.5 percent for Census Tract 78, which is composed entirely of Nellis Air Force Base (Table 3-14).

The median household income for the project study area was estimated at $78,784 in 2010, which is higher than the state ($55,726), Clark County ($56,258), the City of Henderson ($68,039), and Boulder City ($62,171). However, there are three census tracts within the project study area that have median household incomes below that of the state and Clark County: tract 57.03 ($32,228) located in Boulder City, where the project connects with the Eldorado Substation; tract 59.02 ($34,855) located in Northern Clark County, where the project begins at the Harry Allen Substation; and tract 78 ($40,029), which is Nellis Air Force Base. Alternatively, there are two census tracts within the project area that have median household incomes that are almost twice the median household income of Nevada and Clark County: tract 54.37 ($108,527), which includes the exclusive Lake Las Vegas development within the City of Henderson; and tract 57.11 ($104,946), which is located within Boulder City.

Table 3-13. Racial Breakdown 2010

	Total	White	Hispanic or Latino	Black or African American	American Indian/ Alaska Native	Asian	Native Hawaiian/ Other Pacific Islander	Other	Two or More Races	Percent Minority
Nevada	2,700,551	1,786,688	716,501	218,626	32,062	195,436	16,871	324,793	126,075	60.40
Clark County	1,951,269	619,468	568,644	204,379	14,422	168,831	13,628	262,506	99,391	68.30
City of Henderson	257,729	159,793	38,377	13,142	1,683	18,614	1,445	12,309	12,366	38.00
Boulder City	15,023	12,805	1,061	130	125	169	40	242	451	14.80
Tract 59.02	1,433	446	431	5	262	6	2	240	41	68.90
Tract 56.13	4,657	3,828	448	14	43	22	15	169	118	17.80
Tract 78	2,757	1,398	450	405	18	95	47	131	213	49.30
Tract 61.04	3,399	739	1,171	201	31	492	5	599	161	78.30
Tract 54.37	2,981	2,328	233	104	19	174	2	51	70	21.90
Tract 54.35	3,415	2,468	411	140	41	110	30	105	110	27.70
Tract 53.60	4,111	2,845	616	186	32	91	10	130	201	30.80
Tract 57.11	4,348	2,877	505	118	18	472	16	121	221	33.80

Table 3-13. Racial Breakdown 2010										
	Total	**White**	**Hispanic or Latino**	**Black or African American**	**American Indian/ Alaska Native**	**Asian**	**Native Hawaiian/ Other Pacific Islander**	**Other**	**Two or More Races**	**Percent Minority**
Tract 57.03	1,440	978	178	92	16	85	2	37	52	32.10
Source: U.S. Census 2010										

Table 3-14. Poverty Level and Median Household Income (Estimates) in Study Area 2010					
	Population*	**Median household income**	**Income below poverty level**	**Income at or above poverty level**	**Percent below poverty level**
Nevada	2,594,953	$55,726	308,426	2,286,527	11.9
Clark County	1,870,566	$56,258	219,116	1,651,450	11.7
City of Henderson	15,125	$68,039	1,234	13,891	8.2
Boulder City	247,907	$62,171	18,127	229,780	7.3
Tract 59.02	939	$34,855	98	841	10.4
Tract 56.13	3,722	$66,953	343	3,379	9.2
Tract 78	2,784	$40,029	514	2,270	18.5
Tract 61.04	3,504	$84,770	158	3,346	4.5
Tract 54.37	2,624	$108,527	43	2,581	1.6
Tract 54.35	3,623	$85,255	265	3,358	7.3
Tract 53.60	3,682	$81,167	236	3,446	6.4
Tract 57.11	4,467	$104,946	40	4,427	0.9
Tract 57.03	1,180	$32,228	293	887	24.8
Source: U.S. Census 2010 *Population for whom poverty status is determined					

CHAPTER 4. ENVIRONMENTAL CONSEQUENCES

This chapter contains a discussion of the type, duration, and intensity of potential impacts that could result from the construction, operation, and maintenance of the Proposed Action and alternatives. This analysis is based on the affected resources presented in Chapter 3. Proposed mitigation measures are also listed.

The project's contribution to global climate change was not assessed in detail since greenhouse gas emissions would not result from operation and would be negligible for maintenance of the project. However, project construction would result in greenhouse gas emissions; albeit temporary and with a negligible impact on global climate change.

The specific location of transmission line structures and associated access roads cannot be determined until final design is complete. Estimates of permanent and temporary ground disturbance for single- and double-circuit structures were calculated to help assess and compare the potential impacts of the Proposed Action alternatives upon specific resources. These estimates were based on the Proposed Action, Alternative 1, and the following routing area options (see Figure 2-1 and Figure 2-2):

Crystal Routing Area – Impacts are documented for the Proposed Action and Alternative 1 based on the northern Crystal routing option. Changes to impacts based on the southern routing option are discussed following the impact assessment for the Proposed Action and Alternative 1.

River Mountains Routing Area – Impacts are documented for the Proposed Action and Alternative 1 based on the eastern routing option. Changes to impacts based on the western routing option are discussed following the impact assessment for the Proposed Action and Alternative 1.

Dutchman Pass Routing Area – Impacts are documented for the Proposed Action and Alternative 1 based on the eastern routing option. Changes to impacts based on the western routing option are discussed following the impact assessment for the Proposed Action and Alternative 1.

Disturbance estimates were based on design specifications for a single- or double-circuit 500 kV transmission line (Table 4-1).

Table 4-1. Proposed Project Disturbance

	New Temporary Impact	New Permanent Impact
Proposed Action Single Circuit		
Structure and Other Work Areas	496.4 acres	15.5 acres
New Access and Spur Roads	0.0 acres	63.1 acres
Maintain/Upgrade Existing Access Roads*	0.0 acres	77.8 acres
Totals	496.4 acres	156.4 acres
Proposed Action Double Circuit		
Structure and Other Work Areas	567.1 acres	45.2 acres
New Access and Spur Roads	0.0 acres	89.2 acres
Maintain/Upgrade Existing Access Roads*	0.0 acres	77.8 acres
Totals	567.1 acres	212.2 acres

Table 4-1. Proposed Project Disturbance		
	New Temporary Impact	**New Permanent Impact**
Alternative 1 Single Circuit		
Structure and Other Work Areas	414.6 acres	8.3 acres
New Access and Spur Roads	0.0 acres	46.7 acres
Maintain/Upgrade Existing Access Roads*	0.0 acres	77.8 acres
Totals	414.6 acres	132.8 acres
Alternative 1 Double Circuit		
Structure and Other Work Areas	474.2 acres	31.2 acres
New Access and Spur Roads	0.0 acres	65.9 acres
Maintain/Upgrade Existing Access Roads*	0.0 acres	77.8 acres
Totals	474.2 acres	174.9 acres
*Existing roads are assumed to be an average of 12 feet wide. Upgrades could include up to 24-foot-wide roads (or larger, depending on terrain).		

4.1. Air Quality

This section describes the potential air quality impacts that could result from the construction, operation, and maintenance of the proposed transmission line.

4.1.1. Proposed Action

The proposed project would be constructed and operated within the boundaries of Clark County and therefore under the jurisdiction of the DAQEM for purposes of air quality regulation. The proposed corridor is primarily located in an area of Clark County that is currently in nonattainment for PM_{10}.

Air emissions associated with the Proposed Action are primarily short-term and chiefly associated with engine exhaust due to combustion of fossil fuel in construction equipment and fugitive dust during the construction period. While vehicles will be used to drive the transmission line ROW for periodic maintenance, impacts to air quality from vehicle emissions will be negligible.

Before construction can commence, Great Basin would need to apply for a DAQEM Dust Control Permit for Construction Activities, and related Dust Mitigation Plan. Dust control permits are required by DAQEM when project disturbance exceeds 0.25 acre, or when 100 feet of trenching is planned. Dust Mitigation Plans are required by DAQEM when project disturbance exceeds 10 acres. As part of the dust permit, Great Basin will need to establish and implement Best Management Practices (BMPs) for dust control in order to stay compliant with the dust permit.

Great Basin would be required to maintain compliance with the stipulations of the permit and adhere to the BMPs set forth in the Dust Mitigation Plan. Enforcement of the permit would be the responsibility of DAQEM. As a result of the temporary nature of air emissions and through adherence to DAQEM regulations, impacts to air quality will be minimal.

4.1.2. Alternative 1

Alternative 1 would include using approximately 18 miles of NV Energy's existing Harry Allen to Mead 500 kV transmission line structures. Air quality impacts along this portion of the project area would be associated only with pulling and tensioning sites and access road upgrades. Therefore, the air quality impacts for Alternative 1 may be slightly less than the new ROW for the Proposed Action, although in both cases the impacts would be temporary and minimal.

4.1.3. Routing Area Options

The difference in air quality impacts among the potential routing options in the Crystal, River Mountains, and Dutchman Pass routing areas would be negligible.

4.1.4. No Action Alternative

Under the No Action alternative there would be no construction or operation of the Project; therefore, there would be no air quality impacts resulting from project-related activities.

4.1.5. Mitigation

Other than the requirements of the Clark County DAQEM Dust Control Permit and Dust Mitigation Plan, no additional mitigation is proposed.

4.2. Geology and Minerals

The potential effects on geology and minerals from the construction, operation, and maintenance of the project are discussed in this section.

4.2.1. Proposed Action

The major project activities involve (1) surface disturbance resulting from grading for access roads and work areas and clearing small areas for staging; (2) construction activities at the tower locations; and (3) installation of wires and associated hardware. Although the potential for geologic hazards, including seismic, landslides, and subsidence, is low throughout the project area, there is always a chance these events could occur.

The project area includes several mineral resource locations, such as the PABCO and Pioneer gypsum mines, and are other active placer claims scattered throughout the area. Impacts on mineral resources would be mitigated through the placement of towers and access roads, such that project construction and facilities do not restrict access to mineral resources within the project area.

4.2.2. Alternative 1

Impacts from the construction, operation, and maintenance of Alternative 1 would be similar to the Proposed Action.

4.2.3. Routing Area Options

The difference in geology/mineral impacts among the potential routing options in the Crystal, River Mountains, and Dutchman Pass routing areas would be negligible.

4.2.4. No Action Alternative

Under the No Action alternative, the project would not proceed and there would be no project-related impacts to geologic resources.

4.2.5. Mitigation

No mitigation with respect to mineral resources is proposed.

4.3. Soils

This section discusses the potential impacts to soil resources that may occur from the construction, operation, and maintenance of the project.

The primary concern associated with soils is the potential for accelerated soil erosion. Construction activities may result in crushed vegetative cover, compacted soils, and rutting, which when subject to wind or rain can contribute to increased soil erosion. Physical effects of soil compaction would be short-term, minor to moderate, and include reduced permeability and porosity, damage to microbiotic crusts, increased bulk density, decreased available water holding capacity, increased erosion potential, reduced gaseous exchange, and loss of soil structure.

4.3.1. Propose Action

The proposed project area contains certain soils that are moderately to highly susceptible to water and wind erosion. Proper mitigation measures would be required during construction of the proposed project in order to avoid or minimize damage resulting from erosion and prevent acceleration of natural-erosion processes. The placement of tower sites and temporary access roads would be selected to avoid soils that are moderately or highly sensitive to accelerated rates of water or wind erosion.

Access roads would also be selected to minimize the clearing of vegetation and recontouring of the land surface. If new temporary roads or construction areas are cut in undisturbed areas, topsoil would be saved and used during restoration to promote vegetation regrowth, which would assist in stabilizing soils. Impacts from heavy land disturbance activities, such as road cutting, would be mitigated by restoring natural round contours, reseeding to hasten the recovery of surface vegetation, installing cross drains and water bars to limit water erosion, and filling and regarding any temporary ditches used during construction.

The anticipated ground disturbance for the Proposed Action is 652.8 acres for single-circuit structures and 779.3 acres for double-circuit structures.

4.3.2. Alternative 1

Impacts to soils for Alternative 1 would be similar to those for the Proposed Action. The disturbance areas would be slightly less due to the 18-mile stretch where the existing double-circuit Harry Allen to Mead structures would be utilized; but with the application of impact avoidance and minimization measures as discussed above, the impacts from either alternative would be temporary and minimal. The anticipated ground disturbance for Alternative 1 is 547.4 acres for single-circuit structures and 649.1 acres for double-circuit structures.

4.3.3. Routing Area Options

The Crystal southern routing option would disturb approximately 8 acres less than shown for the Proposed Action and Alternative 1 above. The River Mountains and Dutchman's Pass routing areas would have no discernible difference in disturbed acreage. The difference in soil impacts among the routing options would be minimal.

4.3.4. No Action Alternative

Under the No Action alternative, the project would not proceed and there would be no project-related impacts to soils.

4.3.5. Mitigation

No additional mitigation is proposed.

4.4. Water Resources

This section discusses effects on water resources/hydrology that may occur with implementation of the Proposed Action or alternatives.

4.4.1. Proposed Action

The Las Vegas Wash is the only perennial waterway that occurs within the project area. The Gypsum Wash and an unnamed minor wash along the project area corridor only flow during high precipitation events. To the extent reasonably practical, Great Basin would span all segments along the proposed transmission corridor that cross washes or the 100-year floodplain. If spanning would not be feasible, and if jurisdictional waters of the U.S. are identified through on-site delineation, Great Basin would secure the appropriate permits and authorizations from the United States Army Corps of Engineers prior to construction activities. Any required state permits or certifications would also be obtained.

Groundwater depth along the proposed project alignments is almost exclusively located below 20 feet bgs; although in some locations, a shallow aquifer may be present with a water table at less than 20 feet bgs (near the Las Vegas Wash).

Project activities include the construction of steel transmission structures that are imbedded in the ground up to 20 feet or more. Although these structures may be in contact with groundwater in areas where there is a shallow aquifer (e.g., Las Vegas Wash), the small footprint and the materials used for construction would ensure that any impacts to groundwater flows and groundwater quality would be negligible.

The potential for project activities to impact surface water or groundwater quality is minimal. Because the proposed project is a construction project that would disturb more than 1 acre, a National Pollutant Discharge Elimination System (NPDES) permit is required. The project would be covered by the NDEP general stormwater permit for construction activities. The NPDES permit requires the preparation and implementation of a Stormwater Pollution Prevention Plan (SWPPP), which would define the BMPs required for the project. BMPs may either be nonstructural or structural. Nonstructural BMPs include management and operational procedures regarding work activities, such as minimizing land disturbances, employing preventive maintenance, and preserving natural vegetation. Structural BMPs are physical structures designed to protect stormwater quality, and include diversions, silt fences, reseeding, and detention basins.

The BMPs for a site usually consist of the following major elements:

- Source controls, such as surface controls that stabilize disturbed soils and help minimize erosion
- Sediment controls, such as silt fence and sediment basins, that capture sediment that has been eroded
- Materials handling and spill prevention measures designed to prevent the release of petroleum products and other chemicals and substances into stormwater runoff
- Waste management measures designed to prevent the introduction of waste streams into stormwater runoff

General pollution prevention BMPs are designed to reduce pollutants introduced to runoff from ongoing operations (i.e., vehicle maintenance) and ensure that necessary operations are performed in a manner that reduces pollutants (i.e., temporary stream crossing, dewatering operations, and clear water diversion).

After implementation of site-specific BMPs, impacts to surface water, groundwater, and water quality are expected to be negligible to minimal. Impacts related to floodplains for individual structures and roads would be negligible.

4.4.2. Alternative 1 and Routing Area Options

Water quality impacts from Alternative 1 and the three routing options would be similar to the Proposed Action as they are located within the same watershed. The disturbance areas for Alternative 1 would be slightly less due to the 18-mile stretch where the existing double-circuit Harry Allen to Mead structures would be utilized; but with the application of impact avoidance and minimization measures as discussed above, the impacts from either alternative would be temporary and minimal.

4.4.3. No Action Alternative

Under the No Action alternative, the project would not proceed and there would be no project-related impacts to water resources.

4.4.4. Mitigation

No additional mitigation is proposed.

4.5. Vegetation, Excluding Federally Listed Species

This section discusses effects on vegetation resources that may occur with implementation of the Proposed Action.

4.5.1. Proposed Action

Construction activities including construction and use of access roads, construction of tower sites, temporary construction lay-down areas, and use of setup and pull-and-tension sites have the potential to impact vegetation resources. Direct impacts include loss of, or damage to, individual plants and the seed bank, loss or compaction of native soil, and permanent alteration and loss of plant species habitat. Indirect impacts include the introduction or spread of non-native invasive and noxious weeds that could compete with native plant species for resources.

Maintenance activities could impact vegetation during periodic access to the project area for routine inspection, repairs, and other activities. However, maintenance activities would occur infrequently and predominantly along access roads and areas of existing disturbance.

Applicant-proposed environmental protection measures were developed to avoid and minimize potential impacts to botanical resources from construction, operation, and maintenance of the proposed project. Existing roads and previously disturbed areas would be used for the proposed project alignments to the extent reasonably possible to minimize new surface disturbance. Areas that are to be excavated and backfilled or otherwise cleared of vegetation would be addressed in the Restoration Plan. To speed recovery of the native vegetation, the seed bank present in the topsoil in these areas would be stockpiled for replacement upon completion of construction. The stockpile zone would contain a double windrow of topsoil and spoil materials. This approach would integrate with the objectives of erosion control and mitigation of visual impacts. The Restoration Plan would identify methods to be followed during and after construction to minimize impacts to botanical resources.

Sensitive Plant Species

Five sensitive plant species were observed along the proposed alignment. All five occur within the project area regardless of the alternative or routing option. Four of the five species are located primarily in gypsum and badland soils. Because these gypsum endemics have proven difficult to transplant or reseed, avoidance is the preferred mitigation for these species, as discussed below.

Preconstruction surveys would be performed to flag sensitive plant species for avoidance, as well as to flag work areas. Project design measures such as tower location, span width, and access road location would be incorporated to avoid sensitive species where reasonably possible. In areas where avoidance is not reasonably possible, appropriate incidental take permits would be obtained from the NDF. For protected and sensitive plant species other than cacti and yucca, the BLM would determine whether preconstruction seed collection followed by postconstruction seeding of restoration sites, or shrub propagation and live shrub plantings at restoration sites would occur.

To the extent reasonably possible, cacti and yucca are to be salvaged and replaced after disturbance. Individuals are to be properly moved, stockpiled out of harm's way, and then replaced within the disturbed area. The succulents would be salvaged by a BLM-approved contractor, stockpiled in a short term area approved by the BLM or the permanent ROW, and then transplanted to the reclaimed site. The BLM's protocols for proper maintenance of the succulents would be followed according to the Restoration Plan that would be developed for the project.

If cacti and/or yucca are required to be removed from the project area and not replaced within the ROW, consultation with the BLM and NDF would take place to ensure full compliance with applicable laws. The plants will be handled with BLM and NDF guidance and in accordance with the Restoration Plan.

Invasive Species/Noxious Weeds

A Noxious Weed Plan would be prepared in consultation with the BLM and Reclamation. The plan would include, but not be limited to, a discussion of the (1) plan purpose, goals, and objectives; (2) noxious weed inventory; (3) noxious weed management practices; (4) monitoring; and (5) use of pesticides. Stipulations for weed control typically include the following and would be in compliance with both BLM and Reclamation standards:

- Vehicles and equipment would be cleaned prior to arrival on the work site
- If noxious weeds are identified, any cleared vegetation or topsoil would be separately stockpiled and disposed of properly
- Any seed or organic material used onsite would be obtained from a state cleared source free of noxious/invasive weeds

Table 4-2 presents the approximate acres of impact to vegetation that would be disturbed under each alternative.

Table 4-2. Approximate Acres of Impact to Vegetation Resources by Alternative

	New Temporary Impact	New Permanent Impact
Proposed Action		
Single-Circuit	496.4 acres	156.4 acres
Double-Circuit	567.1 acres	212.2 acres
Alternative 1		
Single-Circuit	414.6 acres	132.8 acres

Table 4-2. Approximate Acres of Impact to Vegetation Resources by Alternative		
	New Temporary Impact	**New Permanent Impact**
Double-Circuit	474.2 acres	174.9 acres
Crystal Routing Area		
Single-Circuit	6 acres less than Proposed Action and Alternative	2 acres less than Proposed Action and Alternative
Double-Circuit	6 acres less than Proposed Action and Alternative	2 acres less than Proposed Action and Alternative
River Mountains Routing Area		
Single-Circuit	Same as Proposed Action	Same as Proposed Action
Double-Circuit	Same as Proposed Action	Same as Proposed Action
Dutchman Pass Routing Area		
Single-Circuit	Same as Proposed Action	Same as Proposed Action
Double-Circuit	Same as Proposed Action	Same as Proposed Action

Table 4-3 presents the approximate acres of sensitive plant habitat that would be disturbed under each alternative. As no sensitive plants were located in the areas of the River Mountains and Dutchman Pass routing areas, there is no difference in acreage between those options and the Proposed Action.

Table 4-3. Approximate Acres of Sensitive Plant Habitat Disturbance by Alternative					
	Southwestern (Sticky) Ringstem	**Las Vegas Bearpoppy**	**Littlefield Milkvetch**	**Silverleaf Sunray**	**Beaver Dam Breadroot**
Proposed Action	41.8 acres	32.3 acres	10.5 acres	48.0 acres	21.8 acres
Alternative 1	27.3 acres	21.0 acres	6.8 acres	33.5 acres	21.8 acres
Crystal Routing Area	same as above	same as above	same as above	same as above	2.07 acres more than Proposed Action and Alternative 1
River Mountains Routing Area	same as above	same as above	same as above	same as above	same as above
Dutchman Pass Routing Area	same as above	same as above	same as above	same as above	same as above

4.5.2. Alternative 1 and Routing Area Options

Impacts to vegetation resources under the Proposed Action, Alternative 1, and routing options would be similar, with the sole difference being in acreage of impacts. The disturbance areas for Alternative 1 would be slightly less due to the 18-mile stretch where the existing double-circuit Harry Allen to Mead structures would be utilized. Routing differences between the Proposed Action, and River Mountains and Dutchman Pass routing areas result in comparable acreage impacts.

4.5.3. No Action Alternative

Under the No Action alternative, the ROW would not be issued and there would be no disturbance to vegetation resources from the proposed project. Therefore, there would be no effect to vegetation resources and no impact would occur.

4.5.4. Mitigation

Other than those measures mentioned in Section 4.5.1, no additional mitigation is proposed.

4.6. Wildlife, Excluding Federally Listed Species

This section discusses effects on nonlisted wildlife resources that may occur with implementation of the Proposed Action and alternatives.

Impacts to wildlife would result from ground disturbance and altering the habitat in the project area from construction activities. In order to construct the proposed structures, soil would be compacted and vegetation cover would be removed at work areas within the ROW. The ground disturbance could alter soil characteristics, thus potentially changing some of the vegetation upon which local wildlife depends.

Maintenance activities also have the potential to impact wildlife during periodic access to the project area for routine inspection, repairs, and other activities. Impacts could include mortality from vehicles and equipment and/or disturbance to wildlife.

Migratory Birds

Impacts to migratory birds could result from construction, operation, and maintenance of the proposed project. Migratory bird nests could be abandoned or destroyed as a result of the activities at these times. To minimize the likelihood of nest abandonment or other impacts to breeding, construction within areas containing active nesting would be conducted, to the extent practicable, outside of typical nesting season (March to September).

Preconstruction surveys for nesting migratory birds would be conducted in areas where activities are proposed to occur during the nesting season. If active migratory bird nests are located, a protective buffer would be delineated and the area would be avoided until fledglings leave or the nests are no longer active.

Raptors

The project area contains known burrowing owl habitat. The burrows could be collapsed by ground-disturbing activities or construction traffic. Other potential impacts to the burrowing owl include loss of habitat and disturbance of breeding or foraging birds. Loss of individuals, including young, is possible if construction occurs during the breeding season. Mitigation measures implemented for the desert tortoise would also reduce impacts to the burrowing owl. If active burrowing owl nests are discovered during preconstruction surveys, they will be afforded a 250-foot buffer.

There is potentially suitable nesting habitat for golden eagles within and in the vicinity of the project area. Construction activities may disturb nesting activities through noise and activities within close proximity to active nests. Impacts may also occur as a result of alteration to foraging areas. In Southern Nevada, golden eagles nest from mid-February through early June. They frequently use the same nests for multiple years.

Prior to construction occurring during the eagle nesting season, known nest sites will be inspected for activity. Active nests will be afforded a 0.5-mile buffer from construction activity until the young have fledged.

Transmission structures may provide nesting and perching habitat for some species of raptors. Raptors and other large perching birds are susceptible to electrocution when coming in contact with power line structures, because of their size and behavior. Because these birds often perch on tall structures that offer optimal views of potential prey, the design characteristics of transmission poles appear to be a major factor in raptor electrocutions. Electrocution occurs only when a bird simultaneously contacts two energized phase conductors or an energized conductor and grounded hardware. This happens most frequently when a bird attempts to perch on a transmission pole with insufficient clearance between these elements. Any transmission structures constructed for the proposed project would have clearances between phase conductors or between phase conductors and ground hardware, as recommended by the Avian Power Line Interaction Committee (2006), that are sufficient to protect even the largest birds; and so would present little to no risk of bird electrocution. With the application of appropriate construction designs for all transmission lines and their structures, impacts associated with bird electrocution would be minimized.

Bats

The potential impact the proposed project may have on bats is disturbance to foraging habitat in the Las Vegas Wash. This impact would be temporary and only for the duration of construction. Impacts to the Las Vegas Wash are anticipated to be minimal and primarily consist of noise and vibration. As construction activities would occur during daylight hours, impacts to bats are anticipated to be negligible.

Reptiles and Amphibians

Impacts to chuckwalla and Gila monsters could include direct loss of individuals and habitat during construction and maintenance activities of the proposed Project. Indirect effects could include increased predation by raptors perching on the transmission towers. Some of the mitigation measures implemented to avoid adverse impacts to desert tortoise would also reduce impacts to chuckwalla and Gila monsters.

4.6.1. Proposed Action

Single-Circuit

Under this alternative, 156.4 acres would be permanently disturbed by the Proposed Action. Temporary impacts would occur to 496.4 acres. While the utility corridor currently includes up to three other transmission lines, utilization of single-circuit structures would provide less surface area for nesting and roosting by raptors than double-circuit structures. This could result in less impact to prey species.

Double-Circuit

Under this alternative, 212.2 acres would be permanently disturbed and 567.1 acres would be temporarily disturbed by project-related activities. Double-circuit structures provide increased surface area for perching by raptors and other large birds, which may result in increased predation of prey species within the project area.

4.6.2. Alternative 1

Impacts to wildlife under this alternative would be similar to those described above, except the disturbance areas would be slightly less due to the 18-mile stretch where the existing double-circuit Harry Allen to Mead structures would be utilized and only line stringing would be necessary. Impacts within this area would be shorter in duration and lighter in intensity. This area includes the Las Vegas Wash, which provides habitat to numerous species of wildlife that do not occur elsewhere in the project area.

Single-Circuit

Under this alternative, 132.8 acres would be permanently disturbed by the project. Temporary impacts would occur to 414.6 acres.

Double-Circuit

Under this alternative, 174.9 acres would be permanently disturbed and 474.2 acres would be temporarily disturbed by project-related activities.

4.6.3. Routing Area Options

Crystal Routing Area

Impacts to wildlife via this routing area would be similar to those described above, except slightly less acreage would be disturbed. There would be approximately 2 acres of permanent and 6 acres of temporary disturbance, which is less than under each of the proposed alternatives.

River Mountains Routing Area

Impacts to wildlife would be the same under this routing area as under the Proposed Action. There is no difference in acreage of impacts and the habitat impacted is similar.

Dutchman Pass Routing Area

Impacts to wildlife would be the same under this routing area as under the Proposed Action. There is no difference in acreage of impacts and the habitat impacted is similar.

4.6.4. No Action Alternative

Under the No Action alternative, the ROW would not be issued and there would be no disturbance to wildlife resources caused by the proposed project. Therefore, there would be no effect to wildlife, and no impact would occur.

4.6.5. Mitigation

Other than those measures mentioned in Section 4.6.1, no additional mitigation is proposed.

4.7. Threatened, Endangered, or Candidate Wildlife Species

This section discusses effects on threatened, endangered, or candidate wildlife species that may occur with implementation of the Proposed Action.

Desert Tortoise

Desert tortoises were found along the ROW corridor during spring 2009 wildlife surveys. Highest densities of tortoise and tortoise sign occurred north of mile marker 27, with smaller clusters of tortoise and sign at mile marker 37 and mile markers 43-49. No tortoise or sign were observed south of mile marker 49. This area contains extremely dense coverage of large rocks with little herbaceous cover for forage.

The potential impacts to the desert tortoise could include increased mortality or injury from vehicles or equipment; falls into excavated areas, utility borings, or trenches upon entering a construction site; burrows crushed by construction equipment; and removal or destruction of forage and water sources. Indirect impacts to desert tortoise could include habitat fragmentation and degradation, harassment, noise and vibration from vehicles, increased predation, and fire hazard.

The construction of transmission towers could provide perching areas for tortoise predators such as raptors and common ravens. Predation is a natural means of tortoise mortality; however, the addition of transmission structures could increase predator access to desert tortoise.

The desert tortoise mitigation measures required for the project would be determined through coordination with the BLM and USFWS under a biological opinion. The following avoidance

and minimization measures are based on those found in biological opinions rendered by the USFWS on other projects in the area, which could potentially affect desert tortoise.

Prior to construction, a desert tortoise education program would be presented to all construction personnel. All field personnel will be educated about the desert tortoise and will be able to recognize signs indicating the potential presence of a tortoise. A preconstruction survey for tortoise and burrows would be conducted within 5 days of initial ground-disturbing activities during the desert tortoise inactive season and within 48 hours prior to ground-disturbing activities during the desert tortoise active season. The active season is determined annually by the USFWS, but generally runs between March 15 and October 15. All desert tortoise and tortoise eggs encountered in the proposed ROW corridor would be relocated by an authorized biologist according to protocols provided in the Desert Tortoise Manual (USFWS 2009). All burrows encountered would be inspected for wildlife. If determined to be empty, burrows located in an area of ground disturbance would be collapsed to deter wildlife from re-entering the burrows.

An authorized biologist approved by the USFWS would be onsite during all construction activities during the active season. The authorized biologist would be present to monitor activities and minimize take of desert tortoise. They would be familiar with the protocols for handling and relocating desert tortoise and would have the authority to halt any activity that would result in take. Tortoise that entered areas of construction activity would be relocated out of harm's way.

A maximum 25 mile per hour speed limit would be enforced for all construction equipment and vehicles working within the project ROW and while traveling on associated project access roads. Mitigation fees would be applied for each acre of surface disturbance in desert tortoise habitat. These remuneration fees are used to fund management actions that are expected to provide a direct and indirect benefit to the desert tortoise over time.

USFWS-Listed Birds

There are no anticipated direct impacts to the southwestern willow flycatcher, Yuma clapper rail, or yellow-billed cuckoo. The only potentially suitable habitat for these species occurs along the Las Vegas Wash. The proposed transmission line would span the wash; therefore, it is anticipated that the wash and its riparian habitat would not be directly impacted.

There may be a temporary indirect impact due to noise, vibrations, and traffic during construction of the proposed transmission line in the area of Las Vegas Wash. To the extent practicable, construction activities in this area would occur outside of the breeding season (March to June) to minimize impacts to potential nests and young.

4.7.1. Proposed Action

Single-Circuit

Under this alternative, 156.4 acres of Mojave Desertscrub would be permanently disturbed by the project. Temporary impacts would occur to 496.4 acres of Mojave Desertscrub. Utilization of single-circuit structures would provide fewer nesting and roosting opportunities for raptors and ravens, resulting in less of an impact to desert tortoise. Transmission structures would be constructed on either side of Las Vegas Wash, resulting in potential noise and vibration disturbance to riparian birds, but no loss of habitat.

Double-Circuit

Under this alternative, 212.2 acres of Mojave Desertscrub would be permanently disturbed and 567.1 acres would be temporarily disturbed by project-related activities. Double-circuit structures provide increased surface area for perching by raptors and ravens, which may result in increased predation of desert tortoise within the project area. Transmission structures would be constructed on either side of Las Vegas Wash, resulting in potential noise and vibration disturbance to riparian birds, but no loss of habitat.

4.7.2. Alternative 1

Impacts to desert tortoise under this alternative would be similar to those described above, except approximately 18 miles of the proposed alignment would not require construction of new towers. Therefore, impacts to this area would only result from hanging of the line along existing structures. No habitat would be lost and an authorized biologist would be present to reduce potential direct loss of desert tortoise. Construction activities within this area would be shorter in duration and lighter in intensity.

New transmission structures would not be constructed in the area surrounding Las Vegas Wash. Therefore, noise and vibration levels would be reduced and would be shorter in duration, resulting in a lesser impact to riparian birds.

Single-Circuit

Under this alternative, 132.8 acres of Mojave desertscrub would be permanently disturbed by the project. Temporary impacts would occur to 414.6 acres of Mojave desertscrub.

Double-Circuit

Under this alternative, 174.9 acres of Mojave desertscrub would be permanently disturbed and 474.2 acres of Mojave desertscrub would be temporarily disturbed by project-related activities.

4.7.3. Routing Area Options

Crystal Routing Area

Impacts to federally listed wildlife via this routing area would be similar to those described above, except there would be slightly less acreage disturbed. There would be approximately 2 acres of permanent and 6 acres of temporary disturbance, less than under any of the alternatives.

River Mountains Routing Area

Impacts to federally listed wildlife would be the same under this routing area as under the Proposed Action. There is no difference in acreage of impacts and the habitat impacted is similar.

Dutchman Pass Routing Area

Impacts to federally listed wildlife would be the same under this routing area as under the Proposed Action. There is no difference in acreage of impacts and the habitat impacted is similar.

4.7.4. No Action Alternative

Under the No Action alternative, the ROW would not be issued and there would be no disturbance to federally listed wildlife by the proposed project. Therefore, there would be no effect to federally listed wildlife, and no impact would occur.

4.7.5. Mitigation

Other than those measures mentioned in Section 4.7.1 and those measures that will be required by the USFWS in their Biological Opinion, no additional mitigation is proposed.

4.8. Cultural Resources

This section discusses effects on cultural resources that may occur with implementation of the Proposed Action or alternatives.

4.8.1. Proposed Action

Implementation of the Proposed Action could potentially impact NRHP-eligible cultural resource sites in the direct and indirect effects APE, including 26 known sites that are eligible for listing on the NRHP, or whose eligibility status is unknown or unevaluated. These consist of 10 known historic components (a camp, a mining related site, a railroad related site, 2 sites with historic structures, and 5 historic utility related sites) and 16 known prehistoric components (1 artifact scatter, 1 site with features, 5 fragile pattern sites, 1 habitation site, 4 lithic scatters, 1 quarry, and

3 rockshelters). It is likely that additional cultural resources sites are present in unsurveyed areas within the APEs for the Proposed Action.

As specified in the PA, a Class III cultural resources survey, NRHP eligibility determinations for identified cultural resources, and treatment to avoid and/or mitigate adverse effects to cultural resources would be completed prior to construction. In addition, the PA includes provisions for consultation, unanticipated discoveries, and monitoring of sensitive cultural areas. Implementation of the Proposed Action in accordance with the PA would minimize potential adverse effects to historic properties.

4.8.2. Alternative 1

Implementation of Alternative 1 would have the potential for impacts to NRHP-eligible cultural sites in the direct and indirect effects APE, including 7 known site components outside the area of collocation on existing Harry Allen to Mead 500 kV structures, and 17 within the area of collocation. Known site components within the collocation area consist of 6 historic sites (a camp, a mining related site, a railroad related site, 2 sites with historic structures, and a historic utility) and 10 prehistoric sites (3 fragile pattern sites, 1 habitation site, 3 lithic scatters, 2 quarries, and a rockshelter). Also present is a single cultural resource site for which no information could be obtained. The potential for impacts to known sites within the collocation area is low. Known site components within the collocation area consist of 3 historic utility related sites, 1 prehistoric artifact scatter, 2 prehistoric lithic scatters, and 1 prehistoric rockshelter. It is likely that additional cultural resources sites are present in unsurveyed areas of the direct effects APE for Alternative 1.

As specified in the PA, a Class III cultural resources survey, NRHP eligibility determinations for identified cultural resources, and treatment to avoid and/or mitigate adverse effects cultural resources would be completed prior to construction. In addition, the PA includes provisions for consultation, unanticipated discoveries, and monitoring of sensitive cultural areas. Implementation of Alternative 1 in accordance with the PA would minimize potential adverse effects to historic properties.

4.8.3. Routing Area Options

Differences in the potential for impacts to cultural resources based on the Project routing options are not currently known.

4.8.4. No Action Alternative

Under the No Action Alternative, the Project would not proceed and there would be no project-related impacts to cultural resources.

4.8.5. Mitigation

Implementation of the Proposed Action and its associated facilities has the potential for impacts to cultural resource sites. To avoid and or mitigate potential impacts, mitigation measures and

plans for addressing discoveries are detailed in the PA for the project. To the extent reasonably practicable, the project will avoid impacts to NRHP eligible or potentially eligible cultural resources sites through project design, or redesign, relocation of facilities, or by other means. Where sites cannot be reasonably avoided, project-related effects would be lessened or mitigated with the development and implementation of an appropriate Treatment or Data Recovery Plan.

4.9. Paleontological Resources

The Proposed Action may impact paleontological resources present in the project area. The paleontological inventory described in Section 3.10 demonstrates that paleontological resources are present within the project area. Six of the geological units identified within 1 mile of the project centerline have moderate/undetermined or high potential for paleontological resources.

The primary impact issue for paleontological resources is the loss of scientifically significant fossils and their contextual data. Two types of impacts could potentially affect paleontological resources:

- Direct impacts resulting from ground disturbance during construction
- Indirect impacts due to accelerated erosion

It is possible that ground disturbance, such as grading and cutting of access roads, auguring or blasting for tower footings and anchors, or preparing staging areas, could encounter paleontological resources. In addition, adverse impacts indirectly associated with construction are a concern. For example, fossils could be subject to damage or destruction by erosion that is accelerated by construction disturbance. Impacts to paleontological resources would be mitigated through survey, identification, collection, and deposition of recovered fossils in a museum repository.

4.9.1. Proposed Action

The Proposed Action would result in approximately 60 miles of new transmission line construction. New construction would cross approximately 22 miles of geological units with high potential for paleontological resources and 2 miles of geological units with moderate/undetermined potential for paleontological resources.

For all Project alternatives, the use of single- and double-structure tower types would result in different levels of ground-disturbance and associated potential impacts to paleontological resources. Greater amounts of ground disturbance are directly associated with greater potential impacts to paleontological resources. The anticipated ground disturbance for the Proposed Action is 652.8 acres for single-circuit structures and 779.3 acres for double-circuit structures.

4.9.2. Alternative 1

Alternative 1 would result in approximately 42 miles of new transmission line construction and would occupy 18 miles of previously constructed transmission line structures. New construction would cross 13 miles of geological units with high potential for paleontological resources and 0.5 mile of geological units with moderate/undetermined potential for paleontology.

The anticipated ground disturbance for Alternative 1 is 547.4 acres for single-circuit structures and 649.1 acres for double-circuit structures.

4.9.3. Routing Area Options

Crystal Routing Area

The southern option in the Crystal routing area crosses 1.5 miles of the Muddy Creek Formation, which has a high potential for containing paleontological resources; whereas the northern option crosses 1.9 miles of this same geological unit.

River Mountains Routing Area

With regard to paleontological resources, there is no difference between the east and west options in the River Mountains routing area. Both of the options cross Quaternary Alluvium, which has a low potential for paleontological resources.

Dutchman Pass Routing Area

The western option in the Dutchman Pass routing area would cross 1.7 miles of Muddy Creek Formation; whereas the eastern option would cross 0.8 mile of the same geological unit.

4.9.4. No Action Alternative

Under the No Action alternative, the ROW would not be issued and there would be no disturbance to paleontological resources from the proposed project. Therefore, there would be no effect to paleontological resources, and no impact would occur.

4.9.5. Mitigation

To mitigate potential impacts to paleontological resources, a more detailed inventory would be completed for those portions of the proposed route that warrant further investigation (i.e., areas containing geological units with a PFYC of 3, 4, or 5). A Paleontological Resources Treatment Plan would be developed and include: (1) a pre-construction survey in areas containing known fossil localities with a PFYC of 3, 4, or 5; (2) determination of areas that may require on-site paleontological monitoring during construction; and (3) mitigation of paleontological resources that may be discovered during construction, primarily through paleontological monitoring, fossil collection, curation, and deposition in a federally-approved repository (as stated in BLM Manual 8270 and BLM Handbook H-8270-1). In addition, in-field orientation workshops would be implemented to train construction personnel that would be presented by a BLM-approved paleontologist with schedules determined by the BLM. A rating of low residual impact assumes that scientifically significant fossil specimens and contextual information would be adequately collected from localities if they could not be avoided by the proposed route. Therefore, residual impacts on paleontological resources would be considered low to nonexistent, as long as proper mitigation procedures were implemented. The scientific and educational value of the fossils and

their associated contextual data constitute the chief significance of the resource. Their collection, therefore, mitigates the impacts to paleontological resources.

4.10. Land Use, Recreation, and Access

This section describes the potential land use, transportation, and access impacts that could result from the construction and operation of the proposed transmission line.

4.10.1. Proposed Action

The majority of the length of the proposed ROW corridor is on federal land, within the designated utility corridor. The portions constructed on vacant BLM lands would not conflict with any existing or planned facilities. The BLM has the authority to approve other compatible land uses within the ROW.

Indirect impacts from construction of the proposed transmission line would include conversion of undeveloped desert land to utility-related uses. Operation and maintenance of the proposed transmission line would not conflict with existing federal, state, or county land use plans, policies, or regulations applicable to the project area. Road access impact would be low because only a few miles of new access roads would be required to be upgraded or constructed.

The construction and operation of the proposed transmission line is not anticipated to interrupt dispersed recreational activities on adjacent BLM lands. Vacant BLM lands are used for low-density informal recreation such as hiking, picnicking, off-road driving, and driving on existing paved and unpaved roads. The proposed project would not preclude the use of these areas, but rather would temporarily displace recreational users to surrounding recreation areas if access roads are restricted due to construction. Operation and maintenance of the project facilities would not limit public access to recreation opportunities in the surrounding area. The primary impact to parks, trails, OHV areas, and dispersed recreation areas will be visual impacts. Those visual impacts are further discussed in Section 4.11, Visual Resources.

The now-defunct The Falls golf course driving range is oriented north-to-south and is on average approximately 450 feet wide. It will be crossed by the proposed project from north-to-south. The proposed transmission lines would be directly over the driving range and, depending on the tower placement, the towers may be placed within the driving range. The BLM has a ROW reservation within this area (Serial Number N-73903) granting BLM management, control, administration, and jurisdiction over the corridor, notwithstanding surface ownership. This reservation allows other facilities to be constructed within this corridor that would not conflict with the authorization of new ROW or facilities.

The Proposed Action would cross directly over the planned restaurant/bar of the Jericho Heights master planned development. While this planned development has been granted certain zoning approvals, final approvals have not been obtained. This planned land use conflict would be resolved by the City of Henderson zoning process. There is currently no schedule for planned final approval or construction of the development.

After completion of construction, disturbed areas (with the exception of permanent aboveground facilities) would be restored. The construction and operation of the transmission line would not affect the overall low-density recreation use of the surrounding vacant BLM lands.

4.10.2. Alternative 1

Alternative 1 would include using approximately 18 miles of the existing Harry Allen to Mead 500 kV transmission line structures and ROW. Therefore, the land use, transportation, and access impacts for Alternative 1 may differ slightly from the 60 miles of new ROW for the Proposed Action.

4.10.3. Routing Area Options

Effects to land use, transportation, and access from the different routing options would be similar in nature.

4.10.4. No Action Alternative

Under the No Action alternative there would be no construction or operation of the project; therefore, there would be no land use, transportation, and access impacts resulting from project-related activities.

4.10.5. Mitigation

No mitigation is proposed.

4.11. Visual Resources

4.11.1. Impact Assessment Methodology

The purpose of the visual impact assessment is to identify and characterize the level of visual change in the landscape that could result from the construction, operation, and maintenance of the proposed project. Modification of the landscape is described in levels of visual contrast, which affects compliance with visual resource management classes and scenic quality. The impact assessment is based on the BLM VRM system 8400 series, BLM approved and legally defended visual resource assessments for 500 kV transmission lines projects. The measure of visual impacts is based on visual contrast as defined by the BLM VRM system (BLM Manual 8431). Impact to the viewing public and compliance with VRM classifications was determined by performing contrast analysis from agency approved KOPs (KOPs 1-7). Visual simulations were prepared from each KOP to illustrate the range of typical impacts to viewers. Visual Contrast Rating Worksheets, Simulations, and a map of VRM Classifications are provided in Appendix B.

4.11.2. Visual Contrast

Visual contrast is defined as the degree of visual change that would occur in the landscape due to the construction and operation of the proposed project. In the context of extra-high-voltage transmission lines, visual contrast typically results from (1) landform modifications that are necessary to prepare the ROW for construction; (2) the removal of vegetation to construct roads and maintain the transmission line; (3) the construction of temporary and permanent access roads required to erect the structures and maintain the conductors; and (4) the introduction of transmission line facilities (i.e., structures) into the landscape.

A project contrast assessment was conducted by comparing visual elements (form, line, color, and texture) of the existing landscape with the visual elements associated with the proposed project, including new structures (i.e., towers and conductors) and new or improved access. Changes in landform, vegetation, and structures were evaluated and assigned contrast levels. This evaluation of contrast considered the existing BLM designated utility corridor, which includes a number of existing utility facilities.

Project contrast levels for this type and size of project typically range from strong to weak; however, only minimal to weak-moderate project contrast is expected to occur for the Proposed Action because it would be located within the designated utility corridor. Generally, weak to weak-moderate project contrast would occur where a new ROW would parallel multiple existing transmission lines within the BLM designated utility corridor. This condition occurs for a majority of the Proposed Action. Weak-moderate project contrast may also occur in locations where the proposed action would cross areas that require landform modifications in moderate to steep terrain or where taller, double-circuit structures would be skylined and visible to the viewing public where no other existing facilities are visible. Minimal contrast would occur for the 18-mile shared area under Alternative 1, because the conductors would be co-located onto existing structures within the designated utility corridor. These levels of contrast were considered when assessing impacts to the VRI and KOPs, and demonstrating compliance with designated VRM classification, as described below. Impact differences between the Proposed Action and Routing Area Options are expected to be minimal.

4.11.3. Proposed Action

VRI (Scenic Quality, Sensitivity Levels, Distance Zones, and VRI Classes)

The majority of the proposed action would cross Class C scenery associated with desert plains, playas, and low desert hills. Impacts are anticipated to be minimal, because project contrast would be weak due to existing extra-high-voltage transmission lines associated with the utility corridor, which has similar form, line, color and texture as compared to the proposed project. Portions of the Proposed Action that would cross Class B scenery, primarily characterized by desert mountains and foothills, would have low impacts in moderate terrain because project contrast would be weak. Isolated occurrences of low-moderate impacts are anticipated for portions of the route crossing steep terrain where landform modifications associated with spur roads and staging areas would result in stronger contrast. Impacts to Class A scenery is not anticipated for the proposed action, because the Las Vegas Wash could be spanned and removal of riparian vegetation and modification of the banks would not occur.

Sensitivity Levels, distance zones, and VRI Classes would not be affected by the Proposed Action because the local setting in which the project is proposed has been highly modified by existing transmission line facilities. The project added to this modified setting would not affect these components of the VRI, and therefore existing VRI Classes are not expected to be impacted.

Key Observation Points

Residences

KOP 3 – Low impacts are anticipated for residences in Lake Las Vegas with unobstructed, superior, or elevated views of the Proposed Action. Project contrast would be weak due to similar structure types and existing access. In addition, the project would be backdropped by adjacent terrain, thus reducing contrast. Contrast Rating Sheet in Appendix A describes potential contrast in detail.

KOP 4 – Impacts for residences near Henderson (south of Lake Las Vegas) are anticipated to be low because the project would parallel three existing transmission lines with similar structure types in a skylined condition. Although the views of the project would be unobstructed, proposed facilities would be viewed through three existing transmission lines, which reduce the contrast of the project at this location. The Contrast Rating Sheet in Appendix A describes this condition in detail.

KOP 5 – Low impacts are anticipated for residences in the southern portion of Henderson where views would be primarily unobstructed. Partial screening may occur due to intervening terrain although a portion of the project would be skylined. Weak project contrast would occur because the project would parallel three existing transmission lines with similar structure types in a partially skylined condition. In addition, proposed action would be viewed through three existing transmission lines; thus contrast would be reduced. See Contrast Rating Sheet in Appendix A for a description of this condition.

Recreation Areas

KOP 7 – Quo Vadis Trailhead and trail are anticipated to have low impacts for high sensitivity recreation viewers. The proposed action would parallel three existing transmission lines with similar structure types and would be backdropped by adjacent terrain for all single-circuit structure options. The upper portion of the double-circuit structure option may be partially skylined due to tower height; however, resulting contrast would be similar. Contrast Rating Sheet in Appendix A depicts the differences between the double-circuit and single-circuit tower options.

Travel Routes

KOP 1 – Overall, weak contrast would result for all single-circuit structure options because it would occur within the utility corridor with similar structure types. Contrast would increase to weak-moderate for the double-circuit structure option from this moderate sensitivity travel route

due to terrain and skylined conditions. In addition, contrast associated with access roads would be visible to travelers on I-15 where it crosses the highway; thus impacts are anticipated to be low-moderate. Contrast Rating Sheet in Appendix A depicts the differences between the single- and double-circuit tower options.

KOP 2 – Low impacts are anticipated for high sensitivity travel route viewers along Lake Mead Boulevard. The Proposed Action would cross the road, while parallel to three existing transmission lines with similar structure types in a skylined condition, resulting in a weak level of contrast. The high rate of speed expected on this travel route further reduces the visibility of the proposed facilities; thus minimal effects are anticipated.

KOP 6 – Similar to KOP 1, weak contrast is anticipated for the Proposed Action while crossing this moderate sensitivity travel route. Low impacts are anticipated because the project would be parallel to three existing transmission lines with similar structure types in a skylined condition.

4.11.4. Alternative 1and Routing Area Options

Impacts to VRI and KOPs from Alternative 1 are described below. There would be minimal difference in impacts between the Routing Area Options and the Proposed Action and Alternative 1.

VRI (Scenic Quality, Sensitivity Levels, Distance Zones, and VRICs)

Impacts to Class B and Class C scenery would be the same as specified for the Proposed Action for portions of this alternative that would require new ROW. For portions of Alternative 1 that would be co-located with the existing Harry Allen to Mead 500 kV transmission line structures, impacts to Class A, B, and C scenery are not anticipated because contrast associated with landform, vegetation, and structures would be greatly reduced as ground disturbance would be kept to a minimum.

Sensitivity Levels, distance zones, and VRI Classes would not be affected by Alternative 1, because the local setting in which the project is proposed has been highly modified by existing transmission line facilities. The project added to this modified setting would not affect these components of the VRI; therefore, existing VRI Classes are not expected to be impacted. Further, any changes for Alternative 1 resulting from the project would be nominal, as ground disturbance would be confined to those locations where wire pulling operations would be required to install the conductors on the existing double-circuit within designated BLM utility corridors.

Key Observation Points

Residences

KOP 3 – Minimal impacts are anticipated for residences in Lake Las Vegas with unobstructed, superior, or elevated views of the Proposed Action. Project contrast would be minimal due to co-location with an existing transmission line in a backdropped condition. In addition, the project

would be backdropped by adjacent terrain, thus reducing contrast. See Contrast Rating Sheet in Appendix A for detailed contrast assessment.

KOP 4 – Impacts for residences near Henderson (south of Lake Las Vegas) are anticipated to be minimal because the project would be co-located onto an existing transmission line. Although the views would be unobstructed, this alternative would be viewed through three existing transmission lines and contrast would be minimal. See Contrast Rating Sheet in Appendix A for detailed contrast assessment.

KOP 5 – Minimal impacts are anticipated for residences in the southern portion of Henderson, where views would be primarily unobstructed. Minimal project contrast would occur because the project would be co-located onto an existing transmission line. In addition, this alternative would be viewed through three existing transmission lines. See Contrast Rating Sheet in Appendix A for detailed contrast assessment.

Recreation Areas

KOP 7 – Impacts from Alternative 1 to KOP 7 are expected to be the same as for the Proposed Action.

Travel Routes

KOP 1 – Impacts are anticipated to be the same as for the Proposed Action.

KOP 2 – Minimal impacts are anticipated for high sensitivity travel route viewers along Lake Mead Boulevard. The Proposed Action would cross the road while parallel to three existing transmission lines; however, project contrast would be minimized because the conductors would be co-located onto an existing transmission line. See Contrast Rating Sheet in Appendix A for detailed contrast assessment.

KOP 6 – Similar to KOP 2, impacts are anticipated to be minimal for this moderate sensitivity travel route because project contrast would be minimized due to co-location with an existing transmission line. Furthermore, the typical speed on this travel route would reduce the visibility of the proposed facilities; therefore, contrast would be further reduced.

4.11.5. VRM Consistency

Portions of the alternatives that cross BLM VRM Class III or IV lands while within the designated utility would be consistent with VRM objectives. The alternatives do not cross any Class I or II landscapes. The form, line, color, and texture of the proposed facilities associated with both alternatives, including structure and landscape modifications, would be minimal as described in the KOP descriptions; therefore, contrast levels of moderate for Class III and strong for Class IV would be achieved. Constructing the project (either alternative) with nonspecular conductors and using existing access to the greatest extent practicable, are mitigation measures that are consistent with Class 3 and Class 4 managed lands.

4.11.6. No Action Alternative

Under the No Action alternative, the ROW would not be issued and the proposed project would not be constructed. Therefore, no visual resources would be affected, and no environmental consequences to visual resources would occur.

4.11.7. Mitigation

No additional mitigation is proposed.

4.12. Socioeconomics

This section describes the potential socioeconomic impacts that could result from the construction and operation of the proposed transmission line.

4.12.1. Proposed Action

The Las Vegas area's population is large and diverse, and the local economy is mostly driven by tourism and public service employment (state/local government, the Clark County School District, and Nellis Air Force Base are some of the largest employers of the region); therefore, the economic effects of constructing the transmission line would have little discernible effect on the overall levels of personal income and employment in the region. Accordingly, the project would make a relatively small contribution to the overall economy of the region. More substantially, the project would benefit the economy over the long-term by maintaining reliable electric power service for the growing number of residents, industries, and renewable energy projects in the region. Apart from the benefits of reliable service to customers in general, benefits would accrue to jurisdictions along each ROW corridor in the form of property taxes. Payments would also be made to federal jurisdictions providing ROW easements. Additionally, some positive effects would result during construction, not only in the form of direct employment, but also from procurements of construction materials and services from local suppliers and businesses.

The effects to socioeconomic resources from the Proposed Action would be the same, regardless of the type of transmission structure used.

4.12.2. Alternative 1

Alternative 1 would include using approximately 18 miles of the existing Harry Allen to Mead 500 kV transmission line ROW. While the property taxes and fees associated with ROW easements for Alternative 1 may differ slightly from the 60 miles of new ROW for the Proposed Action, effects to socioeconomic resources would be similar.

4.12.3. Routing Area Options

Effects to socioeconomic resources from the construction and operation of the various routing options would be similar.

4.12.4. No Action Alternative

Under the No Action alternative, the ROW would not be issued and there would be no positive or negative socioeconomic effects from the proposed Project.

4.12.5. Mitigation

No mitigation is proposed.

4.13. Environmental Justice

This section describes the potential environmental justice impacts that could result from the construction and operation of the proposed transmission line.

4.13.1. Proposed Action

The purpose of an environmental justice analysis is to determine whether adverse environmental impacts would disproportionately affect minority and low-income communities or populations, as compared to other communities or populations in a project area. Impacts related to environmental justice could be significant if environmental justice populations exist in the affected area.

Two of the nine census tracts crossed by the proposed project area contain a minority population over 50 percent. Census Tract 59.02 is located north of the Las Vegas Valley and continues to the Lincoln County line to the north. It encompasses more than 130,437 acres and consists of a 68.9 percent minority population, similar to the 68.3 percent minority population Clark County. Census Tract 61.04, located in the eastern Las Vegas Valley, is 2,537 acres, and includes a 78.3 percent minority population.

Two of the nine census tracts crossed by the proposed project area contain a low-income population above the Clark County average (11.7 percent) and the state of Nevada (11.9 percent). Census Tract 78 encompasses Nellis Air Force Base and has 18.5 percent of its population living below the poverty rate. Census Tract 57.03 is located in the southernmost area of the proposed ROW corridor and has 24.8 percent of its population living below the poverty rate. The proposed ROW corridor traverses Census Tract 57.03 for approximately 500 feet before terminating at the Eldorado Substation, and the nearest established residences are located approximately 15 miles south of the termination point in the Town of Searchlight.

On average, the census tracts along the proposed route do not contain minority or low-income population groups significantly greater than Clark County or the state of Nevada as a whole; therefore, there would be no environmental justice impacts from implementation of the project.

The effects to environmental justice resources from the Proposed Action would be the same, regardless of the type of transmission structure used.

4.13.2. Alternative 1

Alternative 1 would include using approximately 18 miles of the existing Harry Allen to Mead 500 kV transmission line structures adjacent to the Proposed Action. Effects to environmental justice resources would be similar for both the Proposed Action and Alternative 1.

4.13.3. Routing Area Options

Effects to environmental justice resources from construction and operation of the various route options would not differ.

4.13.4. No Action Alternative

Under the No Action alternative, the ROW would not be issued and there would be no environmental justice effects from the project.

4.13.5. Mitigation

No mitigation is proposed.

4.14. Cumulative Impacts

4.14.1. Impact Criteria

The analysis presented in this section addresses the potential cumulative impacts to resources from the construction, operation, and maintenance of the proposed project. The CEQ defines cumulative impacts as an "impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions" (40 CFR 1508.7). Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time by various agencies (federal, state, and local) or individuals. Informed decision-making is served by consideration of cumulative impacts resulting from projects that are proposed, under construction, recently completed, or anticipated to be implemented in the reasonably foreseeable future. Information about past, present, and reasonably foreseeable future activities in the cumulative resource area were gathered from the BLM, Clark County, and other agencies; adopted plans; environmental documents; and personal communications with public agencies and utility companies.

The approach to cumulative impacts in this EA considers past actions to include projects or activities that have completed construction and are in operation. The impacts of past actions are already reflected in the baseline conditions identified in Chapter 3. Present actions include projects that are currently under construction or have been fully permitted such that they are likely to be part of the existing environment when the proposed project would begin construction. Reasonably foreseeable future actions (RFFA) include projects for which a formal permit application has been filed. The BLM considers an RFFA on BLM lands as a project for which a ROW application has been submitted. However, the identification of reasonably foreseeable projects on BLM land does not end there; it also considers the status of such projects,

the availability of data for such projects, and whether or not the impacts of such projects are too speculative to be considered reasonably foreseeable, based on the available information.

The cumulative impacts analysis in this EA generally considers actions and impacts within an approximately 4-mile corridor centered on the Proposed Action alignment (2 miles on either side). Most impacts from the proposed transmission line will occur during construction and are expected to be localized and short-term in nature (e.g., surface disturbance, fugitive dust, noise). A few impacts could be slightly more far reaching and longer term (e.g., visual impacts). A 4-mile-wide analysis corridor ensures that the potentially significant cumulative effect of the proposed project impacts combined with impacts from other actions are adequately assessed. Reasonably foreseeable projects within the analysis area that may have cumulative effects when added to the Proposed Action are shown on Figure 4-1.

4.14.2. Reasonably Foreseeable Future Projects

Transmission/Pipeline Projects

In response to Section 368 of the EPAct, the BLM, Department of Energy, and the USFS, prepared the West-wide Energy Corridor Programmatic EIS, which evaluated issues associated with designation of energy corridors on federal lands in 11 western states, including Nevada. With few exceptions, the proposed SNIP alignment is located within a Section 368 corridor. In addition to the existing transmission lines and the proposed project, other transmission providers are considering future transmission projects within this same corridor. The projects listed below are those that have submitted applications or other filing documents with the BLM, Federal Energy Regulatory Commission, or the Public Utilities Commission of Nevada.

Silver State Energy Associates Eastern Nevada Transmission Project

The Silver State Energy Association intends to construct two separate 230 kV overhead transmission lines within a 130-foot ROW in Clark County, Nevada. The new 230 kV transmission lines would run from Gemmill Substation south of Coyote Springs in Clark County, Nevada, to the Tortoise Substation near Moapa in Clark County, Nevada; and also from the Silverhawk Substation located in northeast Las Vegas Valley in an unincorporated area of Clark County, Nevada, to the Newport Substation located in southeast Las Vegas Valley in the City of Henderson, Nevada. Portions of the proposed transmission line from the Silverhawk to Newport substations would most likely be located within the same utility corridor as the SNIP.

TransWest Express Transmission Project

TransWest Express, LLC intends to construct, operate, and maintain an extra-high-voltage direct-current transmission system along a route that is more than 700 miles long and 250 feet wide. The general route for this 500 to 600 kV transmission system begins in south-central Wyoming, extends through northwestern Colorado and central Utah, turns southwest into southern Nevada, and would end near or at the Marketplace Substation west of Boulder City. There are numerous alternative alignments proposed for this project. On January 4, 2011, the Notice of Intent to prepare an EIS was published in the Federal Register by the BLM and the

Western Area Power Administration. A record of decision is anticipated in early 2014 and construction is expected to occur in phases between 2014 and 2016. A portion of the TransWest Express Transmission Project would be located within the West-wide Energy Corridor, including areas where it would parallel the proposed SNIP alignment.

Duke-American Transmission Zephyr Transmission Line Project

Duke Energy recently acquired the proposed Zephyr Project, an approximately 950-mile–long 500 kV DC transmission line originating in southeast Wyoming and terminating in the Eldorado Valley south of Las Vegas. A preliminary application has been filed with the BLM, and the current in-service date is 2020. This project would most likely use the same West-wide Energy Corridors under consideration by other electric transmission providers in the area, including the proposed SNIP alignment.

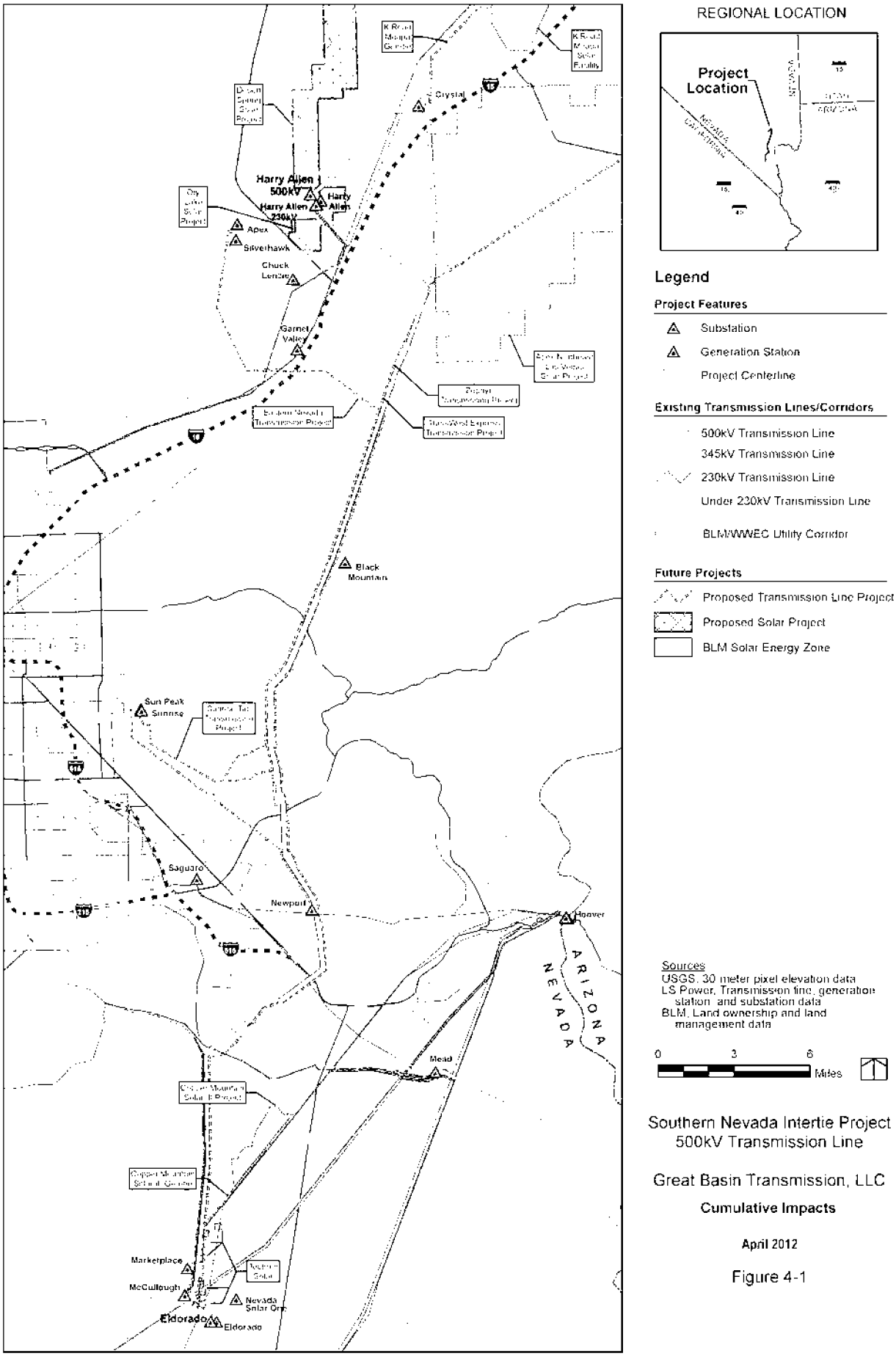

Figure 4-1. Cumulative Impacts

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Sunrise Tap Transmission Project

NV Energy intends to construct, operate, and maintain the Sunrise Tap Transmission Project. This project has several components, including (1) construction of a new double-circuit 500 kV transmission line between the existing Harry Allen to Mead 500 kV line near Lake Las Vegas and the Sunrise Substation on the northeast side of Las Vegas, (2) upgrading the existing Las Vegas #3 69 kV transmission line to a quad-circuit 230 kV/lower voltage line, (3) construction of a new quad-circuit 230 kV/lower voltage transmission line from the existing Las Vegas #3 to the Equestrian Substation on the southeast side of Henderson, (4) upgrading the existing Las Vegas #1 69 kV transmission line to a quad-circuit 230 kV/lower voltage between the Sunrise Substation and the Clark Substation, (5) upgrading the existing transmission lines between the Sunrise Substation and the Winterwood Substation to double-circuit 138 kV and quad-circuit 138/69 kV, and (6) upgrading four existing NV Energy substations (Sunrise, Winterwood, Clark, and Equestrian) to support the new 500 kV and 230 kV transmission lines. Portions of this project would be located in or near the corridor in which the SNIP is proposed to be located.

Renewable Energy Projects

There are seven proposed solar facilities within 2 miles of the proposed ROW corridors; two of the proposed solar facilities are in Eldorado Valley and five proposed solar facilities are near the Harry Allen Substation. In addition, the BLM has proposed the creation of a 15,649-acre Dry Lake solar energy zone (SEZ) west of I-15 and east of Highway 93.

Of the seven solar ROW applications within cumulative effects areas, only two projects have advanced their planning process beyond the initial application stage: the Copper Mountain Solar III and the K Road Solar Project. The status and likelihood of construction of the other five projects is unclear. In an effort to be conservative, available data on all seven projects were used to evaluate the potential cumulative effects when considered with the proposed project, even though some of these projects ultimately may not be developed.

Dry Lake Solar Energy Zone

The proposed Dry Lake SEZ is located in an undeveloped rural area in Dry Lake Valley, which includes the Harry Allen Substation. The proposed SEZ has a total area of 15,649 acres and is bounded on the northwest by the Arrow Canyon Range and on the southeast by the Dry Lake Range. According to the Draft Solar Programmatic EIS (BLM and Department of Energy 2010), the criteria used to identify the SEZ as an appropriate location for solar energy development included proximity to existing transmission lines or designated utility corridors, proximity of existing roads, a slope of generally less than 2 percent, and an area of more than 2,500 acres.

Detailed analysis of the proposed Dry Lake SEZ is included in the Solar Energy Development Programmatic Draft EIS (*ibid*).

Nevada Power Company – Dry Lake Valley Integrated Solar Combined Cycle Project (NVN-084052)

In August 2007, NV Energy submitted a ROW application to construct, operate, and maintain the Dry Lake Valley Integrated Solar Combined Cycle Project. The proposed 120-megawatt (MW) concentrated solar energy project would be located on private and federally-managed land in the Apex Industrial Park approximately 20 miles north of Las Vegas. The project would be connected to the Chuck Lenzie and Harry Allen generating stations, would occupy approximately 800 acres, and would consist of two solar fields. The proposed project is located on the south and east sides of the Harry Allen Substation.

Bright Source Energy – Apex/Northeast Las Vegas Solar Project (NVN-084631)

In July 2008, Bright Source Energy Power Partners, LLC submitted a ROW application to construct and operate the Apex/Northeast Las Vegas Solar Project. The project would be a concentrated solar facility generating up to 1,000 MW of energy. It would occupy 2,000 acres between Pabco and the Valley of Fire Highway along the existing Harry Allen to Mead 500 kV transmission line. In August 2010, the BLM requested additional information from the applicant (BLM and USFS 2011). No additional information is available for this project.

First Solar – Desert Spring Solar Project (NVN-084232)

In July 2007, First Solar, LLC submitted a ROW application to the Las Vegas Field Office to construct and operate the Desert Spring Solar Project. The proposed 400 MW photovoltaic solar project would be constructed on 3,214 acres, less than 1 mile north of the Harry Allen Substation. In July 2008, Cogentrix Solar Services, LLC filed an overlapping or "second in line" ROW application on top of First Solar, LLC application in this area. In May 2009, the BLM requested additional information from the applicant (*ibid*). No additional information is available for these two projects.

Sempra – Copper Mountain Solar III (NVN-089424)

Sempra Generation proposes to construct and operate an up to 220 MW solar energy-generating facility to be located on approximately 1,400 acres of land owned by Boulder City and leased by the applicant. The project would include 7.6 miles of 230 kV transmission line routes from the generation facility across BLM-managed utility corridors. The transmission lines would interconnect with both the Merchant and McCullough substations. The draft EA for this project was completed in November 2011 and the DR was signed on February 9, 2012. Construction is expected to begin in the third quarter of 2012.

K Road Power – K Road Moapa Solar Project (NVN-089176)

K Road Power has entered into an agreement with the Moapa Band of Paiutes to lease land, for up to 50 years, on the Moapa River Indian Reservation located in Clark County, Nevada for the purposes of constructing and operating a 350 MW photovoltaic solar generating station and associated infrastructure. The project would disturb approximately 2,153 acres of land, including

a solar facility footprint, a water pipeline, a 12 kV transmission line, and a 500 kV transmission line. The 500 kV transmission line would be approximately 5.5 miles long and interconnect at the Crystal Substation. A final EIS was issued for this project in March 2012. The project is planned to be constructed in three phases, with the first phase expected to begin in the third quarter of 2012.

Techron Solar, Inc. – (NVN-090395)

This is an application for a 230 kV interconnection to support a 300 MW solar project on private land in Boulder City, Nevada. The project is located in Eldorado Valley, within 1 mile to the east of the SNIP alignment.

4.14.3. Cumulative Impacts on Resources

Cumulative impacts on resources that would result from the construction and operation of the Proposed Action when added to other past, present, and reasonably foreseeable future actions described in the previous section are described below. Because of the uncertain nature of future projects in terms of size, number, location, and types of technology that would be used, cumulative impacts are discussed qualitatively or semi-qualitatively, with ranges given as appropriate. More detailed analyses of cumulative impacts would be performed in the environmental reviews for the specific projects in relation to all other existing and proposed projects in the cumulative effects area.

Air Quality

Cumulative impacts to air quality associated with construction and operation of the proposed project are anticipated to be minimal as air-related impacts are primarily short-term in duration, resulting from the construction of the proposed facilities. Cumulative impacts to air quality could occur if other projects within the corridor were constructed at the same time as the Proposed Action (e.g., other transmission line or solar energy projects); however, at this time the sequence for the construction of these facilities is unknown. If multiple projects were constructed during the same time period, adherence to air permit requirements, and mitigation measures, including dust suppression as outlined in their respective dust control permits, would effectively reduce these cumulative effects. Exceedance of regulatory standards is not anticipated.

Geology and Minerals

The proposed project is not expected to have impacts on geological resources; therefore, there would not be cumulative impacts with other projects.

There are active mining operations and mining claims within or near the proposed ROW corridor in a few locations. Great Basin is working with the existing operations to avoid or minimize impacts on mining, and other projects are expected to do the same, given the legal rights possessed by miners and owners of valid claims. Accordingly, the Proposed Action, when combined with other reasonably foreseeable future projects, would not have significant impacts on mining.

Soils

Cumulative impacts to soil resources would occur during project construction if multiple projects are constructed concurrently. Construction contractors working within Clark County would be required to obtain and comply with a state-issued NPDES permit, and prepare a site-specific SWPPP. Construction contractors would be required to implement site-appropriate BMPs to maintain compliance with their NPDES permit and SWPPP. While fugitive dust emissions may increase if overlapping construction periods were to occur, these events would be short-term in nature and would be mitigated through site-appropriate BMPs. In addition, all contractors would be required to implement soil erosion control measures in accordance with associated state permits for water quality and point source discharge to control erosion. Restoration of all land disturbances on BLM managed lands would be a requirement of each applicant's ROW grant.

Water Resources

The amount of water needed during construction of the project, primarily for dust control, is minimal. Water would be obtained from off-site locations and trucked to the construction site as needed. Similar activities would most likely occur for other reasonably foreseeable transmission line projects in the cumulative effects areas.

Other than short-term use of groundwater for dust suppression and construction, construction and operation of the proposed project and other reasonably foreseeable future transmission lines do not consume a large amount of water resources. The amount of water needed for solar projects in the cumulative effects area is unknown. Photovoltaic technology uses minimal water, while dry- or wet-cooled parabolic trough technology can require large amounts of water (estimated between several hundred to several thousand acre-feet per year). Most of the proposed projects are expected to be photovoltaic. Each solar developer would be required to secure a water supply source and obtain appropriate water right permits and approvals for their project. The state water rights process protects against water overuse and impacts on other water users. Therefore, the proposed project, when added to other reasonably foreseeable future projects, is not expected to contribute measurably to cumulative impacts to water resources.

Biological Resources

Vegetation

Mojave Desert brush scrub habitat, cacti, yuccas, and other sensitive plants in the analysis area may experience cumulative adverse effects due to the volume of projects proposed in the vicinity. This increase would result in an overall increase in use of public lands that may lead to compacted soils and increased soil erosion and crushed, removed, or destroyed vegetation.

The construction of numerous projects throughout the cumulative effects area presents increased opportunities for weed invasions. An increase in the volume of disturbed area created as a result of numerous projects in the region can leave the area susceptible to the proliferation of invasive and noxious weeds species resulting in a cumulative impact. Adherence by all projects to noxious weed management plans and restoration plans, including measures identified by the

BLM, will minimize the introduction and spread of noxious and invasive weeds during and following construction.

Wildlife

Cumulative effects to wildlife at a local level will vary. This is most evident within the BLM utility corridors where additional transmission lines are proposed to be constructed. However, by concentrating these projects in the designated corridors, habitat fragmentation would be minimized.

Desert Tortoise habitat is known to be present throughout the vast majority of the cumulative impacts study area. The Clark County Department of Comprehensive Planning and USFWS have addressed cumulative effects to biological resources from development and construction activities on a county-wide basis, and the Final MSHCP (prepared by Clark County; the Cities of Las Vegas, North Las Vegas, Boulder City, Mesquite, and Henderson; and the Nevada Department of Transportation) addresses sensitive species and protects biological resources and requires mitigation for effects to Desert tortoise. Because plans and mitigation requirements have been, and will continue to be, developed to address potential impacts to the Desert Tortoise, and because consultation and detailed mitigation planning will occur on other future projects, including the solar projects listed above, cumulative effects associated with other future development should be minimized and/or mitigated.

Other non-federal projects occurring within Clark County would fall under the purview of the Clark County MSHCP and associated incidental take permit for impacts to Desert Tortoise and other covered wildlife and plant species. Other federal projects would require separate consultation for listed species pursuant to Section 7 of the ESA.

Opening up areas to casual vehicular access by the public causes indirect impacts. Increased hunting, wildlife harassment, vehicle collisions, and spread of noxious weeds can result in areas that had previously been inaccessible. Increased surface disturbance would result in cumulative loss of habitat for wildlife that inhabits the areas proposed for future projects. The significance of the loss would depend on the availability of adjacent suitable replacement habitat and the mobility of the wildlife to escape harm. Other indirect effects to wildlife result from providing additional perching and/or nesting structures for birds that may prey on juvenile tortoises and other sensitive species. The proposed project follows existing transmission and access for a majority of its length and, therefore would add a relatively small amount of new access roads.

Cultural Resources

The potential exists for cumulative impacts to NRHP-eligible properties as a result of the construction of the proposed project and other reasonably foreseeable projects. A number of contributing historic properties in the Las Vegas Wash Archaeological District, and a number of historic properties along the west front of the River Mountains have been impacted by past projects, particularly in BLM utility corridors where additional transmission lines are proposed to be constructed. While restricting these projects to the designated corridors would reduce impacts to historic properties outside of the designated utility corridors, RFFA have the potential

to create additional impacts to previously affected sites and new impacts to others that have not been previously affected.

Through implementation of mitigation measures, it is anticipated that potential direct impacts from project construction would be fully mitigated through commonly employed practices, such as data recovery, avoidance, or construction monitoring activities. Important resources that would be affected by construction activities would be avoided, or if this is not possible, recovered for their scientific value. Due to the applicability of the NHPA, RFFA will be under the same obligation to identify cultural resources, consult with stakeholders, and avoid or mitigate impacts to those resources, which will reduce cumulative impacts to individual historic properties and to groups of historic properties in the Las Vegas Wash Archaeological District and along the west front of the River Mountains. The potential exists that continuing mitigation to individual, contributing historic properties through data recovery could result in cumulative impacts to the integrity of the Las Vegas Wash Archaeological District.

Paleontological Resources

Effects to paleontological resources are localized and do not generally result in regionally cumulative effects. Paleontological resources vary according to the geological formations that contain them. Geological formations may also vary significantly over short distances, effectively limiting the geographic range of impacts to paleontological resources. Therefore, the impacts of the Proposed Action when added to other RFFA on paleontological resources would be localized within the project area.

While impacts on significant paleontological resources are unlikely to occur within the cumulative effects area, a review of the geological deposits in the footprint of each of the other projects would be performed to determine whether a paleontological survey was warranted. Any paleontological resources encountered would be mitigated to the extent possible as determined through consultation with the BLM. Therefore, the potential construction impacts of the Proposed Action in combination with other reasonably foreseeable projects in the area would not contribute to a cumulatively significant effect to paleontological resources.

Land Use, Transportation, and Access

The Proposed Action and the majority of foreseeable transmission and renewable energy projects would be located on BLM land, within or adjacent to designated utility corridors. Great Basin's selection of the proposed transmission alignment within designated utility corridors was intentionally designed to minimize potential cumulative impacts to multiple resources.

The Sunrise ISA along the proposed corridor presents a unique challenge for siting multiple transmission line projects within the existing 500-foot utility corridor. The Proposed Action would include a new 200-foot ROW within this corridor, and the new transmission line would be located to allow a future line to use the existing Harry Allen to Mead double-circuit structures. Alternative 1 of the Proposed Action would not require a new adjacent alignment through the Sunrise Corridor. Cumulative impacts within the Sunrise Corridor would occur if other transmission line projects were constructed in this section of the existing utility corridor. Other proposed transmission line projects that may utilize this area of the corridor include the Eastern

Nevada Transmission Project; the TransWest Express Transmission Line Project; and the Zephyr Transmission Line Project.

The proposed project and cumulative projects would also result in a more reliable network of utilities, including renewable electric generating stations and increased reliability of electrical transmission lines.

Visual Resources

The majority of the proposed project would be located in a BLM-designated utility corridor that contains existing transmission lines. Increased modifications to the landscape due to the addition of transmission towers within a multi-line corridor typically result in an increase in the visibility at longer distances because of the cumulative physical contrast with the natural landscape. Normally, the first constructed objects in a natural setting cause the most noticeable change because of the contrast of form, line, color, and texture with the surroundings. Each successive change becomes less noticeable than the first. However, the sum of all the changes (e.g., form, line, color, and texture) is more evident to the casual observer. Therefore, the first transmission line in a natural area normally causes the greatest incremental change, but the cumulative visual impact of a corridor increases with the addition of each new line.

The proposed transmission line would mostly parallel existing transmission lines within an existing designated utility corridor. Additional transmission lines within the designated corridor, if constructed, will add further to the visual cumulative impacts in these areas. Grouping of facilities within the designated utility corridor would minimize overall cumulative effects on a regional basis through consolidation. However, in the immediate viewshed of the corridor area, the cumulative visual contrast could be slightly increased as each new project is added, and the multiple lines become more noticeable to the casual observer. Measures to minimize these impacts, such as the selective location of towers within the corridor, the use of similar structures and the similar placement of structures (matching spans), dulled finishes on structures, and the use of nonspecular conductors will reduce these cumulative effects.

Socioeconomic Resources and Environmental Justice

Public services and public utilities in the area have the capacity to serve present and future projects, and thus cumulative impacts would not be measurable. Implementation of the Proposed Action and present and future projects would create socioeconomic effects in the form of increased employment, and increased local and state tax revenue associated with economic activity generated by these projects. However, these changes would have a relatively small socioeconomic impact within the area economy.

The proposed Project, in addition to the other cumulative projects, would contribute to the orderly development in the region, as authorized under federal laws (Southern Nevada Public Land Management Act and Clark County Conservation of Public Land and Natural Resources Act) and by land use and related plans approved by local governments. Each of the cumulative projects requires federal action and associated environmental compliance documentation. Potential socioeconomic impacts have been or would be considered in the environmental analyses and approvals for each of the cumulative projects.

Depending on the progress regarding the development of the other proposed projects described above, additional long-term employment opportunities and income to Clark County could result in beneficial effects.

The proposed project would have no effect on environmental justice and therefore, would not contribute to cumulative impacts within the Las Vegas Valley.

4.14.4. No Action Alternative Impacts

Under the No Action alternative the proposed Project would not be considered in any cumulative effects analysis; however, the No Action alternative for the proposed project does not preclude other facilities from being constructed and operated.

CHAPTER 5. TRIBES, INDIVIDUALS, ORGANIZATIONS, OR AGENCIES CONSULTED

Various agencies and organizations in the project area were contacted to provide project briefings, coordinate for more formal consultations, and obtain any relevant information for inclusion in the EA. In October 2010, Reclamation accepted an invitation from the BLM to be a cooperating agency in the project's NEPA analysis. The following agencies and organizations are among those contacted following the filing of the ROW application:

Bureau of Land Management
Bureau of Reclamation
U.S. Fish and Wildlife Service
Nellis Air Force Base

Nevada Department of Wildlife
Nevada State Historic Preservation Office

Clark County, Nevada
City of Henderson, Nevada
Boulder City, Nevada

Southern Nevada Water Authority
Clark County Regional Flood Control District

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Appendix A BLM Affected Resource Form – May 7, 2010

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Proposed project Name: Southern Nevada Intertie Project (SNIP)

Project Information

NEPA (ePlanning) Number	DOI-BLM-NV-S010-2010-0091-EA
Project Name	Southern Nevada Intertie Project (SNIP)
Project Lead/Manager	Phil Rhinehart,
Project/Activity Type	Right-of-Way,
Case File Number	NVN-086359
Comment Due Date	Friday, May 07, 2010
Applicant/Proponent	Great Basin Transmission, LLC. c/o LS Power Development, LLC
Cost Code	L51010000 ER0000 LVRWF0900220
General Location	A transmission line stretching between a northern terminus at or near the Harry Allen Substation located in Dry Lake, Nevada (approximately 20 miles northeast of Las Vegas) to a southern terminus located at the existing Eldorado Substation located approximately 14 miles southwest of the city center of Boulder City, Nevada (a total project distance of approximately 60 miles). The northern terminus at or near the existing Harry Allen Substation will be located in Sec. 35, T. 17 S., R. 63 E., (or at an alternate location in Secs. 17 and 18, T. 17 S., R. 64 E.). The southern terminus will be at the existing Eldorado Substation located in Sec. 12, T. 25 S., R. 62 E. With minor exceptions the proposed Project alignment will be inside the existing BLM utility corridor which is a multimodal, 3,500-foot-wide corridor (West-Wide Energy Corridor).
Legal Description	See attached file for legal land description.
Map (7.5–mintue USGS topo map)	
Amount of new disturbance (acres)	1,454
Amount of previous disturbance (acres)	
Amount of TOTAL disturbance (acres)	1,454
Duration of project	Construction 12 to 24 months, conducted year-round
Tiered off EA/EIS/BO/ other	

Description: The project is a 500 kilovolt (kV) alternating current (AC) single or double circuit aboveground electric transmission line with necessary access roads, interconnection facilities, and an integrated fiber optic communications line. The proposed alignment is approximately 60 miles long within a 200-foot wide right-of-way. The project will operate year-round to provide delivery of electrical energy between northern and southern Clark County, Nevada. The construction of the project is anticipated to last 12 to 24 months and will be conducted year-round. The project will require small temporary work areas at each tower and three larger temporary work areas.

DETERMINATION OF STAFF: (Choose one of the following abbreviated options for the left column)

NP = not present in the area impacted by the proposed or alternative actions
NI = present, but not affected to a degree that detailed analysis is required
PI = present with potential for relevant impact that need to be analyzed in detail in the EA

Table 1. Affected Resources Form

Determination	Resource	Rationale for Determination	Digital check off	Date
NI	Air Quality	Ensure dust control permits are obtained and ensure compliance for all air quality regulations and stipulations for the duration of the project.	Lisa Christianson, Air Resources Specialist	04/12/2010
PI	Areas of Critical Environmental Concern	The proposed project area is not within any desert tortoise ACECs or any critical desert tortoise habitat. The proposed project is within the River Mountains ACEC containing bighorn sheep habitat. Per the Las Vegas Valley RMP, October 1998, ACECs are designated as ROW avoidance areas. Shapefiles will be needed for the proposed transmission lines, along with proposed acres of disturbance to complete analysis for ACECs. As there will be new surface disturbance associated with the proposed action, impacts to the River Mountain ACECs need to be analyzed in detail.	Jessie Stegmeier	5/7/2010

NP	BLM Natural Areas	No designated areas are present in the district.	Sendi Kalcic	04/16/2010
PI	Cultural Resources	A Class III cultural resources inventory must be conducted of all areas affected directly or indirectly by the project that have not been evaluated within the last ten years. Prior to any surface disturbing activity, those historic properties discovered within the area of potential effect (APE) will require mitigation subsequent to the development of an appropriate historic properties treatment plan (HPTP), which must be developed in consultation with the Nevada State Historic Preservation Office (SHPO).	Susanne Rowe	04/16/2010
NI	Greenhouse Gas Emissions	Currently there are no emission limits for suspected Greenhouse Gas (GHG) emissions, and no technically defensible methodology for predicting potential climate changes from GHG emissions. However, there are, and will continue to be, several efforts to address GHG emissions from federal activities, including BLM authorized uses.	Lisa Christianson, Air Resources Specialist	04/12/2010
PI	Environmental Justice	Proposed project may affect VRM and landscape characteristic for residents on nearby Native American Reservation.	Susan Farkas	04/14/2010
NP	Farmlands (Prime or Unique)	Proposed project area does not include any prime or unique farmlands.	Krystal Johnson	04/06/2010

PI	Fish and Wildlife Excluding Federally Listed Species	Wildlife species in the general area include small mammals, rodents, birds and reptiles. Additionally, the BLM sensitive species bighorn sheep, western burrowing owl, phainopepla, chuckwalla and banded Gila monster may be present in the general area. These species would be displaced as lands are disturbed within the project area. The primary direct impact of the proposed action on wildlife would be killing or maiming of ground dwelling animals during construction and the loss of habitat. Additional impacts associated with the mortality from vehicular traffic may also be realized upon the completion of construction and subsequent use of the project area.	Jessie Stegmeier	5/7/2010
NI	Floodplains	Construction and operation activities would result in minimal change to downstream flooding effects	Sarah Peterson	4/14/2010
NI	Fuels/Fire Management	Construction activities can increase the risk of a wildland fire event, please ensure that ROW holder is informed about fire restriction during the applicable time of year. Including but not limited to no smoking outside of enclosed vehicle, and permits are required for any welding or open flame torch activities. In addition when rehabbing construction road ensure, by working with BLM	Lucas J. Rhea	4/09/2010

		botanist, that native, non fire conducive, Mojave vegetation is used. Weed issues contribute to fuels and fire management issues.		
NI	Geology / Mineral Resources/Energy Production	Any necessary excavation that produces mineral materials within the ROW must be used within the ROW or stockpiled on site for sale by the BLM.	George Varhalmi	4/20/2010
PI	Hydrologic Conditions	New roads associated with line could increase road drainage densities	Sarah Peterson	4/14/2010
NI	Invasive Species/ Noxious Weeds	A weed plan must be in place to address construction and maintenance phases of this project. Due to desert tortoise habitat, control of weed populations may need to plan for mechanical or biological controls and increased preventive measures, rather than utilizing chemical methods.	Nora Caplette	4/19/10
PI	Lands/Access	The preferred, and alternative routes run through the area released from the Sunrise Mountain Instant Study Area (ISA) by Public Law (P.L.) 107–282, Section 207–C. P.L. 107–282 released from the ISA a 500–foot wide corridor for the State-regulated sponsor of the Centennial Project. Though released from consideration within the ISA there are limitations on uses within the corridor. These issues will have to be addressed in detail. If existing facilities within the corridor are to be used, a letter of	Phil Rhinheart	05/11/2010

		concurrence from the current right-of-way holder will be required. In as much as this project is to be considered a Federal Undertaking and there are private land owners over whose property the proposed transmission line will cross, these private holdings too, will be addressed in the EA. LS Power must have an agreement with them as to project impact and mitigation measures to be taken to keep them whole. BLM has no authority to issue a ROW grant on private property where the U.S. has not reserved the right to do so. Therefore, LS Power must obtain easements from all private property owners. Before the BLM will issue a ROW grant for the proposed project copies of these agreements MUST be filed with the BLM, and they will become a part of the case file. In instances where the proposed action crosses, or impacts existing authorizations those will have to be mitigated so as to protect existing rights. A segment of the proposed transmission line is on lands administered by the Bureau of Reclamation (BOR), therefore, a cooperating agency agreement will have to be completed between		

		the two Federal agencies, and BOR, as well as the BLM will have to agree to and sign the EA. For the segment of the transmission line located on BOR administered lands an authorization (right-of-way grant) from BOR will be required, as BLM has no authority to issue a ROW grant on these lands. An alternative that you might want to evaluate would be to place the line to the east of the ISA, within the Lake Mead National Recreation Area, administered by the National Park Service, as this would avoid the issues associated with the ISA.		
NP	Livestock Grazing	Proposed project area does not include any authorized grazing allotments.	Krystal Johnson	04/06/2010
PI	Migratory Birds	Migratory birds, including the BLM sensitive species the western burrowing owl (*Athene cunicularia*), may be present on the project site. 1) To prevent undue harm, habitat-altering projects or portions of projects should be scheduled outside bird breeding season. In upland desert habitats and ephemeral washes containing upland species, the season generally occurs between March 15th - July 30th. 2) If a project that may alter any breeding habitat has to occur during the breeding season, then a qualified	Jessie Stegmeier	5/7/2010

		biologist must survey the area for nests prior to commencement of construction activities. This shall include burrowing and ground nesting species in addition to those nesting in vegetation. If any active nests (containing eggs or young) are found, an appropriately-sized buffer area must be avoided until the young birds fledge.		
PI	Native American Religious Concerns	The BLM must conduct government-to-government consultation with tribes who traditional territory will be impacted by the project.	Susanne Rowe	04/16/2010
PI	Paleontology	Fossil bearing strata are present and may be impacted.	Susanne Rowe	04/16/2010
NI	Rangeland Health Standards	Proposed project area will be within an existing utility corridor, there should be no major impacts to rangeland health.	Krystal Johnson	04/06/2010
NI	Recreation	No Issues	Marilyn Peterson	4/6/2010
PI	Socio-Economics	Proposed project may provide benefit to the social and economic infrastructures of Southern Nevada — in form of additional employment and by strengthening the utility grid to prevent potential blackouts and other adverse effects due to additional usage that current infrastructure may not be able to support.	Susan Farkas	04/14/2010
PI	Soils	Applicant will need to utilize bmps to reduce potential for erosion	Sarah Peterson	4/14/2010

PI	Threatened, Endangered or Candidate Plant Species	Can not complete comments at this time. There is a potential for Las Vgeas buckwheat, Eriogonum corymbosum var. nilesii (a federal candidate species) to be present. If it has not already been completed, a rare plant survey will need to completed.	Fred Edwards	4/16/2009
PI	Threatened, Endangered or Candidate Animal Species	The proposed project area is not within any desert tortoise ACECs or any critical desert tortoise habitat. This project cannot be covered under existing Biological Opinions because it exceeds the acreage of disturbance they cover, therefore a biological assessment (BA) needs to be prepared and formal consultation with USFWS completed to get a BO. The BA should be contracted by the proponent as we do not have staff and funding available to do it in house. Once an acceptable BA is received, consultation with USFWS will take approximately 135 days to complete. The BA will analyze impacts to listed species and analyze impacts to BLM sensitive species in an appendix. The SOW for the surveys are provided in the ePlanning project folder "SOW". Shapefiles will be needed for the proposed transmission lines, along with proposed acres of disturbance to complete analysis for	Jessie Stegmeier	5/7/2010

		threatened and endangered species.		
NP	Wastes (hazardous or solid)	No Hazmat issues present. Include Standard Stipulations in ROW grant.	Per Mike Moran, entered by PR	04/04/2010
PI	Water Resources/ Quality (drinking/ surface/ground)	Applicant will need to utilize bmps to reduce impacts to water quality	Sarah Peterson	4/14/2010
NP	Wetlands/Riparian Zones	Not Present	Sarah Peterson	4/14/2010
NP	Wild and Scenic Rivers	Not Present	Marilyn Peterson	4/6/2010
PI	Wilderness/WSA	The proposed action is located adjacent to Sunrise Mountain Instant Study Area. The ISA is managed under the nonimpairment mandate and the existing wilderness values must not be degraded so far as to constrain Congress' decision to either designate as Wilderness or release for other purposes. The proposed action is within a corridor which was released from wilderness study and is no longer subject to section 603(c) of FLPMA and is instead managed under the current Land Use Plan. While no buffers are created around WSAs, the proposed action is located in close proximity to the ISA boundary, and activities outside need to be considered for impacts to wilderness characteristics within the ISA itself. Wilderness characteristics are commonly identified as: untrammeled, undeveloped, naturalness, outstanding opportunities for solitude or a primitive	Sendi Kalcic	04/26/2010

		and unconfined type of recreation. The proposed action would have a negative impact to the natural character resulting from becoming increasingly isolated within a "sea" of modern development. While there is currently a transmission line in existence within the corridor, construction of another transmission line would collectively decrease naturalness within the ISA. The proposed action would result in a decrease of opportunities for people to experience solitude, particularly during initial construction and following maintenance due to the sights and sounds of associated activities.		
NI	Woodland / Forestry	Cactus and yucca are likely to be present within the project impact area. Cactus and yucca are considered government property and are regulated under the Nevada BLM forestry program. All cactus and yucca within permanent and temporary impact areas must be salvaged and replanted in temporary impact areas or undisturbed portions of the project area. If this is not possible, cactus and yucca may be transported to a BLM stockpile for later use by BLM, sold to the public or another alternative may be developed in coordination with the BLM botanist. Unless otherwise directed	Fred Edwards	4/16/2010

		by the BLM botanist, all replanted cactus and yucca must be watered and otherwise maintained for a period of one year. To ensure successful salvage and transplant, all cactus and yucca must be salvaged using a contractor (or other approved by the BLM botanist) with at least three years experience salvaging and maintaining plant materials in the Mojave or Sonoran Deserts.		
PI	Vegetation Excluding Federally Listed Species	Can not complete comments at this time. There is a potential for BLM special status plants to be present. If it has not already been performed, a rare plant survey will need to completed.	Fred Edwards	4/16/2010
PI	Visual Resources	Can not complete comments without more information. Can not open the map in the maps folder to determine what VRM classes the project goes through. Visual Simulations, establishment of KOPs, and Visual Contrast Ratings will be required for this project. More information needed on where new disturbance will be located and what the finished transmission line will look like.	Lauren Brown	4/23/2010
NP	Wild Horses and Burros	Proposed project area does not include any herd management areas.	Krystal Johnson	04/06/2010

NP	Areas with Wilderness Characteristics	The proposed action is located within areas which do not meet the elements for wilderness characteristics.	Sendi Kalcic	04/20/2010

Appendix B Visual Contrast Rating Worksheets, Simulations, VRM Classifications and KOP Map

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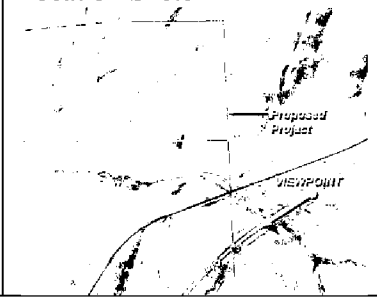
VISUAL CONTRAST RATING WORKSHEET

Date: March 2012
District: Southern Nevada
Resource Area: BLM - Las Vegas Field Office
Activity (program): Electric Utility Facilities

Project Name: Southern Nevada Intertie Project	**Location**	Location Sketch
Key Observation Point : 1 I-15 – Configuration 1& 2	Township 17S Range 64E Section 15	
VRM Class: III		

Characteristic Landscape Description

	Landform/Water	Vegetation	Structures
Form	Flat, horizontal (foreground), Rolling hills to mountainous (middleground) Mountainous (background)	Small, low, sparse patches (foreground) Sparse, irregular patch (middleground)	Tall vertical, transparent (middleground)
Line	Smooth, straight, horizontal (foreground) Undulating; curving (middleground) Undulating, diagonal (background)	Irregular (foreground)	Geometric, vertical (middleground)
Color	Grey, tan, beige (foreground) Brown, tan (middleground) Grayish-dull brown (background)	Green, tan (foreground) Green (middleground)	Grey-matted (foreground)
Texture	Fine (foreground) Fine, smooth – medium (middleground) Fine texture (background)	Medium, uneven, random, (foreground) Even, random (middleground)	Fine, uniform (foreground)

Proposed Activity Description (Facility)

	Landform/Water	Vegetation	Structures
Form	Flat, horizontal (foreground), Rolling hills to mountainous (middle ground) Mountainous (background)	Small, low, sparse patches (foreground) Sparse, irregular patch (middle ground)	Tall vertical, transparent (middle ground)
Line	Smooth, straight, horizontal (foreground) Undulating; curving (middle ground) Undulating, diagonal (background)	Irregular (foreground)	Geometric, vertical (middle ground)
Color	Grey, tan, beige (foreground) Brown, tan (middle ground) Grayish-dull brown (background)	Green, tan (foreground) Green (middle ground)	Grey-matted (foreground)
Texture	Fine (foreground) Fine, smooth – medium (middle ground) Fine texture (background)	Medium, uneven, random, (foreground) Even, random (middle ground)	Fine, uniform (foreground)

Degree of Contrast

M = Minimal

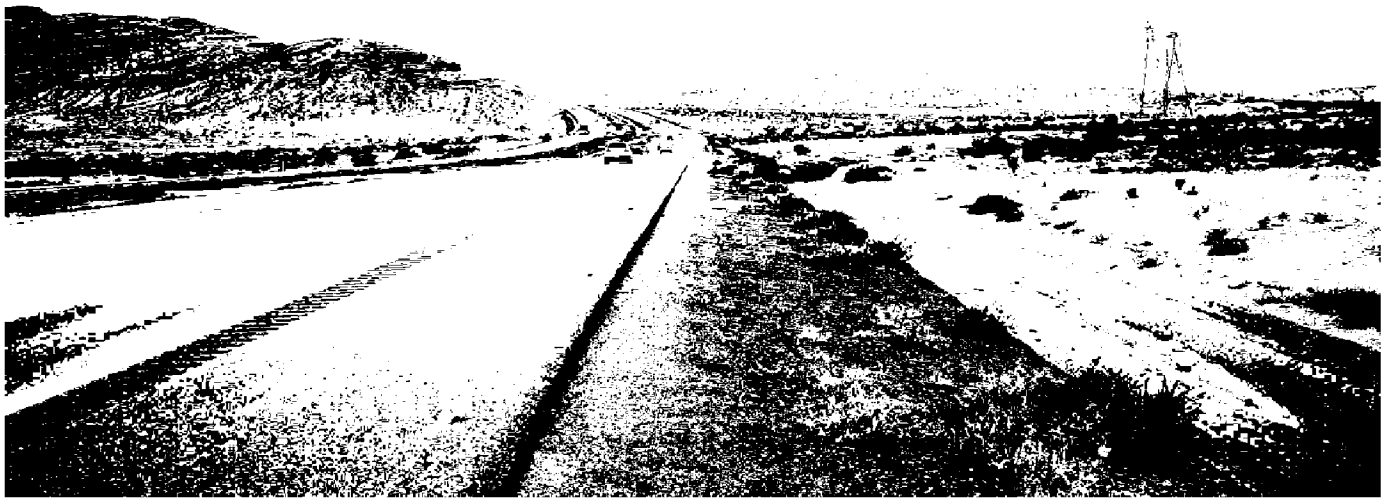
		Features											
		Landform/ Water Body				Vegetation				Structures			
Degree of Contrast		Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
Elements	Form			X				X				X	
	Line		X					X				X	
	Color		X					X					M
	Texture			X				X					M

Does project design meet visual resource management objectives?
Yes

Additional mitigating measures recommended?
Match existing transmission line spans.

Evaluators Names:
Lori Tuchman, Marc Schwartz

Date: March 2012
District: Southern Nevada
Resource Area: BLM - Las Vegas Field Office
Activity (program): Electric Utility Facilities

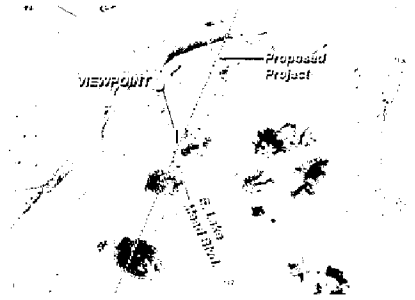


Southwest View from I-15

Weak-moderate contrast would result from the construction and operation of the proposed project within a modified setting designated as VRM Class III. The proposed single-circuit lattice structures would be similar in form and color as compared to existing lattice structures located within the utility corridor. Matching existing spans crossing over I-15 would further reduce impacts. The construction of the project would also result in some vegetation clearing and landform modification based on the use of existing access and sparse vegetation. Due to the occurrence of moderate terrain, portions of the proposed project will be partially skylined which would increase contrast, in particular, for the double-circuit structure because it would be taller.

VISUAL CONTRAST RATING WORKSHEET

Date: March 2012
District: Southern Nevada
Resource Area: BLM – Las Vegas Field Office
Activity (program): Electric Utility Facilities

Project Name: Southern Nevada Intertie Project **Key Observation Point : 2** Lake Mead Boulevard within Sunrise ISA – Configuration 1 **VRM Class: III**	**Location** Township 20S Range 63E Section 22	Location Sketch 

Characteristic Landscape Description

	Landform/Water	Vegetation	Structures
Form	Flat; gently rolling hills (foreground), Rolling hills (middleground) Mountainous (background)	Low, irregular (foreground)	Tall vertical, transparent (foreground/middleground)
Line	Straight, linear; flat, horizontal; diagonal (foreground) Diagonal; curving (middleground) Irregular, horizontal (background)	Weak, irregular (foreground)	Geometric, vertical (foreground/middleground)
Color	Dark grey, reds (foreground) Brown, tan, red, (middleground) Dull brown, beige, red (background)	Light green, dark green (foreground) Dark green (middle ground)	Grey, matted (foreground/middleground)
Texture	Medium to fine (foreground/middleground) Fine, smooth (background)	Medium, uneven sparse (foreground) Fine, sparse (middle/background)	Fine, uniform (foreground/middleground)

Proposed Activity Description (Facility)

	Landform/Water	Vegetation	Structures
Form	Flat; gently rolling hills (foreground), Rolling hills (middleground) Mountainous (background)	Low, irregular (foreground)	Tall vertical, transparent (foreground/middleground)
Line	Straight, linear; flat, horizontal; diagonal (foreground) Diagonal; curving (middleground) Irregular, horizontal (background)	Weak, irregular (foreground)	Geometric, vertical (foreground/middleground)
Color	Dark grey, reds (foreground) Brown, tan, red, (middleground) Dull brown, beige, red (background)	Light green, dark green (foreground) Dark green (middleground)	Grey, matted (foreground/middleground)
Texture	Medium to fine (foreground/middleground) Fine, smooth (background)	Medium, uneven sparse (foreground) Fine, sparse (middle/background)	Fine, uniform (foreground/middleground)

Degree of Contrast

M = Minimal

		Features											
		Landform/ Water Body				Vegetation				Structures			
Degree of Contrast		Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
Elements	Form			X				X				X	
	Line			X				X				X	
	Color			X					X				M
	Texture			X					X			X	

Does project design meet visual resource management objectives?
Yes

Additional mitigating measures recommended?
Match existing spans and restore lay down areas adjacent to Lake Mead Boulevard.

Evaluators Names:
Lori Tuchman, Marc Schwartz

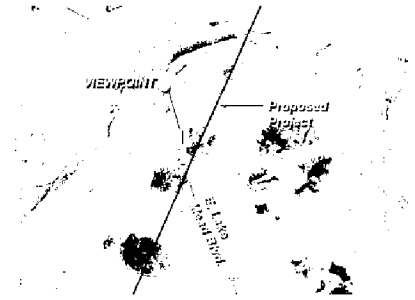
Date: March 2012
District: Southern Nevada
Resource Area: BLM – Las Vegas Field Office
Activity (program): Electric Utility Facilities

Southeast View from Lake Mead Boulevard

Weak contrast would result from the construction and operation of the proposed project within a modified setting designated as VRM Class III. The proposed single and double-circuit lattice structures would be similar in form and color as compared to existing structures located within the utility corridor. Matching existing spans crossing over I-15 would further reduce impacts. Matching existing spans and restoring lay down areas adjacent to Lake Mead Boulevard would further reduce contrast. The construction of the project would also result in minimal vegetation clearing and landform modification for the accommodation of lay down areas based on the use of existing access and sparse vegetation.

VISUAL CONTRAST RATING WORKSHEET

Date: March 2012
District: Southern Nevada
Resource Area: BLM – Las Vegas Field Office
Activity (program): Electric Utility Facilities

Project Name: Southern Nevada Intertie Project **Key Observation Point : 2** Lake Mead Boulevard within Sunrise ISA – Configuration 2 **VRM Class: III**	**Location** Township 20S Range 63E Section 22	Location Sketch 

Characteristic Landscape Description

	Landform/Water	Vegetation	Structures
Form	Flat; gently rolling hills (foreground), Rolling hills (middleground) Mountainous (background)	Low, irregular (foreground)	Tall vertical, transparent (foreground/middleground)
Line	Straight, linear; flat, horizontal; diagonal (foreground) Diagonal; curving (middleground) Irregular, horizontal (background)	Weak, irregular (foreground)	Geometric, vertical (foreground/middleground)
Color	Dark grey, reds (foreground) Brown, tan, red, (middleground) Dull brown, beige, red (background)	Light green, dark green (foreground) Dark green (middleground)	Grey, matted (foreground/middleground)
Texture	Medium to fine (foreground/middleground) Fine, smooth (background)	Medium, uneven sparse (foreground) Fine, sparse (middle/background)	Fine, uniform (foreground/middleground)

Proposed Activity Description (Facility)

	Landform/Water	Vegetation	Structures
Form	Flat; gently rolling hills (foreground), Rolling hills (middleground) Mountainous (background)	Low, irregular (foreground)	Tall vertical, transparent (foreground/middleground)
Line	Straight, linear; flat, horizontal; diagonal (foreground) Diagonal; curving (middleground) Irregular, horizontal (background)	Weak, irregular (foreground)	Geometric, vertical (foreground/middleground)
Color	Dark grey, reds (foreground) Brown, tan, red, (middleground) Dull brown, beige, red (background)	Light green, dark green (foreground) Dark green (middleground)	Grey, matted (foreground/middleground)
Texture	Medium to fine (foreground/middleground) Fine, smooth (background)	Medium, uneven sparse (foreground) Fine, sparse (middle/background)	Fine, uniform (foreground/middleground)

Degree of Contrast

M = Minimal

		Features											
		Landform/ Water Body				Vegetation				Structures			
Degree of Contrast		Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
Elements	Form				M				M				M
	Line				M				M			X	
	Color				M				X				M
	Texture				X				X				M

Does project design meet visual resource management objectives?
Yes

Additional mitigating measures recommended?
Restore lay down areas adjacent to Lake Mead Boulevard.

Evaluators Names:
Lori Tuchman, Marc Schwartz

Date: March 2012
District: Southern Nevada
Resource Area: BLM – Las Vegas Field Office
Activity (program): Electric Utility Facilities

Southeast View from Lake Mead Boulevard

Minimal contrast would result from the construction and operation of the proposed project within a modified setting designated as VRM Class III. The proposed action for this configuration would have transmission lines co-located onto existing structures reducing contrast for color and form. Restoring lay down areas as a result of stringing new transmission lines adjacent to Lake Mead Boulevard would further reduce contrast. The co-location of the project would also result in minimal vegetation clearing and landform modification for the accommodation of lay down areas based on the use of existing access and sparse vegetation.

VISUAL CONTRAST RATING WORKSHEET

Date: March 2012
District: Southern Nevada
Resource Area: BLM - Las Vegas Field Office
Activity (program): Electric Utility Facilities

Project Name: Southern Nevada Intertie Project	**Location**	Location Sketch
Key Observation Point : 3 Residential-Undeveloped Residential Lot – Configuration 1	Township 21S Range 63E Section 22	
VRM Class: III		

Characteristic Landscape Description

	Landform/Water	Vegetation	Structures
Form	Highly developed residential (foreground), Rolling hills to mountainous (middleground) mountainous (background)	Irregular vertical (foreground) Sparse, irregular patch (background)	Geometric, vertical (foreground) Tall vertical, transparent (middleground)
Line	Linear, horizontal (foreground) Diagonal (middleground) Undulation, horizontal (background)	Irregular vertical (foreground)	Complex, geometric (foreground) Moderate vertical (middleground)
Color	Green, brown, grey, tan (foreground) Light/dark red (middleground) Browns, tans (background)	Green (foreground) Grey-green (middleground) Dark Green (wash)	Greens, reds, browns, light tan (foreground) Grey, matted (middleground)
Texture	Fine, smooth (fore/middleground) Course to fine texture (background)	Course, dense (foreground) Sparse, fine (middle/background)	Course, dense (foreground) Fine, uniform (middleground)

Proposed Activity Description (Facility)

	Landform/Water	Vegetation	Structures
Form	Highly developed residential (foreground), Rolling hills to mountainous (middleground) mountainous (background)	Irregular vertical (foreground) Sparse, irregular patch (background)	Geometric, vertical (foreground) Tall vertical, transparent (middleground)
Line	Linear, horizontal (foreground) Diagonal (middleground) Undulation, horizontal (background)	Irregular vertical (foreground)	Complex; curving horizontal; geometric (foreground) Moderate vertical (middleground)
Color	Green, brown, grey, tan (foreground) Light/dark red (middleground) Browns, tans (background)	Green (foreground) Grey-green (middleground) Dark Green (wash)	Greens, reds, browns, light tan (foreground) Grey, matted (middleground)
Texture	Fine, smooth (foreground/middleground) Course to fine texture (background)	Course, dense (foreground) Sparse, fine (middle/background)	Course, dense (foreground) Fine, uniform (middleground)

Degree of Contrast

M = Minimal

		Features											
		Landform/ Water Body				Vegetation				Structures			
Degree of Contrast		Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
Elements	Form			X				X				X	
	Line			X				X				X	
	Color			X					X				M
	Texture			X					X			X	

Does project design meet visual resource management objectives?
Yes

Additional mitigating measures recommended?
No

Evaluators Names:
Lori Tuchman, Marc Schwartz

Date: March 2012
District: Southern Nevada
Resource Area: BLM - Las Vegas Field Office
Activity (program): Electric Utility Facilities

Southwest View from Undeveloped Residential Lot

Weak contrast would result from the construction and operation of the proposed project within a modified setting designated as VRM Class III. The proposed single and double-circuit lattice structures would be similar in form and color as compared to existing lattice structures located within the utility corridor. The double-circuit structure would be slightly taller resulting in a partially skylined condition which would increase contrast slightly. Restoring lay down areas adjacent to residents would further reduce contrast. The construction of the project would also result in minimal vegetation clearing and landform modification for the accommodation of lay down areas based on the use of existing access and sparse vegetation.

VISUAL CONTRAST RATING WORKSHEET

Date: March 2012
District: Southern Nevada
Resource Area: BLM - Las Vegas Field Office
Activity (program): Electric Utility Facilities

Project Name: Southern Nevada Intertie Project **Key Observation Point : 3** Residential-Undeveloped Residential Lot – Configuration 2 **VRM Class: III**	**Location** Township 21S Range 63E Section 22	Location Sketch

Characteristic Landscape Description

	Landform/Water	Vegetation	Structures
Form	Highly developed residential (foreground), Rolling hills to mountainous (middleground) mountainous (background)	Irregular vertical (foreground) Sparse, irregular patch (background)	Geometric, vertical (foreground) Tall vertical, transparent (middleground)
Line	Linear, horizontal (foreground) Diagonal (middleground) Undulation, horizontal (background)	Irregular vertical (foreground)	Complex, geometric (foreground) Moderate vertical (middleground)
Color	Green, brown, grey, tan (foreground) Light/dark red (middleground) Browns, tans (background)	Green (foreground) Grey-green (middleground) Dark Green (wash)	Greens, reds, browns, light tan (foreground) Grey, matted (middleground)
Texture	Fine, smooth (foreground/middleground) Course to fine texture (background)	Course, dense (foreground) Sparse, fine (middle/background)	Course, dense (foreground) Fine, uniform (middleground)

Proposed Activity Description (Facility)

	Landform/Water	Vegetation	Structures
Form	Highly developed residential (foreground), Rolling hills to mountainous (middleground) mountainous (background)	Irregular vertical (foreground) Sparse, irregular patch (background)	Geometric, vertical (foreground) Tall vertical, transparent (middleground)
Line	Linear, horizontal (foreground) Diagonal (middleground) Undulation, horizontal (background)	Irregular vertical (foreground)	Complex, curving horizontal, geometric (foreground) Moderate vertical (middleground)
Color	Green, brown, grey, tan (foreground) Light/dark red (middleground) Browns, tans (background)	Green (foreground) Grey-green (middleground) Dark Green (wash)	Greens, reds, browns, light tan (foreground) Grey, matted (middleground)
Texture	Fine, smooth (foreground/middleground) Course to fine texture (background)	Course, dense (foreground) Sparse, fine (middle/background)	Course, dense (foreground) Fine, uniform (middleground)

Degree of Contrast

M = Minimal

		Features											
		Landform/ Water Body				Vegetation				Structures			
Degree of Contrast		Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
Elements	Form				M				M				M
	Line				M				M			X	
	Color				M				X				M
	Texture				X				X				M

Does project design meet visual resource management objectives?
Yes

Additional mitigating measures recommended?
No

Evaluators Names:
Lori Tuchman, Marc Schwartz

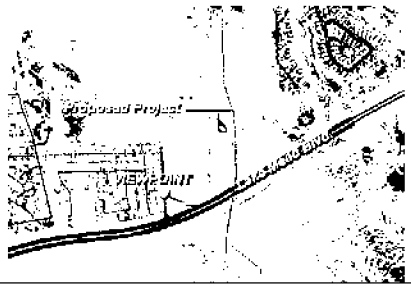
Date: March 2012
District: Southern Nevada
Resource Area: BLM - Las Vegas Field Office
Activity (program): Electric Utility Facilities

Southwest View from Undeveloped Residential Lot

Minimal contrast would result from the construction and operation of the proposed project within a modified setting designated as VRM Class III. The proposed action for this configuration would have transmission lines co-located onto existing structures reducing contrast for color and form. Restoring lay down areas adjacent to residents as a result of stringing new transmission lines would further reduce contrast. The co-location of the project would also result in minimal vegetation clearing and landform modification for the accommodation of lay down areas based on the use of existing access and sparse vegetation.

VISUAL CONTRAST RATING WORKSHEET

Date: March 2012
District: Southern Nevada
Resource Area: BLM – Las Vegas Field Office
Activity (program): Electric Utility Facilities

Project Name: Southern Nevada Intertie Project **Key Observation Point : 4** Residential-Roy Way – Configuration 1 **VRM Class: IV**	**Location** Township 21S Range 63E Section 33	Location Sketch 

Characteristic Landscape Description

	Landform/Water	Vegetation	Structures
Form	Flat, horizontal (foreground), Irregular, undulating hills (middleground) Flat, undulating hills, mountainous (background)	Low, irregular, tall (foreground) Low, irregular, random (middleground) Irregular patch (background)	Geometric, tall, vertical (foreground) Geometric, tall, transparent (middleground) Low, geometric (background)
Line	Linear, horizontal (foreground) Undulating, horizontal (middleground) Undulating, irregular, weak (background)	Tall, vertical; low irregular (foreground) Diagonal, straight (middleground) Irregular, horizontal (background)	Complex, curving, horizontal, vertical Vertical, geometric (middleground) Weak horizontal (background)
Color	Dark-light grey, beige (foreground) Dark brown, red, beige (middleground) Tan, light red, brown (background)	Dark-light green, yellow (foreground) Dark green (middle-background)	Beige, red (foreground) Matted grey (middle ground) Pale reds (background)
Texture	Fine, smooth (foreground/background) Medium (middleground)	Medium, uneven random (foreground) Fine, dense (middle-background)	Medium, ordered (foreground) Medium to fine, uniform (middleground) Fine, dotted (background)

Proposed Activity Description (Facility)

	Landform/Water	Vegetation	Structures
Form	Flat, horizontal (foreground), Irregular, undulating hills (middleground) Flat, undulating hills, mountainous (background)	Low, irregular, tall (foreground) Low, irregular, random (middleground) Irregular patch (background)	Geometric, tall, vertical (foreground) Geometric, tall, transparent (middleground) Low, geometric (background)
Line	Linear, horizontal (foreground) Undulating, horizontal (middleground) Undulating, irregular, weak (background)	Tall, vertical; low irregular (foreground) Diagonal, straight (middleground) Irregular, horizontal (background)	Complex, curving, horizontal, vertical (foreground) Vertical, geometric (middleground) Weak horizontal (background)
Color	Dark-light grey, beige (foreground) Dark brown, red, beige (middleground) Tan, light red, brown (background)	Dark-light green, yellow (foreground) Dark green (middle-background)	Beige, red (foreground) Matted grey (middleground) Pale reds (background)
Texture	Fine, smooth (foreground/background) Medium (middleground)	Medium, uneven random (foreground) Fine, dense (middle-background)	Medium, ordered (foreground) Medium to fine, uniform (middleground) Fine, dotted (background)

Degree of Contrast

M = Minimal

		Features											
		Landform/ Water Body				Vegetation				Structures			
Degree of Contrast		Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
Elements	Form			X				X				X	
	Line			X				X				X	
	Color			X					X				M
	Texture			X					X			X	

Does project design meet visual resource management objectives?
Yes

Additional mitigating measures recommended?
Match existing spans and restore lay down areas adjacent to Lake Mead Boulevard.

Evaluators Names:
Lori Tuchman, Marc Schwartz

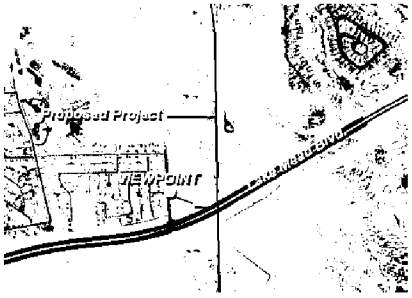
Date: March 2012
District: Southern Nevada
Resource Area: BLM – Las Vegas Field Office
Activity (program): Electric Utility Facilities

Southeast View from Roy Way

Weak contrast would result from the construction and operation of the proposed project within a modified setting designated as VRM Class IV. The proposed structures for single and double-circuit options would be similar in form and color as compared to existing structures located within the utility corridor. Matching existing spans and restoring lay down areas adjacent to residents would further reduce contrast. The construction of the project would also result in minimal vegetation clearing and landform modification for the accommodation of lay down areas based on the use of existing access and sparse vegetation.

VISUAL CONTRAST RATING WORKSHEET

Date: March 2012
District: Southern Nevada
Resource Area: BLM – Las Vegas Field Office
Activity (program): Electric Utility Facilities

Project Name: Southern Nevada Intertie Project **Key Observation Point : 4** Residential-Roy Way – Configuration 2 **VRM Class: IV**	**Location** Township 21S Range 63E Section 33	Location Sketch 

Characteristic Landscape Description

	Landform/Water	Vegetation	Structures
Form	Flat, horizontal (foreground), Irregular, undulating hills (middleground) Flat, undulating hills, mountainous (background)	Low, irregular, tall (foreground) Low, irregular, random (middleground) Irregular patch (background)	Geometric, tall, vertical (foreground) Geometric, tall, transparent (middleground) Low, geometric (background)
Line	Linear, horizontal (foreground) Undulating, horizontal (middleground) Undulating, irregular, weak (background)	Tall, vertical; low irregular (foreground) Diagonal, straight (middleground) Irregular, horizontal (background)	Complex, curving, vertical (foreground) Vertical, geometric (middleground) Weak horizontal (background)
Color	Dark-light grey, beige (foreground) Dark brown, red, beige (middleground) Tan, light red, brown (background)	Dark-light green, yellow (foreground) Dark green (middle-background)	Beige, red (foreground) Matted grey (middleground) Pale reds (background)
Texture	Fine, smooth (foreground/background) Medium (middleground)	Medium, uneven random (foreground) Fine, dense (middle-background)	Medium, ordered (foreground) Medium to fine, uniform (middleground) Fine, dotted (background)

Proposed Activity Description (Facility)

	Landform/Water	Vegetation	Structures
Form	Flat, horizontal (foreground), Irregular, undulating hills (middleground) Flat, undulating hills, mountainous (background)	Low, irregular, tall (foreground) Low, irregular, random (middleround) Irregular patch (background)	Geometric, tall, vertical (foreground) Geometric, tall, transparent (middleground) Low, geometric (background)
Line	Linear, horizontal (foreground) Undulating, horizontal (middleground) Undulating, irregular, weak (background)	Tall, vertical; low irregular (foreground) Diagonal, straight (middleground) Irregular, horizontal (background)	Complex, curving, vertical (foreground) Vertical, geometric (middleground) Weak horizontal (background)
Color	Dark-light grey, beige (foreground) Dark brown, red, beige (middleground) Tan, light red, brown (background)	Dark-light green, yellow (foreground) Dark green (middle-background)	Beige, grey, red (foreground) Matted grey (middleground) Pale reds (background)
Texture	Fine, smooth (foreground/background) Medium (middleground)	Medium, uneven random (foreground) Fine, dense (middle-background)	Medium, ordered (foreground) Medium to fine, uniform (middleground) Fine, dotted (background)

Degree of Contrast

M = Minimal

		Features											
		Landform/ Water Body				Vegetation				Structures			
Degree of Contrast		Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
Elements	Form				M				M				M
	Line				M				M			X	
	Color				M				X				M
	Texture				X				X				M

Does project design meet visual resource management objectives?
Yes

Additional mitigating measures recommended?
Restore lay down areas and access roads adjacent to Lake Mead Boulevard.

Evaluators Names:
Lori Tuchman, Marc Schwartz

Date: March 2012
District: Southern Nevada
Resource Area: BLM – Las Vegas Field Office
Activity (program): Electric Utility Facilities

Southeast View from Roy Way

Minimal contrast would result from the construction and operation of the proposed project within a modified setting designated as VRM Class IV. The proposed action for this configuration would have transmission lines co-located onto existing structures reducing contrast for color and form. Restoring lay down areas adjacent to residents would further reduce contrast. The co-location of the project would also result in minimal vegetation clearing and landform modification for the accommodation of lay down areas based on the use of existing access and sparse vegetation.

VISUAL CONTRAST RATING WORKSHEET

Date: March 2012
District: Southern Nevada
Resource Area: BLM – Las Vegas Field Office
Activity (program): Electric Utility Facilities

Project Name: Southern Nevada Intertie Project	**Location**	Location Sketch
Key Observation Point : 5 Residential-Firth Avenue – Configuration 1	Township 22S Range 63E Section 4	
VRM Class: IV		

Characteristic Landscape Description

	Landform/Water	Vegetation	Structures
Form	Highly developed residential (foreground), Rolling hills (middleground) Mountainous (background)	Low, irregular (foreground) Sparse, irregular (middleground)	Geometric; horizontal, narrow (foreground) Tall, transparent geometric; Solid geometric (middleground)
Line	Horizontal, straight; undulating (foreground) Diagonal, undulating (middleground) Weak, horizontal, undulating (background)	Irregular (foreground) Vertical, weak; irregular (middleground)	Simple geometric; staggered horizontal (foreground) Geometric, simple, vertical (middleground)
Color	Light grey, light tan (foreground) Light tan, tan (middleground) Dull grey (background)	Light and dark green (foreground/middleground)	Reds, tan, beige, light grey (foreground) Black, wood (?); matted grey (middleground)
Texture	Medium-fine (foreground/middleground)	Medium, sparse (foreground/middleground)	Medium, ordered; fine, smooth (foreground) Fine, uniform, smooth (middleground)

Proposed Activity Description (Facility)

	Landform/Water	Vegetation	Structures
Form	Highly developed residential (foreground), Rolling hills (middleground) Mountainous (background)	Low, irregular (foreground) Sparse, irregular (middleground)	Geometric; horizontal, narrow (foreground) Tall, transparent geometric; Solid geometric (middleground)
Line	Horizontal, straight; undulating (foreground) Diagonal, undulating (middleground) Weak, horizontal, undulating (background)	Irregular (foreground) Vertical, weak; irregular (middleground)	Simple geometric; curving, staggered horizontal (foreground) Geometric, simple, vertical (middleground)
Color	Light grey, light tan (foreground) Light tan, tan (middleground) Dull grey (background)	Light and dark green (foreground/middleground)	Reds, tan, beige, light grey (foreground) Black, wood (?); matted grey (middleground)
Texture	Medium-fine (foreground/middleground)	Medium, sparse (foreground/middleground)	Medium, ordered; fine, smooth (foreground) Fine, uniform, smooth (middleground)

Degree of Contrast

M = Minimal

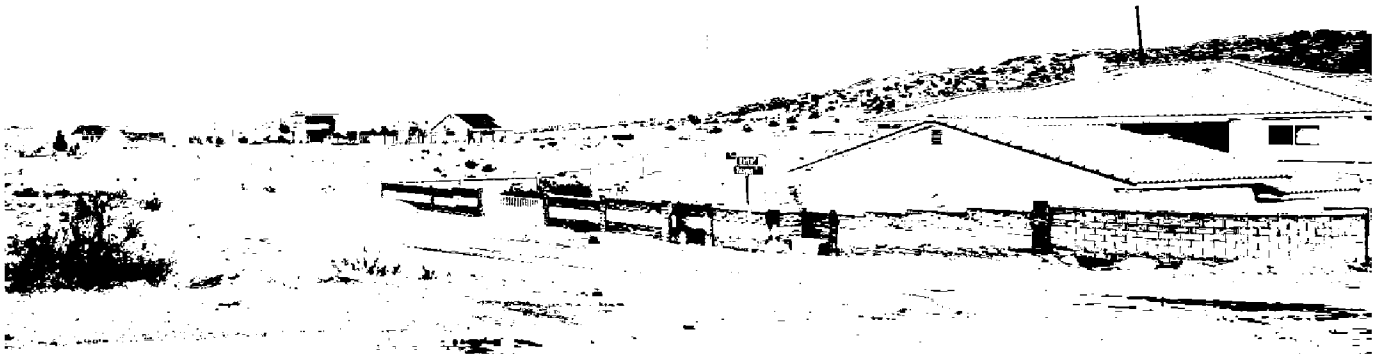
		Features											
		Landform/ Water Body				Vegetation				Structures			
Degree of Contrast		Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
Elements	Form				X				X			X	
	Line				X				X			X	
	Color				X				X				M
	Texture				X				X			X	

Does project design meet visual resource management objectives?
Yes

Additional mitigating measures recommended?
No

Evaluators Names:
Lori Tuchman, Marc Schwartz

Date: March 2012
District: Southern Nevada
Resource Area: BLM – Las Vegas Field Office
Activity (program): Electric Utility Facilities



Northeast View from Firth Avenue

Weak contrast would result from the construction and operation of the proposed project within a modified setting designated as VRM Class IV. The proposed single and double-circuit structures would be similar in form and color as compared to existing structures located within the utility corridor. The construction of the project would also result in minimal vegetation clearing and landform modification based on the use of existing access and sparse vegetation. It is unlikely that landscape contrast will be visible from this KOP due to intervening topography.

VISUAL CONTRAST RATING WORKSHEET

Date: March 2012
District: Southern Nevada
Resource Area: BLM – Las Vegas Field Office
Activity (program): Electric Utility Facilities

Project Name: Southern Nevada Intertie Project	**Location**	Location Sketch
Key Observation Point : 5 Residential-Firth Avenue – Configuration 2	Township 22S Range 63E Section 4	
VRM Class: IV		

Characteristic Landscape Description

	Landform/Water	Vegetation	Structures
Form	Highly developed residential (foreground), Rolling hills (middleground) Mountainous (background)	Low, irregular (foreground) Sparse, irregular (middleground)	Geometric; horizontal, narrow (foreground) Tall, transparent geometric; Solid geometric (middleground)
Line	Horizontal, straight; undulating (foreground) Diagonal, undulating (middleground) Weak, horizontal, undulating (background)	Irregular (foreground) Vertical, weak; irregular (middleground)	Simple geometric; curving, staggered horizontal (foreground) Geometric, simple, vertical (middleground)
Color	Light grey, light tan (foreground) Light tan, tan (middleground) Dull grey (background)	Light and dark green (foreground/middleground)	Reds, tan, beige, light grey (foreground) Black, wood; matted grey (middleground)
Texture	Medium-fine (foreground/middleground)	Medium, sparse (foreground/middleground)	Medium, ordered; fine, smooth (foreground) Fine, uniform, smooth (middleground)

Proposed Activity Description (Facility)

	Landform/Water	Vegetation	Structures
Form	Highly developed residential (foreground), Rolling hills (middleground) Mountainous (background)	Low, irregular (foreground) Sparse, irregular (middleground)	Geometric; horizontal, narrow (foreground) Tall, transparent geometric; Solid geometric (middleground)
Line	Horizontal, straight; undulating (foreground) Diagonal, undulating (middleground) Weak, horizontal, undulating (background)	Irregular (foreground) Vertical, weak; irregular (middleground)	Simple geometric; curving, staggered horizontal (foreground) Geometric, simple, vertical (middleground)
Color	Light grey, light tan (foreground) Light tan, tan (middleground) Dull grey (background)	Light and dark green (foreground/middleground)	Reds, tan, beige, light grey (foreground) Black, wood; matted grey (middleground)
Texture	Medium-fine (foreground/middleground)	Medium, sparse (foreground/middleground)	Medium, ordered; fine, smooth (foreground) Fine, uniform, smooth (middleground)

Degree of Contrast

M = Minimal

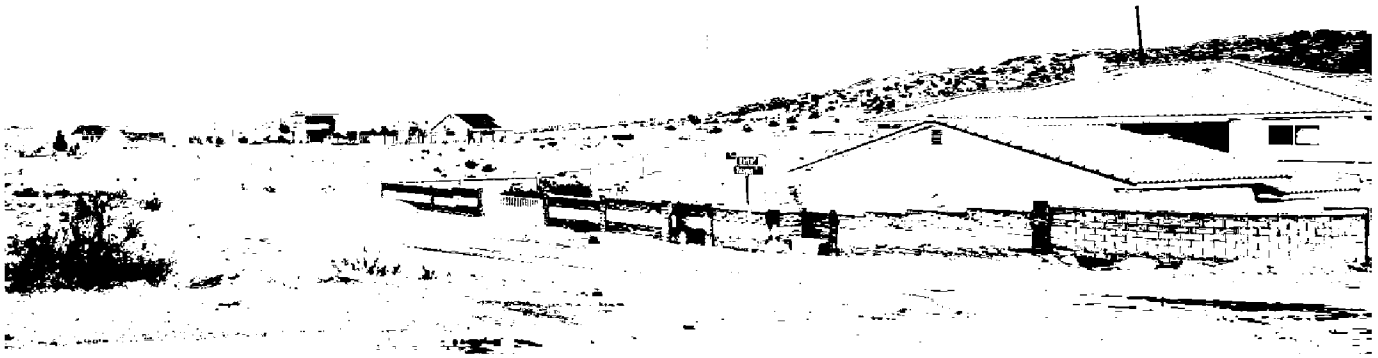
		Features											
		Landform/ Water Body				Vegetation				Structures			
Degree of Contrast		Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
Elements	Form				X				X				M
	Line				X				X			X	
	Color				X				X				M
	Texture				X				X				M

Does project design meet visual resource management objectives?
Yes

Additional mitigating measures recommended?
No

Evaluators Names:
Lori Tuchman, Marc Schwartz

Date: March 2012
District: Southern Nevada
Resource Area: BLM – Las Vegas Field Office
Activity (program): Electric Utility Facilities



Northeast View from Firth Avenue

Minimal contrast would result from the construction and operation of the proposed project within a modified setting designated as VRM Class IV. The proposed action for this configuration would have transmission lines co-located onto existing structures reducing contrast for color and form. The construction of the project would also result in minimal vegetation clearing and landform modification based on the use of existing access and sparse vegetation. It is unlikely that the landscape contrast will be visible from this KOP due to intervening topography.

VISUAL CONTRAST RATING WORKSHEET

Date: March 2012
District: Southern Nevada
Resource Area: BLM – Las Vegas Field Office
Activity (program): Electric Utility Facilities

Project Name: Southern Nevada Intertie Project **Key Observation Point : 6** Boulder Highway – Configuration 1 **VRM Class: IV**	**Location** Township 23S Range 63E Section 2	Location Sketch

Characteristic Landscape Description

	Landform/Water	Vegetation	Structures
Form	Flat, horizontal; Gently rolling (foreground), Gently rolling (middleground)	Low, irregular (foreground) Irregular patch (middleground)	Tall, vertical, transparent (middleground)
Line	Straight, horizontal, diagonal (foreground) Diagonal, undulating (middleground)	Irregular, weak (foreground/middleground)	Simple, straight, vertical, curving horizontal; Geometric (foreground to middleground)
Color	Light grey, tan (foreground/middleground)	Light green, green (foreground) Green, brownish-yellow (middleground)	Grey, matted; dark brown (middleground)
Texture	Fine-medium (foreground) Medium (middleground)	Medium, sparse (foreground/middleground)	Fine, uniform (middleground)

Proposed Activity Description (Facility)

	Landform/Water	Vegetation	Structures
Form	Flat, horizontal; Gently rolling (foreground), Gently rolling (middleground)	Low, irregular (foreground) Irregular patch (middleground)	Tall, vertical, transparent (middleground)
Line	Straight, horizontal, diagonal (foreground) Diagonal, undulating (middleground)	Irregular, weak (foreground/middleground)	Simple, straight, vertical; Geometric (middleground)
Color	Light grey, tan (foreground/middleground)	Light green, green (foreground) Green, brownish-yellow (middleground)	Grey, matted; dark brown (middleground)
Texture	Fine-medium (foreground) Medium (middleground)	Medium, sparse (foreground/middleground)	Fine, uniform (middleground)

Degree of Contrast

M = Minimal

Degree of Contrast		Features											
		Landform/ Water Body				Vegetation				Structures			
		Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
Elements	Form				X				X			X	
	Line				X				X			X	
	Color				X				X				M
	Texture				X				X				M

Does project design meet visual resource management objectives?
Yes

Additional mitigating measures recommended?
No

Evaluators Names:
Lori Tuchman, Marc Schwartz

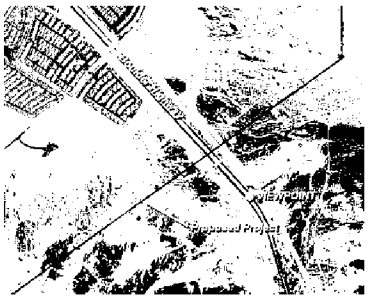
Date: March 2012
District: Southern Nevada
Resource Area: BLM – Las Vegas Field Office
Activity (program): Electric Utility Facilities

Northwest View from Boulder Highway

Weak contrast would result from the construction and operation of the proposed project within a modified setting designated as VRM Class IV. The proposed single and double-circuit structures would be similar in form and color as compared to existing structures located within the utility corridor. The construction of the project would also result in minimal vegetation clearing and landform modification based on the use of existing access and sparse vegetation. It is unlikely that landscape contrast will be visible from this KOP due to the rolling topography.

VISUAL CONTRAST RATING WORKSHEET

Date: March 2012
District: Southern Nevada
Resource Area: BLM – Las Vegas Field Office
Activity (program): Electric Utility Facilities

Project Name: Southern Nevada Intertie Project **Key Observation Point : 6** Boulder Highway – Configuration 2 **VRM Class: IV**	**Location** Township 23S Range 63E Section 2	Location Sketch 

Characteristic Landscape Description

	Landform/Water	Vegetation	Structures
Form	Flat, horizontal; Gently rolling (foreground), Gently rolling (middleground)	Low, irregular (foreground) Irregular patch (middleground)	Tall, vertical, transparent (middleground)
Line	Straight, horizontal, diagonal (foreground) Diagonal, undulating (middleground)	Irregular, weak (foreground/middleground)	Simple, straight, vertical; horizontal, curving; Geometric (foreground to middleground)
Color	Light grey, tan (foreground/middleground)	Light green, green (foreground) Green, brownish-yellow (middleground)	Grey, matted; dark brown (middleground)
Texture	Fine-medium (foreground) Medium (middleground)	Medium, sparse (foreground/middleground)	Fine, uniform (middleground)

Proposed Activity Description (Facility)

	Landform/Water	Vegetation	Structures
Form	Flat, horizontal; Gently rolling (foreground), Gently rolling (middleground)	Low, irregular (foreground) Irregular patch (middleground)	Tall, vertical, transparent (middleground)
Line	Straight, horizontal, diagonal (foreground) Diagonal, undulating (middleground)	Irregular, weak (foreground/middleground)	Simple, straight, vertical; horizontal, curving; Geometric (foreground to middleground)
Color	Light grey, tan (foreground/middleground)	Light green, green (foreground) Green, brownish-yellow (middleground)	Grey, matted; dark brown (middleground)
Texture	Fine-medium (foreground) Medium (middleground)	Medium, sparse (foreground/middleground)	Fine, uniform (middleground)

Degree of Contrast

M = Minimal

Degree of Contrast		Features											
		Landform/ Water Body				Vegetation				Structures			
		Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
Elements	Form				X				X				M
	Line				X				X			X	
	Color				X				X				M
	Texture				X				X				M

Does project design meet visual resource management objectives?
Yes

Additional mitigating measures recommended?
No

Evaluators Names:
Lori Tuchman, Marc Schwartz

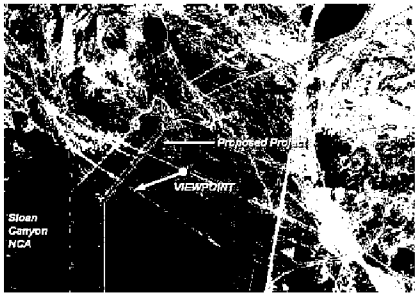
Date: March 2012
District: Southern Nevada
Resource Area: BLM – Las Vegas Field Office
Activity (program): Electric Utility Facilities

Northwest View from Boulder Highway

Minimal contrast would result from the construction and operation of the proposed project within a modified setting designated as VRM Class IV. The proposed action for this configuration would have transmission lines co-located onto existing structures reducing contrast for color and form. The construction of the project would also result in minimal vegetation clearing and landform modification based on the use of existing access and sparse vegetation. It is unlikely that landscape contrast will be visible from this KOP due to the rolling topography.

VISUAL CONTRAST RATING WORKSHEET

Date: March 2012
Resource Area: Sloan Canyon NCA/N. McCullough Wilderness
Activity (program): Electric Utility Facilities

Project Name: Southern Nevada Intertie Project	**Location**	Location Sketch
Key Observation Point : 7 Quo Vadis Trailhead – Configuration 1 & 2	Township 23S Range 62E Section 13	
VRM Class: III		

Characteristic Landscape Description

	Landform/Water	Vegetation	Structures
Form	Flat, horizontal (foreground/middleground), Mountainous (background)	Low, irregular (foreground/middleground) Irregular patch (background)	Tall, vertical, transparent (foreground) Indistinct, vertical (background)
Line	Straight, horizontal (foreground/middleground) Irregular, jagged; horizontal (background)	Irregular, horizontal (foreground) Horizontal (middleground) Horizontal, irregular (background)	Simple, straight, vertical; Geometric (foreground) Weak, vertical (background)
Color	Brown/Tan (foreground/middleground) Dark brown, tan (background)	Light green, green (foreground) Green-yellow to green (middleground) Dark green to light green (background)	Grey, matted (foreground) Dull/matted grey (background)
Texture	Fine, uniform (foreground/middleground) Course- medium; striated (background)	Even/random, medium (foreground) Dense, uniform, fine (middleground) Fine, smooth, patchy (background)	Fine, uniform (foreground) Very fine (background)

Proposed Activity Description (Facility)

	Landform/Water	Vegetation	Structures
Form	Flat, horizontal (foreground/middleground), Mountainous (background)	Low, irregular (foreground/middleground) Irregular patch (background)	Tall, vertical, transparent (foreground) Indistinct, vertical (background)
Line	Straight, horizontal (foreground/middleground) Irregular, jagged; horizontal (background)	Irregular, horizontal (foreground) Horizontal (middleground) Horizontal, irregular (background)	Simple, straight, vertical; Geometric (foreground) Weak, vertical (background)
Color	Brown/Tan (foreground/middleground) Dark brown, tan (background)	Light green, green (foreground) Green-yellow to green (middleground) Dark green to light green (background)	Grey, matted (foreground) Dull/matted grey (background)
Texture	Fine, uniform (foreground/middleground) Course- medium; striated (background)	Even/random, medium (foreground) Dense, uniform, fine (middleground) Fine, smooth, patchy (background)	Fine, uniform (foreground) Very fine (background)

Degree of Contrast

M = Minimal

		Features											
		Landform/ Water Body				Vegetation				Structures			
Degree of Contrast		Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
Elements	Form				M				M			X	
	Line				M				M			X	
	Color				M				M				M
	Texture				X				X				M

Does project design meet visual resource management objectives?
Yes

Additional mitigating measures recommended?
No

Evaluators Names:
Lori Tuchman, Marc Schwartz

Date: March 2012
Resource Area: Sloan Canyon NCA/N. McCullough Wilderness
Activity (program): Electric Utility Facilities

West View from road leading to Quo Vadis Trailhead

Weak contrast would result from the construction and operation of the proposed project within a modified setting designated as VRM Class III. The proposed single and double-circuit lattice structures would be similar in form and color as compared to existing lattice structures located within the utility corridor. Matching existing spans will also reduce the impacts. The construction of the project would also result in minimal vegetation clearing and landform modification for the accommodation of lay down areas based on the use of existing access. It is unlikely that landscape contrast will be visible from this KOP due to the distance of the project (approximately 1000-feet) east of this access the road and vegetation coverage over the valley floor.

Existing Condition - Existing IPP 500kV lattice structure transmission line and the existing Crystal-McCullough 500kV lattice structure transmission line crossing Interstate 15

Simulated Condition - Proposed Southern Nevada Intertie Project single-circuit 500kV steel lattice structure transmission line

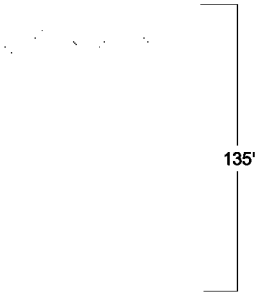
This simulation is based on a typical project description for a 500kV transmission line.
Actual structure sizes, heights, materials, and conductor sag will vary on a case-by-case basis based on final design.

October 12, 2009

View Location: Viewpoint from Interstate 15 northeast of Dry Lake Mountains, facing southwest towards the existing transmission lines

Photographic Details:
Date: 7-23-09
Time: 3:30
Focal Length: 50mm
Atmospheric Conditions: Overcast

500kV Steel Galvanized Tower



Structure configurations based on specifications provided by Great Basin Transmission for the purposes of photographic simulations

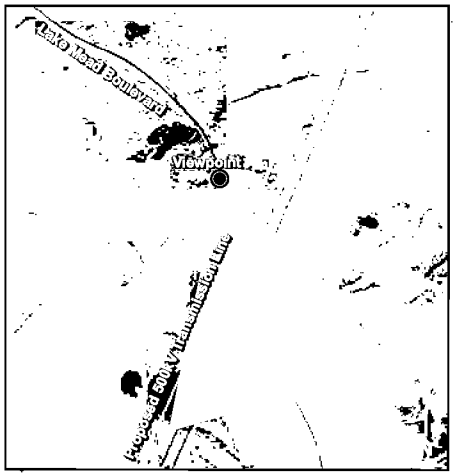
Southern Nevada Intertie Project
500kV Transmission Line
Viewpoint 1 – Interstate 15
Great Basin Transmission, LLC
Appendix A

Existing Condition - Existing IPP 500kV lattice structure transmission line, existing Crystal-McCullough 500kV transmission line (within the Sunrise Mountain Instant Study Area (ISA)) and existing Harry Allen to Mead double-circuit, 500kV transmission line

Simulated Condition - Proposed Southern Nevada Intertie Project double-circuit 500kV steel lattice structure transmission line

This simulation is based on a typical project description for a 500kV transmission line.
Actual structure sizes, heights, materials, and conductor sag will vary on a case-by-case basis based on final design.

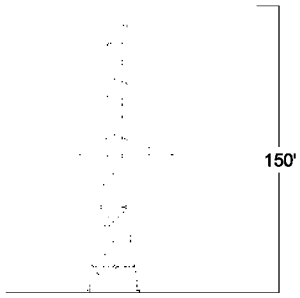
October 12, 2009



View Location: Viewpoint facing south-southeast from Lake Mead Boulevard within the Sunrise Mountain ISA, west of Lake Mead National Recreation Area, Nevada, towards the existing transmission lines

Photographic Details:
Date: 7-23-09
Time: 2:45 PM
Focal Length: 50mm
Atmospheric Conditions: Overcast

500kV Steel Galvanized Tower



Structure configurations based on specifications provided by Great Basin Transmission for the purposes of photographic simulations

Southern Nevada Intertie Project
500kV Transmission Line
Viewpoint 2 – Sunrise ISA
Great Basin Transmission, LLC
Appendix A

Existing Condition - Existing IPP 500kV lattice structure transmission line, existing Crystal-McCullough 500kV transmission line and existing Harry Allen to Mead double-circuit 500kV transmission line adjacent to Lake Las Vegas Resort

Simulated Condition - Proposed Southern Nevada Intertie Project single-circuit 500kV steel lattice structure transmission line

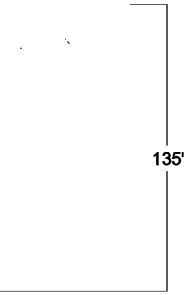
This simulation is based on a typical project description for a 500kV transmission line.
Actual structure sizes, heights, materials, and conductor sag will vary on a case-by-case basis based on final design.

October 12, 2009

View Location: Viewpoint facing southwest from Lake Las Vegas Residential Area, towards the Las Vegas wash and adjacent existing transmission lines

Photographic Details:
Date: 5-13-09
Time: 1:33 PM
Focal Length: 50mm
Atmospheric Conditions: Clear

500kV Steel Galvanized Tower



Structure configurations based on specifications provided by Great Basin Transmission for the purposes of photographic simulations

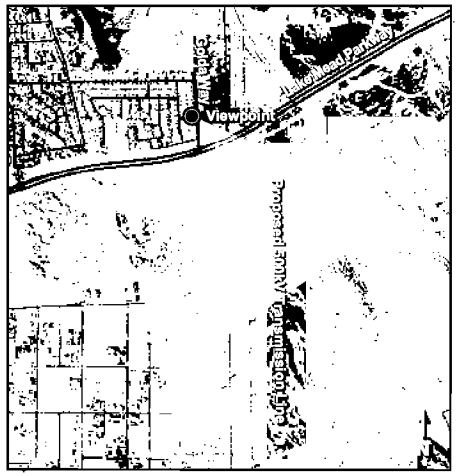
Southern Nevada Intertie Project
500kV Transmission Line
Viewpoint 3 – Lake Las Vegas Residential Community
Great Basin Transmission, LLC
Appendix A

Existing Condition - Existing IPP 500kV lattice structure transmission line, existing Crystal-McCullough 500kV transmission line, existing Harry Allen to Mead double-circuit 500kV transmission line, and existing 138kV line crossing East Lake Mead Parkway and adjacent to the Calico Ridge residential community

Simulated Condition - Proposed Southern Nevada Intertie Project single-circuit 500kV steel lattice structure transmission line

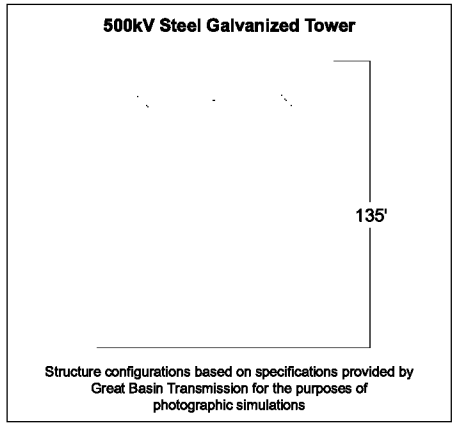
This simulation is based on a typical project description for a 500kV transmission line.
Actual structure sizes, heights, materials, and conductor sag will vary on a case-by-case basis based on final design.

October 12, 2009



View Location: Viewpoint from Golda Way, facing southeast towards East Lake Mead Parkway, northeast of Henderson, Nevada

Photographic Details:
Date: 7-23-09
Time: 2:03 PM
Focal Length: 50mm
Atmospheric Conditions: Overcast



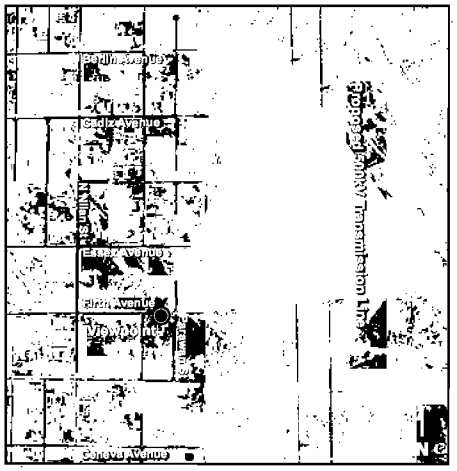
Southern Nevada Intertie Project
500kV Transmission Line
Viewpoint 4 – Calico Ridge Residential Community
Great Basin Transmission, LLC
Appendix A

Existing Condition - Existing IPP 500kV lattice structure transmission line, existing Crystal-McCullough 500kV transmission line, existing Harry Allen to Mead double-circuit 500kV transmission line, and existing 138kV line adjacent to Foothills Residential Community

Simulated Condition - Proposed Southern Nevada Intertie Project single-circuit 500kV steel lattice structure transmission line

This simulation is based on a typical project description for a 500kV transmission line.
Actual structure sizes, heights, materials, and conductor sag will vary on a case-by-case basis based on final design.

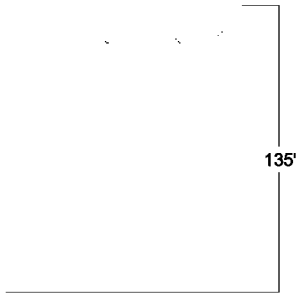
October 12, 2009



View Location: Viewpoint facing northeast from the corner of Firth Avenue and Paraway Street, Henderson, Nevada

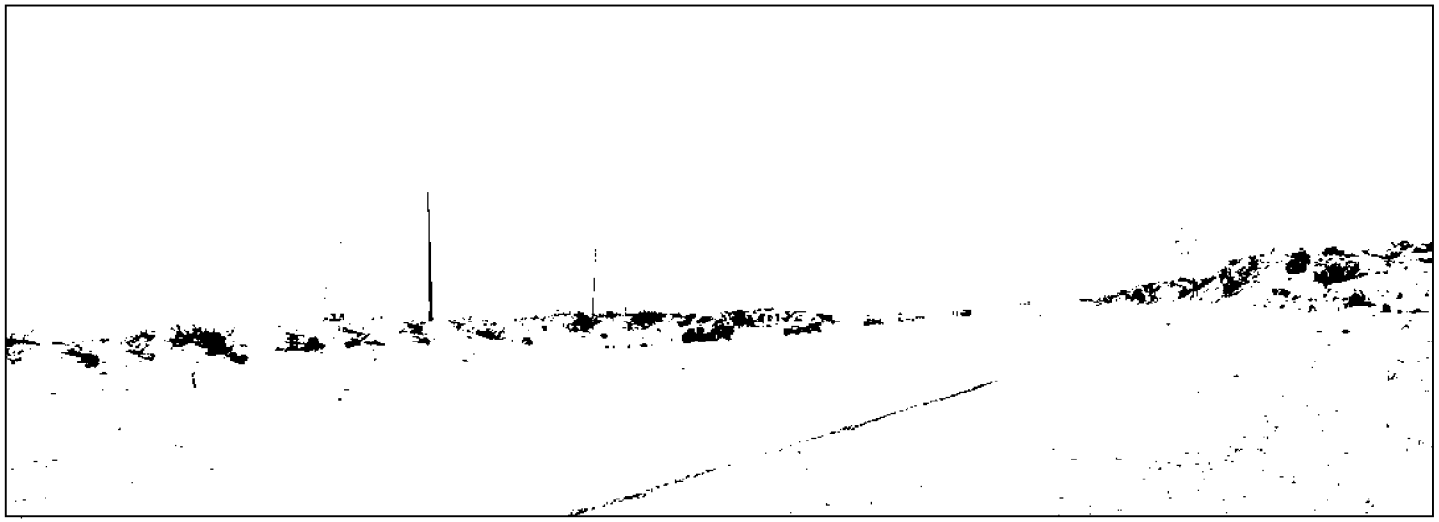
Photographic Details:
Date: 7-23-09
Time: 2:03 PM
Focal Length: 50mm
Atmospheric Conditions: Overcast

500kV Steel Galvanized Tower

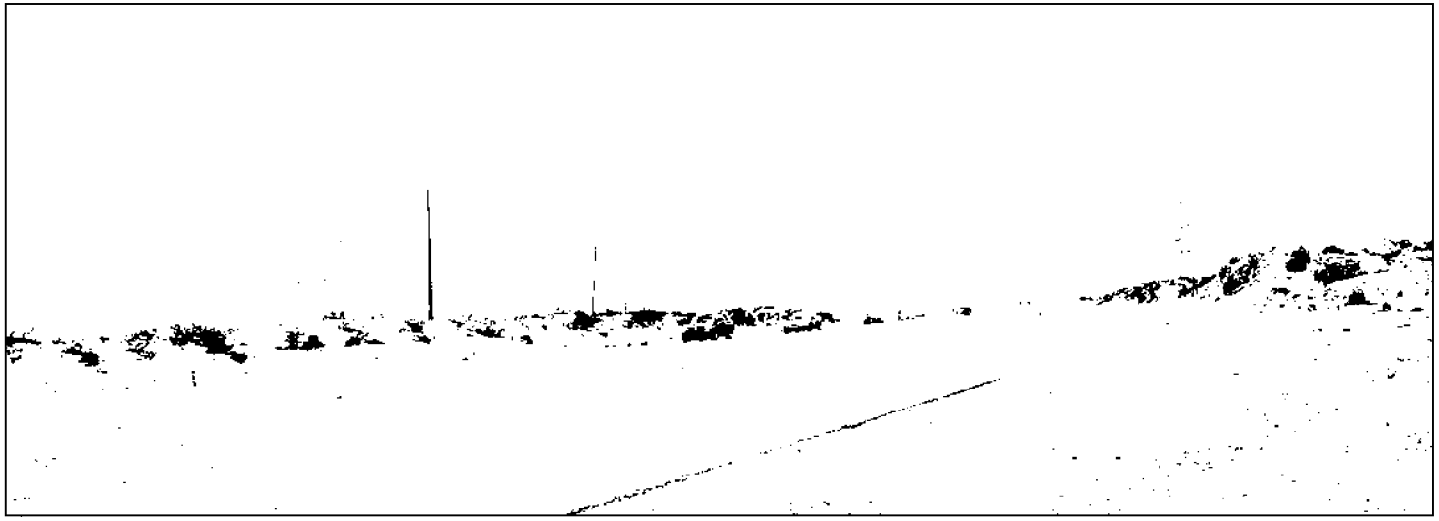


Structure configurations based on specifications provided by Great Basin Transmission for the purposes of photographic simulations

Southern Nevada Intertie Project
500kV Transmission Line
Viewpoint 5 – Foothills
Great Basin Transmission, LLC
Appendix A



Existing Condition - Existing IPP 500kV lattice structure transmission line, existing Crystal-McCullough 500kV transmission line and existing Harry Allen to Mead double-circuit, 500kV transmission line crossing Highway 93/95



Simulated Condition - Proposed Southern Nevada Intertie Project single-circuit 500kV steel lattice structure transmission line

This simulation is based on a typical project description for a 500kV transmission line.
Actual structure sizes, heights, materials, and conductor sag will vary on a case-by-case basis based on final design.

October 12, 2009

View Location: Viewpoint facing northwest, towards the transmission line corridor crossing of Highway 93/95, southeast of Henderson, Nevada

Photographic Details:
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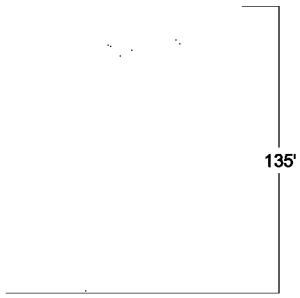
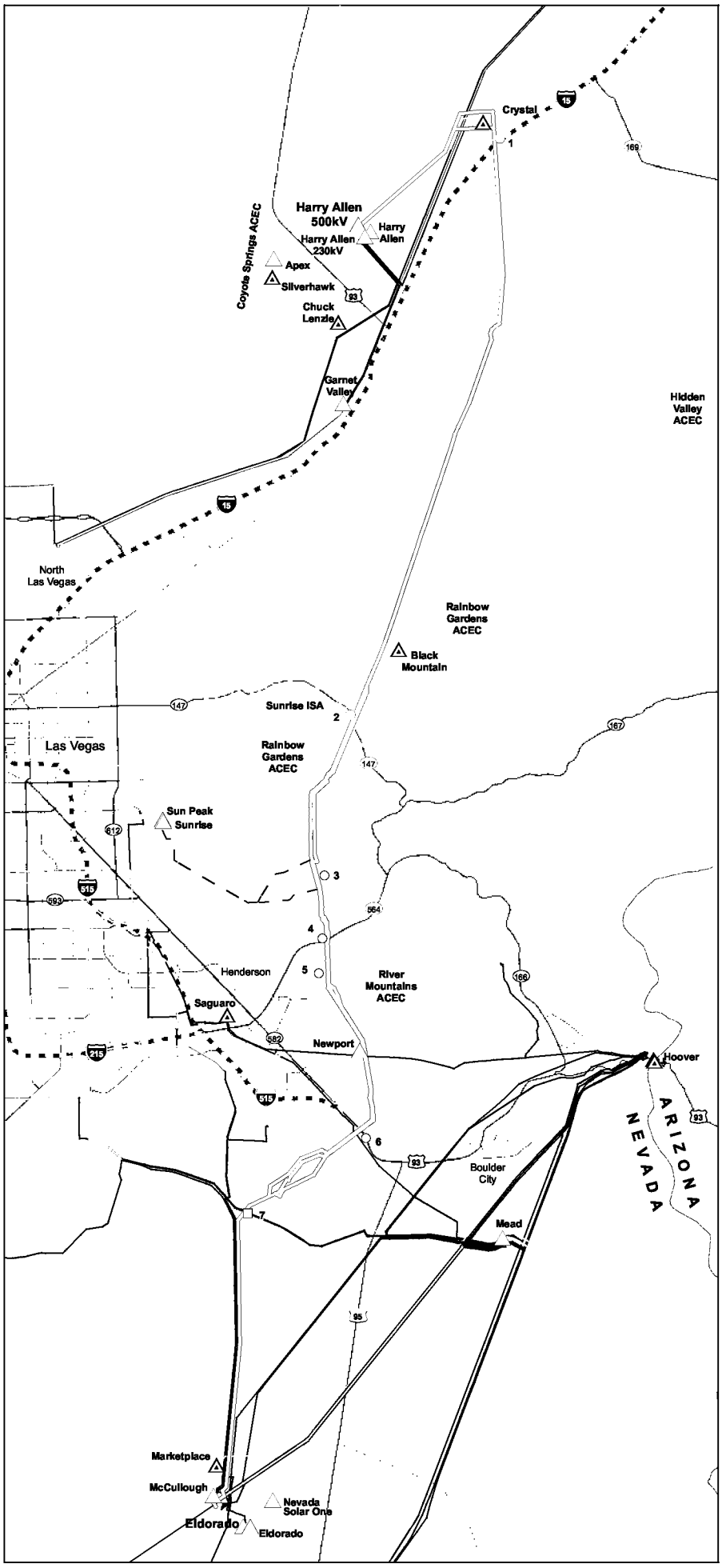
Time: 12:20 PM
Focal Length: 50mm
Atmospheric Conditions: Overcast

500kV Steel Galvanized Tower



Structure configurations based on specifications provided by Great Basin Transmission for the purposes of photographic simulations

Southern Nevada Intertie Project
500kV Transmission Line
Viewpoint 6 – Interstate 515
Great Basin Transmission, LLC
Appendix A



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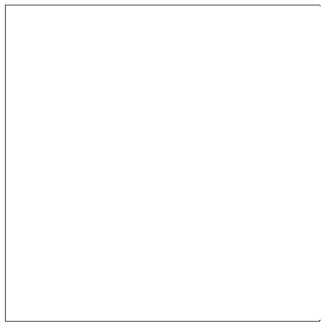
REGIONAL LOCATION



Legend

Project Features

- Substation
- Generation Station
- Project Centerline

Visual Inventory

- VRM Class II
- VRM Class III
- VRM Class IV
- Key Observation Point/ Simulation Point
- Key Observation Point
- ACEC
- Designated Wilderness Area
- Instant Study Area
- National Conservation Area

Transmission Lines

- 500kV Transmission Line
- Proposed 500kV Transmission Line
- 345kV Transmission Line
- 230kV Transmission Line
- Under 230kV Transmission Line

Sources
USGS, 30-meter pixel elevation data
LS Power, Transmission line, generation station, and substation data
BLM, Land ownership and land management data

0 3 6 Miles

Southern Nevada Intertie Project 500kV Transmission Line

Great Basin Transmission, LLC

Visual Inventory

April 2012

Figure A-1

EXHIBIT 3

EXHIBIT 3

BIOLOGICAL ASSESSMENT
FOR THE
SOUTHERN NEVADA INTERTIE PROJECT

Prepared for:

Bureau of Land Management

Bureau of Reclamation

Prepared by:

Environmental Planning Group, LLC

August 2014

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1.0 INTRODUCTION

1.1 PURPOSE

This Biological Assessment (BA) has been prepared to assess the potential impacts of construction, operation, and maintenance of the Southern Nevada Intertie Project (SNIP; also referred to as the Project) on species listed under the Endangered Species Act of 1978, as amended (ESA), including the Southwestern Willow Flycatcher (*Empidonax traillii extimus*), Yuma Clapper Rail (*Rallus longirostris yumanensis*), and Mojave Desert Tortoise (*Gopherus agassizii*). This BA identifies measures to minimize, mitigate, and compensate for potential impacts to these species and is intended to provide the information needed by the U.S. Fish and Wildlife Service (USFWS) to conduct formal consultation and issue a Biological Opinion (BO) in accordance with requirements of Section 7 of the ESA.

The BLM is the lead federal agency for the Proposed Action and for Section 7 consultation, and the BOR is acting as a cooperating agency. Environmental Planning Group, LLC (EPG) conducted surveys and prepared this BA.

1.2 PROJECT DESCRIPTION

The proponent, Great Basin Transmission, LLC, is proposing to construct, operate, and maintain the SNIP, a 500-kilovolt (kV) transmission line. The proposed Project would involve the construction and operation of a single-circuit alternating current transmission line stretching between a northern terminus at the Harry Allen Substation located in Dry Lake, Nevada (approximately 20 miles northeast of Las Vegas), and a southern terminus at the Eldorado Substation located approximately 14 miles southwest of Boulder City, Nevada for a total length of approximately 60 miles. The Project will be located primarily on public lands, managed by the BLM and Bureau of Reclamation (BOR), within Clark County, Nevada (Figure 1).

The Project passes through two designated Areas of Critical Environmental Concern (ACEC); Rainbow Gardens ACEC and River Mountains ACEC. Rainbow Gardens ACEC is located in the area of Black Mountain, and was designated to protect rare plants and geological, scientific, scenic, and cultural values. River Mountains ACEC is located east of Henderson, and was established as a protected area for Bighorn Sheep (*Ovis canadensis*) and a scenic viewshed for Henderson and Boulder City. The Project would also cross private lands and the Clark County Wetlands Park.

Proposed Action

The Proposed Action consists of approximately 60 miles of new single-circuit 500kV transmission structures from the Harry Allen Substation to the Eldorado Substation (Figure 1). The transmission line would be located inside a 200-foot-wide (100 feet on either side of center) ROW located primarily on federal lands with some private easements. The new structures would parallel, to the extent practicable, the existing electric transmission facilities within the utility corridor, and the majority of the transmission line is proposed to be constructed approximately 200 feet from the closest parallel transmission line. Engineering constraints may require deviations from this 200-foot separation in certain areas along the transmission line. These specific areas would be determined as part of final engineering.

Alternatives

The following alternatives were considered during the planning process for the Project, and are noted here as they may be depicted on figures or discussed in this BA. Surveys for Mojave Desert Tortoises were conducted on all alternatives. However, this BA is intended only to support Section 7 consultation on the Proposed Action shown on Figure 1.

- Alternative 1 – Use of 18 Miles of Open Position on the Existing Harry Allen to Mead Double-circuit Structures
- River Mountains Alternative Routing Area
- Dutchman Pass Alternative Routing Area

Summary

The Proposed Action would consist of new single-circuit transmission line construction for the length of the Project, and would use the following alignments in each alternative routing area:

- River Mountains Alternative Routing Area: western alignment
- Dutchman Pass Alternative Routing Area: western alignment

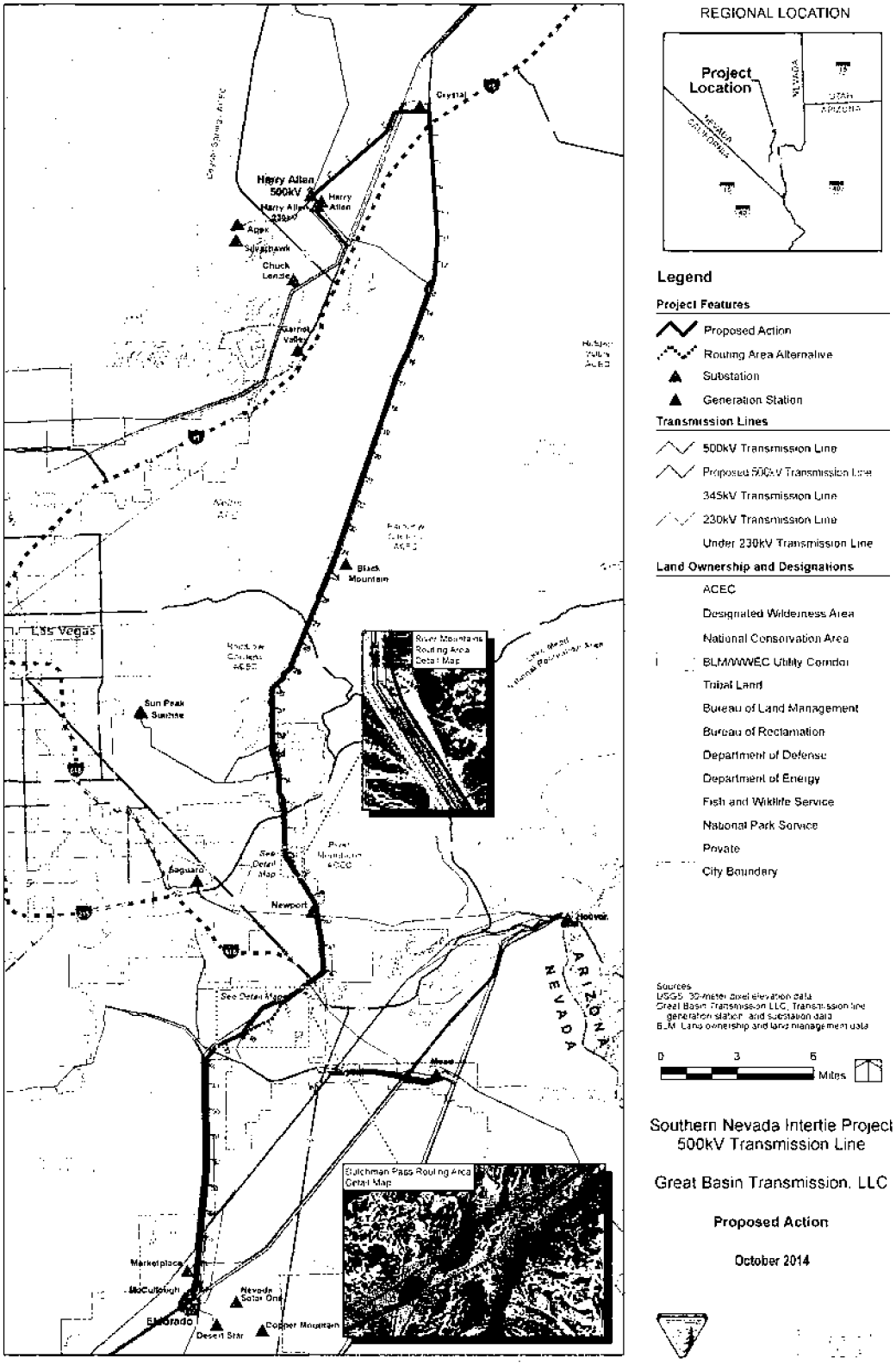

Figure 1. Proposed Action overview.

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1.3 PRIOR STUDIES AND SECTION 7 CONSULTATION

The BLM prepared a BA and environment assessment (EA) for the Harry Allen to Mead transmission line in October 2003, and March 2004, respectively, for which the USFWS issued a BO in April 2004. The Finding of No Significant Impact (FONSI) issued by Western Area Power Administration (WAPA) for that project determined that by implementing the mitigation measures outlined in the BO, there would be no significant impact to the Desert Tortoise (Department of Energy 2004). In the BO, it was determined that if avoidance and minimization measures were taken, the action was not likely to adversely affect the Southwestern Willow Flycatcher or the Yuma Clapper Rail.

Additional studies have been conducted in the immediate area, including Harry Allen to Northwest 500kV Transmission Line EA (March 2002); Harry Allen to Crystal 500kV Transmission Line EA (June 2001); Crystal Substation Expansion and Harry Allen to Crystal 500kV Transmission Line Reroute EA (November 2001); Crystal Substation EA (1997); Moapa Paiute Energy Center Draft EIS (March 2001); and Proposed Las Vegas Resource Management Plan and Final EIS (May 1998).

A Programmatic Biological Opinion (PBO) was issued in 2013, covering 8 major types of actions conducted or authorized by the Southern Nevada District Office of the BLM (USFWS 2013a). The PBO covers the issuance of ROWs for linear utilities, and provides reasonable and prudent measures to minimize the effects of covered actions to listed species.

1.4 DATA COLLECTION

Biological data sources for special-status species included scientific literature, existing data held by agencies or EPG, data provided from other project reports, and agency communications. At the request of the BLM, field surveys were conducted by EPG from April to June 2009 for rare plants and the Mojave Desert Tortoise on all Project alternatives under consideration at that time. An additional alternative that included an interconnection to the Mead Substation was surveyed in 2009, but later eliminated from consideration. The Dutchman Pass Alternative Routing Area was developed after completion of the initial Desert Tortoise surveys, and was surveyed by EPG in April 2012. The results of all Desert Tortoise surveys are included as Appendix B. Additional occurrence, distribution, and abundance data were obtained from the Nevada Natural Heritage Program, BLM's Las Vegas District Office, and published works.

Table 1 provides information on ESA-listed, proposed, and candidate species that may occur in the Project area, as provided by the USFWS online Information, Planning, and Conservation (IPaC) database (Appendix A). Each species known to occur or that may occur in the Project area is discussed in detail in this BA. One species proposed for ESA listing, the Yellow-billed Cuckoo (Western population), has been recorded infrequently in the Clark County Wetlands Park, which is crossed by the Project. However, surveys in 2013 determined that suitable habitat was absent from nearly all of the Wetlands Park, including the portion crossed by the Project, and no suitable habitat is present in the nearby Lake Las Vegas Mitigation Wetlands. The location of the detections and all suitable habitat is approximately 4.3 miles west of the Project (Van Dooremolen 2014a). This species is not addressed further.

Table 1. ESA-listed, proposed, and candidate species that may occur in the Project area.				
C: Candidate **E:** Endangered **NA:** Critical habitat is not designated for candidate species			**PT:** Proposed Threatened **T:** Threatened	
Common Name ***Latin Name***	**Status**	**Designated Critical Habitat**	**Habitat and Notes**	**Occurrence In or Near the Project Area**
Birds				
Yuma Clapper Rail *Rallus longirostris yumanensis*	E	No	Resident or migrant in areas with emergent marsh vegetation and shallow water. Recorded from Las Vegas Wash near the Project area.	May occur in Project area.
Yellow-billed Cuckoo, Western population *Coccyzus americanus*	PT	Proposed	Nests in riparian woodlands, preferring areas with high canopy cover and large, mature trees. Recorded from Las Vegas Wash outside the Project area.	No suitable habitat in Project area.
Southwestern Willow Flycatcher *Empidonax traillii extimus*	E	Yes	Nests in dense riparian vegetation, preferring areas with high canopy cover and seasonal flooding. Recorded from Las Vegas Wash near the Project area.	May occur in Project area.
Reptiles				
Mojave Desert Tortoise *Gopherus agassizii*	T	Yes	Present in much of the undeveloped Mojave Desertscrub in Clark County, Nevada. Recorded throughout the Project area.	Present in Project area.
Amphibians				
Relict Leopard Frog *Lithobates onca*	C	NA	Present in several natural and reintroduced populations around the Lake Mead area. No natural or reintroduced populations near the Project area.	No suitable habitat in Project area.
Fish				
Pahrump Poolfish *Empetrichthys latos*	E	No	Extirpated from native distribution, and introduced into 3 locations in Nevada.	No suitable habitat in Project area.
Razorback Sucker *Xyrauchen texanus*	E	Yes	Present in portions of the Colorado River system. Lake Mead is designated critical habitat for the species.	No suitable habitat in Project area.

2.0 STUDY AREA AND ENVIRONMENTAL SETTING

The Project is located entirely within Clark County, Nevada, and crosses approximately 60 miles of Mojave Desertscrub habitat, from the vicinity of Dry Lake Valley to the Eldorado Valley.

2.1 PHYSIOGRAPHIC PROVINCE

The Project is located within the Basin and Range Physiographic Province, which occupies the southwestern interior of North America. The long, narrow mountain ranges, broad valleys, and soils of this province are primarily the result of regional geological processes that stretched the Earth's crust 8 to 12 million years ago. The soils in this area are classified as thermic soils, which have mean annual soil temperatures of 59 to 72 degrees Fahrenheit and a difference between mean summer and mean winter temperatures greater than 9 degrees Fahrenheit at a depth of 20 inches or in shallow soils at the soil-bedrock interface. These shallow, gravelly soils are generally formed on gently to moderately steep valley slopes and hillsides (Hendricks 1985), in calcareous alluvium derived from mostly sedimentary rocks. The southern portion of the Project area also crosses an area in and near the Sloan Canyon NCA derived from igneous rock at the base of the McCullough Range. The Project area is located in a region with an average annual precipitation of 3 to 6 inches, most of which occurs during winter storms. Summer rains originating from the Gulf of Mexico infrequently produce rainfall in the area.

2.2 BIOTIC COMMUNITIES

The Brown, Lowe, and Pase system for classification and description of North American biotic communities (Brown 1994) is used to identify and classify biotic communities in this BA.

The Project is located within the Mojave Desertscrub biome, the smallest of the four desert biomes in North America, and is intermediate in elevation and temperature between Sonoran Desertscrub and Great Basin Desertscrub. Plants and animals occupying Mojave Desertscrub are similar to those observed in the Lower Colorado River Subdivision of Sonoran Desertscrub, within the Creosotebush series, *Larrea tridentata–Ambrosia dumosa* association. These sparsely vegetated communities occupy areas characterized by gravelly bajadas and inconspicuous low plains. Other plants associated with this biome include Water Jacket (*Lycium andersonii*), Mormon Tea (*Ephedra* spp.), and Ratany (*Krameria* spp.). The Joshua Tree (*Yucca brevifolia*), one of the few Mojave endemics, is arguably the most representative symbol of the Mojave Desert.

In addition to the upland Mojave Desertscrub biome, riparian areas occur in narrow bands along streams and marshes. The largest riparian corridor in the Project area is Las Vegas Wash, which includes approximately 12 miles of surface flow and riparian vegetation supported in part by treated wastewater and runoff from the Las Vegas area. Las Vegas Wash drains northeasterly into the western arm of Lake Mead, a reservoir on the Colorado River. The Project crosses Las Vegas Wash at approximately three miles northeast of Henderson on the east side of Las Vegas. Typical vegetation found within this wetland biome includes Fremont Cottonwoods (*Populus fremontii*), willows (*Salix* sp.), and Southern Cattail (*Typha domingensis*), but at the Project crossing, the vegetation is dominated by saltcedar (*Tamarix* spp.), an exotic species that has replaced many native plants as the dominant vegetation type along extensive reaches of riparian habitat.

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3.0 SPECIES ACCOUNTS

3.1 YUMA CLAPPER RAIL

Taxonomy and Listing History

The Yuma Clapper Rail (*Rallus longirostris yumanensis*) was originally described by Dickey (1923) as a new species of Clapper Rail (*Rallus yumanensis*), but Oberholser (1937) revised the taxonomy to include it as a subspecies.

The Yuma Clapper Rail was listed as endangered, without designated critical habitat, on March 11, 1967, primarily because of loss and modification of riparian habitats (USFWS 2006). The species was considered for downlisting to threatened in 1983; however, severe flooding of the Lower Colorado River that year and unstable population numbers since has resulted in the proposal not being reconsidered (USFWS 2006). In addition to its listing under the ESA, the Yuma Clapper Rail is classified as protected wildlife under Nevada Revised Statutes, Chapter 501 (Nevada Natural Heritage Program [NNHP] 2007). The final Recovery Plan for the bird was released in 1983 (USFWS 1983), and a draft Revised Recovery Plan was released in 2010 (USFWS 2010).

No critical habitat has been designated for the Yuma Clapper Rail.

The Yuma Clapper Rail is a watch list species under the Clark County MSHCP.

Range of the Species

Dickey (1923) described *R. yumanensis* from specimens collected along the Colorado River in the vicinity of Laguna Dam, north of Yuma, Arizona. Until recently, the species was thought to primarily inhabit freshwater areas along the Colorado River from Laughlin, Nevada, to the delta at the Gulf of California in Mexico. Yuma Clapper Rails are also found around the Salton Sea in California and along several major river drainages in southwestern and central Arizona (USFWS 1983; Arizona Game and Fish Department [AGFD] 2006).

Important breeding areas for the Yuma Clapper Rail include Mittry Lake (AZ), Imperial Reservoir, Imperial National Wildlife Refuge (NWR), Bill Williams River NWR, Topock Gorge and Topock Marsh on Havasu NWR, Cibola NWR, Imperial Wildlife Area, Sonny Bono Salton Sea NWR, and the Cienega de Santa Clara. Smaller populations occur elsewhere in the Lower Colorado River Valley, and along the Gila River where moderately extensive emergent vegetation is persistent. With the exception of birds found along the Gila River, most populations are thought to be non-migratory (AGFD 2006). This species was previously thought to be a long-distance Neotropical migrant. However, Eddleman (1989) found that at least 70 percent of the individuals he telemetered on the Lower Colorado River did not migrate. Individuals along the Gila River are thought to migrate during the winter, possibly due to the cooler temperatures at those higher elevations (Corman and Wise-Gervais 2005).

Habitat

The Yuma Clapper Rail is the only Clapper Rail species that breeds in freshwater marshes. The species will also inhabit brackish marshes. Preferred habitat appears to be mature cattail-bulrush stands in shallow water near high ground (USFWS 1983). Territories are distributed along a zone where standing water gives way to saturated soils in marshes. Sites are abandoned when ground surfaces dry out (AGFD 2006). This interface between the water, soil, and vegetation appears to be more important to site selection than does the presence of specific plants. The dominant plant species that most frequently typifies Yuma Clapper Rail habitat is the Southern Cattail (*Typha domingensis*). This species is frequently associated with the California Bulrush (*Schoenoplectus californicus*) along the Lower Colorado River. Saltcedar has been found to form part of the cover used by territorial individuals in some areas. However, the presence of saltcedar typically indicates a drying trend at the soil surface, thus eventually making the site a less-preferred location for Yuma Clapper Rails (AGFD 2006).

Winter habitat is typically heavily overgrown, narrow, wet sloughs and backwaters. These areas tend to have a higher variety of vegetation types including more mature herbaceous and woody species than do lacustrine marshes (AGFD 2006).

Life History

Nests are commonly built along channels with banks that are slightly higher than adjacent marsh areas. These nests are constructed beneath woody shrubs, small trees, or in clumps of herbaceous growth. Nests that are elevated will have runways leading into them. Nests may also be built in dense vegetation near the water's edge or on a small high site within a marsh. As such, stable water levels are important during the nesting season. Nests are constructed of dry sedges and grasses and are 18 to 24 inches tall, 7 to 10 inches wide, are cupped, and may rise 8 to 12 inches above the substrate (Terres 1980; AGFD 2006).

Yuma Clapper Rails nest from March through June. Typically, eggs hatch in early June. Yuma Clapper Rails lay one clutch per year, unless the clutch is lost, and then a second attempt may be made (AGFD 2006). Average clutch size has been estimated as 6.5 eggs, with a range of 6 to 8 eggs (USFWS 1983; AGFD 2006). Eggs are yellow-buff to green-buff and have brown blotches or spots. Females lay 1 egg per day and begin incubating after the last egg is laid. Incubation lasts 21 to 23 days, and all eggs hatch within a 24-hour period (AGFD 2006).

Young are precocial and will follow the adults within 48 hours of hatching (AGFD 2006). Family groups will stay together for 24 to 30 days after the eggs hatch. Chicks are independent at 35 to 42 days after hatching, and the first flight occurs at 63 to 70 days after hatching (Terres 1980).

The primary food source for the Yuma Clapper Rail appears to be crayfish, which have been introduced to the area for use as fish bait. Individual birds may consume other small fish, clams, isopods, snout beetles, water beetles, dragonflies and dragonfly nymphs, other insects, and small seeds (USFWS 1983; AGFD 2006). It is thought that seasonal shifts in habitat use by crayfish may affect the use of habitats by the Clapper Rails.

Threats to the Survival of Yuma Clapper Rail

Two primary factors have been identified as serious threats to the continued existence of the Yuma Clapper Rail (USFWS 2006): loss and degradation of wetland habitat, and the

accumulation of selenium into the habitat. Arizona lost an estimated 36 percent of its wetlands between 1780 and 1980 (Dahl 1990). The primary causes for riparian alteration and degradation in Arizona include urban and agricultural development, water diversion and impoundment, channelization, livestock grazing, off-road vehicles and other recreational use, and hydrological changes resulting from these uses (USFWS 1995). The same reasons have led to the decline of wetlands in Nevada (e.g., Jones and Cahlan 1975). Continued growth and water management along the Lower Colorado River will remain constant threats to the Yuma Clapper Rail.

High levels of selenium can result in acute toxicity, chronic poisoning, and tissue damage and reproductive impairments. Selenium is naturally present in many geologic formations in the Colorado River watershed, and becomes concentrated in the water through evaporation. Dissolved or deposited selenium can be absorbed, or at higher trophic levels consumed, by vegetation, micro-organisms, invertebrates, and fish. The Yuma Clapper Rail then consumes these invertebrates and fish, especially crayfish. Selenium levels in the Lower Colorado River have been consistently increasing during the previous 10 to 15 years and are now at levels above the point of concern for reproductive impairment (King et al. 2000; USFWS 2006). Little species-specific data is available to correlate selenium levels with Yuma Clapper Rail reproductive rates. However, the links of selenium to impacts of other bird species indicates that cause for concern exists.

Yuma Clapper Rail in the Project Area

The historic distribution of the Yuma Clapper Rail is unclear, but the species has recently been documented as far north as Las Vegas Wash, as well as tributaries of the Overton Arm of Lake Mead (Van Dooremolen 2014b). During Southwestern Willow Flycatcher surveys along the Las Vegas Wash in 1998, a Yuma Clapper Rail was detected in the active floodplain of Las Vegas Wash downstream from Pabco Road (SWCA Environmental Consultants 1998). Subsequent surveys resulted in a single individual detected in 2005 and a single individual detected in 2006. Systematic surveys for Yuma Clapper Rails conducted in 2000 and 2001 failed to detect any individuals, and no other incidental detections have taken place since 2006 (Van Dooremolen 2014b). The closest known population is present along the Muddy River approximately 40 miles northeast of the Las Vegas Wash (Van Dooremolen 2014b).

Much of the surface flow in Las Vegas Wash is now within the Clark County Wetlands Park. Intensive management is ongoing in this area, to reduce heavy erosion that has occurred since the 1950s, to improve wetland habitat quality, and to manage these wetlands to improve water quality where Las Vegas Wash flows into Lake Mead. Several temporary and permanent weirs have been constructed across Las Vegas Wash, and marsh vegetation can rapidly develop upstream from these structures. Small patches of potentially suitable Yuma Clapper Rail habitat were identified throughout the Wetlands Park. The habitat patches nearest the Project area include those formed by the Powerline Crossing Weir, Rainbow Gardens Weir, and the temporary Demonstration Weir, which supported the most extensive habitat in the Wetlands Park (Figure 2). However, the Demonstration Weir failed during a heavy summer flood, and channelization drained a portion of that marsh. A permanent weir is under construction nearby, and habitat conditions upstream from the new weir are expected to recover and improve in the future (Van Dooremolen 2014b). Downstream from the new weir, a portion of Las Vegas Wash has been channelized. The imagery in Figure 2 predates the damage and repair of the Demonstration Weir.

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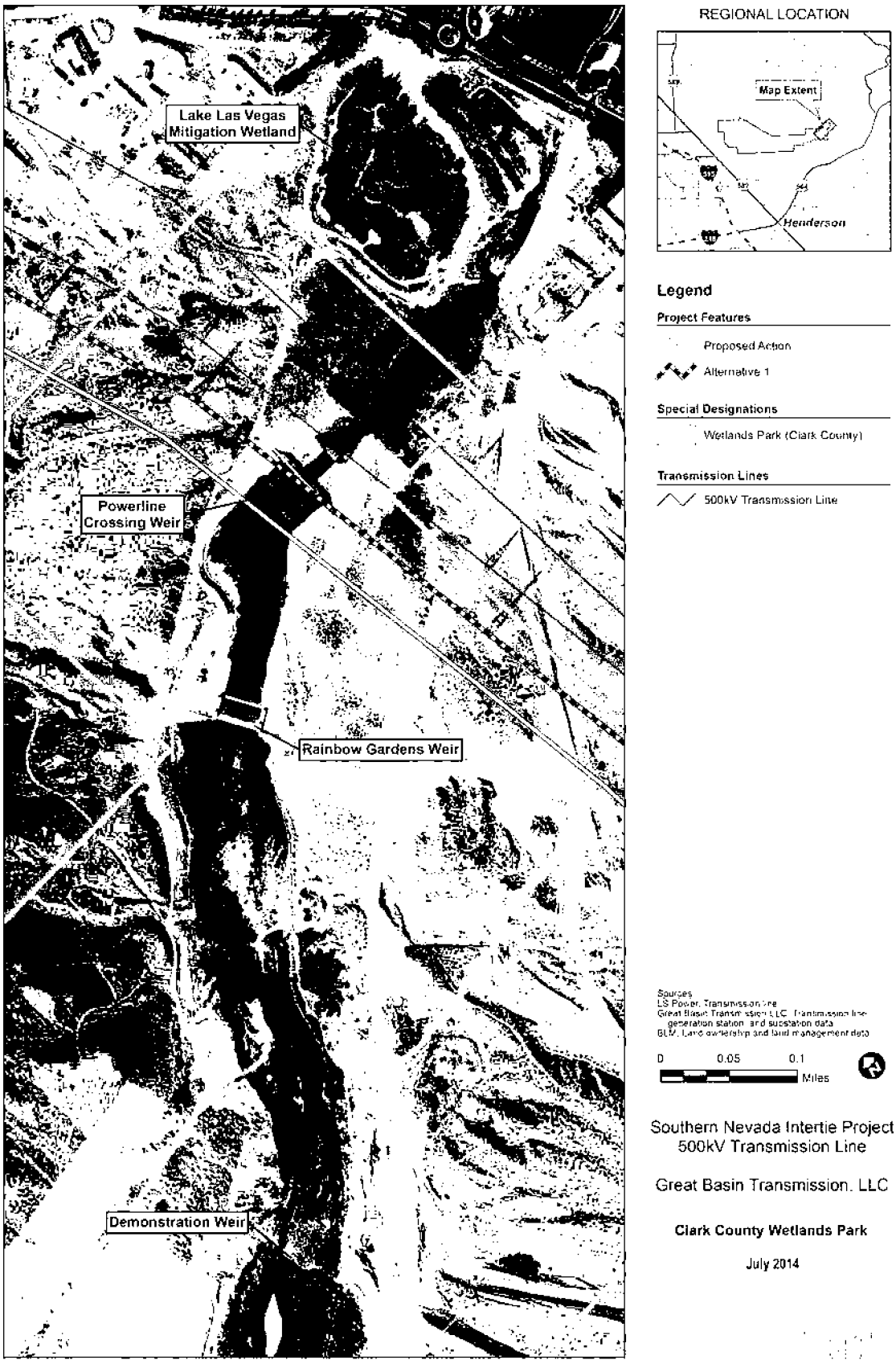

Figure 2. Clark County Wetlands Park and Las Vegas Wash crossing.

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3.2 SOUTHWESTERN WILLOW FLYCATCHER

Taxonomy and Listing History

The Willow Flycatcher (*Empidonax traillii*) was originally described by Audubon (1828) as Traill's flycatcher (*Muscicapa traillii*), from specimens obtained in wooded areas along the Arkansas River. Since that time, it has been placed in the genus *Empidonax*, and four subspecies are commonly recognized (Hubbard 1987) including the Southwestern Willow Flycatcher (*E. traillii extimus*).

The Southwestern Willow Flycatcher was listed as endangered, without designated critical habitat, on February 27, 1995, primarily because of loss and modification of riparian habitats (USFWS 1995). Critical habitat was later designated on July 22, 1997. A court decision in 2001 required the release of a revised critical habitat designation on October 19, 2005 (USFWS 2005). An additional revision was completed in 2013 (USFWS 2013b). The final Recovery Plan for the Southwestern Willow Flycatcher was released in 2002 (USFWS 2002). In addition to its status under the ESA, the Southwestern Willow Flycatcher is classified as protected wildlife under Nevada Revised Statutes, Chapter 501 (NNHP 2007).

The majority of the Southwestern Willow Flycatcher's distribution is in Arizona, New Mexico, and California, and 18 critical habitat units (CHU), totaling 599 river miles, were designated in those states (USFWS 1997). In Nevada, Southwestern Willow Flycatcher management units are identified for the Virgin River and Pahranagat Valley, and critical habitat is designated on the Virgin River, outside the Project area. CHUs had previously been designated by the 1997 rule at Upper and Lower Pahranagat Lake and at the Key Pittman Wildlife Management Area. However, the revised rule excluded the habitat along the Pahranagat Wash and added CHUs on the Virgin River in Nevada and Utah (USFWS 2005).

The Southwestern Willow Flycatcher is a covered species under the Clark County MSHCP.

Range of the Species

Phillips (1948) described *E. t. extimus*, the Southwestern Willow Flycatcher, from specimens collected on the San Pedro River in southeastern Arizona. Historical breeding records exist for southern California, southern Nevada, southern Utah, Arizona, New Mexico, western Texas, southwestern Colorado, and northwestern Mexico (USFWS 2002). Between 1993 and 2001, 258 territories were documented in New Mexico, 359 in Arizona, and 256 in California. Prior to 1962, only three records were known for Nevada (USFWS 2002). However, between 1993 and 2001, 73 territories across southern Nevada, in the Amargosa River Drainage, Meadow Valley Wash, and the Pahranagat River Drainage, were identified (USFWS 2002).

All subspecies of the Willow Flycatcher winter in Central America, from southwestern Mexico (Nayarit and Oaxaca) south to Panama and possibly northwestern Columbia (AOU 1998), but migration routes are relatively unknown (USFWS 2002) and are believed to pass through primarily the southern and southwestern parts of the United States, with the northern subspecies passing through the breeding areas of the Southwestern Willow Flycatcher (American Ornithologist's Union [AOU] 1998; Sogge et al. 1997). The normal spring migration

period is from early May through early June, and the fall migration may extend from late July through September (Phillips et al. 1964).

Habitat

In the western United States, the Southwestern Willow Flycatcher is often found on willow-covered islands, and in brush along watercourses, beaver meadows, and mountain parks, always in close association with riparian waters and lentic waters (USFWS 2002). The species may be found from low-elevation desert rivers and streams to as high as 7,875 feet in elevation (Terres 1980). Southwestern Willow Flycatcher territories and nest sites are usually located near open water, cienagas, marshy seeps, or saturated soils (Sogge et al. 1997). In the semiarid and arid parts of the Southwest, hydrologic conditions are naturally highly variable both within a season and between years. Many sites have surface water or saturated soil only during the early part of the breeding season. Breeding habitat on the edge of a reservoir may have standing water during a wet year, or it may be further from surface water during dry conditions.

Four specific habitat types have been described as breeding areas for the Southwestern Willow Flycatcher (Sogge et al. 1997). Monotypic high-elevation communities are composed of dense stands of willow 10 to 23 feet in height, with no distinct overstory. This community is often associated with sedges, rushes, or other herbaceous wetland plants. A second habitat type is monotypic exotic, with dense stands of saltcedar or Russian Olive (*Elaeagnus angustifolia*) up to 33 feet in height. These species form a dense, closed canopy, with no distinct overstory layer. Native broadleaf-dominated communities form a third habitat type. This habitat may be composed of a single species, such as Goodding Willow, but often contains other broadleaf tree and shrub species, including cottonwoods, other willows, Boxelder (*Acer negundo*), ash (*Fraxinus* spp.), alder (*Alnus* spp.), and Common Buttonbush (*Cephalanthus occidentalis*). The vegetation in this habitat type ranges in height from 10 to 49 feet. There are trees of various size classes, and there is often a distinct overstory. The final habitat type is a mixture of native and exotic species, including those listed above. Within any particular area, the native and exotic species may be dispersed as patches dominated by natives or exotics, or they may be more evenly distributed through the area.

Regardless of the species composition, all of these habitats share common structural characteristics (Sogge et al. 1997). Occupied habitats always have dense vegetation in the patch interior, and dense patches are often interspersed with small clearings, open water, or areas of sparse shrubs. Habitat patches can vary in size and shape, with some occupied areas being relatively dense, linear, contiguous stands, and others being large, irregularly shaped mosaics of dense vegetation intermingled with open areas. Patch sizes may be as small as 2 acres, or as large as several hundred to a thousand acres. Southwestern Willow Flycatchers have not been found nesting in narrow riparian habitats less than approximately 33 feet wide.

Migration and wintering Southwestern Willow Flycatcher habitat may differ from nesting habitat. During migration, riparian habitat along major southwestern drainages is commonly used, but a close association with water may not always exist. These areas might be considered stopover areas, and may be very important resources (USFWS 2002).

Winter habitat in Mexico, Central, and northern South America may be humid or semi-arid areas, such as those bordering woodlands and in second-growth forests, savannas, fields, and pastures (USFWS 2002). Southwestern Willow Flycatchers also may winter in habitat more

typical of that used during breeding, and Southwestern Willow Flycatchers have been observed defending winter territories near water (USFWS 2002).

Life History

Southwestern Willow Flycatchers normally select nest sites in thickets of shrubs and trees between 13 to 23 feet in height, with dense foliage between ground level and 13 feet (USFWS 1995). Nest trees are often rooted in or near water. Plant species diversity in nest territories varies. Southwestern Willow Flycatchers will nest in native riparian vegetation communities where available, but will also nest in monocultures of saltcedar or Russian Olive (U.S. Geological Survey [USGS] 2002). Nest sites are commonly reported in Geyer Willow (*Salix geyeriana*), Goodding Willow, Boxelder, and California Live Oak (*Quercus agrifolia*) (Sogge et al. 1997). Unusual nest sites have been reported in Arizona Sycamore (*Platanus wrightii*) and a climbing Multiflora Rose (*Rosa multiflora*) in the Gila River Valley in New Mexico (Stoleson and Finch 1999).

Southwestern Willow Flycatcher nests are usually constructed in upright or slanting forks, between about 3.6 to 15 feet above the ground (Ehrlich et al. 1988; Harrison 1979). The nest is an open compact cup of plant bark, fiber, and grass, and is lined with a thin layer of fine grass, and cottony and silky plant materials. Feathers are frequently used in the rim, and the nest may have plant material dangling from the bottom (Harrison 1979).

Southwestern Willow Flycatchers usually spend only three to four months in nesting habitat, spending the rest of the year in migration or at wintering ground (USFWS 2002). Typically, spring migration takes place between late April and mid-June. Nest construction may begin in mid-May and is usually complete by the end of June, although second nest construction attempts may last until late July. The period for egg-laying and incubation extends from late May until late July. Chicks may be present in the nests between early June and early August, and fledging may be anytime from late June to early August. Departure dates from the nest area are not well-known, but are likely to be between mid-August and mid-September (USFWS 2002).

Females lay one egg per day until a clutch of 3 to 4 eggs is present (USFWS 2002). Eggs are buff or light tan and have brown markings around the blunt end. Incubation is primarily by the female and lasts 12 to 13 days after the last egg has been laid. Most eggs hatch within 48 hours of each other, with the female providing initial care. Young are altricial, and nestlings fledge after 12 to 15 days (Ehrlich et al. 1988; USFWS 2002).

Food preferences of the Willow Flycatcher are reported by Bent (1942), in documentation associated with the Alder Flycatcher (*Empidonax alnorum*). These were considered a single species at the time the data were collected, and the sample set included both species. Hymenopterans, including wasps, bees, and some ants, were the largest single category, approximately 40 percent of all food. Beetles were the second-largest category, at less than 20 percent. Dipterans, including crane flies, robber flies, house flies, and others, provided approximately 14 percent of the diet, and all other invertebrates combined totaled approximately 15 percent. Plant matter, less than 4 percent of the diet, included elderberries (*Sambucus* spp.), blackberries or raspberries (*Rubus* spp.), dogwood berries (*Cornus* spp.), juniper berries (*Juniperus* sp.), and unidentified fruits and seeds (Ehrlich et al. 1988; USFWS 2002).

Like most other flycatchers, the Willow Flycatcher forages primarily by hovering and hawking, flying from a perch to capture flying insects (Ehrlich et al. 1988). The species tends to be fairly

active, moving frequently from perch to perch (Bent 1942). Willow Flycatchers will also glean when foraging for spiders, millipedes, and other flightless arthropods, and when feeding on berries.

Threats to the Survival of Southwestern Willow Flycatchers

Two factors have been identified as the primary threats to the continued existence of the Southwestern Willow Flycatcher (USFWS 1995). These threats are the loss and degradation of riparian habitat, and brood parasitism by Brown-headed Cowbirds (*Molothrus ater*), although current information indicates Brown-headed Cowbird parasitism may not be as substantial a threat as previously believed.

Overuse by cattle and other livestock is a primary factor in the degradation and modification of riparian habitats in the western United States (Szaro 1989). The inherent characteristics of riparian areas (adequate water, lush vegetation, and moderate microclimate) make it attractive to cattle. The primary impacts of cattle on riparian habitats result from the removal and trampling of vegetation. Cattle also can alter plant species composition through selective grazing, or because the plants have varying tolerances to grazing. The potential impact of grazing to bird populations has been studied by Taylor (1986), who reported significant decreases of bird abundance and species richness with increased grazing pressure in riparian habitats in the semi-arid region of eastern Oregon. USFWS (1995) cites several references that document adverse effects on Southwestern Willow Flycatchers from grazing in riparian areas, and notes that most sites known to support Southwestern Willow Flycatchers have little or no grazing.

Flooding and stream-flow alterations related to dam construction have a major impact on riparian vegetation and vertebrate populations. Upstream from dams, the impoundment of water and accumulation of salts and sediments generally preclude the establishment of native vegetation on the shore lines (Szaro 1989). In these areas, large impoundments replace free-flowing rivers with large bodies of calm water.

Riparian areas downstream from dams also have been affected by the alterations in stream flow. A series of dams on the Salt River in central Arizona has altered the downstream flow patterns such that the survival of cottonwood seedlings is virtually nonexistent for extended periods of time (Fenner et al. 1985). The primary cause of this failure appears to be the change from natural heavy flows during winter to heavy summer flow to meet irrigation demands. Although flow regulation can create riparian zones, such as along the Colorado River in the Grand Canyon (Stevens and Waring 1985), flood events also promote seedling establishment and the renewal of riparian systems (Applegate 1981), and may favor native trees over invasive species.

Physical modification of stream channels can take place through natural processes, such as erosion and downcutting, although these processes may be facilitated by human activities. Stream channels may also be deliberately modified, particularly for flood control or other engineering concerns in urban areas. Channelization of rivers can reduce or eliminate meanders, reduce the floodplain, increase the stream gradient, lower the water table, and reduce bank vegetation (Brooker 1985). Subsequent impacts on wildlife include losses in abundance and diversity of riparian vegetation, fish, macro-invertebrates, birds, and mammals.

The USFWS (1995) believes that the invasion of saltcedar is a factor in the loss and modification of habitat for the Southwestern Willow Flycatcher. Saltcedar was originally

introduced to the western United States in the late 1800s as an ornamental windbreak and for erosion control. It spread rapidly along Southwestern river and stream channels, frequently replacing the native vegetation. Many other human activities, including livestock grazing, water diversion, channelization, and vegetation removal, in the riparian area tend to facilitate the spread of saltcedar. The spread of saltcedar coincides with the decline of the Southwestern Willow Flycatcher, although the species will nest in dense saltcedar stands (USFWS 1995). The structure of saltcedar branches and the dense canopy cover create physically suitable nest sites for Southwestern Willow Flycatchers (DeLoach et al. 2000), but saltcedar may otherwise provide suboptimal nesting habitat. Insect biomass can be high in saltcedar monocultures, but diversity is often low and abundant species may not be preferred prey for Southwestern Willow Flycatchers or other riparian birds (Knutson et al. 2003).

The Brown-headed Cowbird, a brood parasite, can be a threat to Southwestern Willow Flycatchers. Although Bent (1942) reports that Willow Flycatchers are uncommon hosts of Brown-headed Cowbirds, other, more recent, studies suggest the contrary. Increasing populations of Brown-headed Cowbirds in the range of the Southwestern Willow Flycatcher began in the late 1800s, with the increase in human population density and their associated livestock (USFWS 1995). The Willow Flycatcher has become an increasingly common host to Brown-headed Cowbirds (Ehrlich et al. 1992). The USFWS (1995) and Sogge et al. (1997) cite numerous papers that demonstrate that cowbird parasitism is a common and widespread threat to the Southwestern Willow Flycatcher. The flycatchers appear to be nearly incapable of rearing their own young if a cowbird chick is in the nest, and parasitism almost always leads to a complete failure of the nest (Sogge et al 1997).

Southwestern Willow Flycatchers in the Project Area

The historical distribution of the Southwestern Willow Flycatcher is unclear, but the species' distribution near the Project area would have been shaped by the naturally fragmented and patchy distribution of riparian habitat in the Mojave Desert (Great Basin Bird Observatory 2009; U.S. Forest Service [USFS] 2000; USFWS 2002). In southern Nevada, territories were observed along the Virgin River in 1997, and potential habitat includes the Meadow Valley Wash, the Muddy River, and the Colorado River system (Hiatt and Boone 2003).

Treated wastewater and runoff from the Las Vegas metropolitan area now flows into Las Vegas Wash, and has created a new source of permanent surface water. Portions of the Las Vegas Wash system are managed for the development of riparian or marsh vegetation, in part with the goal of creating suitable nesting habitat for Southwestern Willow Flycatchers. During surveys conducted by SWCA in 2007, the first resident Southwestern Willow Flycatcher was detected defending a territory within the Las Vegas Wash, although nesting was not confirmed. This individual was detected approximately 1.5 miles upstream from the existing transmission line crossings and proposed location for the Project (SWCA 2008). Surveys conducted in 2008 detected a resident Southwestern Willow Flycatcher west of the Pabco Road Weir, approximately 3 miles upstream from the proposed Project (SWCA 2009). No residents were detected in 2009 or 2010, but an individual was confirmed in 2011 approximately 1.5 miles upstream from the proposed Project alignment (Van Dooremolen 2014b).

In some years, Willow Flycatchers are only recorded outside the nesting season and may be migrating individuals from one of the other subspecies. In 2013, non-resident Willow Flycatchers were detected near the Project area (Figure 2) above the Rainbow Gardens Weir and at the Lake Las Vegas Mitigation Wetlands (Van Dooremolen 2014b). Habitat conditions near the

Project area were noted as largely unsuitable, but with some areas showing improved conditions in some years.

Designated Critical Habitat in the Project Area

No critical habitat is designated in the Project area.

3.3 MOJAVE DESERT TORTOISE

Taxonomy and Listing History

The Desert Tortoise (*Gopherus agassizii*) was first described by Cooper in 1863 as *Xerobates agassizii*. Past taxonomic changes have assigned the species to various genera, including *Scaptochelys* (Bramble 1971), a return to *Xerobates* (Lamb et al. 1989), and *Gopherus* (Crumley 1994), the genus under which it and related species are now recognized. In 2011, the Sonoran Desert population of the Desert Tortoise was determined to be a separate species, the Sonoran Desert Tortoise (*Gopherus morafkai*) (Murphy et al. 2011). The Mojave Desert Tortoise is defined as those Desert Tortoises north and west of the Colorado River and west of Beaver Dam Slope, Utah, and is distributed throughout southern Nevada, southeastern California, the Beaver Dam Mountains and Virgin River area of southwestern Utah, and northwestern Arizona in the Arizona Strip. The Sonoran Desert Tortoise is found in much of western Arizona and south through Sonora to northern Sinaloa, Mexico. The Sonoran Desert Tortoise also occurs on Isla Tiburon, in the Sea of Cortez (Germano et al. 1994). The USFWS determined that listing of the Sonoran Desert Tortoise was warranted but precluded by higher listing priorities, and the species is now a candidate for ESA listing (USFWS 2009).

Major declines and die-offs of Desert Tortoises were observed in the Mojave Desert in the 1980s, leading to the emergency listing of the Mojave population of Desert Tortoises as threatened in 1989 (USFWS 1989). The USFWS published a proposed rule to list the Mojave population as threatened, but because the emergency rule expired on April 2, 1990, it was necessary to publish the final rule on the same day, in order to prevent a lapse in protection for the Desert Tortoise (USFWS 1990).

A recovery plan was released in 1994 (USFWS 1994a) and a revised recovery plan was issued in May 2011 (USFWS 2011). In this revised recovery plan, the Mojave Desert Tortoise's range has been divided in to five recovery units. Each recovery unit has been delineated based on genetic, ecological, and physiological characteristics. A total of 6.4 million acres of critical habitat was designated in 1994 (USFWS 1994b).

The California and Nevada state Natural Heritage Programs have listed Desert Tortoises as imperiled, and in Utah they are considered critically imperiled (NatureServe 2009). The Mojave Desert Tortoise is on the watch list of species in Clark County, Nevada, and it is considered sensitive by the BLM and USFS (NNHP 2007). In Arizona, both species of Desert Tortoise are listed as wildlife species of concern (AGFD 2001).

The Mojave Desert Tortoise is a covered species under the Clark County MSHCP.

Range of the Species

The Desert Tortoise occurs throughout much of the Mojave and Colorado (western portion of the Sonoran) deserts of the United States and Mexico. Differences in behavior, genetics, and morphology from the Sonoran species are clear, with the Colorado River apparently having served as an isolating mechanism (Germano et al. 1994). Importantly, the history of land use and the scale of human-induced habitat alteration have differed between populations, with Mojave Desert Tortoises in the Mojave facing a different suite of threats than Sonoran Desert Tortoises. Sonoran Desert Tortoises are not found in the Project area or elsewhere in Nevada, and the remainder of the document refers to "Mojave Desert Tortoise" and "Desert Tortoise" interchangeably.

Population densities of the Mojave Desert Tortoise are decreasing in many areas, particularly in the western Mojave Desert (reviewed by Corn 1994). According to a USGS report (Berry and Medica 1995), density estimates in 1990 ranged from approximately 13 to 168 adult Desert Tortoises per square mile, depending on the location. A study in southeastern Nevada found a density of approximately 44 Desert Tortoises per square mile, and most populations discussed in that report showed a downward trend (Berry and Medica 1995).

Habitat

Mojave Desert Tortoises are found primarily in Mojave Desertscrub, but also in vegetation characteristic of the Lower Colorado River Subdivision of Sonoran Desertscrub (Turner and Brown 1994). Mojave Desert Tortoises are generally associated with communities dominated by Creosotebush and other sclerophyll shrubs and small cacti (Germano et al. 1994). Some parts of their range may contain abundant Joshua Trees (*Yucca brevifolia*). In the Mojave Desert, habitat supporting the highest Desert Tortoise densities is generally gently rolling alluvial fans with sandy or gravelly soils (Ernst et al. 1994).

Adequate burrowing substrate and thermal cover species are a crucial habitat component for Desert Tortoises. Mojave Desert Tortoises will construct their own burrows to avoid extreme hot or cold temperatures. Mojave Desert Tortoises often excavate burrows under vegetation, and the burrows can be up to 33 feet deep (AGFD 2001). Elevations at which Mojave Desert Tortoises occur range from below sea level in Death Valley, California, up to approximately 5,000 feet at Yucca Mountain, Nevada (AGFD 2001).

Life History

The annual reproductive cycle of the Mojave Desert Tortoise begins in February or March, when emerging from hibernation. Mating generally takes place in the spring and may last into fall (Ernst et al. 1994). Between 1 and 14 eggs are laid in an excavated nest near a shrub or burrow entrance between May and July (Ernst et al. 1994). Incubation generally lasts for 90 to 120 days. Egg hatch rates vary, but hatchling and juvenile mortalities are assumed to be very high, and it has been estimated that only 1 hatchling for every 15 to 20 nests will survive to reach sexual maturity (Lawler, no date). Average age of viability of females is primarily a function of body size, but is usually between the ages of 12 and 25 years (USFWS 1994b). Female Mojave Desert Tortoises produce from one to three clutches of eggs per year (Turner 1986).

Desert Tortoises are herbivores, consuming a wide variety of plant material including dicot annuals, grasses, herbaceous perennials, trees, shrubs, subshrubs, woody vines, and

succulents (AGFD 2001). A study of Mojave Desert Tortoise food habits found that they used 43 plant species, including 37 annuals and 6 perennials (Jennings 1997). The diet showed a very strong preference for native plants (95.3 percent), and some of their preferred food plants were uncommon to rare (Jennings 1997). A study of juvenile Desert Tortoises found differences in diet between wet and dry summers. During a very dry summer, Desert Tortoises were observed foraging on only 3 species, but they used 15 species during a wet summer (Spangenberg 1995). Desert Tortoises may forage selectively, sampling several possibilities before consumption (Oftedal 2002; Van Devender et al. 2002). Selective food preferences for individual Desert Tortoises within a population make plant diversity an important constituent of Desert Tortoise habitat (Tracy 2001). Desert Tortoises also ingest rocks, bones, and soil, possibly to maintain intestinal bacteria, to provide additional minerals, or as gastroliths to aid digestion (Esque and Peters 1994; Stitt and Davis 2003).

Threats to the Survival of the Mojave Desert Tortoise

Desert Tortoises are facing numerous threats to their survival. Livestock grazing, recreational off-highway-vehicle (OHV) use, military training activities, urban development, utility and transportation development, disease, and increases in predation are some of the factors that affect Desert Tortoise survival by reducing or fragmenting available habitat, causing population declines (Lovich 1999). Additional threats include illegal collection of Desert Tortoises as pets, vandalism (shooting, crushing, or mutilation), road mortality, and use as human food (USFWS 1994a).

The presence of livestock may affect Desert Tortoise habitat in several ways. Desert Tortoises, their eggs, and hatchlings can be killed directly by trampling and collapsing burrows. Livestock also trample vegetation (e.g., creosote bush) that is utilized by Desert Tortoises to shade burrows, pallets, and for thermoregulation. Impacts from grazing include damage to soil crusts and cryptogamic soils, leading to increased erosion, decreased water infiltration due to soil compaction, and an increase in exotic annual vegetation, which compromises plant diversity and density, and can change fire regimes (USFWS 1994a). Removal of native vegetation by livestock grazing allows the infiltration and proliferation of exotic plants on the disturbed soils. Some of these invading exotic species include Redstem Stork's Bill (*Erodium cicutarium*), Prickly Russian Thistle (*Salsola iberica*), Common Mediterranean Grass (*Schismus barbatus*), Arabic Schismus (*S. arabicus*), Cheatgrass (*Bromus tectorum*), and Red Brome (*Bromus rubens*) (USFWS 1994a), and are often lower in nutritional quality relative to native species (Oftedal 2002).

Invasion by exotic plants can have a negative impact on Desert Tortoises due to the changes that are effected in the native plant community. Red Brome, for example, a European species, competes with native perennial grasses, shrubs, and annuals. Recurrent fires due to the presence of exotic annuals such as Red Brome can reduce the abundance and diversity of native forbs on which the Desert Tortoises depend (National Park Service [NPS] 2001). Increased fires also contribute to habitat fragmentation, which is a contributing factor in Desert Tortoise population declines (USFWS 1994a).

Effects to Desert Tortoises and their habitat by OHV use include mortality by crushing on the surface or in burrows, collapsing of burrows, destruction of soil crusts and compaction of soils, soil erosion, proliferation of weeds, increase in wild fires, and damage or destruction of plants used for food, water, and thermoregulation (USFWS 1994a). A study of food preferences found that the preferred plant species were often found in washes and on hills. These areas also are

heavily used by recreational OHVs (Jennings 1997). Reduced availability of preferred food sources due to damage from recreational OHVs can force Desert Tortoises to change their diets. This may result in additional energy expenditures searching for acceptable food sources. When Desert Tortoises are forced to switch foods, they accrue a long-term digestive deficit while their gut microflora adjusts to the new food source. Their effective feeding season is thus shortened (Tracy 2001).

Military operations within Desert Tortoise habitat can cause impacts from construction, operation, and maintenance of facilities and roads; development of support communities; tank maneuvers; off-road travel by a wide variety of other vehicles; bombing and artillery practice; ordnance testing; and the litter resulting from these activities (USFWS 1994a).

Urban development has affected Desert Tortoises and their habitat through habitat fragmentation and destruction. The construction of roads leads to habitat destruction, habitat fragmentation, road kills, and increased human access into formerly remote areas. The proliferation of landfills and illegal dumps subsidizes increased population densities of predators, including Common Ravens (*Corvus corax*), Coyotes (*Canis latrans*), and feral domestic dogs (*Canis familiaris*). These effects are greatest nearer to urban areas (USFWS 1994a). Gila Monsters (*Heloderma suspectum*), snakes, skunks, and foxes are also Desert Tortoise egg predators (Ernst et al. 1994; Stitt et al. 2003).

While predators are not normally a concern for Desert Tortoise populations in an undisturbed ecosystem, the perturbation of an ecosystem can cause predators to become a management issue. Increasing populations of generalist native predators have resulted in an increased rate of mortality of hatchling and juvenile Desert Tortoises. The USFWS's Breeding Bird Survey Program showed a 15-fold increase in Common Raven populations in the Mojave Desert for the 20-year period from 1968 to 1988 (BLM et al. 1989). This surge in the population was attributed to an increase in perching and nesting structures from transmission lines and other artificial structures, as well as an artificial increase in food availability. Food sources were augmented through road-kills, landfills, trash, garbage dumps, and agricultural developments. The perching structures listed were fence posts, utility poles and communication towers, signs, buildings, bridges, and freeway access ramps. Elevated perches were historically scarce in the Mojave Desert, and such man-made substitutes provide perching and nesting sites for predatory birds. Farrell (1989) documented Common Ravens utilizing power line towers for perches while consuming juvenile Desert Tortoises (USFWS 1994a). Human predation in the form of highway mortality and the illegal removal of adult Desert Tortoises for pets are also factors in population declines (Lovich 1999; USFWS 1994b). Desert Tortoises will void their bladders in response to harassment, and this loss of stored water jeopardizes their survival through the summer (Averill-Murray et al. 2002).

The manipulation of populations and individual Desert Tortoises during early conservation efforts was mostly unsuccessful. This may have been due to a lack of information regarding Desert Tortoise ecology, or poor planning. The translocation of in-situ Desert Tortoises and reintroduction of captive Desert Tortoises to the wild by the public are ongoing management problems. Non-native tortoises are occasionally illegally released by the public as well. The historic lack of success of reintroductions can be attributed to several factors. Relocated Desert Tortoises often attempt to return to their home ranges (Blythe et al. 2004) and they face increased vulnerability to predators and potential antagonistic responses from resident Desert Tortoises. Perhaps the largest problem facing potential relocation efforts is the potential for the spread of diseases, especially upper respiratory tract disease (URTD), and genetic pollution.

Recently, URTD has been found to be a significant contributor to mortality of both species of Desert Tortoise, but more so for Mojave Desert Tortoises. URTD is caused by a bacterium (*Mycoplasma agassizii*), and it may be aggravated by simultaneous infections from other bacteria. URTD has been reported in a variety of tortoise species from around the world. It is likely that it has been spread through the wild populations by the release of infected, captive tortoises (Jacobson 1992). One of the main reasons for the emergency listing of Mojave Desert Tortoises in 1999 was the observed die-offs of populations due to URTD.

Groundwater withdrawal may cause the development of large fissures (Koehn Dry Lake, Saltdale, California), which act as pit-fall traps that can capture Desert Tortoises. Desert Tortoises can also be trapped in utility trenches. Railroads can fragment Desert Tortoise habitat by creating a barrier to dispersal, if wildlife-permeable crossings are not present (Edwards et al. 2004; USFWS 1994b).

Desert Tortoises in the Project Area

The Mojave Desert Tortoise occupies suitable habitat throughout most of the proposed ROW, but densities appear to vary with habitat quality. Results from surveys conducted for the Desert Tortoise specifically for the Project are presented in Section 3.5 and Appendix B.

Designated Critical Habitat in the Project Area

No critical habitat is designated in the Project area.

BLM and Other Management Plans

In Nevada, the majority of Desert Tortoise habitat is on BLM land and is managed by the BLM under the amended Clark County Management Framework Plan (2005) and the Caliente Management Framework Plan Amendment (2000). The Clark County Plan provides direction for comprehensive land use planning in Clark County, as required by the Clark County Growth Management Act. The BLM has adopted a conservation strategy in the Northeastern Mojave Recovery Unit based upon the establishment of Desert Tortoise ACECs. Specifically, the Las Vegas Resource Management Plan (RMP) has committed to managing land for the Desert Tortoise in the Coyote Springs area through the establishment of the Coyote Springs Desert Tortoise ACEC. Although the Project crosses through the Rainbow Gardens ACEC and River Mountains ACEC, they are not designated for protection of the Mojave Desert Tortoise. The Clark County Management Framework Plan, Short-term Habitat Conservation Plan, the Caliente Management Framework Plan Amendment, and the RMPs for the BLM provide protection to the Desert Tortoise in the vicinity of the Project.

Previous consultations at the programmatic or planning level have determined that projects that are in compliance with each of the plans discussed above, where applicable, are not likely to jeopardize the continued existence of the Mojave Desert Tortoise or adversely modify its critical habitat.

Results of Desert Tortoise Surveys

Introduction and Methods

On March 10, 2009, EPG met with the BLM to discuss key biological issues associated with the Project and, specifically, the protocol for Desert Tortoise surveys. EPG and the BLM agreed that Desert Tortoise surveys along the proposed SNIP ROW would consist of ROW and zone-of-influence (ZOI) surveys that adhered to USFWS's 2009 Pre-Project Field Survey Protocol for Potential Desert Tortoise Habitats (June 12, 2009). The ROW survey would encompass a 100-foot buffer on either side of the centerline of the proposed transmission line, and a survey providing 100 percent coverage would be conducted using 10-meter (~30-foot) belt transects. Presence-absence surveys also would be conducted in the ZOI outside the proposed ROW. ZOI surveys would not be conducted on the side of the Project ROW adjacent to existing transmission lines. ZOI surveys would be conducted at 150 meters, 300 meters, and 450 meters (600-meter transect excluded per the BLM's request) from the edge of the ROW.

Prior to field work, each transect was located and plotted on 7.5-minute USGS maps illustrating the location of the transmission line. Surveys were conducted by four biologists from April 23 through June 3, 2009 (permission was granted to complete the survey during the first three days in June, as weather conditions were forecast to be appropriate). Surveys were initiated at dawn and were conducted when ground temperatures were below 95 degrees Fahrenheit (35 degrees Celsius). During surveys, live Desert Tortoises and Desert Tortoise sign (i.e., burrows, scats, and carcasses) were recorded. Sign was categorized according to age with Class 1 being the most recent and Class 5 being the oldest. Burrows that could not be positively identified as a Desert Tortoise burrow were not recorded. Desert Tortoises were searched for above ground and within burrows. When a Desert Tortoise was located, it was not handled or harassed. When possible, the mid-carapace length (MCL) and sex were approximated without disturbing the individual. All Desert Tortoise and sign locations were recorded on handheld GPS units using Universal Transverse Mercator (UTM) in North American Datum (NAD) 83 Zone 11. In addition to noting Desert Tortoises, surveyors also documented any other wildlife species encountered.

In 2012, an alternative was developed in the Dutchman Pass Alternative Routing Area. The alternative would cross an area that had not been surveyed in 2009, which resulted in the need for additional surveys to be conducted along this 2.7-mile route. On April 4, 2012, three EPG biologists conducted surveys in the Dutchman Pass Alternative Routing Area, per the protocol detailed above.

Results of Surveys

Twenty-seven days of surveys and 645 transect miles were surveyed, including alternatives that were later modified or eliminated from consideration. Within that time, 15 live Desert Tortoises and 187 other detections were documented. These included 105 burrows, 42 scat, 35 carcasses, 2 egg shells, 1 bone, and 1 set of tracks. Figure 3 shows the location of all types of Desert Tortoise detections from surveys conducted in 2009 and 2012. Additional details are provided in Appendix B.

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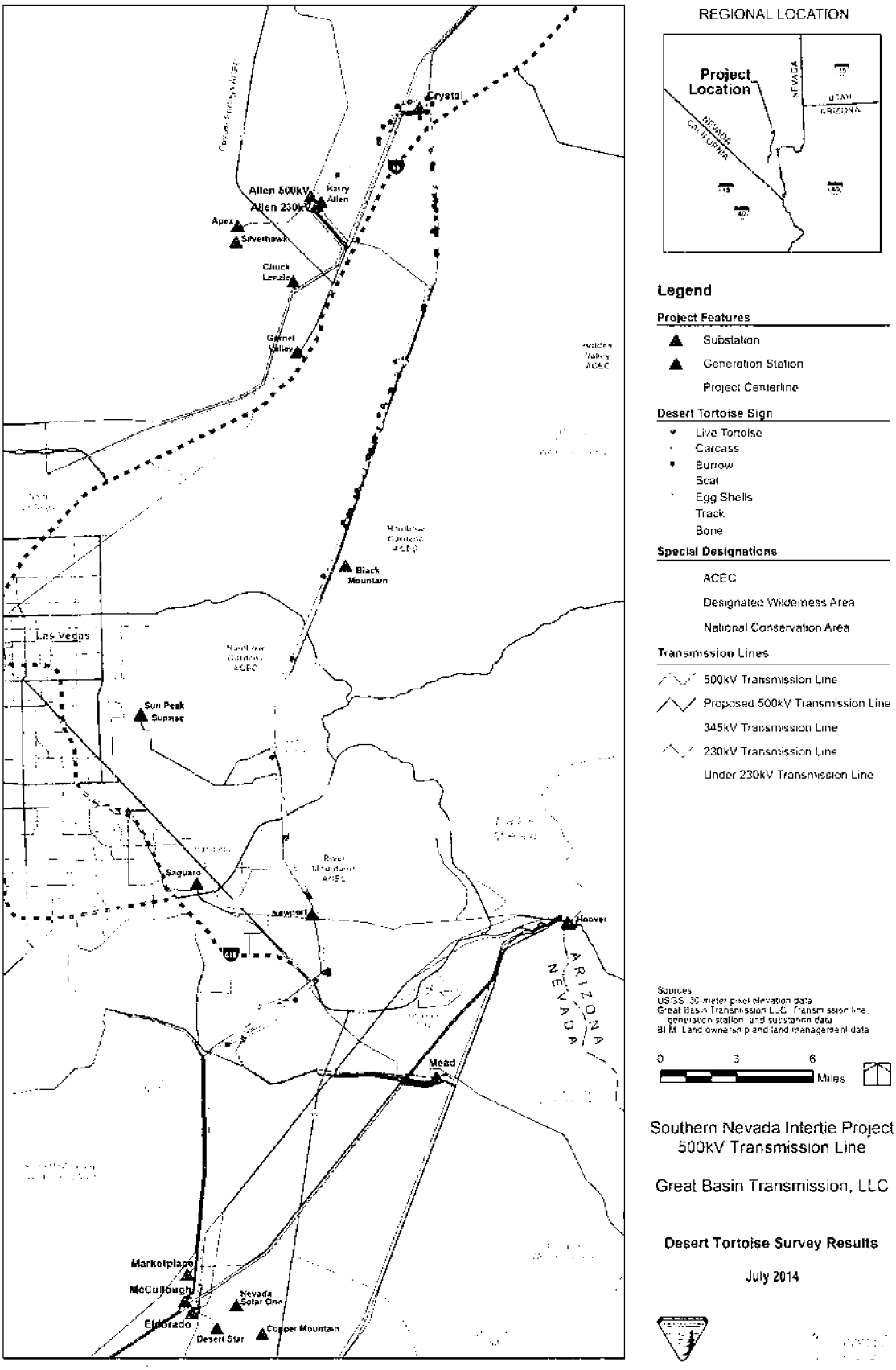

Figure 3. Mojave Desert Tortoise survey results.

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4.0 EFFECTS ANALYSIS

4.1 INTRODUCTION

The ESA provides definitions for the direct and indirect effects of an action on ESA-listed species, together with the effects of other activities that are interrelated or interdependent with the action. Direct effects are defined as the immediate (occurring at the same time and place as the action) effects on the species or its habitat. Indirect effects are those effects that are caused by or result from the action that are later in time or outside the defined action area, and are reasonably certain to occur. Interrelated effects are those effects that are part of a larger action and dependent on the larger action for their justification. Interdependent effects are those effects that have no independent purpose apart from the action under consideration.

Also addressed in this section are cumulative effects. These are the effects of future non-federal (state, local governments, or private) activities on ESA-listed species or critical habitat that are reasonably certain to occur within the action area of the federal action subject to Section 7 consultation. They may occur from individually minor to collectively significant actions taking place over time.

For the purposes of this BA, direct effects to a species or its habitat may result from ground-disturbing activities, particularly the construction of new access roads, substation components, transmission structures, buildings, and ancillary facilities. Indirect effects to a species or its habitat may occur as a result of increased use by the public of newly constructed access roads that remain open beyond completion of construction (for maintenance purposes), changes in vegetation cover outside the ROW (e.g., spread of invasive plants), or diversion of a water source. They are foreseeable and often occur later in time or space. Interrelated and interdependent effects to a species or its habitat can result from access roads that provide increased access for other projects in the area.

Impacts to a resource can either be long-term or short-term in duration. In general, ground disturbance and habitat loss from access roads and facilities are considered long-term impacts; that is, persisting for more than 10 years. Short-term impacts result primarily from the use of temporary laydown or staging areas, pulling and tensioning areas, and some other construction activities.

Cumulative effects, as defined for Section 7 consultation, are the effects of future state, private, or local actions without a federal nexus that are reasonably likely to occur. Cumulative effects are only analyzed if an action "may affect, and is likely to adversely affect" a listed species. The following sections discuss the potential for direct and indirect effects to the Southwestern Willow Flycatcher, Yuma Clapper Rail, and Mojave Desert Tortoise, and also discuss the potential for cumulative effects to the Southwestern Willow Flycatcher and the Mojave Desert Tortoise. However, all future projects anticipated in the action area for the Project would be covered under the Clark County MSHCP or have a federal nexus, and past or future Section 7 consultation would likely address effects to ESA-listed species.

4.2 YUMA CLAPPER RAIL

Direct Impacts

Ground-disturbing activities from the construction of the proposed transmission line would not directly affect Yuma Clapper Rails or their habitat, as the Project would span the entire floodplain. Furthermore, no Clapper Rails have been detected along Las Vegas Wash since 2006 (Van Dooremolen 2014), although marginal suitable habitat exists elsewhere in the Wetlands Park.

Marsh vegetation in the portion of Las Vegas Wash nearest the Project area was negatively affected by the failure of the Demonstration Weir in 2012. Construction is ongoing in the vicinity of the failed Demonstration Weir, and will eventually result in stabilization of this portion of Las Vegas Wash to facilitate habitat management goals. However, physical modification of the channel in the former location of the Demonstration Weir has channelized a portion of Las Vegas Wash and reduced the ability of marshy vegetation to develop. Surveys are anticipated to continue in this area, primarily to monitor changes in habitat conditions (Van Dooremolen 2014). The imagery in Figure 2 predates the damage and removal of the Demonstration Weir.

In summary, no direct effects to the Yuma Clapper Rail are anticipated, as the species has not been recorded at any location in the Las Vegas Wash system since 2006, and recent changes to Las Vegas Wash near the Project have reduced the ability of that area to support the species.

Indirect Impacts

No indirect impacts to Yuma Clapper Rails are anticipated as a result of the Project. No ongoing maintenance needs would require the modification of emergent marshy vegetation, and the Project would not affect water availability or the physical structure of marsh habitat in the Las Vegas Wash system.

4.3 SOUTHWESTERN WILLOW FLYCATCHER

Direct Impacts

Southwestern Willow Flycatchers have been recorded defending territories in the Clark County Wetlands Park, but have not been confirmed to nest. Additional detections of Willow Flycatchers (subspecies unknown) have taken place during the migratory season outside apparently suitable nesting habitat, including adjacent to the Project area.

Construction of transmission lines can result in the loss of Southwestern Willow Flycatcher nesting habitat, primarily through vegetation management. Under some conditions, the presence of transmission lines limits, but does not entirely preclude, the development of potential nesting habitat within the proposed Project ROW. The minimum required clearance between conductors and vegetation would not typically allow the development of mature riparian woodlands, but dense patches of young willow trees can provide suitable Southwestern Willow Flycatcher habitat while maintaining adequate clearance. Elevated terrain outside the floodplain of Las Vegas Wash provides additional clearance where the existing transmission lines span

the floodplain, as the structure bases will be located approximately 30 to 40 feet higher than the floodplain. However, suitable nesting habitat is not present in the existing ROWs at this time.

Southwestern Willow Flycatchers, if present at the time of construction, could be directly affected by noise and disturbance associated with human activity during construction of the Project across Las Vegas Wash. Substantial noise or other types of disturbance during the nesting season could result in nest abandonment or lowered productivity. However, at the Las Vegas Wash crossing, the stream channel and pools formed near the weirs are bordered by narrow strips of vegetation that do not provide suitable nesting habitat for Southwestern Willow Flycatchers. The presence of water and saturated soils with willows and saltcedar may attract migrating individuals, but patches of habitat do not appear to be dense or extensive enough at the proposed crossing location to support nesting. Thus, direct effects to nesting Southwestern Willow Flycatchers are not anticipated.

Indirect Impacts

Although vegetation management within the proposed ROW would be a part of the Proposed Action and would be a direct effect, ROW vegetation management may have indirect effects outside the ROW by reducing patch size or canopy cover in adjacent Southwestern Willow Flycatcher nesting habitat. At the present time, no patches of suitable habitat appear to be adequate to support nesting, and the potential for future development of suitable habitat in or adjacent to the existing transmission line ROWs and the proposed Project ROW is uncertain.

Cumulative Impacts

Although the proposed Las Vegas Wash crossing is located on land owned by Clark County, management of the habitat at this location is conducted collaboratively with county, state, and federal agencies. Clark County implements an MSHCP that was developed collaboratively between Clark County, the USFWS, and other stakeholders. Additionally, actions affecting the water flow and quality in Las Vegas Wash are subject to permitting under the federal Clean Water Act, administered by the BOR, and would require Section 7 consultation. This would include the ongoing efforts to stabilize the wash system to reduce erosion and to improve habitat for ESA-listed and other bird species, largely implemented by the Southern Nevada Water Authority. Therefore, it is anticipated that there will be no cumulative impacts (state, private, or tribal actions with no federal nexus) to the Southwestern Willow Flycatcher.

4.4 MOJAVE DESERT TORTOISE

Direct Impacts

Direct impacts to the Mojave Desert Tortoise are associated with Project construction, during which time construction activities potentially could injure or kill Desert Tortoises. Desert Tortoises may also be harassed through removal from construction areas by authorized biologists. Vehicles that travel outside of areas subject to clearance surveys may also injure or kill Desert Tortoises above ground or in their burrows. Feeding, breeding, and sheltering activities may be interrupted during construction. The application of water as a dust suppressant during construction could attract Desert Tortoises and increase the risk of mortality and/or injury.

Direct impacts to Mojave Desert Tortoise habitat would result from ground-disturbing construction activities. The proposed Project will result in the temporary and permanent disturbance of suitable Mojave Desert Tortoise habitat. The Project would not cross designated critical habitat.

Table 2 presents the estimated amount of potential temporary and permanent disturbance in suitable Desert Tortoise habitat associated with the construction and operation of Project facilities (tower sites, access roads, etc.), developed in conjunction with Project engineers. For the purpose of this analysis, Table 2 presents the amount of disturbance estimated for the entire Project. However, approximately 1.2 miles (approximately 2 percent) of the Project would cross previously disturbed areas or otherwise unsuitable habitat, in the vicinity of Las Vegas Wash (Figure 2) and along a flood control project in the River Mountains Alternative Routing Area near Henderson (Figure 1).

Project activities that disturb or remove components of suitable habitat could affect the ability of Desert Tortoises to use those habitats, even if blading or other types of high-intensity ground disturbance do not take place. Habitat components that may be affected by the Project include burrows and shrubs that may be removed during access road construction or where cross-country travel takes place. Shrubs provide cover for adult and juvenile Desert Tortoises, and burrows are often constructed under the canopy of creosote bush or other shrubs. Some potential burrow habitat will be lost by access road construction, and compaction of soils on access roads will make them unsuitable for burrowing after construction.

Table 2. Approximate acres of impact to Desert Tortoise habitat

	New Temporary Impact	New Permanent Impact
Proposed Action Single-Circuit		
Federal Lands and Reserved Corridors	407.3	227.4
Private Lands	13.5	4.0
Total	**420.8**	**231.4**

Indirect Impacts

Indirect impacts to Desert Tortoises could result from an increase in public access during and after transmission line construction. Impacts from increased public access could include further habitat disturbance and a greater take of Desert Tortoises due to direct mortality from OHVs crushing Desert Tortoises, increased illegal collection of Desert Tortoises, and mortality from vandalism and shooting. Improved access also may result in more unwanted pet Desert Tortoises being returned to the wild, potentially exposing wild Desert Tortoises to diseases.

The presence of the transmission line could cause indirect impacts to Desert Tortoises by increasing the availability of perching and nesting sites for Common Ravens and other predatory birds. Increased food and water availability in the vicinity of construction areas could attract predators or augment their populations. Hatchling Desert Tortoises are particularly vulnerable to predation by a variety of native mammals, reptiles, and birds.

The Project could contribute to changes in habitat outside the ROW, by contributing to the spread of non-native plants that may alter forage availability or cause an increase in fire frequency or intensity. Dust deposition from construction or recreational traffic may also reduce

plant productivity outside the ROW. Increased public access could also facilitate the dispersal of seeds of invasive plants such as Sahara Mustard.

Mojave Desert Tortoises rely heavily on the spring annual plant community for food, and some species of spring annuals (e.g., *Erodium cicutarium* and *Erodium texanum*) may be enhanced by soil disturbance around tower sites. Desert Tortoises prefer and derive greater nutritional benefit from native annual forage. Non-native forage species will most likely increase following disturbance. Filaree (*Erodium cicutarium*) is an exotic species that is frequently consumed by Desert Tortoises, although other spring annuals are preferred.

Cumulative Impacts

The majority of suitable Mojave Desert Tortoise habitat crossed by the Project is on federal land, managed by the BLM and BOR. Further, all new development in Clark County is subject to Clark County's MSHCP, developed under Section 10 of the ESA. Incidental take on private lands has been analyzed programmatically and may be authorized by the USFWS under the terms of that MSHCP.

Private lands, partially developed and used for mining and industrial activities, would be crossed north of Lake Mead Boulevard. However, the portion of this property that would be crossed by the Project is undeveloped except for existing utility ROWs and may support Mojave Desert Tortoises. Existing land uses in this area will likely continue, and could affect Mojave Desert Tortoises.

Undeveloped private lands would be crossed south of Las Vegas Wash. Although suitable Mojave Desert Tortoise habitat may be present in this area, the habitat is highly fragmented by existing residential, commercial, and industrial development, and by Lake Mead Drive. However, this portion of the Project is adjacent to two existing transmission lines, which may limit residential development that could otherwise take place. Development outside the existing and proposed ROWs is likely to continue to contribute to the loss of Mojave Desert Tortoise habitat.

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5.0 MITIGATION PLANNING

Two types of mitigation measures were developed for the Project: generic mitigation and selectively committed mitigation measures. With respect to biological resources, mitigation measures focus particularly on minimizing effects to ESA-listed and other special-status species. Generic and selective mitigation measures related to the avoidance and mitigation of impacts to species addressed in this BA are set forth in the following tables. These and other mitigation measures will be included in conditions of the Construction, Operation, and Maintenance (COM) Plan (or Plan of Development [POD]). During construction, these measures will be monitored by the Compliance Inspection Contractor (CIC), who will review the applicability of these measures and make final determinations regarding their implementation.

Table 3 lists generic mitigation measures, those that apply to the entire Project wherever applicable. Generic mitigation measures are a part of the Project description. Selectively committed measures are applied on a case-by-case basis, in specific impact locations.

Table 3. Generic mitigation measures (to be applied in all Project areas, as applicable)
1. All construction vehicle movement outside the ROW would normally be restricted to predesignated access, contractor-acquired access, or public roads.
2. In construction areas where recontouring is not required, vegetation would be left in place wherever possible, and original contours would be maintained to reduce root damage and allow for resprouting.
3. Prior to construction, all supervisory construction personnel would be instructed on the protection of biological resources. To assist in this effort, the environmental awareness training would address: (a) federal and state laws regarding plants and wildlife, including collection and removal; and (b) the importance of these resources and the purpose and necessity of protecting them.
4. Roads would be built as near as possible at right angles to the streams and washes. Culverts would be installed where necessary. All construction and maintenance activities shall be conducted in a manner that minimizes disturbance to vegetation, drainage channels, and intermittent or perennial streambanks. Road construction would include dust-control measures during construction in sensitive areas. All existing roads would be left in a condition equal to or better than their condition prior to the construction of the Project. Towers would be sited a minimum distance of 200 feet from streams.
5. Mitigation measures that will be developed during the consultation period under Section 7 of the Endangered Species Act (1974) will be adhered to as specified in the BO from the USFWS.
6. Hazardous materials shall not be drained onto the ground or into streams or drainage areas. Totally enclosed containment shall be provided for all trash. All construction waste including trash and litter, garbage, other solid waste, petroleum products, and other potentially hazardous materials shall be removed to a disposal facility authorized to accept such materials.
7. Pre-construction surveys for plants and wildlife species designated as sensitive or of concern will be conducted in areas of known or reasonably anticipated occurrence or habitat, including noxious weed surveys, as stipulated by the land-administering agency during the development of the final POD.
8. Prior to construction, a Noxious Weed Management Plan will be developed in accordance with BLM standards. Included in the noxious weed plan will be stipulations regarding construction, restoration, and operation (e.g., use of weed-free materials, washing of equipment).

Table 4 lists selectively committed measures that are applied on a case-by-case basis. Selectively committed measures are applied in response to site-specific conditions, the results of surveys, or to otherwise avoid impacts to sensitive resources in specific locations.

Table 4. Selective mitigation measures (to be applied in specific locations, as designated)
1. No widening or upgrading of existing access roads would be undertaken in the area of construction and operation, except for repairs necessary to make roads passable, where soils and vegetation are very sensitive to disturbance.
2. Where possible, there would be no blading of new access roads in the area of construction and operation. Existing crossings would be used at perennial streams and irrigation channels. Off-road or cross-country access routes would be used for construction and maintenance. This would minimize ground disturbance impacts. These access routes must be flagged with an easily seen marker and the route must be approved in advance of use by the authorized officer.
3. All new access roads not required for maintenance would be permanently closed using the most effective and least environmentally damaging methods appropriate to that area as approved by the BLM, in coordination with the Project proponent (e.g., stockpiling and replacing topsoil, or rock replacement). This would limit new or improved accessibility into the area.
4. Modified tower design or alternate tower type would be used to minimize ground disturbance and/or avian conflicts.
5. Structures would be placed so as to avoid sensitive features such as, but not limited to, riparian areas and watercourses, to allow conductors to clearly span the features within limits of standard tower design. This would minimize the amount of sensitive features disturbed.

5.1 MITIGATION MEASURES SPECIFICALLY FOR THE SOUTHWESTERN WILLOW FLYCATCHER

To avoid any unpermitted incidental take of Southwestern Willow Flycatchers, the applicant proposes the mitigation measures presented below. These measures would be applied through conditions in the COM Plan (or POD) to avoid and minimize impacts to the species. These mitigation measures are similar to those developed in connection with other projects in the immediate area, including the BO prepared for the Harry Allen to Mead 500kV transmission line project.

- Conduct pre-construction protocol surveys or review results of any ongoing surveys for the Southwestern Willow Flycatcher within the Las Vegas Wash in the vicinity of the Project area. If a nest is found, no construction activities will occur within 800 meters of the nest until a qualified biologist confirms that the nest is no longer active and construction activities are not likely to impact the individual(s).
- The transmission line will span Las Vegas Wash to minimize the removal of vegetation.

Structures will be placed to avoid sensitive features such as, but not limited to, riparian areas and watercourses and/or to allow conductors to clearly span the features, within limits of the standard structure design. If the sensitive features cannot be completely avoided, structures will be placed to minimize disturbance. The Southwestern Willow Flycatcher is a covered species

under the Clark County MSHCP. To offset impacts to the habitat of covered species on non-federal lands, the MSHCP requires that a compensation fee of $550 per acre of ground disturbance in the MSHCP Plan Area be paid to cover conservation actions and the administration of the MSHCP. As presented in Table 2, 17.5 acres of temporary and permanent impacts would occur on private lands as a result of the Project. The applicant and BLM propose that compensation fees associated with those 17.5 acres of ground disturbance be administered under the terms of the MSHCP.

5.2 MITIGATION MEASURES SPECIFICALLY FOR THE MOJAVE DESERT TORTOISE

Adherence to the mitigation measures that are outlined in this BA and additional measures identified by the USFWS in the BO will ensure that this Project is consistent with the appropriate land management plans, including those listed in Section 3.3.

Mitigation measures designed specifically to reduce impacts to the Desert Tortoise have been developed to assist in the formal consultation process. These measures would be applied through conditions in the COM Plan (or POD) to avoid and minimize impacts to the Desert Tortoise. The measures include those developed in connection with other projects in the immediate area including, the SWIP EIS and Record of Decision, the SWIP BO (March 23, 1994; updated in 2007), and through discussions with the USFWS and BLM. In order to lessen or avoid adverse effects to Desert Tortoises and preclude any unpermitted incidental take, the following mitigation measures would be applicable.

Measures that would minimize mortality or injury of Desert Tortoises due to construction or maintenance activities and operation of heavy equipment:

1. If blasting is necessary, all Desert Tortoises located within 100 feet of the blast site will be removed and temporarily relocated in accordance with Desert Tortoise handling protocol, prior to blasting. All Desert Tortoise burrows or cover sites within a 200-foot radius of the blast site will be located and the entrances carefully stuffed with crumpled newspaper or other material approved by the BLM and USFWS. After blasting is completed, all burrows and cover sites will be inspected for damage, and stuffing material will be removed. If a burrow or cover site has collapsed and there is a possibility that it could be occupied, it will be excavated to ensure that no Desert Tortoises have been buried and are in danger of suffocation.

2. During the Desert Tortoise activity period, March 1 through October 31, Desert Tortoise biologists shall be present during all construction and maintenance (e.g., emergency repairs) activities where one or more pieces of heavy construction equipment are being used.

3. All movement of construction vehicles outside of the ROW will be restricted to pre-designated access, contractor-acquired access, or public roads.

4. The limits of construction will be predetermined, with activity restricted to and confined within those limits. No paint or permanent discoloring agents will be applied to rocks or vegetation to indicate survey or construction activity limits.

5. Hazardous materials shall not be drained onto the ground or into streams or drainage areas. Total enclosed containment shall be provided for all trash. All construction waste, including trash and litter, garbage, other solid waste, petroleum products, and other potentially hazardous materials, shall be removed to a disposal facility authorized to accept such materials.

6. Prior to construction, a plan establishing handling, holding, and relocation procedures for Desert Tortoises will be developed. The plan will be developed in consultation with the BLM and USFWS and will be approved by those agencies. The plan will include, at a minimum: (a) a protocol for moving Desert Tortoises above ground in construction areas; (b) a protocol for excavating and relocating Desert Tortoises found in burrows in areas flagged for disturbance; and (c) the techniques for constructing artificial burrows for relocated Desert Tortoises. The plan would account for the time of year and temperature ranges. The purpose for deferring the development of the plan is to ensure the use of the most current and effective techniques available at the time of construction.

7. Construction and maintenance vehicles will not exceed a speed of 25 miles per hour in Desert Tortoise habitat, except where posted otherwise (e.g., US 93; I-15).

8. All construction sites and access roads shall be clearly marked or flagged at the outer limits prior to the onset of any surface-disturbing activity. All personnel shall be informed that their activities must be confined within the marked or flagged areas.

9. Construction sites and access roads shall be surveyed by authorized Desert Tortoise biologists no more than 15 days prior to the initiation of construction. Surveys shall provide 100-percent coverage of the construction area. All Desert Tortoise burrows located will be conspicuously flagged or marked. All Desert Tortoise burrows, and other species' burrows that may be used by Desert Tortoises, will be examined to determine the occupancy of each burrow by Desert Tortoises, using a fiber-optic scope, if necessary.

10. From November 1 through February 28, environmental monitors (in place of authorized Desert Tortoise biologists) will be on site during all phases of transmission line construction, to ensure that all construction vehicles and heavy equipment remain within the boundaries of the marked construction zone. If necessary, an authorized Desert Tortoise biologist will be brought on site to excavate any Desert Tortoise burrow in harm's way.

11. Desert Tortoises and eggs found within construction sites will be removed by authorized Desert Tortoise biologists, in accordance with the most current protocols identified by the BLM and USFWS. Desert Tortoises removed from the Project ROW will be released into undisturbed habitat within 1,000 feet of the collection site. Any Desert Tortoise removed from construction sites shall be placed in the shade of a shrub or in a natural, unoccupied burrow similar to the one in which it was found or in an artificial burrow, following the most current protocol approved by the BLM and USFWS. Desert Tortoises shall not be placed on lands outside the administration of the federal government without the written permission of the landowner. Desert Tortoises shall be purposely moved only by authorized Desert Tortoise biologists, solely for the purpose of moving them out of harm's way.

12. Any excavated holes related to transmission line construction (i.e., foundations) left open overnight will be covered, and/or Desert Tortoise-proof fencing will be installed to prevent the possibility of Desert Tortoises falling into the open holes.

13. All vehicle or equipment operators in the ROW within Desert Tortoise habitat will be required to check under their vehicle or equipment before use. This will take place any time a vehicle is left unattended, as well as in the morning before any construction activity begins.

Measures that would minimize predation on Desert Tortoises by ravens drawn to construction areas or by unleashed dogs brought to construction areas:

14. To prevent mortality, injury, and harassment of Desert Tortoises and damage to their burrows and cover sites, no pets shall be permitted in any Project construction area, unless confined or leashed.

15. Trash and food items will be removed daily by construction workers and placed in raven-proof containers.

Measures that would minimize destruction of Desert Tortoise habitat, such as soil compaction, erosion, or crushed vegetation, resulting from construction or maintenance activities:

16. In construction areas where recontouring is not required, vegetation will be left in place wherever possible, and the original contouring will be maintained, to avoid excessive root damage and to allow for resprouting.

17. Except for repairs necessary to make roads passable, no widening or upgrading of existing roads will be undertaken in the area of construction and operation, where soils and vegetation are very sensitive to disturbance.

18. The alignment of any new access roads or overland routes will follow the designated area's landform contours where possible, provided that such alignment does not impact additional resources. These alignments should minimize ground disturbance and/or reduce scarring.

19. All new access roads not required for maintenance will be permanently closed using the most effective and least environmentally damaging method appropriate to that area, with the concurrence of the landowner or land manager (e.g., stockpiling and replacing topsoil or rock replacement). These closures would limit new or improved accessibility into the area.

20. Within Desert Tortoise habitat, a biologist will be assigned to the pre-construction survey team(s). The biologist will be responsible for ensuring that the placement of new access routes, spur roads, and tower sites will affect as few Desert Tortoise burrows as possible. The alignment of access and spur roads will be as direct as possible, to minimize habitat disturbance and minimize the destruction of Desert Tortoise burrows. Other work areas (e.g., splicing, tensioning, pulling, and batch sites) will be surveyed by a biologist as construction proceeds. Potential work areas will be flagged several days prior to construction for review by a biologist. To the extent possible, these sites will be located in previously disturbed areas.

21. Overnight parking and storage of equipment will be in previously disturbed areas (i.e., lacking vegetation). These areas will also be designated by the pre-construction survey team. If previously disturbed areas are not available, these activities will be restricted to the ROW and will be cleared of Desert Tortoises by the on-site biologist prior to use.

22. Within Desert Tortoise habitat, construction and maintenance workers will strictly limit their activities and vehicles to construction areas and routes of travel that have been identified and/or flagged to eliminate adverse impacts to Desert Tortoises and their habitat. Aside from these areas, workers may not drive cross-country, even within the ROW. All workers will be instructed that their activities are restricted to previously identified, flagged, or cleared areas.

23. To the extent possible, access to splicing and tensioning sites will occur by overland travel and crushing of vegetation (i.e., no blading of such sites will occur). The CIC will ensure that blading is conducted only where necessary. Due to construction constraints resulting from equipment size and personnel safety, blading would be needed at most spur roads and tower sites.

24. In areas where restoration is required, reseeding will occur through the use of plant species approved by BLM. Reclamation and monitoring requirements and practices will be approved by the BLM.

25. Prior to construction, only herbicides that are approved by the BLM will be applied to identified weed infestations in Desert Tortoise habitat.

Measures that would be taken to ensure compliance with measures contained within the BO:

26. The Project proponent will designate a CIC, who will be responsible for overseeing compliance with protective stipulations for the Desert Tortoise and for coordinating compliance with the BLM. The CIC will have the authority to halt activities of construction equipment that may be in violation of the stipulations.

27. All construction and maintenance workers will participate in a Desert Tortoise resource awareness program. The program will be developed by the Project proponent prior to the beginning of construction. The program will be submitted to the USFWS or BLM for review and approval prior to implementation. The program will include, at a minimum, the following topics: (a) the occurrence of Desert Tortoises; (b) the sensitivity of the species to human activities; (c) legal protection for Desert Tortoises; (d) penalties for violations of federal and state laws; (e) general Desert Tortoise activity patterns; (f) reporting requirements; (g) measures to protect Desert Tortoises; and (h) personal measures employees can take to promote the conservation of Desert Tortoises.

28. The USFWS and BLM will be notified within three days of any Desert Tortoise death or injury caused by Project activities. Notification will include the date, time, circumstances, and locations of any injury or death. Dead animals may be marked and left on-site. Injured animals will be transported to a qualified veterinarian. The USFWS will furnish direction on the final disposition of Desert Tortoises taken to a veterinarian.

29. The CIC and on-site biologist will prepare a report for the BLM and USFWS no later than 90 days after completion of construction within Desert Tortoise habitat. The report will document the effectiveness of the Desert Tortoise mitigation measures, the number of

Desert Tortoises excavated from burrows, and the number of Desert Tortoises moved from construction sites. The report will make recommendations for modifying or refining the stipulations, to enhance benefits to the Desert Tortoise or to modify or discontinue mitigation measures determined to be ineffective. The report will include an estimate of the actual acreage of habitat disturbance caused by crushing and blading versus the estimates prior to construction.

5.3 MITIGATION MEASURES SPECIFICALLY FOR MOJAVE DESERT TORTOISE HABITAT

Table 2 in Section 4.4 (Approximate Acres of Impact to Desert Tortoise Habitat) presents the estimated amount of potential temporary and permanent disturbance as a result of the Project. These values were determined based on an estimate of the type and extent of disturbance associated with the construction and operation of Project facilities (tower sites, access roads, etc.) that were developed in conjunction with Project engineers to date.

The objective of habitat compensation is to ensure that there is no net loss of habitat quality for the Desert Tortoise. The ultimate objective of such compensation is to ensure that the number and viability of regional populations is not diminished. Compensation for the loss of habitat on public lands is required by applicable endangered species laws, regulations, and agency policies, including BLM Desert Tortoise protection policies, and will be applied to the Project.

Suitable compensation options for impacts on public lands may include contribution to a Desert Tortoise holding or research facility, acquisition of off-site land for a Desert Tortoise preserve, or contribution to the research study of a problem affecting Desert Tortoises. Examples of research topics might include effects of raven predation or livestock grazing on Desert Tortoise populations.

The decision regarding the distribution and appropriate use of mitigation remuneration for the disturbance of Desert Tortoise habitat will be determined through consultations between the USFWS and BLM and will be included in the BO. The actual per-acre rate of remuneration will also be determined through consultation between the BLM and USFWS and will be included in the Project BO.

The Mojave Desert Tortoise is a covered species under the Clark County MSHCP. To offset impacts to the habitat of covered species on non-federal lands, the MSHCP requires that a compensation fee of $550 per acre of ground disturbance in the MSHCP Plan Area be paid to cover conservation actions and the administration of the MSHCP. As presented in Table 2, 17.5 acres of temporary and permanent impacts would occur on private lands as a result of the Project. The applicant and BLM propose that compensation fees associated with those 17.5 acres of ground disturbance be administered under the terms of the MSHCP.

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6.0 DETERMINATION OF EFFECTS

6.1 YUMA CLAPPER RAIL

The Project will have no effect on the Yuma Clapper Rail, as supported by the following information:

- Direct effects
  - The Yuma Clapper Rail is not known to be present in the Project area, as indicated by long-term annual surveys.
  - Flood damage and restoration actions beginning in 2012 have reduced or eliminated marshy vegetation in some areas near the Project area.
- Indirect effects
  - No indirect effects to Yuma Clapper Rails or their habitat are anticipated, as Las Vegas Wash will be spanned and ROW management would not affect emergent marshy vegetation.

6.2 SOUTHWESTERN WILLOW FLYCATCHER

The Project may affect, and is likely to adversely affect, the Southwestern Willow Flycatcher through the following mechanisms:

- Direct effects
  - Disturbance of individual Southwestern Willow Flycatchers, if present but not detected by surveys, may occur during construction or maintenance activities.
- Indirect effects
  - The Project may require vegetation management that would limit but not preclude the development of riparian woodland habitat.

These direct effects would be minimized by the applicant's commitment to conduct preconstruction surveys or utilize existing data from ongoing surveys in the Las Vegas Wash system, and to modify the schedule of construction and maintenance, if required, to avoid take of Southwestern Willow Flycatchers.

Indirect effects would be reduced by the ability to span Las Vegas Wash, by siting structures on elevated terrain, which reduces the need for vegetation management, and by crossing Las Vegas Wash in a location adjacent to similar vegetation management. Indirect effects to the species would also be offset by the payment of mitigation funds through the Clark County MSHCP for ground disturbance on private lands.

6.3 MOJAVE DESERT TORTOISE

The Project may affect, and is likely to adversely affect, the Mojave Desert Tortoise through the following mechanisms:

- Direct effects
  - The Project may result in mortality of individual Mojave Desert Tortoises through construction activities, including vehicle traffic and blading.
  - The Project would result in the temporary loss of an estimated 421 acres, and the permanent loss of an estimated 231 acres of suitable habitat for the Mojave Desert Tortoise.
- Indirect effects
  - The Project may contribute to future increases in predation pressure on the Mojave Desert Tortoise, by increasing the number of perches and nest sites for predatory birds. Construction activities may attract predators to the Project area, locally increasing predation pressure.
  - The Project may contribute to alteration of habitat conditions in otherwise undisturbed areas, through the spread of invasive plant seeds and through dust deposition.
  - The Project may contribute to increased recreational access in Mojave Desert Tortoise habitat, which can increase Mojave Desert Tortoise mortality or harassment.

The mitigation measures previously recommended will be effective at reducing impacts to the Desert Tortoise and its habitat. Generic and selective mitigation measures, as described in Section 5 of this BA, will reduce ground disturbance. All measures restricting ground-disturbing activity also will be effective at reducing the potential for incidental take during construction. Additional key mitigation measures developed specifically for the Mojave Desert Tortoise identified in Section 5 include, but are not limited to, payment of required compensatory mitigation funds, contractor awareness training, parking and storing equipment in previously disturbed areas, adherence to pre-construction procedures for handling, holding, and relocating Desert Tortoises, and not exceeding speed limits of 25 miles per hour from March 1 through November 1.

Ravens are generally attracted to transmission lines for perching and nesting; therefore, as a part of the additional recommended mitigation measures, trash and food items will be removed daily by construction workers and placed in raven-proof containers. To prevent mortality, injury, and harassment of Desert Tortoises and damage to their burrows and cover sites, no pets shall be permitted in any Project construction area, unless confined or leashed.

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Appendix A: Trust Resources List

U.S. Fish and Wildlife Service

Trust Resources List

This resource list is to be used for planning purposes only — it is not an official species list.

Endangered Species Act species list information for your project is available online and listed below for the following FWS Field Offices:

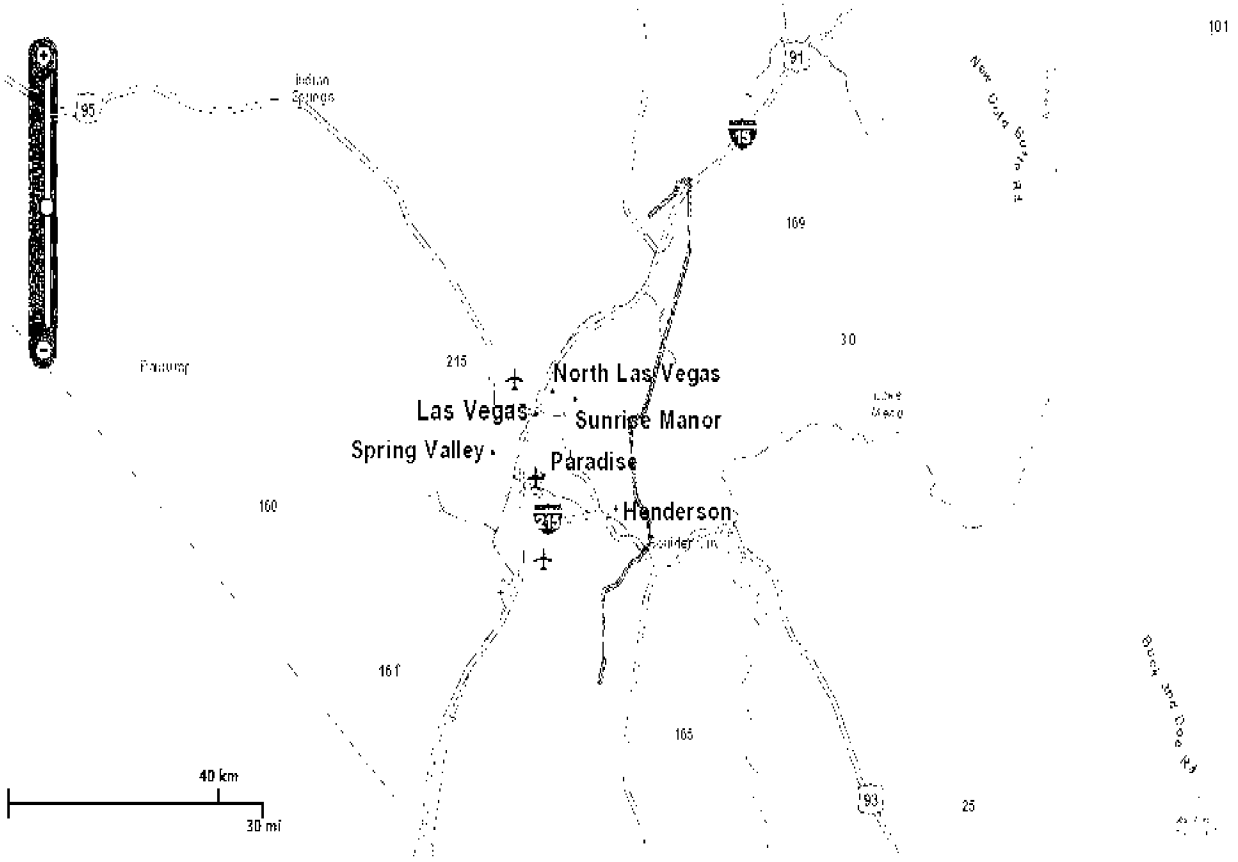
Nevada Fish and Wildlife Office
1340 FINANCIAL BOULEVARD, SUITE 234
RENO, NV 89502
(775) 861-6300
http://www.fws.gov/nevada/

Project Name:

Southern Nevada Intertie Project

Trust Resources List

Project Location Map:



Project Counties:

Clark, NV

Trust Resources List

Geographic coordinates (Open Geospatial Consortium Well-Known Text, NAD83):

MULTIPOLYGON (((-114.8541618 36.457633, -114.8476414 36.4741784, -114.8476374 36.4741847, -114.8476314 36.4741891, -114.8476243 36.474191, -114.824965 36.4758475, -114.8249569 36.4758465, -114.82495 36.4758423, -114.8249452 36.4758357, -114.8249435 36.4758278, -114.8239135 36.380802, -114.8239153 36.3807935, -114.9228466 36.1624742, -114.9228524 36.1624668, -114.9228609 36.1624629, -114.9509952 36.1569227, -114.9434443 36.0931595, -114.9372653 36.0520982, -114.9125847 36.026229, -114.9125796 36.0262192, -114.9063655 35.9954483, -114.9063659 35.9954386, -114.9063709 35.9954302, -114.9310901 35.9704269, -114.9310949 35.9704233, -114.9311007 35.9704213, -114.9462008 35.9676438, -114.9770954 35.9370768, -114.9771039 35.9370718, -115.0073017 35.9281804, -115.0059284 35.8636736, -115.0059284 35.8636732, -115.0059284 35.8369583, -115.0059291 35.836953, -115.0138255 35.8080017, -115.013828 35.8079961, -115.0138322 35.8079915, -115.0189821 35.803815, -115.018989 35.8038113, -115.0189968 35.8038106, -115.0190042 35.8038129, -115.0190102 35.8038179, -115.0190139 35.8038248, -115.0190146 35.8038326, -115.0190123 35.80384, -115.0190073 35.803846, -115.0138624 35.8080185, -115.0059684 35.836961, -115.0059684 35.863673, -115.007342 35.9281949, -115.0073403 35.9282033, -115.0073352 35.9282103, -115.0073276 35.9282145, -114.97712 35.9371088, -114.9462246 35.9676766, -114.9462198 35.9676801, -114.9462141 35.9676821, -114.9311141 35.9704595, -114.9064068 35.9954508, -114.9126177 36.0262056, -114.9372986 36.0520752, -114.9373021 36.0520802, -114.9373039 36.052086, -114.9434839 36.0931538, -114.943484 36.0931544, -114.9510371 36.1569363, -114.9510365 36.1569438, -114.9510334 36.1569505, -114.951028 36.1569556, -114.9510211 36.1569583, -114.9228788 36.1625001, -114.8239535 36.380806, -114.8249833 36.4758061, -114.8476088 36.4741521, -114.8541273 36.4576114, -114.854131 36.4576053, -114.8541366 36.457601, -114.9142181 36.4261016, -114.9142256 36.4260994, -114.9142334 36.4261002, -114.9142402 36.4261039, -114.9142451 36.42611, -114.9142473 36.4261175, -114.9142465 36.4261253, -114.9142428 36.4261321, -114.9142367 36.426137, -114.8541618 36.457633)))

Project Type:

Transmission Line

Endangered Species Act Species List (USFWS Endangered Species Program).

There are a total of **6** threatened, endangered, or candidate species on your species list. Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fishes may appear on the species list because a project could cause downstream effects on the species. Critical habitats listed under the **Has Critical Habitat** column may or may not lie within your project area. See the **Critical habitats within your project area** section below for critical habitat that lies within your project area. Please contact the designated FWS office if you have questions.

Species that should be considered in an effects analysis for your project:

Trust Resources List

Amphibians	Status		Has Critical Habitat	Contact
relict leopard Frog (*Lithobates onca*)	Candidate	species info		Nevada Fish And Wildlife Office
Birds				
Southwestern Willow flycatcher (*Empidonax traillii extimus*) Population: Entire	Endangered	species info	Final designated critical habitat	Nevada Fish And Wildlife Office
Yuma Clapper rail (*Rallus longirostris yumanensis*) Population: U.S.A. only	Endangered	species info		Nevada Fish And Wildlife Office
Fishes				
Pahrump poolfish (*Empetrichthys latos*) Population: Entire	Endangered	species info		Nevada Fish And Wildlife Office
Razorback sucker (*Xyrauchen texanus*) Population: Entire	Endangered	species info	Final designated critical habitat	Nevada Fish And Wildlife Office
Reptiles				
Desert tortoise (*Gopherus agassizii*) Population: U.S.A., except in Sonoran Desert	Threatened	species info	Final designated critical habitat	Nevada Fish And Wildlife Office

Critical habitats within your project area:

There are no critical habitats within your project area.

FWS National Wildlife Refuges (USFWS National Wildlife Refuges Program).

There are no refuges found within the vicinity of your project.

Trust Resources List

FWS Migratory Birds (USFWS Migratory Bird Program).

The protection of birds is regulated by the Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Protection Act (BGEPA). Any activity, intentional or unintentional, resulting in take of migratory birds, including eagles, is prohibited unless otherwise permitted by the U.S. Fish and Wildlife Service (50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)). The MBTA has no provision for allowing take of migratory birds that may be unintentionally killed or injured by otherwise lawful activities. For more information regarding these Acts see http://www.fws.gov/migratorybirds/RegulationsandPolicies.html.

All project proponents are responsible for complying with the appropriate regulations protecting birds when planning and developing a project. To meet these conservation obligations, proponents should identify potential or existing project-related impacts to migratory birds and their habitat and develop and implement conservation measures that avoid, minimize, or compensate for these impacts. The Service's Birds of Conservation Concern (2008) report identifies species, subspecies, and populations of all migratory nongame birds that, without additional conservation actions, are likely to become listed under the Endangered Species Act as amended (16 U.S.C 1531 et seq.).

For information about Birds of Conservation Concern, go to http://www.fws.gov/migratorybirds/CurrentBirdIssues/Management/BCC.html.

Migratory birds of concern that may be affected by your project:

There are **8** birds on your Migratory birds of concern list. The Division of Migratory Bird Management is in the process of populating migratory bird data with an estimated completion date of August 1, 2014; therefore, the list below may not include all the migratory birds of concern in your project area at this time. While this information is being populated, please contact the Field Office for information about migratory birds in your project area.

Species Name	Bird of Conservation Concern (BCC)	Species Profile	Seasonal Occurrence in Project Area
Bell's Vireo (*Vireo bellii*)	Yes	species info	Breeding
Bendire's Thrasher (*Toxostoma bendirei*)	Yes	species info	Breeding
Black-chinned Sparrow (*Spizella atrogularis*)	Yes	species info	Breeding
Brewer's Sparrow (*Spizella breweri*)	Yes	species info	Breeding, Migrating
Costa's Hummingbird (*Calypte costae*)	Yes	species info	Breeding

Trust Resources List

Gray vireo (*Vireo vicinior*)	Yes	species info	Breeding
Le Conte's thrasher (*toxostoma lecontei*)	Yes	species info	Breeding
Prairie Falcon (*Falco mexicanus*)	Yes	species info	Year-round

NWI Wetlands (USFWS National Wetlands Inventory).

The U.S. Fish and Wildlife Service is the principal Federal agency that provides information on the extent and status of wetlands in the U.S., via the National Wetlands Inventory Program (NWI). In addition to impacts to wetlands within your immediate project area, wetlands outside of your project area may need to be considered in any evaluation of project impacts, due to the hydrologic nature of wetlands (for example, project activities may affect local hydrology within, and outside of, your immediate project area). It may be helpful to refer to the USFWS National Wetland Inventory website. The designated FWS office can also assist you. Impacts to wetlands and other aquatic habitats from your project may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal Statutes. Project Proponents should discuss the relationship of these requirements to their project with the Regulatory Program of the appropriate U.S. Army Corps of Engineers District.

Data Limitations, Exclusions and Precautions
The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery and/or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

Exclusions - Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and

Trust Resources List

nearshore coastal waters. Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

Precautions - Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

The following wetland types intersect your project area in one or more locations:

Wetland Types	NWI Classification Code	Total Acres
Freshwater Forested/Shrub Wetland	PSS	755.301
Lake	L2US	3310.4851

Appendix B:
Mojave Desert Tortoise Survey Report for the Southern Nevada Intertie Project

MOJAVE DESERT TORTOISE SURVEY REPORT
FOR THE
SOUTHERN NEVADA INTERTIE PROJECT

Prepared for and under the Direction of:
Bureau of Land Management
Bureau of Reclamation
Western Area Power Administration

Prepared by:
EPG, Inc.

On Behalf of:
Great Basin Transmission, LLC

June 2010

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APPENDICES

Appendix A	Aerial Maps Showing Desert Tortoise Locations
Appendix B	USFWS Approved Desert Tortoise Survey Protocol (April 2009)
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SECTION 1.0 INTRODUCTION

1.1 PURPOSE

BLM has requested that Great Basin Transmission, LLC (Great Basin) conduct surveys for several plant and animal species of concern along the Southern Nevada Intertie Project corridor (Project). The results of these surveys would be incorporated into the Construction, Operation, and Maintenance (COM Plan) or Plan of Development (POD) and final project design in an effort to minimize potential adverse impacts upon these species.

One species of interest along the project corridor is the Mojave population of the Desert Tortoise (*Gopherus agassizii)* (all tortoises north and west of the Colorado River in Arizona, Utah, Nevada, and California). It was listed as Threatened by the U.S. Fish and Wildlife Service (USFWS) on April 2, 1990. A recovery plan was published in June 1994, and revised in 2008. As a result, the BLM requested that Desert Tortoise surveys be conducted in suitable habitat along the project corridor. The goal of these surveys was to determine presence/absence and abundance of the tortoise occurring along the Project alignment within the species' range on Federal and non-Federal lands, The information gathered from these surveys would help determine the appropriate level of consultation with USFWS, and help determine the incidental take as defined by the Endangered Species Act (ESA) of Desert Tortoises and tortoise habitat impacts.

1.2 PROJECT DESCRIPTION

Great Basin Transmission, LLC ("GBT") is proposing to construct, operate, and maintain a 500 kilovolt (kV) transmission line known as the Southern Nevada Intertie Project (the "Project"). The proposed Project will involve construction of approximately 50-60 miles of above-ground transmission line stretching between a northern terminus at or near NV Energy's 500 kV Harry Allen Substation, Clark County, Nevada (approximately 20 miles northeast of Las Vegas), and a southern terminus at Western Area Power Administration (WAPA) 500 kV Mead Substation in Clark County, Nevada (approximately three miles south of downtown Boulder City), or an alternate southern terminus at the existing 500 kV Marketplace, McCullough, or Eldorado Substations in Eldorado Valley, Clark County.

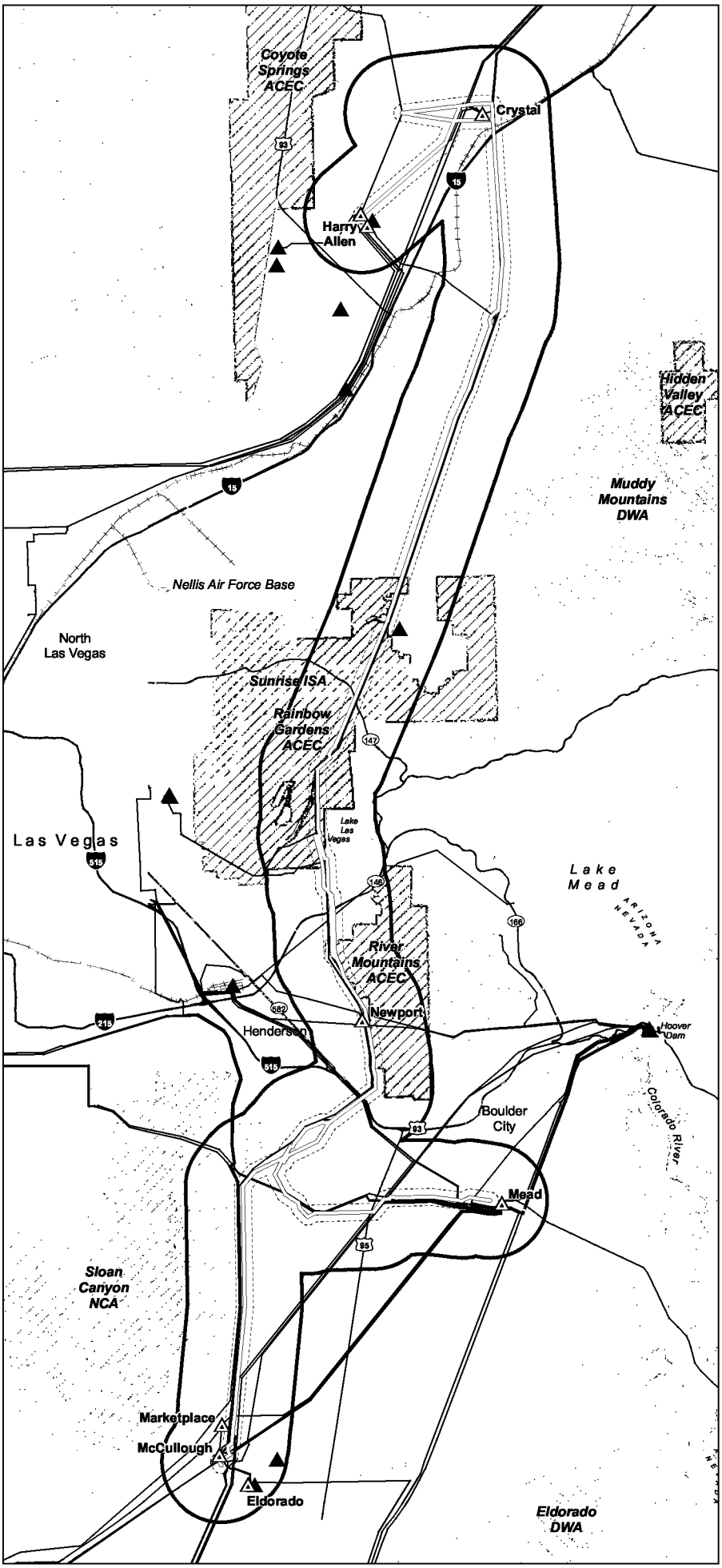
In addition to the interconnection facilities at each of the interconnecting substations, the Project may include new transformers and related facilities at the southern terminus to interconnect with voltage levels other than 500 kV such as a connection to the Mead 230 kV Substations. The Project will be located primarily on public lands, managed by the Bureau of Land Management (BLM), Bureau of Reclamation (USBR), and WAPA, within Clark County, Nevada (Figure 1).

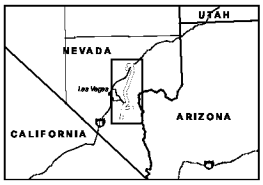
The Project passes through two designated Areas of Critical Environmental Concern (ACEC); Rainbow Gardens ACEC and River Mountains ACEC. Rainbow Gardens is a biological ACEC located in the area of Black Mountain and was designated as such to protect geological, scientific, scenic, cultural, and sensitive plant values. River Mountains ACEC is a cultural ACEC

located east of Henderson, established as a protected area for Bighorn Sheep and a scenic viewshed for Henderson and Boulder City.

The Project alignment will be located inside a 200-foot wide (100 feet on either side of center) right-of-way (ROW) that consists primarily of Federal lands with some private easements. The Project will primarily utilize self-supporting, steel lattice towers made of galvanized steel with dulled finish. Other tower types including steel H-frames, steel monopoles, and guyed-V structures may be selected. Single- circuit tower heights will range between approximately 90 and 172 feet with tower spans averaging about 1,200 to 1,600 feet. Double-circuit tower heights will range from about 150 to 190 feet and with tower spans of approximately 1,200 to 1,600 feet. Tower foundations will typically be three to 10 feet in diameter and 15 to 55 feet deep, depending on the tower type and local soil conditions.

The Project alignment will generally follow existing transmission facilities and designated utility corridors including the Sunrise Corridor east of Las Vegas. Portions of the right-of-way will be determined according to site-specific design and environmental requirements. There is some potential flexibility for the siting of tower locations at a linear distance of up to 400 feet, and up to 50 feet laterally. The centerline, right-of-way, access roads, and tower locations are based on preliminary engineering only and will be refined to reflect changes that occur when more detailed engineering is available.





LEGEND

Project Features

- Proposed Project
- Project Study Corridor
- Biological Study Corridor

Management Areas

- Area of Critical Environmental Concern
- Designated Wilderness Area
- Instant Study Area
- National Conservation Area

Utilities

- Substation
- Generating Station
- SWIP 500kV Transmission Line ROW
- Proposed 500kV Transmission Line
- 500kV Transmission Line
- 345kV Transmission Line
- 230kV Transmission Line
- Sub-230kV Transmission Line

Reference Features

- State Boundary
- Interstate
- Highway/Major Road
- Local Road
- Railroad

Southern Nevada Intertie Project 500kV Transmission Line

Great Basin Transmission, LLC

Project Location

0 2 4 8
Miles

Sources: USGS 30-Meter pixel elevation data; LS Power, 2009; EPG, 2009;

August 4, 2009

S:\EPG\Geospatial\Projects\LS_Power\SNIP\MXD\draft2dec.mxd

SECTION 2.0 PROJECT AREA DESCRIPTION

The project is located within the Basin and Range Physiographic Province, which occupies the southwestern interior of North America. The long, narrow mountain ranges, broad valleys, and soils of this province are primarily the result of regional geological processes that stretched the earth's crust 8 to 12 million years ago. The soils in this area are classified as thermic soils, which have mean annual soil temperatures of 59 to 72 degrees Fahrenheit. The difference between mean summer and mean winter temperatures is greater than 9 degrees Fahrenheit at a depth of 20 inches or in shallow soils at the soil-bedrock interface. These soils are generally shallow, gravelly, and medium to coarse-textured on gently to moderately steep valley slopes and hillsides (Hendricks 1985), and were formed in calcareous, gravelly alluvium derived from mostly sedimentary rocks. The project area is located in a region that averages 3 to 6 inches per year of precipitation, most of which occurs during winter storms. Summer rains originating from the Gulf of Mexico rarely produce rainfall in the area.

The Brown, Lowe, and Pase system for classification and description of North American biotic communities (Brown 1994) is used to identify and classify biotic communities in this BA. The Project is located within the Mojave Desert scrub biome, the smallest of the four desert biomes in North America, and is intermediate between the Sonoran Desert scrub and Great Basin Desert scrub. Plants and animals occupying Mojave Desert scrub are similar to those observed in the Lower Colorado River Subdivision of Sonoran desert scrub, within the creosote bush series, *Larrea tridentata-Ambrosia dumosa* association. These open-plant communities occupy areas characterized by gravelly bajadas and inconspicuous low plains. Other plants associated with this biome, include box-thorn (*Lycium andersonii*), Mormon tea (*Ephedra* spp.), and ratany (*Krameria* spp.). The Joshua tree (*Yucca brevifolia*), one of the few Mojave endemics, is arguably the most representative symbol of the Mojave Desert.

In addition to the upland Mojave Desert scrub biome, riparian areas occur along narrow communities along streams and marshes. The largest riparian corridor in the project area is Las Vegas Wash, a 12-mile long channel, which drains northeasterly into the western arm of Lake Mead, which drains into the Colorado River. The project crosses the Las Vegas Wash at approximately three miles northeast of Henderson on the east side of Las Vegas. Typical vegetation found within this wetland biome is generally comprised of cottonwoods (*Populus* sp.), willows (*Salix* sp.), and southern cattail (*Typha domingensis*), but at the Project crossing, the vegetation is dominated by salt cedar (*Tamarix* spp.), an exotic species that has replaced many native plants as the dominant vegetation type along extensive reaches of riparian habitat.

SECTION 3.0 SPECIES DESCRIPTION

3.1 REGULATORY STATUS

Major declines and die-offs of Desert Tortoises were observed in the Mojave Desert in the 1980s, leading to the emergency listing of the Mojave population of Desert Tortoises as threatened in 1989 (54 FR 32326). On October 13, 1989, the USFWS published a proposed rule to list the Mojave population as threatened, but because the emergency rule expired on April 2, 1990, it was necessary to publish the final rule on the same day, in order to prevent a lapse in protection for the tortoise (55 FR 12178).

As described in the 1993 Draft Recovery Plan, the Mojave population was divided into six distinct population segments or recovery units, based on presumed evolutionary history (those population segments are sometimes deemed ESUs [evolutionarily significant units]) (59 FR 5820). Each recovery unit was delineated based on variations in genetic, morphological, ecological, physiological, and behavioral traits. Critical habitat was designated in 1994, encompassing 6.4 million acres within six management units across California, Nevada, Utah, and Arizona (59 FR 5820). In 2008 the USFWS issued a Draft Revised Recovery Plan which reduced to five the number of recovery units, and changed some boundaries of the 1994 recovery units (USFWS 2008).

Under the Natural Heritage Program ranking system, the Desert Tortoise is considered imperiled/vulnerable (NatureServe 2009). The Mojave population is on the Clark County Rare Species List as an At-Risk taxon (NNHP 2004) and is a U.S. Forest Service (USFS) threatened species and a BLM Nevada special status species (NNHP 2007).

3.2 DISTRIBUTION AND POPULATION TREND

The Desert Tortoise is recognized to consist of two geographically dissimilar populations: the Mojave and the Sonoran. The Mojave population is defined as those tortoises north and west of the Colorado River and west of Beaver Dam Slope, Utah, and is distributed throughout southern Nevada, southeastern California, the Beaver Dam Mountains and Virgin River area of southwestern Utah, and northwestern Arizona. The Sonoran population is found in most of Arizona, western New Mexico, and south through Sonora to northern Sinaloa, Mexico. The Sonoran population of Desert Tortoises also occurs on Isla Tiburon, in the Sea of Cortez (Germano et al. 1994).

Differences in behavior, genetics, and morphology exist throughout the species' range, with the Colorado River apparently having served as an isolating mechanism; tortoises on either side differ in many important ways (Germano et al. 1994). Importantly, the history of land use and the scale of human-induced habitat alteration have differed between populations, with tortoises in the Mojave facing many more recent threats than those in the Sonoran Desert.

Population densities of the Desert Tortoise are decreasing in many areas, particularly in the western Mojave Desert (Corn 1994). According to a USGS report (Berry and Medica 1995),

density estimates in 1990 ranged from approximately 5 to 65 adult tortoises per square kilometer (13 to 168 per square mile) depending on location. A study in southeastern Nevada found a density of approximately 17 tortoises per square kilometer (44 per square mile), and most populations discussed in that report showed a downward trend (Berry and Medica 1995).

Although population density studies have been conducted for many years in several areas throughout the Desert Tortoise's range, inconsistencies in sampling techniques, study scale, and study goals make long-term population trend determinations impracticable. Those data may however provide a general overview of the species' range-wide status and demonstrate considerable declines at the local level (USFWS 2008). Beginning in 2001 (1999 in the Upper Virgin River Recovery Unit) annual range-wide monitoring was initiated (USFWS 2006). Results from the first 5 years of this program estimated a population density low of 1 to 3 tortoises per square kilometer (2-8/mile^2) for the NE Mojave Recovery Unit, and a high of 17 to 30 tortoises per square kilometer (44-78/mile^2) for the Upper Virgin River Recovery Unit (USFWS 2006). Because this monitoring program is designed to measure long-term population trends, the first 5 years of the program are essentially to establish baseline densities and variability between years and between recovery units (USFWS 2006).

3.3 SURVEY HISTORY

In support of the Southwest Intertie Project (SWIP), Desert Tortoise surveys were conducted in July 2006, that included a total of 43.5 miles of transects along the SWIP project corridor. The SWIP transmission line connects with SNIP at Harry Allen Substation. According to the SWIP survey, burrows were found along the survey corridor west of the Crystal Substation site, and carcasses were found near the Harry Allen Substation.

3.4 HABITAT AND LIFE HISTORY

Tortoises of the Mojave population are found primarily in Mojave desertscrub, but also in vegetation characteristic of the Lower Colorado River Subdivision of Sonoran desertscrub (Turner and Brown 1994). They are generally associated with communities dominated by creosote bush and other sclerophyll shrubs and small cacti (Germano et al. 1994). Some parts of their range may contain abundant Joshua trees. In the Mojave Desert, the terrain is generally gently rolling alluvial fans with sandy or gravelly soils (Ernst et al. 1994).

Adequate burrowing substrate and thermal cover species are a crucial habitat component for Desert Tortoises. In the Mojave region, Desert Tortoises will construct their own burrows to avoid extreme hot or cold temperatures. Mojave Desert Tortoises often excavate burrows under vegetation, and they can be up to 10 meters (33 feet) deep (AZGFD 2001). Elevations at which tortoises occur in the Mojave range from below sea level in Death Valley, California, up to about 5,000 feet at Yucca Mountain, Nevada (AZGFD 2001).

The annual reproductive cycle of the Mojave Desert Tortoise begins in February or March when they emerge from hibernation. Mating generally takes place in the spring and may last into fall (Ernst et al. 1994). Between 1 and 14 eggs are laid in an excavated nest near a shrub or burrow

entrance between May and July (Ernst et al. 1994). Incubation generally lasts for 90 to 120 days. Egg hatch rates vary, but hatchling and juvenile mortalities are assumed to be very high, and it has been estimated that only 1 hatchling for every 15 to 20 nests will survive to reach sexual maturity (Lawler, no date). Average age of reproductive viability of females is primarily a function of animal size, but is usually between the ages of 12 and 25 years (USFWS 1994). Females from the Mojave population produce from one to three clutches of eggs per year (Turner 1986).

Desert Tortoises are herbivores, consuming a wide variety of plant materials including dicot annuals, grasses, herbaceous perennials, trees, shrubs, subshrubs/woody vines, and succulents (AZGFD 2001). A study of Desert Tortoises' food habits in the Mojave Desert found that they used 43 plant species, including 37 annuals and 6 perennials (Jennings 1997). The diet showed a very strong preference for native plants (95.3 percent), and some of their preferred food plants were uncommon to rare (Jennings 1997). A study of juvenile tortoises found differences in diet between wet and dry summers. During a very dry summer, tortoises were observed foraging on only 3 species, but they used 15 species during a wet summer (Spangenberg 1995). Tortoises may forage selectively, sampling several possibilities before consumption (Oftedal 2002, Van Devender et al. 2002). Selective food preferences for individual tortoises within a population make plant diversity an important constituent of tortoise habitat (Tracy 2001). Desert Tortoises also ingest rocks, bones, and soil, possibly to maintain intestinal bacteria, to provide additional minerals, or as gastroliths to aid digestion (Esque and Peters 1994, Stitt and Davis 2003).

SECTION 4.0 METHODOLOGY

EPG biologists followed 2009 desert tortoise survey protocol developed by the U.S. Fish and Wildlife Service (USFWS) (Appendix B). During the surveys, at least one USFWS authorized biologist was present at all times. The surveys were conducted from 23 April through 3 June, 2009 during the tortoise's active period of April through May. Permission was obtained from BLM to survey the final portion of the alignment during the first three days in June. Surveys were initiated at dawn and were only conducted when ground temperatures were below 95 degrees Fahrenheit (35 degrees Celsius).

Surveys were conducted within the ROW and a zone-of-influence (ZOI). The ROW included 100% coverage and encompassed a 100-foot buffer on either side of the centerline of the proposed transmission line using 10-meter (~30-foot) wide belt transects. Presence/absence surveys were conducted in the ZOI. These surveys were conducted along one side of the ROW where the proposed transmission line was parallel to an existing transmission line. In areas where the proposed line was not parallel to an existing line, ZOI surveys were conducted on both sides of the transmission line, conducted at 150-meters, 300-meters, and 450-meters from the edge of the ROW. It was determined that for this Project, the 600-meter ZOI transect was not necessary (Mark Slaughter, BLM – personal communication April 1, 2009).

Live tortoises as well as tortoise sign (e.g. burrows, scat, and carcasses) were recorded. Sign was categorized according to age with Class 1 sign being the most recent and Class 5 being the oldest (Tables 1-3). (Note: These definitions have been defined as standard by the Desert Tortoise Council and are universally accepted by all federal and state agencies, universities, and other interested individuals or parties). Burrows which could not be positively identified as a tortoise burrow were not recorded. Tortoises were searched for both above ground and in burrows and were not handled or harassed. When possible, the mid-carapace length (MCL) and sex were approximated without disturbing the individual. All locations of tortoises and sign were recorded using handheld GPS using Universal Transverse Mercator (UTM) in North American Datum (NAD) 83 Zone 11. In addition to noting tortoises, surveyors documented other animal and plant species (Appendix F).

Table 1. Desert Tortoise Carcass Classes

Class 1	Fresh or putrid
Class 2	Normal color; scutes adhere to bone
Class 3	Scutes peeling off bone
Class 4	Shell bone is falling apart; growth rings on scutes are peeling
Class 5	Disarticulated and scattered

Table 2. Desert Tortoise Burrow Classes	
Class 1	Currently active with tortoise or recent tortoise sign
Class 2	Good condition, definitely tortoise; no recent sign
Class 3	Deteriorated condition; definitely tortoise
Class 4	Deteriorated condition; possibly tortoise
Class 5	Good condition, possibly used by tortoise

Table 3. Desert Tortoise Scat Classes	
Class 1	Wet (not from rain or dew) or freshly dried; obvious odor
Class 2	Dried with glaze; some odor; dark brown
Class 3	Dried no glaze or odor; bleaching (light brown); tightly packed
Class 4	Dried; light brown to pale yellow loose material
Class 5	Bleached or consisting of only plant fiber

SECTION 5.0 SURVEY RESULTS

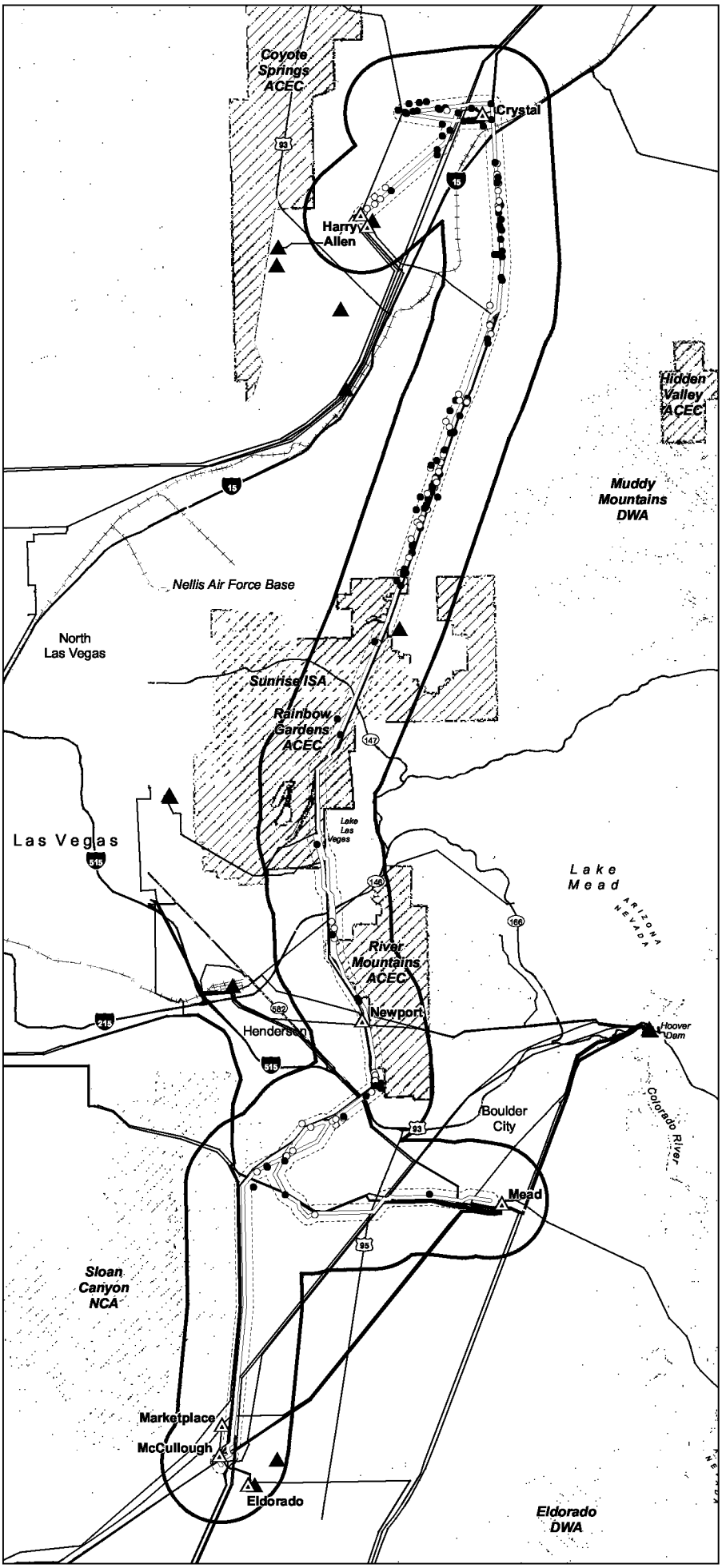
5.1 LIVE TORTOISES AND TORTOISE SIGN

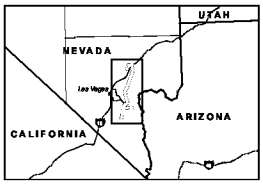
Twenty-six days and a total of 620 transect miles were surveyed between 23 April and 3 June 2009 (Figure 2; Appendix A). Within that time, 16 live tortoises and 199 sign were documented (Tables 4 and 5). Of the total sign, 125 burrows, 42 scat, 28 carcasses, 2 egg shells, 1 bone, and 1 set of tracks were recorded.

Table 4. Live Tortoises Observed During 2009 Surveys

Date	Easting	Northing	Time	Location[a]	MCL	Sex
4/28/2009	695059	4036767	1129	not in burrow	295	Mal
4/29/2009	695164	4035641	1134	in burrow	250	Unk
4/30/2009	694621	4026842	942	not in burrow	300	Mal
5/04/2009	692539	4021534	715	in burrow	Unk	Unk
5/04/2009	691177	4017501	1005	not in burrow	250	Mal
5/04/2009	691158	4017405	1053	not in burrow	250	Mal[b]
5/04/2009	692239	4020606	1237	in burrow	>250	Mal?
5/06/2009	690834	4017946	1015	not in burrow	270	Mal
5/07/2009	695217	4035937	844	not in burrow	220	Fem
5/12/2009	688287	4009824	715	in burrow	Unk	Unk
5/18/2009	681448	3979100	800	in burrow	240	Unk
5/18/2009	683212	3980573	930	in burrow	240	Unk
5/20/2009	686541	3983066	626	cave opening	280	Unk
5/20/2009	688355	3984798	959	plane of burrow	180	Unk
5/21/2009	683258	3978665	707	not in burrow	245	Fem
5/28/2009	685896	3993303	709	in burrow	220	Unk

[a]Not in burrow indicates the individual was observed aboveground. Plane of burrow indicates the individual was at the mouth or near the entrance of a burrow.
[b]Possible re-sighting of individual observed at 1005 on 5/4/2009.





LEGEND

Project Features

- Proposed Project
- Project Study Corridor
- Biological Study Corridor

Desert Tortoise Sign

- Live Tortoise
- Carcass
- Burrow
- Scat
- Egg Shells
- Track

Management Areas

- Area of Critical Environmental Concern
- Designated Wilderness Area
- Instant Study Area
- National Conservation Area

Utilities

- Substation
- Generating Station
- SWIP 500kV Transmission Line ROW
- Proposed 500kV Transmission Line
- 500kV Transmission Line
- 345kV Transmission Line
- 230kV Transmission Line
- Sub-230kV Transmission Line

Reference Features

- State Boundary
- Interstate
- Highway/Major Road
- Local Road
- Railroad

Southern Nevada Intertie Project 500kV Transmission Line

Great Basin Transmission, LLC

Figure 2
Desert Tortoise Survey Results

Sources: USGS 30-Meter pixel elevation data; LS Power, 2009; EPG, 2009;

August 4, 2009

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Table 5. Tortoise Sign Observed During 2009 Surveys				
Date	**Easting**	**Northing**	**Sign Type**	**Classification/Comments**
5/28/2009	685935	3993568	Bone	C5
4/23/2009	694300	4039146	Burrow	C3
4/23/2009	693769	4039121	Burrow	C2
4/23/2009	693766	4039131	Burrow	C1
4/23/2009	693581	4039133	Burrow	C3; easting may be 693851
4/23/2009	693287	4039094	Burrow	C3
4/23/2009	693976	4039158	Burrow	C2
4/23/2009	694267	4039189	Burrow	C3
4/23/2009	694267	4039189	Burrow	C3
4/23/2009	694838	4039179	Burrow	C2
4/24/2009	692957	4039569	Burrow	C3
4/24/2009	691929	4039757	Burrow	C3
4/24/2009	690667	4039669	Burrow	C3
4/24/2009	690436	4039642	Burrow	C3
4/24/2009	690436	4039642	Burrow	C3
4/24/2009	690436	4039643	Burrow	C3
4/24/2009	690436	4039643	Burrow	C3
4/24/2009	690067	4039553	Burrow	C3
4/24/2009	690034	4039565	Burrow	C2
4/24/2009	689983	4039601	Burrow	C3
4/24/2009	691840	4039824	Burrow	C3; faces west
4/24/2009	691840	4039824	Burrow	C3; faces north
4/24/2009	691840	4039824	Burrow	C3; faces south
4/24/2009	692249	4039860	Burrow	C3
4/25/2009	691175	4040190	Burrow	C3
4/25/2009	691175	4040190	Burrow	C3
4/25/2009	690790	4040154	Burrow	C2
4/25/2009	690194	4040093	Burrow	C3
4/25/2009	694824	4040077	Burrow	C1
4/25/2009	694394	4038814	Burrow	C2
4/25/2009	692345	4039703	Burrow	C2
4/25/2009	689595	4039713	Burrow	C3
4/25/2009	692068	4038934	Burrow	C3
4/25/2009	693719	4039829	Burrow	C3
4/27/2009	692511	4038581	Burrow	C3
4/27/2009	689198	4035185	Burrow	C3
4/27/2009	687676	4033947	Burrow	C1

Table 5. Tortoise Sign Observed During 2009 Surveys				
Date	**Easting**	**Northing**	**Sign Type**	**Classification/Comments**
4/28/2009	691793	4037499	Burrow	C3
4/28/2009	691809	4037214	Burrow	C3
4/28/2009	692074	4038273	Burrow	C2
4/28/2009	695171	4039709	Burrow	C2
4/29/2009	695170	4036127	Burrow	C2
4/29/2009	695207	4035208	Burrow	C2
4/29/2009	695253	4033940	Burrow	C2
4/29/2009	695365	4033044	Burrow	C3
4/29/2009	695292	4033227	Burrow	C2
4/29/2009	695292	4033217	Burrow	C2
4/29/2009	695353	4032455	Burrow	C3
4/29/2009	695453	4031794	Burrow	C2
4/29/2009	695432	4031470	Burrow	C2
4/29/2009	695438	4030164	Burrow	C1
4/29/2009	695438	4030164	Burrow	C1
4/29/2009	695397	4030318	Burrow	C3
4/29/2009	695428	4032976	Burrow	C3
4/29/2009	695399	4033571	Burrow	C2
4/29/2009	695245	4034197	Burrow	C1
4/29/2009	695347	4034396	Burrow	C3
4/29/2009	695164	4035641	Burrow	C1
4/29/2009	695194	4035687	Burrow	C1
4/29/2009	695155	4035813	Burrow	C1
4/30/2009	694656	4026627	Burrow	C3
4/30/2009	693480	4023390	Burrow	C3
4/30/2009	693494	4023528	Burrow	C3
4/30/2009	693405	4023212	Burrow	C2
5/4/2009	692666	4021534	Burrow	C2
5/4/2009	692539	4021548	Burrow	C1; at caliche cave
5/4/2009	692183	4020521	Burrow	C3
5/4/2009	692165	4020457	Burrow	C2
5/4/2009	692158	4020382	Burrow	C3
5/4/2009	691992	4019922	Burrow	C2
5/4/2009	691798	4018988	Burrow	C2
5/4/2009	691614	4018765	Burrow	C3
5/4/2009	691282	4017837	Burrow	C3
5/4/2009	691463	4018204	Burrow	C2

Table 5. Tortoise Sign Observed During 2009 Surveys				
Date	**Easting**	**Northing**	**Sign Type**	**Classification/Comments**
5/4/2009	691482	4018315	Burrow	C3
5/4/2009	691562	4018523	Burrow	C3
5/4/2009	691503	4018561	Burrow	C3
5/4/2009	691738	4019068	Burrow	C3
5/4/2009	691939	4019267	Burrow	C2
5/4/2009	692239	4020606	Burrow	C1; tortoise inside
5/4/2009	692737	4021615	Burrow	C3
5/4/2009	692738	4021623	Burrow	C3
5/4/2009	693064	4022531	Burrow	C2
5/5/2009	690802	4016460	Burrow	C3
5/5/2009	690857	4016244	Burrow	C2
5/5/2009	690451	4015304	Burrow	C2
5/5/2009	690387	4015240	Burrow	C3
5/5/2009	690394	4014834	Burrow	C2
5/5/2009	689964	4013918	Burrow	C3
5/5/2009	690026	4013706	Burrow	C2
5/5/2009	689908	4013708	Burrow	C3
5/5/2009	689758	4012969	Burrow	C2
5/5/2009	689527	4013223	Burrow	C2; ZOI
5/5/2009	690597	4017246	Burrow	C2; ZOI
5/5/2009	691078	4017321	Burrow	C2; ZOI
5/5/2009	690816	4016384	Burrow	C2
5/5/2009	689908	4013604	Burrow	C3
5/6/2009	692836	4023400	Burrow	C2
5/6/2009	692506	4022827	Burrow	C3
5/6/2009	691456	4019754	Burrow	C3
5/6/2009	691828	4017946	Burrow	C2
5/6/2009	691779	4020021	Burrow	C2
5/7/2009	695152	4031615	Burrow	C3
5/7/2009	695017	4031603	Burrow	C2
5/7/2009	686339	4004582	Burrow	C3
5/7/2009	686193	4005475	Burrow	C3
5/12/2009	688287	4009824	Burrow	C1; tortoise inside
5/14/2009	682222	3980301	Burrow	C1
5/14/2009	682227	3980245	Burrow	C2
5/18/2009	683283	3980845	Burrow	C1
5/18/2009	683676	3981162	Burrow	C1

Table 5. Tortoise Sign Observed During 2009 Surveys				
Date	**Easting**	**Northing**	**Sign Type**	**Classification/Comments**
5/18/2009	684202	3982687	Burrow	C1
5/18/2009	684682	3982513	Burrow	C2; 5 baby quail in burrow
5/19/2009	685025	3998414	Burrow	C3
5/20/2009	687800	3984247	Burrow	C2
5/20/2009	688247	3985577	Burrow	C1
5/20/2009	688320	3985251	Burrow	C1
5/20/2009	688613	3984976	Burrow	C2
5/20/2009	688617	3984699	Burrow	C3
5/28/2009	685858	3994073	Burrow	C1
5/28/2009	685935	3993568	Burrow	C2
5/28/2009	685936	3993528	Burrow	C3
5/28/2009	686013	3993693	Burrow	C1
5/29/2009	687287	3989759	Burrow	C1
5/29/2009	687390	3989583	Burrow	C1
6/1/2009	691353	3978736	Burrow	C3
4/27/2009	688266	4034839	Carcass	C3
4/27/2009	688888	4035364	Carcass	
4/27/2009	687836	4034181	Carcass	C5
4/27/2009	688592	4034737	Carcass	C5
4/27/2009	688286	4034431	Carcass	C5
4/29/2009	695287	4034633	Carcass	C5
4/29/2009	695154	4035842	Carcass	C5 male
4/30/2009	694813	4027125	Carcass	C1; ~166mm; found upside down; fresh bugs
4/30/2009	693448	4023319	Carcass	C4; 900 mm separation
5/4/2009	692539	4021548	Carcass	C5
5/4/2009	692200	4020583	Carcass	C4; 210 MCL female
5/4/2009	691693	4018980	Carcass	C5
5/4/2009	691776	4018789	Carcass	C5
5/4/2009	692152	4020341	Carcass	C4; 260mm spread out; probable female
5/5/2009	690665	4016539	Carcass	C4; 240mm female
5/5/2009	690226	4014564	Carcass	C4; 200mm female
5/5/2009	694764	4027650	Carcass	C5
5/5/2009	694763	4028741	Carcass	C5
5/6/2009	692998	4023743	Carcass	C3; 280mm male
5/6/2009	unk	unk	Carcass	C3
5/6/2009	692483	4021911	Carcass	C5; adult

Table 5. Tortoise Sign Observed During 2009 Surveys				
Date	**Easting**	**Northing**	**Sign Type**	**Classification/Comments**
5/6/2009	693057	4023391	Carcass	C3; 240mm AF
5/12/2009	688461	4009762	Carcass	C3; 170 female
5/14/2009	681657	3980005	Carcass	C2; juvenile; MCL 50
5/20/2009	686107	3982969	Carcass	C3; ~220 MCL; relatively fresh but disarticulated due to predation
5/20/2009	688099	3984482	Carcass	C4 female; ~200 MCL
5/20/2009	688325	3985431	Carcass	C5
5/28/2009	686024	3993120	Carcass	C4; Juv (~4 in long); at caliche cave
5/18/2009	683676	3981162	Egg shells	inside burrow
5/18/2009	684202	3982687	Egg shells	fragments outside of burrow
4/25/2009	692345	4039703	Scat	C2
4/27/2009	687676	4033947	Scat	C2
4/28/2009	695172	4036709	Scat	C2
4/29/2009	695170	4036127	Scat	C2 & C4
4/29/2009	695207	4035208	Scat	C3
4/29/2009	695229	4034334	Scat	C2
4/29/2009	695245	4034197	Scat	C3; in burrow
4/29/2009	695194	4035687	Scat	C3; in burrow
4/29/2009	695240	4035618	Scat	C2
5/4/2009	692539	4021548	Scat	C2
5/4/2009	691992	4019922	Scat	C3
5/4/2009	691651	4018493	Scat	C2; at entrance to unk burrow
5/4/2009	691282	4017837	Scat	C2; outside burrow
5/4/2009	691257	4017250	Scat	C1
5/5/2009	689713	4013683	Scat	C2
5/5/2009	690343	4015584	Scat	C3
5/5/2009	690930	4016753	Scat	C2
5/5/2009	690816	4016384	Scat	C4; inside burrow
5/5/2009	691884	4019382	Scat	C2
5/5/2009	694765	4027699	Scat	C4
5/6/2009	692291	4022234	Scat	C2
5/6/2009	691406	4019595	Scat	C2
5/6/2009	691240	4018166	Scat	C2
5/14/2009	682222	3980301	Scat	C1
5/18/2009	683329	3980883	Scat	C2
5/18/2009	683676	3981162	Scat	C2-4
5/18/2009	684202	3982687	Scat	C3 multiple

Table 5. Tortoise Sign Observed During 2009 Surveys				
Date	**Easting**	**Northing**	**Sign Type**	**Classification/Comments**
5/18/2009	684682	3982513	Scat	C3 multiple
5/20/2009	685888	3982851	Scat	C4 scat at caliche cave
5/20/2009	688329	3985135	Scat	C5 scat at caliche cave
5/20/2009	688319	3985381	Scat	C3
5/20/2009	688325	3985431	Scat	C3
5/20/2009	688247	3985577	Scat	C1
5/20/2009	688339	3985319	Scat	C3
5/20/2009	686527	3983012	Scat	C3; at caliche cave
5/20/2009	686107	3982662	Scat	C3; at caliche cave
5/21/2009	684902	3977579	Scat	C1
5/28/2009	685855	3994078	Scat	C3 & C4; at caliche cave
5/28/2009	685935	3993568	Scat	C4
5/28/2009	685936	3993528	Scat	C3 & C4
5/28/2009	686014	3993124	Scat	C3 & C4; at caliche cave
5/28/2009	686013	3993693	Scat	C4
5/28/2009	686013	3993693	Tracks	

5.2 OTHER ANIMAL AND PLANT OBSERVATIONS

During surveys, 3 burrowing owls (*Athene cunicularia*) were observed and one active burrow was located. In addition, the surveyors recorded numerous encounters of Las Vegas bearpoppy (*Arctomecon californica*) and sticky ringstem (*Anulocaulis leiosolenus*) in the area of the PABCO gypsum mine. In total, the surveyors encountered 37 birds, 4 mammals, 25 invertebrates, 14 reptiles, and 71 plants. (Appendix F).

SECTION 6.0 SUMMARY DISCUSSION/RECOMMENDATIONS

Twenty-six days and a total of 620 transect miles were surveyed between 23 April and 3 June 2009. Within that time, 16 live tortoises and 197 sign were documented (Tables 4 and 5). There is no designated Critical Habitat present; however, suitable habitat occurs throughout the Project Area

Tortoises of the Mojave population are found primarily in Mojave Desert scrub, but also in vegetation characteristic of the Lower Colorado River Subdivision of Sonoran desert scrub (Turner and Brown 1994). They are generally associated with communities dominated by creosote bush and other sclerophyll shrubs and small cacti (Germano et al. 1994). Some parts of their range may contain abundant Joshua trees (*Yucca brevifolia*). In the Mojave Desert, the terrain is generally gently rolling alluvial fans with sandy or gravelly soils (Ernst et al. 1994).

Adequate burrowing substrate and thermal cover species are a crucial habitat component for Desert Tortoises. In the Mojave region, Desert Tortoises construct their own burrows to avoid extreme hot or cold temperatures. Mojave Desert Tortoises often excavate burrows under vegetation, and they can be up to 10 meters (33 feet) deep (AGFD 2001).

The Mojave Desert Tortoise occupies suitable habitat throughout most of the proposed right-of-way, but also includes a portion of lower quality habitat from Lake Mead Blvd (around Frenchman Mtn.) to Lake Mead Pkwy (south of Las Vegas Wash).

Direct impacts to the Mojave Desert Tortoise are generally associated with project construction, during which time construction activities potentially could injure or kill tortoises. Tortoises could also be harassed through removal from construction areas. Vehicles that stray from construction areas and roads could crush Desert Tortoises above ground or in their burrows. Feeding, breeding, and sheltering activities could also be interrupted during construction.

Indirect impacts to tortoises are generally due to increases in public access during and after transmission line construction. Impacts from increased public access could include further habitat disturbance and a greater loss of Desert Tortoises due to direct mortality from off-road vehicles crushing tortoises, increased illegal collection of tortoises, and mortality from vandalism and shooting. Better access potentially could result in more unwanted pet tortoises being returned to the wild, potentially infecting resident wild tortoises with diseases.

The presence of transmission lines generally increases threats to tortoises, mainly from predation of the young by avian predators like ravens. Transmission structures provide perching sites for ravens. Hatchlings are particularly vulnerable to predation by a variety of native mammals, reptiles, and birds. Raven populations have been on the increase in the Mojave Desert since the 1980s, especially in response to urban expansion.

Maintenance of roads, the transmission line, and other infrastructure could result in harassment, burrow destruction, injury, and/or mortality to Desert Tortoises. The application of water as a

dust suppressant during road maintenance could attract Desert Tortoises onto the roadway, potentially resulting in mortality and/or injury.

6.1 DESERT TORTOISE HABITAT

Direct impacts to Desert Tortoise Habitat are generally associated with ground-disturbing construction activities. The proposed project potentially could result in the temporary and permanent disturbance of Desert Tortoise Non-Critical Habitat.

Project activities that potentially disturb or remove primary constituent elements of habitat could adversely modify those habitats. The elements that could be affected by the project include shrubs that would be removed during access road construction. Shrubs provide cover for adult and juvenile tortoises, and burrows are often constructed under the canopy of creosote bush or other shrubs. Some potential burrow habitat could be lost by access road construction, and compaction of soils on access roads could make them unavailable for burrowing. Mojave Desert Tortoises rely heavily on the spring annual plant community for food and some species of spring annuals (e.g., *Erodium cicutarium* and *Erodium texanum*) could be enhanced by soil disturbance around tower sites. Tortoises prefer and derive greater nutritional benefit from native annual forage. Non-native forage species would most likely increase following disturbance. Filaree (*Erodium cicutarium*) is an exotic species that is frequently consumed by Desert Tortoises, although other spring annuals are preferred.

Indirect impacts to Desert Tortoise habitat are generally due to increases in public access from new roads constructed for the project. These roads could allow for an increase in off-road vehicle use and public access resulting in a degradation of Desert Tortoise habitat, including crushing of native vegetation and areas potentially used for the construction of burrows. Increased public access could also facilitate the dispersal of seeds of noxious weeds such as Sahara mustard.

Two types of mitigation measures have been developed for the Project including generic mitigation and selectively committed mitigation measures. Generic mitigation measures are those that apply to the project as a whole and are typically part of the project description. Selectively committed measures are applied on a case-by-case basis, in specific impact locations. The overarching purpose of both sets of measures with respect to biological resources is to reduce impacts to biological resources, as well as special status species, resulting from the construction, operation, and maintenance of the proposed transmission line, where possible. Generic and selective mitigation measures related to the avoidance and mitigation of impacts to species addressed in the draft Biological Assessment prepared for the Project. These and other mitigation measures would be imposed through conditions in the COM Plan (or POD) being developed by the BLM, USBR, and GBT. During construction, these measures would be monitored by the Compliance Inspection Contractor (CIC) who would review the applicability of these measures and make final determinations regarding their implementation (refer to the Draft Biological Assessment for the list of generic and selective mitigation measures developed for SNIP).

In addition to the generic and selective mitigation measures developed for SNIP, other mitigation measures have been designed specifically to reduce impacts to the Desert Tortoise and to assist in the formal consultation process. These measures would be applied through conditions in the COM Plan (or POD) to avoid and minimize impacts to the tortoise. The measures include those developed in connection with other projects in the immediate area including, the SWIP EIS and Record of Decision, the SWIP BO (March 23, 1994; updated in 2007), and through discussions with the USFWS and BLM.

Measures that would minimize mortality or injury of Desert Tortoises due to construction or maintenance activities and operation of heavy equipment:

1. If blasting is necessary, all tortoises located within 100 feet of the blast site will be removed and temporarily relocated in accordance with Desert Tortoise handling protocol, prior to blasting. Prior to any blasting, all tortoise burrows or coversites within a 200-foot radius of the blast site will be located and the entrances carefully stuffed with crumpled newspaper or other material approved by BLM and USFWS. After blasting is completed, all burrows and coversites will be inspected for damage, and stuffing material will be removed. If a burrow or coversite has collapsed and there is a possibility that it could be occupied, it will be excavated to ensure that no tortoises have been buried and are in danger of suffocation.

2. During the tortoise activity period, March 1 through October 31, tortoise biologists shall be present during all construction, and maintenance (e.g., emergency repairs) activities where one or more pieces of heavy construction equipment are being used.

3. All movement of construction vehicles outside of the right-of-way will be restricted to pre-designated access, contractor-acquired access, or public roads.

4. The limits of construction will be predetermined, with activity restricted to and confined within those limits. No paint or permanent discoloring agents will be applied to rocks or vegetation to indicate survey or construction activity limits.

5. Hazardous materials shall not be drained onto the ground or into streams or drainage areas. Total enclosed containment shall be provided for all trash. All construction waste, including trash and litter, garbage, other solid waste, petroleum products, and other potentially hazardous materials, shall be removed to a disposal facility authorized to accept such materials.

6. Prior to construction, a plan establishing handling, holding, and relocation procedures for tortoises will be developed. The plan will be developed in consultation with BLM and USFWS and will be approved by those agencies. The plan will include, at a minimum: (a) a protocol for moving tortoises above ground in construction areas; (b) a protocol for excavating and relocating tortoises found in burrows in areas flagged for disturbance; and (c) the techniques for constructing artificial burrows for relocated tortoises. The plan

would account for the time of year and temperature ranges. The purpose for deferring the development of the plan is to ensure the use of the most current and effective techniques available at the time of construction.

7. Construction and maintenance vehicles will not exceed a speed of 25 miles per hour in tortoise habitat, except where posted otherwise (e.g., US 93; I-15).

8. All construction sites and access roads shall be clearly marked or flagged at the outer limits prior to the onset of any surface-disturbing activity. All personnel shall be informed that their activities must be confined within the marked or flagged areas.

9. Construction sites and access roads shall be surveyed by qualified tortoise biologists no more than 15 days prior to the initiation of construction. Surveys shall provide 100 percent coverage of the construction area. All Desert Tortoise burrows located will be conspicuously flagged or marked. All Desert Tortoise burrows, and other species' burrows that may be used by Desert Tortoises, will be examined to determine the occupancy of each burrow by tortoises, using a fiber-optic scope, if necessary.

10. From November 1 through February 28, environmental monitors (in place of Desert Tortoise biologists) will be on site during all phases of transmission line construction, to ensure that all construction vehicles and heavy equipment remain within the boundaries of the marked construction zone. If necessary, a qualified Desert Tortoise biologist will be brought on site to excavate any tortoise burrow in harms way.

11. Desert Tortoises and eggs found within construction sites will be removed by qualified Desert Tortoise biologists, in accordance with the most current protocols identified by the BLM and USFWS. Desert Tortoises removed from the project sites will be released into undisturbed habitat within 1,000 feet of the collection site.

    Any Desert Tortoise removed from construction sites shall be placed in the shade of a shrub or in a natural, unoccupied burrow similar to the one in which it was found or in an artificial burrow, following the most current protocol approved by the BLM and USFWS. Desert Tortoises shall not be placed on lands outside the administration of the federal government without the written permission of the landowner. Desert Tortoises shall be purposely moved only by qualified tortoise biologists, solely for the purpose of moving them out of harm's way.

12. Any excavated holes related to transmission line construction (i.e., foundations) left open overnight will be covered, and/or tortoise proof fencing will be installed to prevent the possibility of tortoises falling into the open holes.

13. Anyone on the right-of-way within Desert Tortoise habitat will be required to check under their vehicle before driving away. This includes all construction equipment and the area

under vehicles should be checked any time a vehicle is left unattended, as well as in the morning before any construction activity begins.

Measures that would minimize predation on tortoises by ravens drawn to construction areas or by unleashed dogs brought to construction areas:

14. To prevent mortality, injury, and harassment of Desert Tortoises and damage to their burrows and coversites, no pets shall be permitted in any project construction area, unless confined or leashed.

15. Trash and food items will be removed daily by construction workers and placed in raven-proof containers.

Measures that would minimize destruction of Desert Tortoise habitat, such as soil compaction, erosion, or crushed vegetation, resulting from construction or maintenance activities:

16. In construction areas where recontouring is not required, vegetation will be left in place wherever possible, and the original contouring will be maintained, to avoid excessive root damage and to allow for resprouting.

17. Except for repairs necessary to make roads passable, no widening or upgrading of existing roads will be undertaken in the area of construction and operation where soils and vegetation are very sensitive to disturbance.

18. The alignment of any new access roads or overland routes will follow the designated area's landform contours where possible, provided that such alignment does not impact additional resources. These alignments should minimize ground disturbance and/or reduce scarring.

19. All new access roads not required for maintenance will be permanently closed using the most effective and least environmentally-damaging method appropriate to that area, with the concurrence of the landowner or land manager (e.g., stockpiling and replacing topsoil or rock replacement). These closures would limit new or improved accessibility into the area.

20. Within Desert Tortoise habitat, a biologist will be assigned to the pre-construction survey team(s). The biologist will be responsible for ensuring that the placement of new access routes, spur roads, and tower sites will affect as few tortoise burrows as possible. The alignment of access and spur roads will be as direct as possible, to minimize habitat disturbance and minimize the destruction of tortoise burrows. Other work areas (e.g., splicing, tensioning, pulling, and batch sites) will be surveyed by a biologist as construction proceeds. Potential work areas will be flagged several days prior to

construction for review by a biologist. To the extent possible, these sites will be located in previously disturbed areas.

21. Overnight parking and storage of equipment will be in previously disturbed areas (i.e., lacking vegetation). These areas will also be designated by the pre-construction survey team. If previously disturbed areas are not available, these activities will be restricted to the right-of-way and will be cleared of tortoises by the on-site biologist prior to use.

22. Within Desert Tortoise habitat, construction and maintenance workers will strictly limit their activities and vehicles to construction areas and routes of travel that have been identified and/or flagged to eliminate adverse impacts to Desert Tortoises and their habitat. Aside from these areas, workers may not drive cross-country, even within the right-of-way. All workers will be instructed that their activities are restricted to previously identified, flagged or cleared areas.

23. To the extent possible, access to tower sites, and at splicing and tensioning sites will occur by overland travel and crushing of vegetation (i.e., no blading of such sites will occur). The CIC will ensure that blading is conducted only where necessary. Due to construction constraints resulting from equipment size and personnel safety, blading would be needed at most spur roads and tower sites.

24. In areas where restoration is required, reseeding will occur through the use of native plant species. Reclamation and monitoring requirements and practices will be approved by the BLM.

25. Prior to construction, only herbicides that are approved by the BLM will be applied to identified weed infestations in tortoise habitat.

Measures that would be taken to ensure compliance with measures contained within the Biological Opinion:

26. The project proponent will designate a CIC, who will be responsible for overseeing compliance with protective stipulations for the Desert Tortoise and for coordinating compliance with the BLM. The CIC will have the authority to halt activities of construction equipment that may be in violation of the stipulations.

27. All construction and maintenance workers will participate in a tortoise-education program. The program will be developed by the project proponent prior to the beginning of construction. The program will be submitted to the USFWS for review and approval prior to implementation. The program will include, at a minimum, the following topics: (a) the occurrence of Desert Tortoises; (b) the sensitivity of the species to human activities; (c) legal protection for Desert Tortoises; (d) penalties for violations of federal and state laws; (e) general tortoise activity patterns; (f) reporting requirements; (g)

measures to protect tortoises; and (h) personal measures employees can take to promote the conservation of Desert Tortoises.

28. The USFWS and BLM will be notified within three days of any tortoise death or injury caused by project activities. Notification will include the date, time, circumstances, and locations of any injury or death. Dead animals may be marked and left on-site. Injured animals will be transported to a qualified veterinarian. The USFWS will furnish direction on the final disposition of tortoises taken to a veterinarian.

29. The CIC and on-site biologist will prepare a report for the BLM and USFWS no later than 90 days after completion of construction within Desert Tortoise habitat. The report will document the effectiveness of the tortoise mitigation measures, the number of tortoises excavated from burrows, and the number of tortoises moved from construction sites. The report will make recommendations for modifying or refining the stipulations, to enhance benefits to the tortoise or to reduce needless hardship on the project proponent. The report will include an estimate of the actual acreage of habitat disturbance caused by crushing and blading versus the estimates prior to construction.

30. Offsite mitigation fees collected for Clark County shall be deposited in interest-bearing escrow accounts to be established by the project proponent. Upon conclusion of the rehabilitation evaluation, which shall occur no later than seven years after the reclamation project work is completed, the project proponent shall receive a refund of the offsite mitigation fees equal to the percentage in which the rehabilitation is successful.

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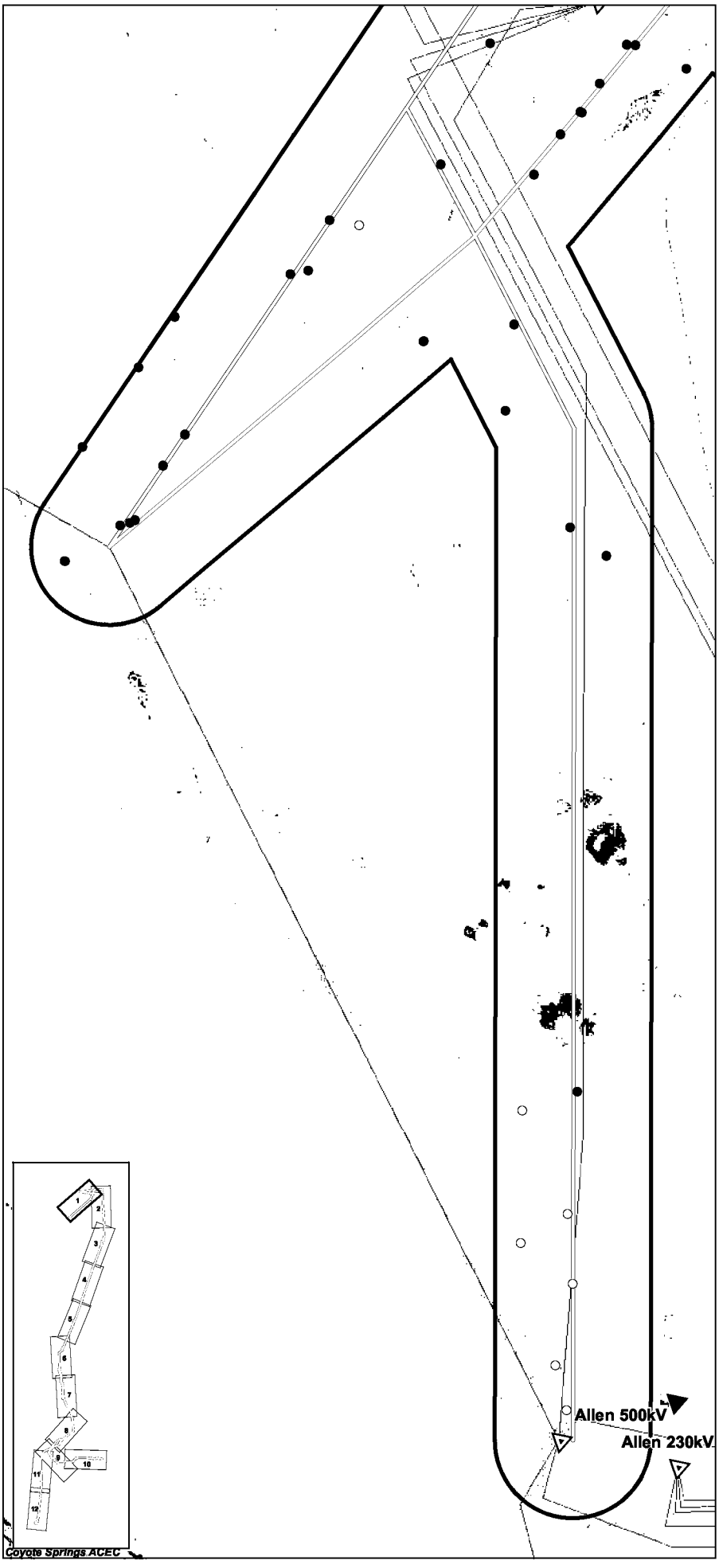
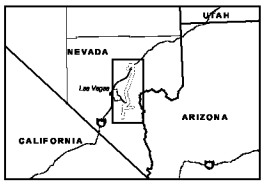
Appendix A

Aerial Maps Showing Desert Tortoise Locations





LEGEND

Project Features

- Proposed Project Centerline
- Desert Tortoise Survey Corridor

Desert Tortoise Sign

- Live Tortoise
- Carcass
- Burrow
- Scat
- Egg Shells
- Track

Management Areas

- Area of Critical Environmental Concern
- Designated Wilderness Area
- Instant Study Area
- National Conservation Area

Utilities

- Substation
- Generating Station
- SWIP 500kV Transmission Line ROW
- Proposed 500kV Transmission Line
- 500kV Transmission Line
- 345kV Transmission Line
- 230kV Transmission Line
- Sub-230kV Transmission Line

Reference Features

- State Boundary
- Interstate
- Highway/Major Road
- Local Road
- Railroad

Southern Nevada Intertie Project 500kV Transmission Line

Great Basin Transmission, LLC

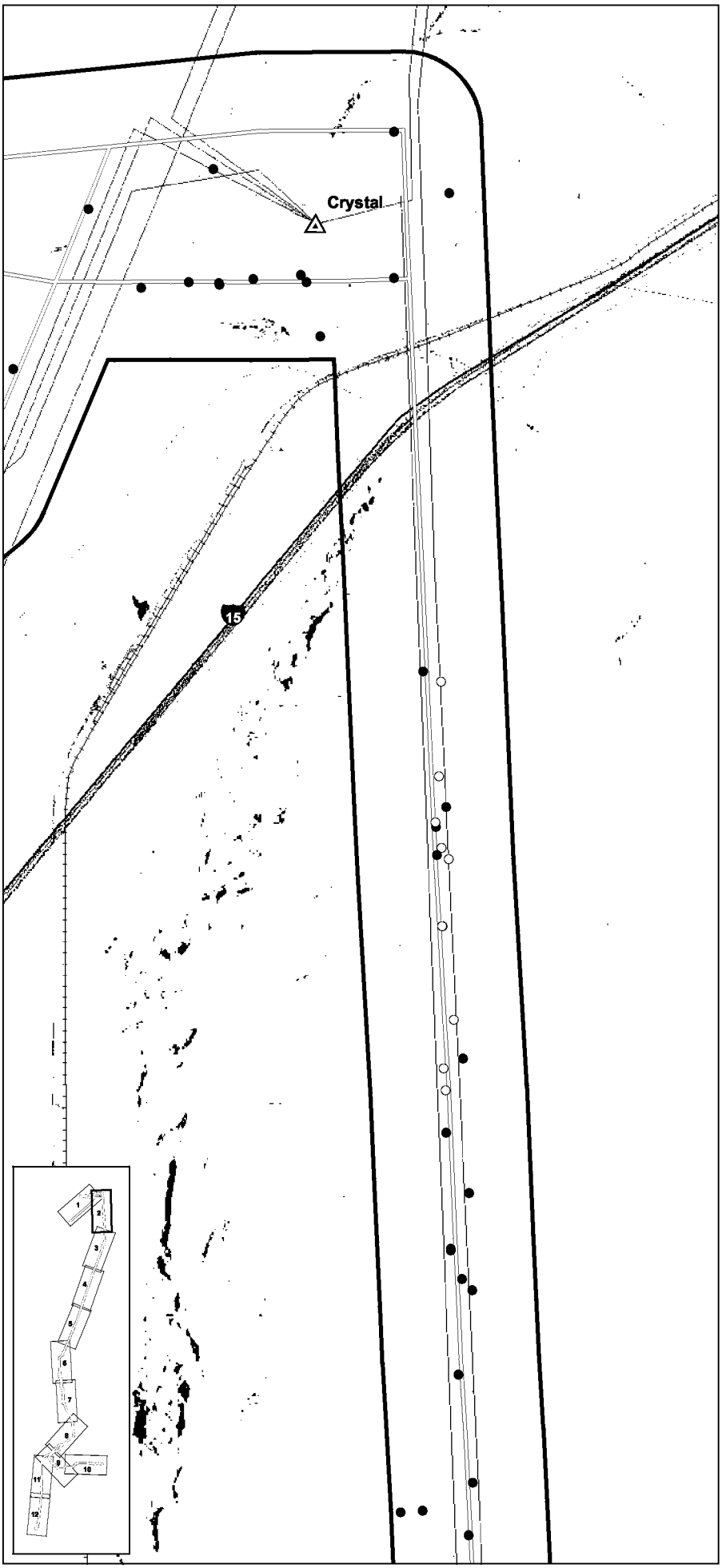
Map 1

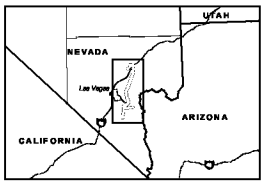
Desert Tortoise Survey Map

0 0.25 0.5 1 Miles

Sources: USGS 30-Meter pixel elevation date; LS Power, 2009; EPG, 2009;

August 4, 2009





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Southern Nevada Intertie Project 500kV Transmission Line

Great Basin Transmission, LLC

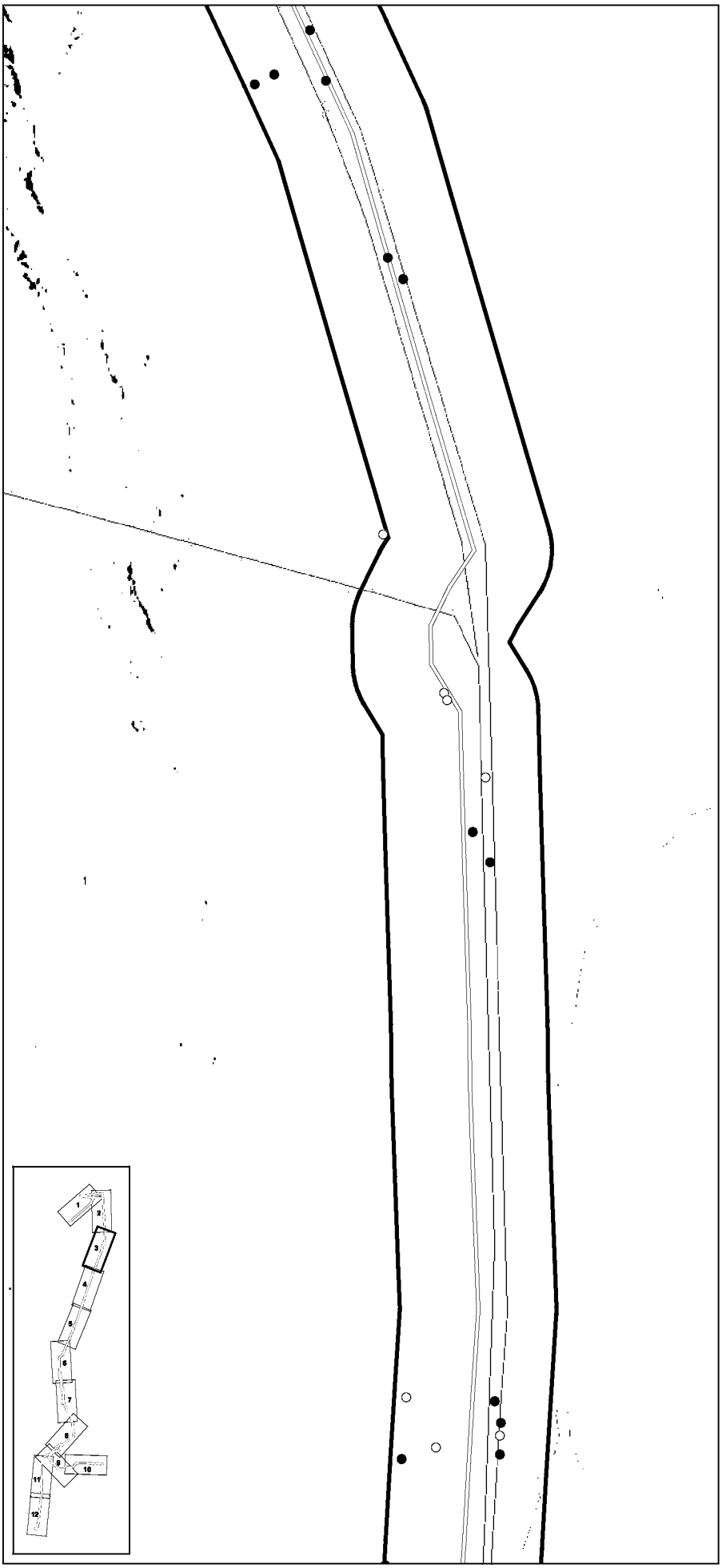
Map 2

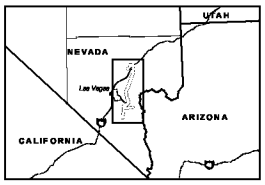
Desert Tortoise Survey Map

0 0.25 0.5 1 Miles

Sources: USGS 30-Meter pixel elevation date; LS Power, 2009; EPG, 2009;

August 4, 2009





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Reference Features

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Southern Nevada Intertie Project 500kV Transmission Line

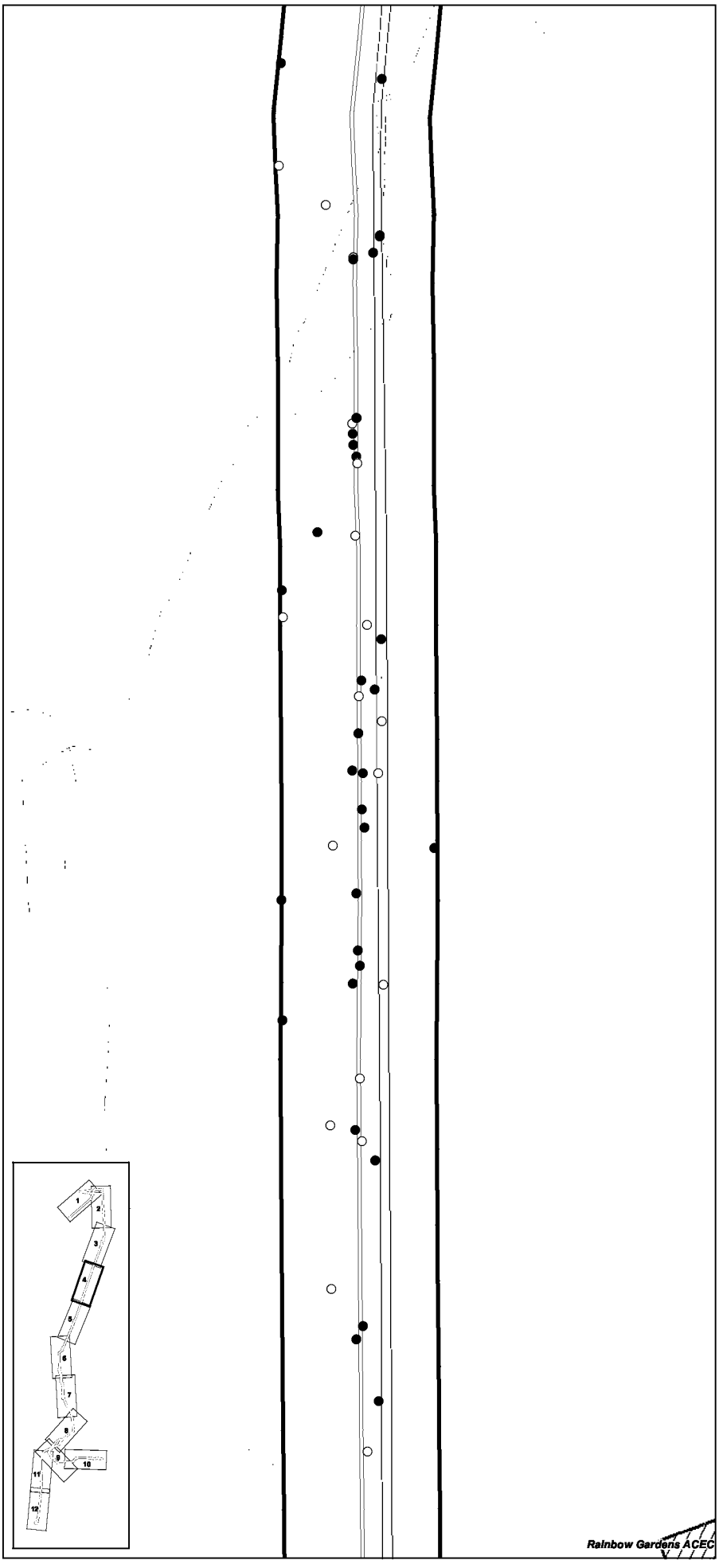
Great Basin Transmission, LLC

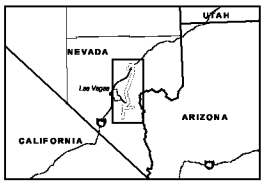
Map 3

Desert Tortoise Survey Map

Sources: USGS 30-Meter pixel elevation date; LS Power, 2009; EPG, 2009;

August 4, 2009





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Reference Features

- State Boundary
- Interstate
- Highway/Major Road
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- Railroad

Southern Nevada Intertie Project
500kV Transmission Line

Great Basin Transmission, LLC

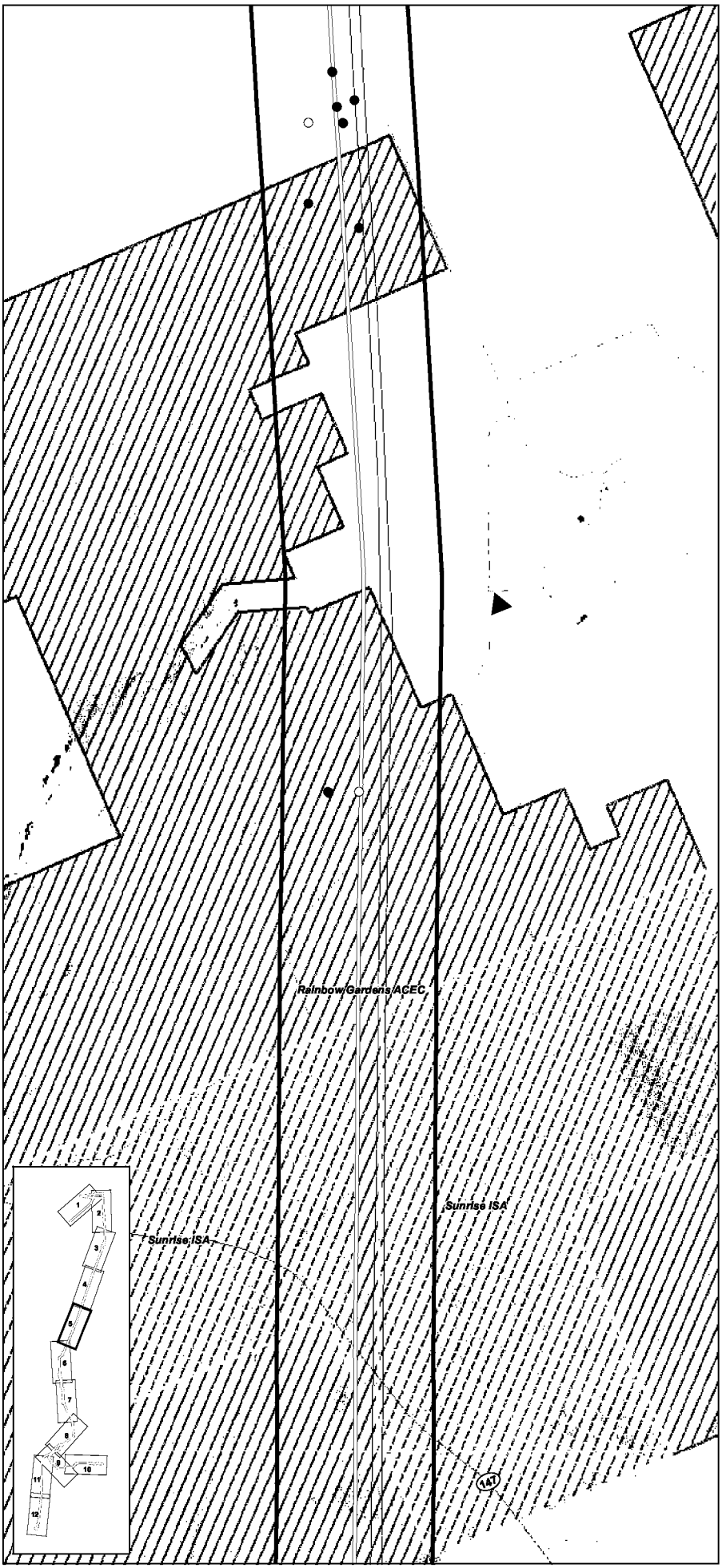
Map 4

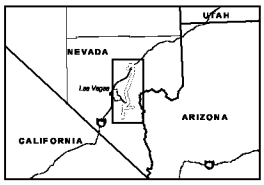
Desert Tortoise Survey Map

0 0.25 0.5 1
Miles

Sources: USGS 30-Meter pixel elevation date; LS Power, 2009; EPG, 2009;

August 4, 2009





LEGEND

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Reference Features

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Southern Nevada Intertie Project
500kV Transmission Line

Great Basin Transmission, LLC

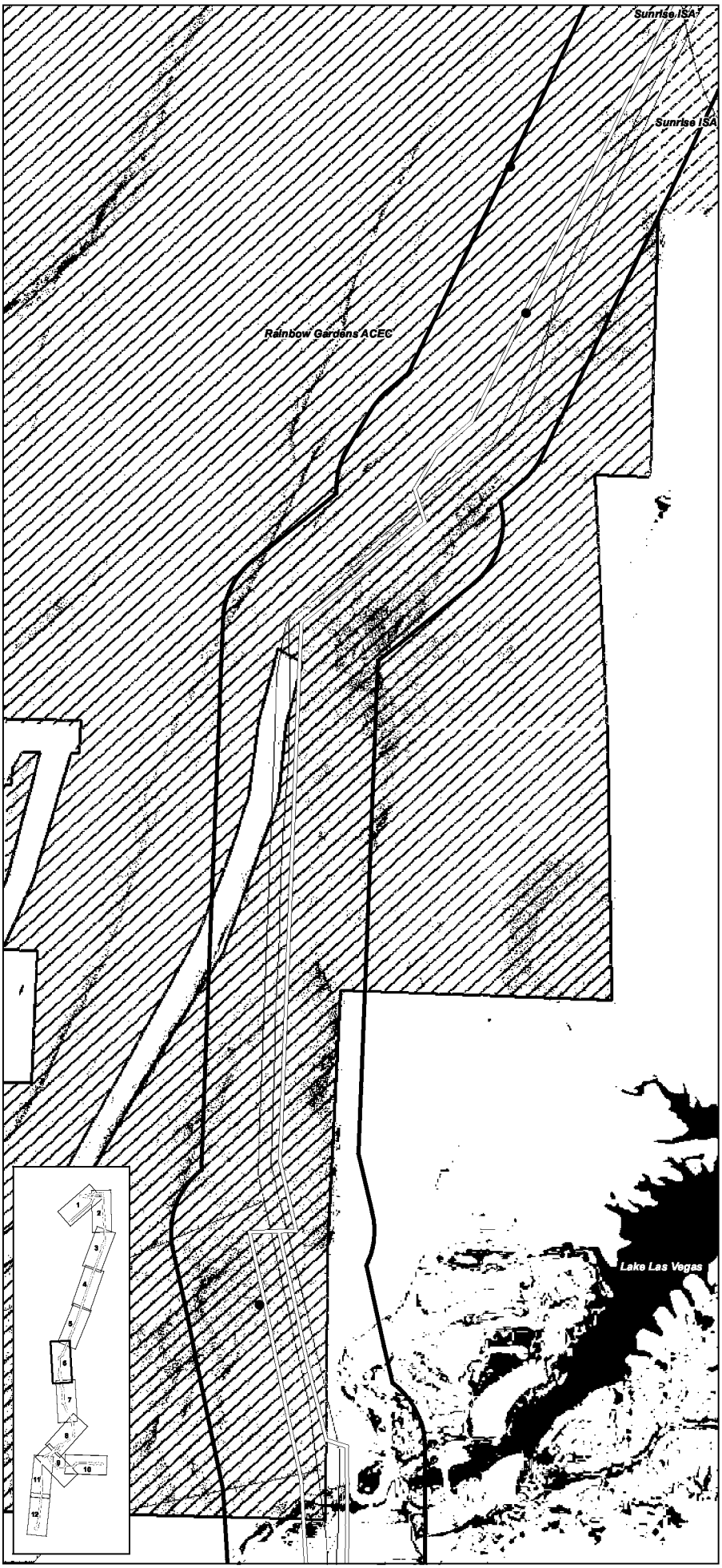
Map 5

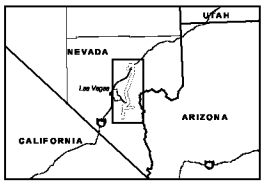
Desert Tortoise Survey Map

0 0.25 0.5 1
Miles

Sources: USGS 30-Meter pixel elevation date; LS Power, 2009; EPG, 2009;

August 4, 2009





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- National Conservation Area

Utilities

- Substation
- Generating Station
- SWIP 500kV Transmission Line ROW
- Proposed 500kV Transmission Line
- 500kV Transmission Line
- 345kV Transmission Line
- 230kV Transmission Line
- Sub-230kV Transmission Line

Reference Features

- State Boundary
- Interstate
- Highway/Major Road
- Local Road
- Railroad

Southern Nevada Intertie Project
500kV Transmission Line

Great Basin Transmission, LLC

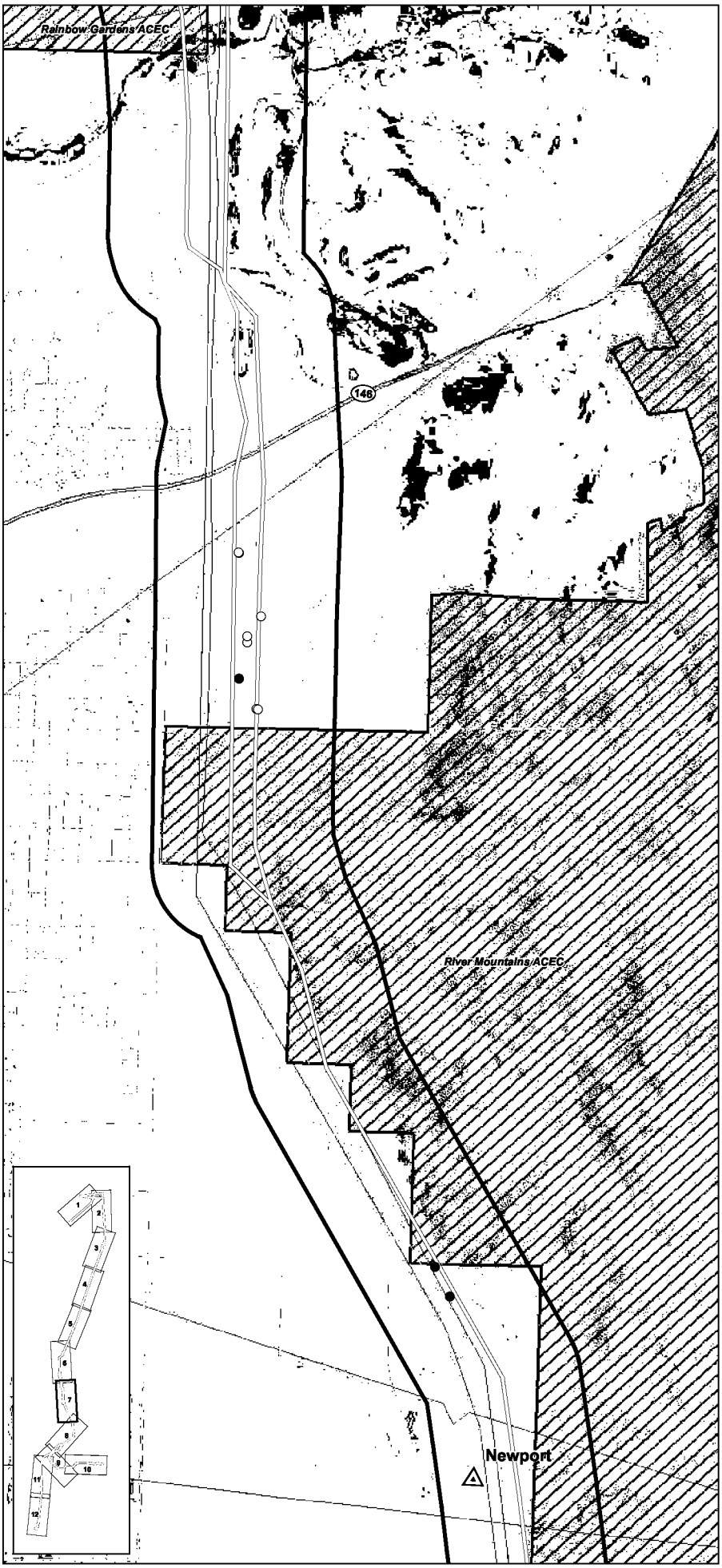
Map 6

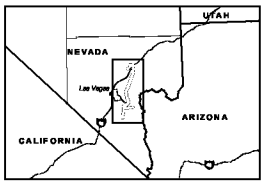
Desert Tortoise Survey Map

0 0.25 0.5 1
Miles

Sources: USGS 30-Meter pixel elevation date; LS Power, 2009; EPG, 2009;

August 4, 2009





LEGEND

Project Features

- Proposed Project Centerline
- Desert Tortoise Survey Corridor

Desert Tortoise Sign

- Live Tortoise
- Carcass
- Burrow
- Scat
- Egg Shells
- Track

Management Areas

- Area of Critical Environmental Concern
- Designated Wilderness Area
- Instant Study Area
- National Conservation Area

Utilities

- Substation
- Generating Station
- SWIP 500kV Transmission Line ROW
- Proposed 500kV Transmission Line
- 500kV Transmission Line
- 345kV Transmission Line
- 230kV Transmission Line
- Sub-230kV Transmission Line

Reference Features

- State Boundary
- Interstate
- Highway/Major Road
- Local Road
- Railroad

Southern Nevada Intertie Project
500kV Transmission Line

Great Basin Transmission, LLC

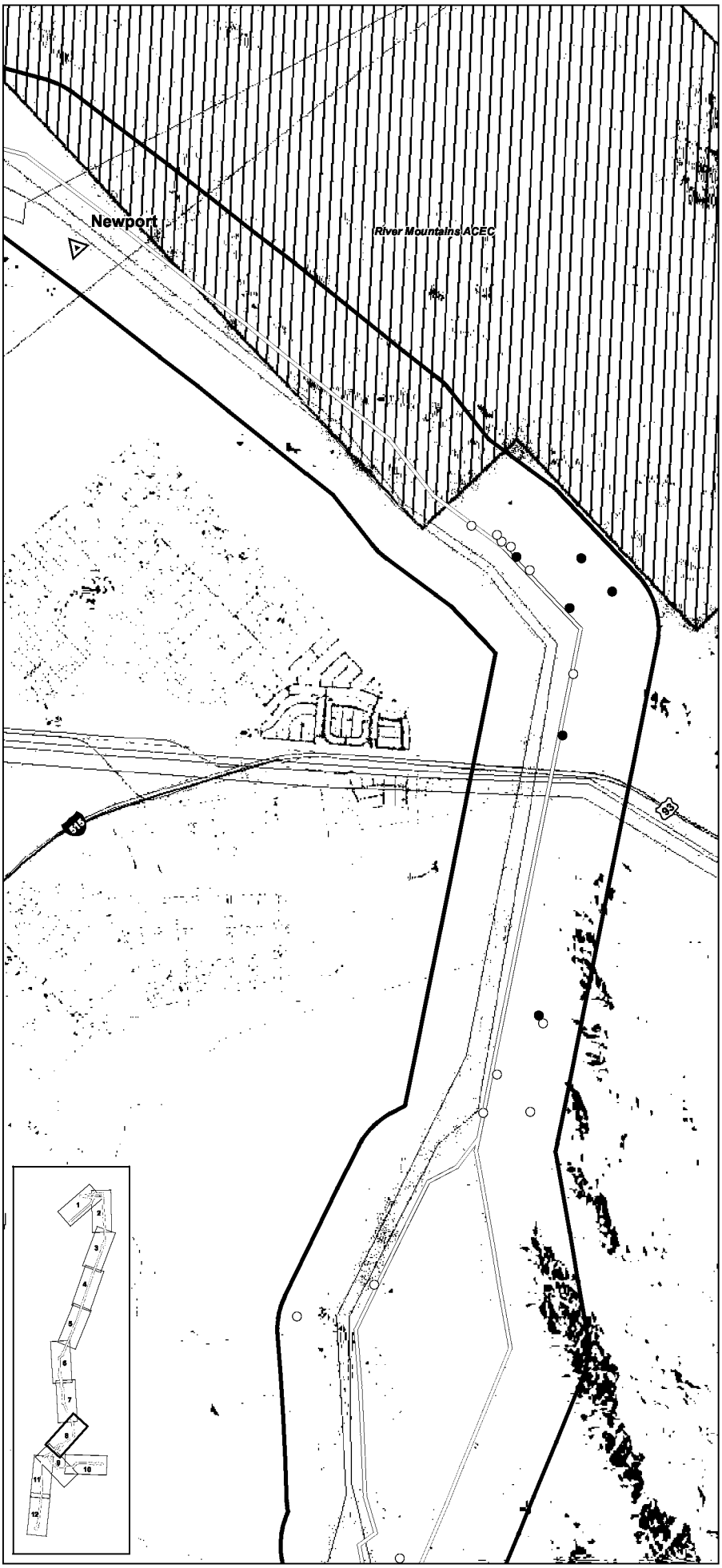
Map 7

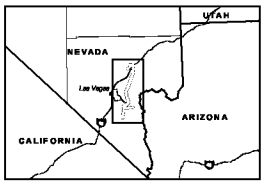
Desert Tortoise Survey Map

0 0.25 0.5 1
Miles

Sources: USGS 30-Meter pixel elevation date; LS Power, 2009; EPG, 2009;

August 4, 2009





LEGEND

Project Features

- Proposed Project Centerline
- Desert Tortoise Survey Corridor

Desert Tortoise Sign

- Live Tortoise
- Carcass
- Burrow
- Scat
- Egg Shells
- Track

Management Areas

- Area of Critical Environmental Concern
- Designated Wilderness Area
- Instant Study Area
- National Conservation Area

Utilities

- Substation
- Generating Station
- SWIP 500kV Transmission Line ROW
- Proposed 500kV Transmission Line
- 500kV Transmission Line
- 345kV Transmission Line
- 230kV Transmission Line
- Sub-230kV Transmission Line

Reference Features

- State Boundary
- Interstate
- Highway/Major Road
- Local Road
- Railroad

Southern Nevada Intertie Project
500kV Transmission Line

Great Basin Transmission, LLC

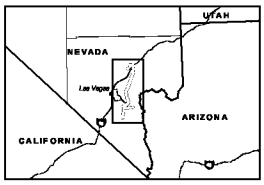
Map 8

Desert Tortoise Survey Map

0 0.25 0.5 1 Miles

Sources: USGS 30-Meter pixel elevation date; LS Power, 2009; EPG, 2009;

August 4, 2009



LEGEND

Project Features

- Proposed Project Centerline
- Desert Tortoise Survey Corridor

Desert Tortoise Sign

- Live Tortoise
- Carcass
- Burrow
- Scat
- Egg Shells
- Track

Management Areas

- Area of Critical Environmental Concern
- Designated Wilderness Area
- Instant Study Area
- National Conservation Area

Utilities

- Substation
- Generating Station
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- Proposed 500kV Transmission Line
- 500kV Transmission Line
- 345kV Transmission Line
- 230kV Transmission Line
- Sub-230kV Transmission Line

Reference Features

- State Boundary
- Interstate
- Highway/Major Road
- Local Road
- Railroad

Southern Nevada Intertie Project 500kV Transmission Line

Great Basin Transmission, LLC

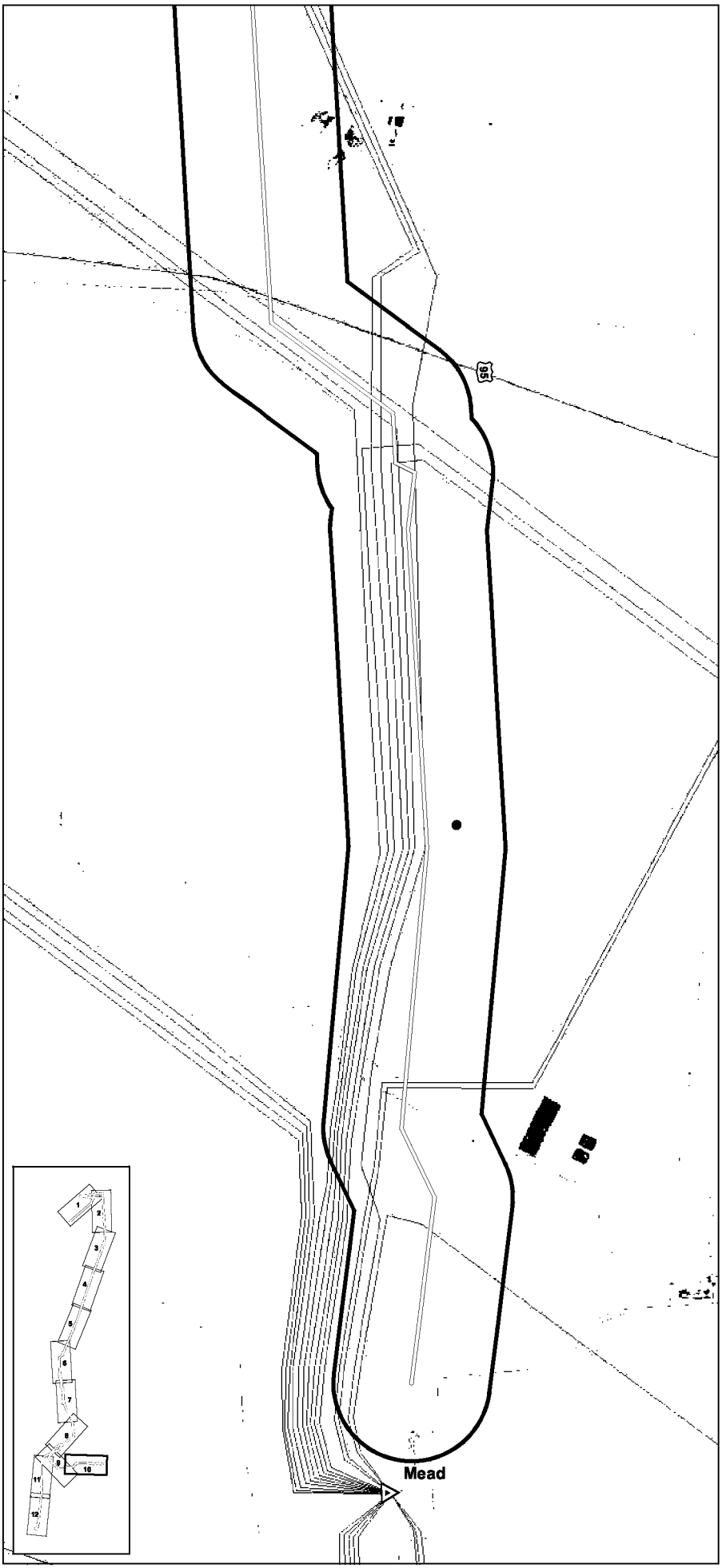
Map 9

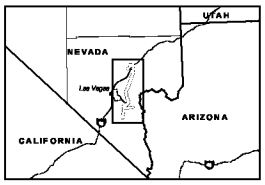
Desert Tortoise Survey Map

0 0.25 0.5 1 Miles

Sources: USGS 30-Meter pixel elevation date; LS Power, 2009; EPG, 2009;

August 4, 2009





LEGEND

Project Features

- Proposed Project Centerline
- Desert Tortoise Survey Corridor

Desert Tortoise Sign

- Live Tortoise
- Carcass
- Burrow
- Scat
- Egg Shells
- Track

Management Areas

- Area of Critical Environmental Concern
- Designated Wilderness Area
- Instant Study Area
- National Conservation Area

Utilities

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- Generating Station
- SWIP 500kV Transmission Line ROW
- Proposed 500kV Transmission Line
- 500kV Transmission Line
- 345kV Transmission Line
- 230kV Transmission Line
- Sub-230kV Transmission Line

Reference Features

- State Boundary
- Interstate
- Highway/Major Road
- Local Road
- Railroad

Southern Nevada Intertie Project
500kV Transmission Line

Great Basin Transmission, LLC

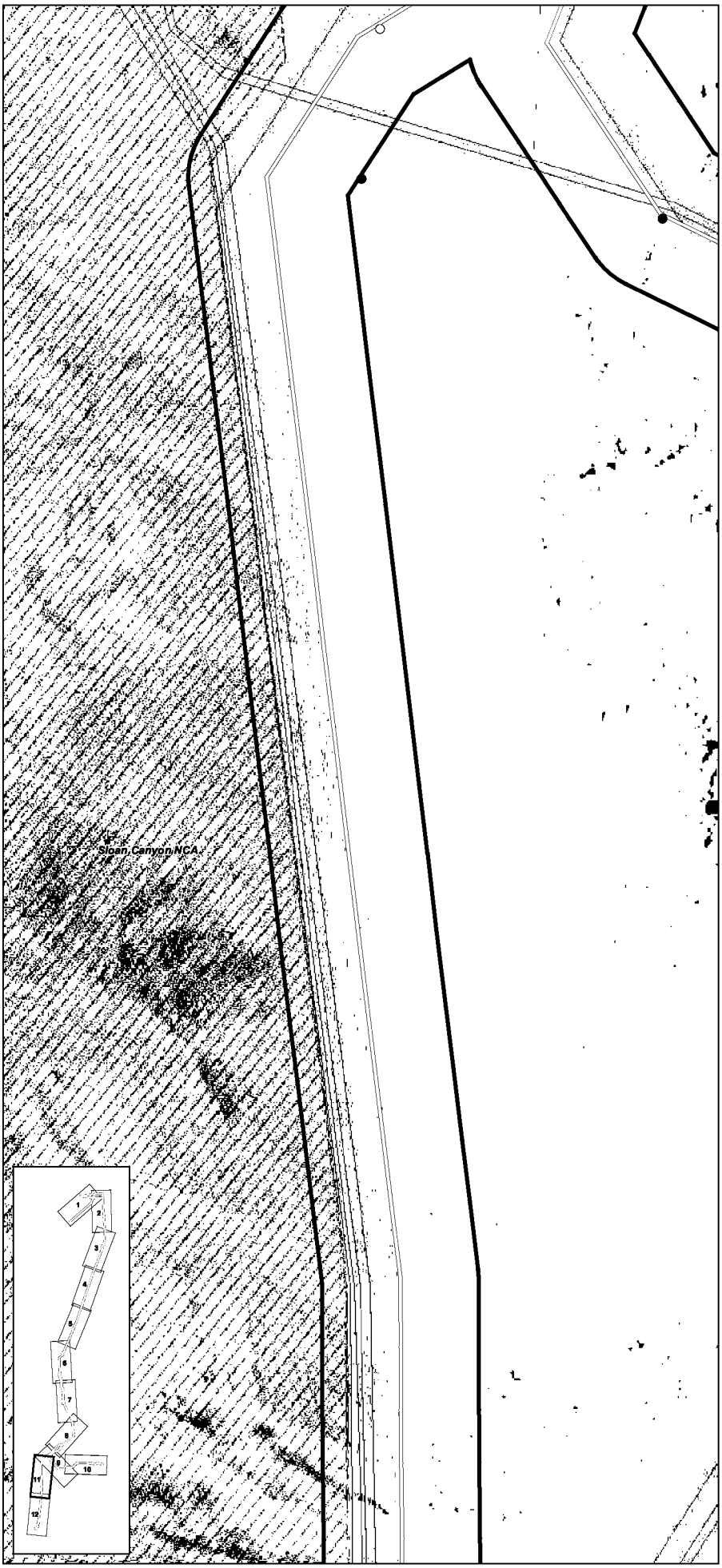
Map 10

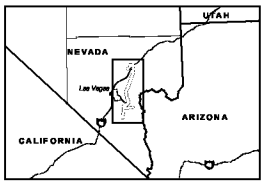
Desert Tortoise Survey Map

0 0.25 0.5 1
Miles

Sources: USGS 30-Meter pixel elevation date; LS Power, 2009; EPG, 2009;

August 4, 2009





LEGEND

Project Features

- Proposed Project Centerline
- Desert Tortoise Survey Corridor

Desert Tortoise Sign

- Live Tortoise
- Carcass
- Burrow
- Scat
- Egg Shells
- Track

Management Areas

- Area of Critical Environmental Concern
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- 500kV Transmission Line
- 345kV Transmission Line
- 230kV Transmission Line
- Sub-230kV Transmission Line

Reference Features

- State Boundary
- Interstate
- Highway/Major Road
- Local Road
- Railroad

Southern Nevada Intertie Project
500kV Transmission Line

Great Basin Transmission, LLC

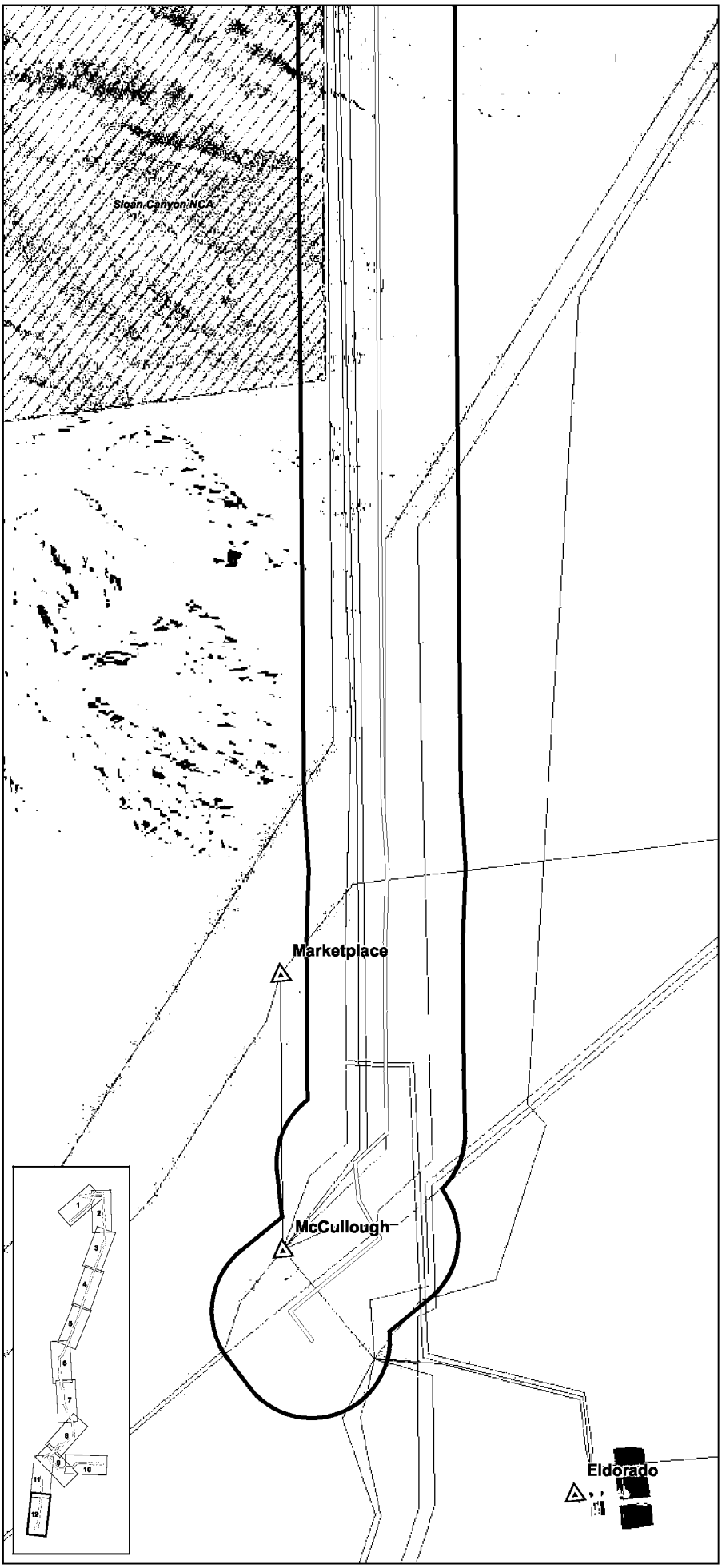
Map 11

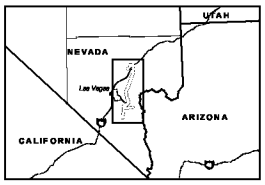
Desert Tortoise Survey Map

0 0.25 0.5 1
Miles

Sources: USGS 30-Meter pixel elevation date; LS Power, 2009; EPG, 2009;

August 4, 2009





LEGEND

Project Features

- Proposed Project Centerline
- Desert Tortoise Survey Corridor

Desert Tortoise Sign

- Live Tortoise
- Carcass
- Burrow
- Scat
- Egg Shells
- Track

Management Areas

- Area of Critical Environmental Concern
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- 345kV Transmission Line
- 230kV Transmission Line
- Sub-230kV Transmission Line

Reference Features

- State Boundary
- Interstate
- Highway/Major Road
- Local Road
- Railroad

Southern Nevada Intertie Project
500kV Transmission Line

Great Basin Transmission, LLC

Map 12

Desert Tortoise Survey Map

0 0.25 0.5 1 Miles

Sources: USGS 30-Meter pixel elevation date; LS Power, 2009; EPG, 2009;

August 4, 2009

Appendix B

USFWS Approved Desert Tortoise Survey Protocol

PREPARING FOR ANY ACTION THAT MAY OCCUR WITHIN THE RANGE OF THE MOJAVE DESERT TORTOISE (*Gopherus agassizii*)

The Mojave population of the desert tortoise (*Gopherus agassizii*) was listed by the U.S. Fish and Wildlife Service (USFWS) as threatened on April 2, 1990 (USFWS 1990) and by the State of California on August 3, 1989. Subsequently, proposed actions within the range of the desert tortoise fall under purview of the Endangered Species Act 1973, as amended (ESA), in addition to State regulations, including the California Endangered Species Act (CESA). For detailed information on the ecology of the Mojave desert tortoise, please see USFWS (2009).

This protocol provides recommendations for survey methodology to determine presence/absence and abundance of desert tortoises for projects occurring within the species range on Federal and non-Federal lands, and to provide a standard method for reporting survey results. Information gathered from these procedures will: 1) help determine the appropriate level of consultation with USFWS and the appropriate state agency; 2) help determine the incidental take of desert tortoises resulting from proposed projects as defined by the ESA and CESA; and 3) help minimize and avoid take.

This guidance includes:

- Site Assessment
- Pre-project Field Survey Protocol for Potential Desert Tortoise Habitats
- USFWS 2009 Desert Tortoise Pre-project Survey Data Sheet

This guidance is subject to revision as new information becomes available. Before initiating the protocols described below, please check with your local USFWS and appropriate state agency offices to verify that you are implementing the most up-to-date methods. To ensure quality and reduce the likelihood of nonconcurrence with survey results, we recommend that the names and qualifications of the surveyors be provided to USFWS and appropriate state agency for review prior to initiating surveys.

In Arizona:

U.S. Fish and Wildlife Service
Arizona Ecological Services
323 N. Leroux St., Suite 201
Flagstaff, AZ 86001
(928) 226-0614

In California, for Inyo, Kern, Los Angeles, and San Bernardino Counties:

U.S. Fish and Wildlife Service
Ventura Fish and Wildlife Office
2493 Portola Road, Suite B
Ventura, California 93003
(805) 644-1766

In California, for Imperial and Riverside Counties, and Joshua Tree National Park and the San Bernardino National Forest in San Bernardino Co:

U.S. Fish and Wildlife Service
Carlsbad Fish and Wildlife Office
6010 Hidden Valley Road
Carlsbad, California 92009
(760) 431-9440

In Nevada:

U.S. Fish and Wildlife Service
Southern Nevada Field Office
4701 North Torrey Pines Drive
Las Vegas, Nevada 89130
(702) 515-5230

In Utah:

U.S. Fish and Wildlife Service
Utah Ecological Services Field Office
2369 West Orton Circle
West Valley City, Utah 84119
(801) 975-3330

State Agencies

Arizona Game & Fish Department
State Headquarters--Nongame Branch
5000 W. Carefree Highway
Phoenix, AZ 85086
623-236-7767

California Department of Fish and Game (CDFG)
For Fresno, Kern, Kings, Madera, Mariposa, Merced, Monterey, San Benito, San Luis Obispo, Stanislaus, Tulare and Tuolumne Counties:
Central Region Headquarters Office
1234 E. Shaw Avenue
Fresno, CA 93710
(559) 243-4005 ext. 151

For Imperial, Inyo, Mono, Riverside and San Bernardino Counties:
Inland Deserts Regional Office
3602 Inland Empire Boulevard, Suite C-220
Ontario, CA 91764
(909) 484-0167

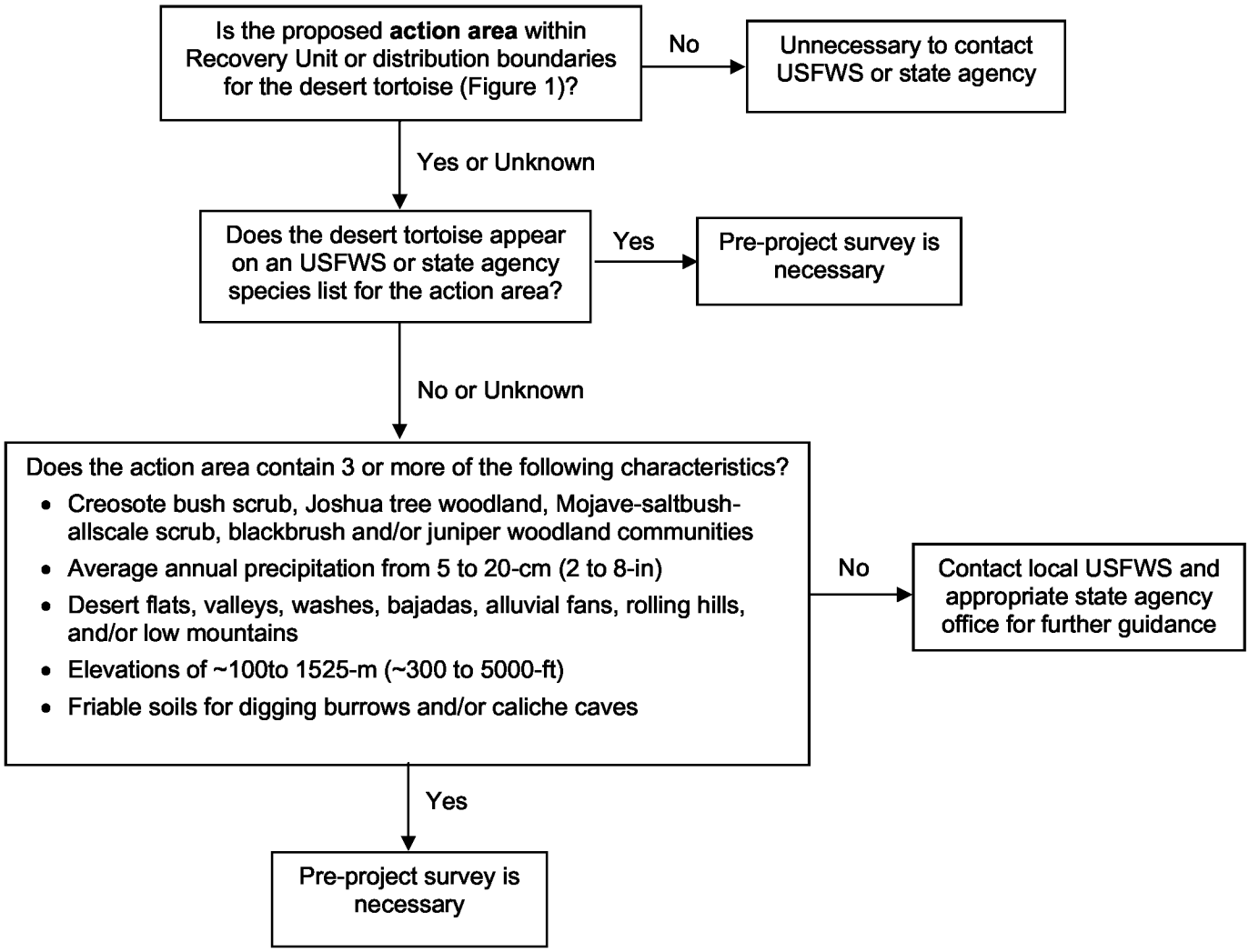
For Los Angeles, Orange, San Diego, Santa Barbara and Ventura Counties:
South Coast Regional Office
4949 Viewridge Avenue
San Diego, CA 92123
(858) 467-4201

Nevada: Department of Wildlife:
Southern Region
4747 Vegas Dr.
Las Vegas, NV 89108
(702) 486-5127

Utah Division of Wildlife Resources:
Southern Region
1470 N Airport Rd
Cedar City, UT 84720
(435) 865-6100

Site Assessment

Use the below key to assess if desert tortoises may be present within or near the action area and determine survey and consultation requirements[1]. The **action area** is defined by regulation as all areas to be affected directly or indirectly and not merely the immediate area involved in the action (50 CFR §402.02). The extent of the action area is not limited to the "footprint" of the action nor is it limited by the authority of the Federal, state, or local agency or any other entity proposing the project. The environmental baseline, the analysis of the effects of the action, and the amount or extent of incidental take are based upon the action area. If you cannot access the entire action area during your surveys for some reason (e.g. access to private property is unavailable), please note that in your survey report.



[1] If determined that the proposed project is not likely to adversely affect the desert tortoise and a tortoise or tortoise sign (shells, bones, scutes, limbs, burrows, pallets, scats, egg shell fragments, tracks, courtship rings, drinking sites, mineral licks, etc.) is found in the action area during implementation of the proposed project, the proposed action should *immediately* stop and then it must be determined whether further or formal consultation is necessary to comply with the ESA or CESA in California. It is recommended that the USFWS and CDFG in California be notified in writing within three days of the discovery. This short notification period will help ensure a prompt response by USFWS and CDFG to facilitate ESA and CESA compliance.

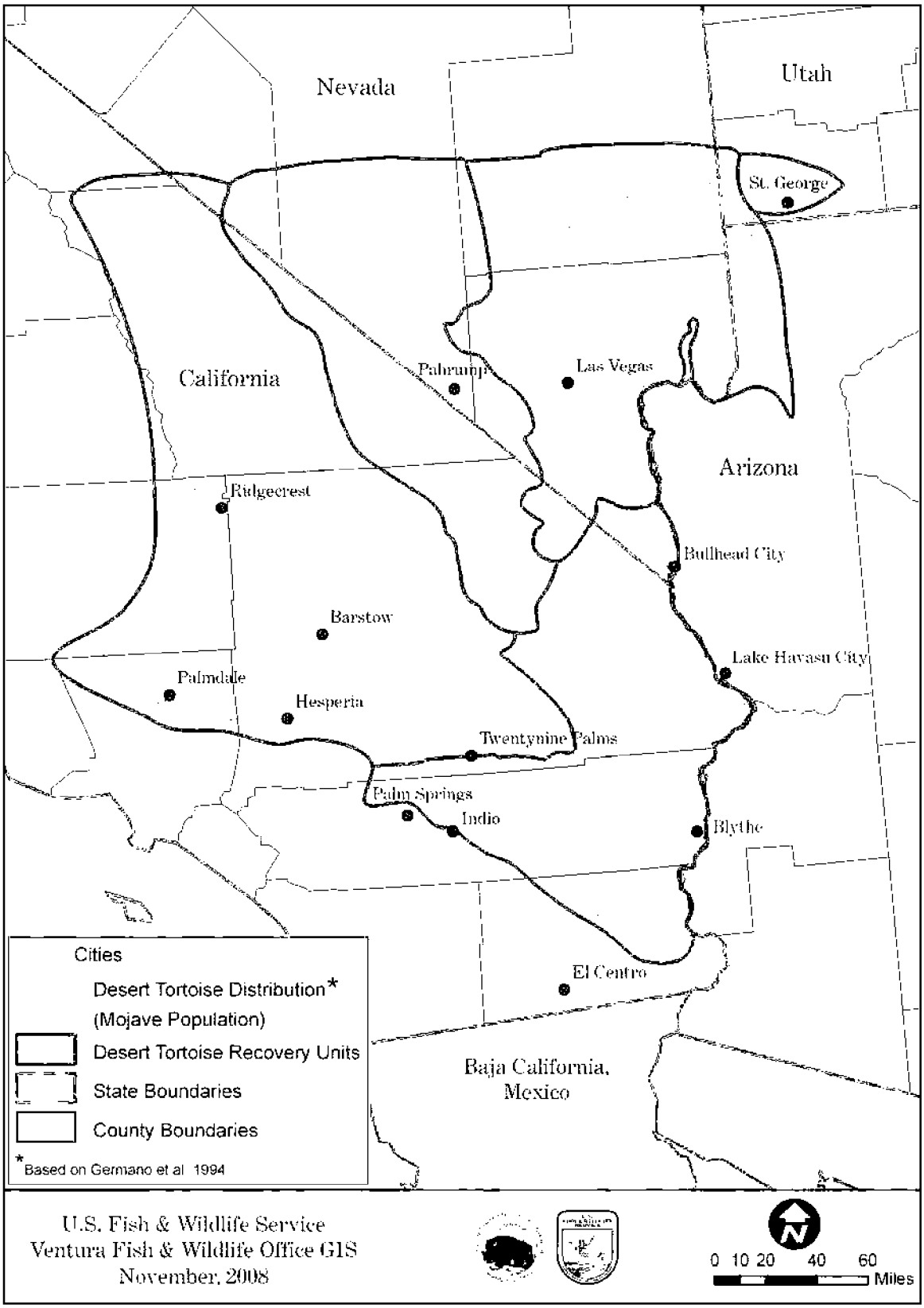


Figure 1: Known Range of the Desert Tortoise (Mojave Population)

Pre-project Field Survey Protocol for Potential Desert Tortoise Habitats

Objectives of survey

- Determine presence or absence of desert tortoises within the action area
- Estimate the number of tortoises (abundance) within the action area
- Assess the distribution of tortoises within the action area to inform take avoidance and minimization

The **action area** is defined by regulation as all areas to be affected directly or indirectly and not merely the immediate area involved in the action (50 CFR §402.02). The action area is not limited to the "footprint" of the action or jurisdiction. Rather, it is a biological determination of the reach of the proposed action on listed species.

Field Methods

This protocol takes into account the fact that not all tortoises within the action area are seen by the surveyor. Provided is an equation which accounts for tortoises that are below ground at the time of surveys and for above-ground tortoises that are cryptic and may be missed.

$$\begin{pmatrix}\text{Estimated number of tortoises}\\ \text{within action area}\end{pmatrix} = \frac{\begin{pmatrix}\text{Number of tortoises}\\ \text{observed above ground}\end{pmatrix}}{\begin{pmatrix}\text{Probability that}\\ \text{a tortoise is}\\ \text{above ground } (P_a)\end{pmatrix}\begin{pmatrix}\text{Probability of}\\ \text{detecting a tortoise,}\\ \text{if above ground } (P_d)\end{pmatrix}}\begin{pmatrix}\text{Action area}\\ \text{Area surveyed}\end{pmatrix}$$

Surveys of 100% coverage, or probabilistic sampling where appropriate, should utilize this equation to estimate the number of tortoises within the action area (see below; Table 1, P_a and P_d).

- Information to determine presence/absence *and* estimate number of tortoises within the action area is collected during the same survey effort. Surveyed objects include all tortoises that are above ground (both out of burrows and within burrows but still visible), as well as all tortoise sign (burrows, scats, carcasses, etc). Record all locations of tortoises and sign encountered during the survey effort using the USFWS 2009 Desert Tortoise Pre-Project Survey Data Sheet (attached). Please submit a copy of the original datasheets with results of the survey to your local USFWS office.
- Surveys should be conducted during the tortoise's most active periods (April through May or September through October) (Nussear and Tracy 2007; Inman 2008; USFWS 2009). Surveys outside these time periods may be approved by USFWS, and CDFG in California (e.g., warm weather in March or rainfall in August stimulating increased tortoise activity).
- Desert tortoises utilize burrows to avoid daily and annual thermal extremes (Woodbury and Hardy 1948). Therefore, surveys should take place when air temperatures are below 40°C (104°F) (Zimmerman et al. 1994; Walde et al. 2003; Inman 2008). Air temperature is measured ~5-cm from the soil surface in an area of full sun, but in the shade of the observer.
- Ten-meter (~30-ft) wide belt transects should be used during surveys. For all projects, surveys which cover the entire project area with the 10-m belt transects (100% coverage) are always an acceptable option. For very large action areas, probabilistic sampling may also be an option, such that the appropriate proportion of the action area is surveyed (Table 2). If probabilistic sampling is an option for the project site, each transect should be chosen either systematically or randomly ensuring that the entire action area has an equal probability of being included in the sample. Transects should be completed in a random order, oriented in a logistically convenient pattern (e.g., lines, squares, or triangles). Any sampling design other than simple systematic or random sampling must be approved by USFWS (e.g. stratification). See *Frequently Asked Questions* section for a discussion of 100% coverage and probabilistic sampling.
- USFWS considers the results of a pre-project survey to be valid for no more than one year. If survey results are older than one year, please contact the local USFWS office.

Presence or absence of desert tortoises within the project vicinity

- Occurrence of either live tortoises or tortoise sign (burrows, scats, and carcasses) in the action area indicates desert tortoise presence and therefore requires formal consultation with USFWS.
- If neither tortoises nor sign are encountered during the action area surveys and the project, or any portion of project, is ≤ 0.8 km^2 (200 acres) or linear, three additional 10-m (~30-ft) belt transects at 200-m (~655-ft) intervals parallel to and/or encircling the project area perimeter (200-m, 400-m, and 600-m from the perimeter of the project site) should be surveyed. These transects are employed only as part of the presence/absence determination; they are not included in the estimation of tortoise abundance. See *Frequently Asked Questions* section below for an explanation of why additional surveys are needed.
- If neither tortoises nor sign are encountered during the action area surveys, as well as project perimeter surveys where appropriate, please contact your local USFWS office. Informal consultation with the USFWS may be required even though no desert tortoises or sign are found during surveys.

Number of tortoises within the action area

The attached Table 3 spreadsheet will estimate the number of adult tortoises (>160 mm MCL) within the action area using the "Number of tortoises within the action area" equation from above.

Enter the requested information into the Table 3 spreadsheet, as follows:

1. Enter the total project area.
2. Enter the appropriate value from Table 1 for the term "probability that a tortoise is above ground" (P_a).
3. Enter the number of adult tortoises (>160-mm midline carapace length) found during the survey of the action area for the term "number of tortoises observed above ground" (n).

Table 1. Probability that a desert tortoise is above ground (P_a) relative to the previous winter's rainfall (October through March)

Use amount of rainfall from the winter preceding the pre-project survey to determine which value of P_a is appropriate for the project

To find this amount of rainfall, go to the Western Regional Climate Center site: http://www.wrcc.dri.edu/summary/Climsmsca.html; click on your location and scroll down to "monthly totals"

Previous Winter Rain	Probability (P_a)	Variance(P_a)
<40 mm (~1.5 inches)	0.64	0.08
≥40 mm (~1.5 inches)	0.80	0.05

The estimate for the term "probability of detecting a tortoise if above ground (P_d)" is already included in spreadsheet Table 3 (P_d = 0.63; variance = 0.011). See *Frequently Asked Questions* section below for how P_a and P_d and their associated variances were estimated.

See *Appendix 1* for a detailed description of the method used to estimate desert tortoise abundance.

100% Coverage or Probabilistic Sampling?

100% coverage surveys are always an acceptable option, regardless of the size of the action area. For very large action areas, probabilistic sampling may be an additional option, such that the appropriate proportion of the action area is surveyed as detailed below.

For the 2009 field season, probabilistic sampling is not an option for desert tortoise pre-project surveys in California due to the requirement of CESA to avoid, minimize, and fully mitigate (CDFG code section 2081).

Table 2. Is probabilistic sampling an appropriate option for the proposed action area?

Is your action area smaller than the area given below for the recovery unit in which the project occurs?

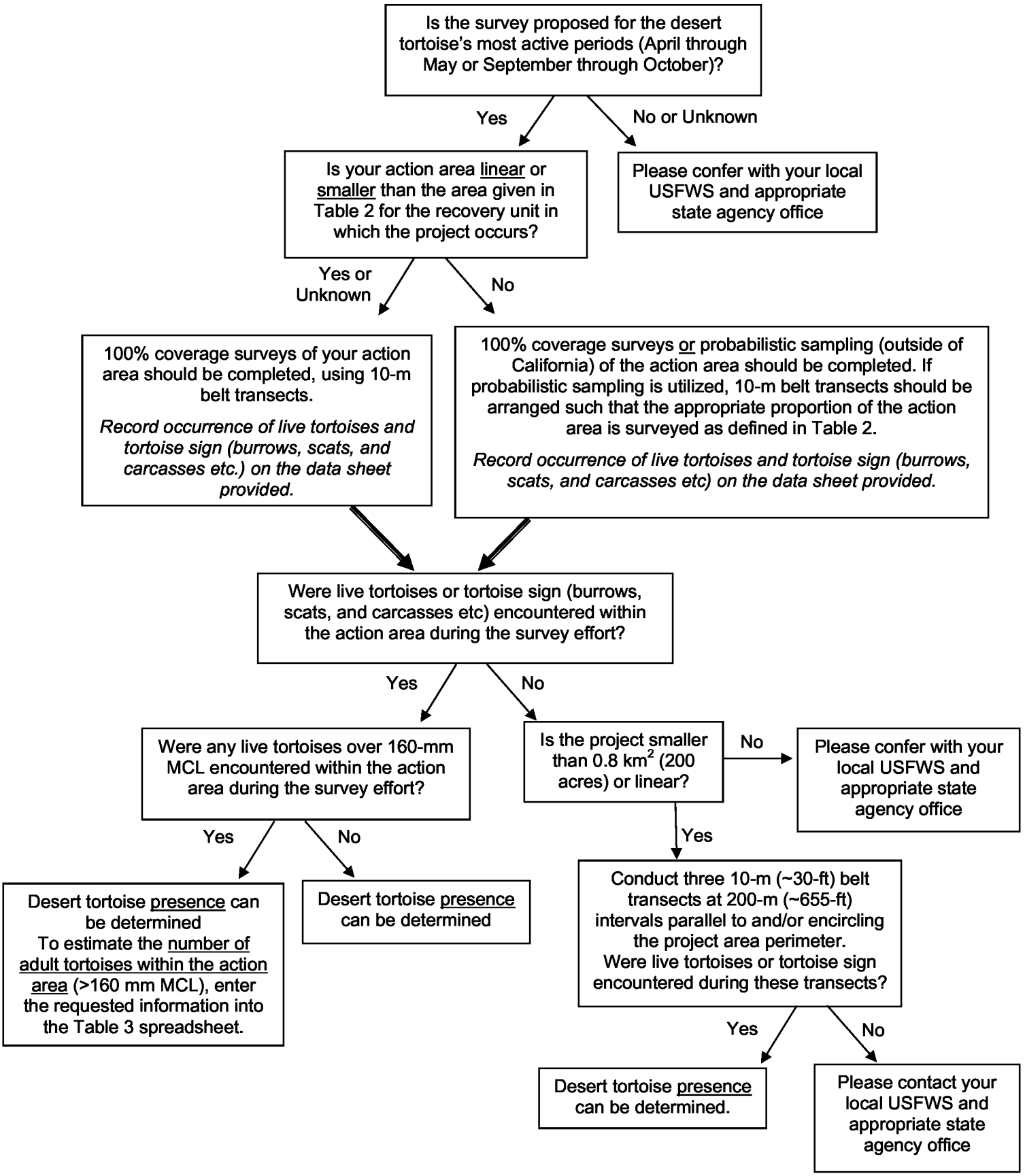
Recovery Unit	Threshold Action Area to Allow Sampling
Western Mojave	7.2 km^2 (1777 acres)
Eastern Mojave	10.8 km^2 (2676 acres)
Colorado Desert	6.4 km^2 (1573 acres)
Northeastern Mojave	23.3 km^2 (5764 acres)
Upper Virgin River	2.0 km^2 (490 acres)

If yes: 100% coverage surveys of your action area must be completed.

If no, total transect lengths that must be surveyed are given below. 100% coverage surveys are also an option, regardless of the size of the project.

Recovery Unit	Total Transect Length (km) to Sample
Western Mojave	719
Eastern Mojave	1083
Colorado Desert	637
Northeastern Mojave	2333
Upper Virgin River	198

Decision Tree for Pre-project Field Survey Protocol for Potential Desert Tortoise Habitats



Frequently Asked Questions: Desert Tortoise Pre-project Field Survey Protocol

Why did USFWS revise the 1992 USFWS Desert Tortoise Pre-project Survey Protocol?

Desert tortoises occur at low densities across most of the Mojave Desert (USFWS 2006). They are cryptic and spend much of their time underground in burrows (Burge 1977; Nagy and Medica 1986; Bulova 1994) and therefore not all animals within an area will be seen by even the best trained surveyors. Tortoises underground in burrows, as well as individuals hidden above ground, need to be included in estimates.

The 1992 USFWS Desert Tortoise Pre-project Survey protocol was based on a Bureau of Land Management protocol from the mid-1970s, which utilized the best available information at the time, but did not take into account that some tortoises will be underground and missed during the survey effort. The data collected during the extensive USFWS range-wide monitoring program (currently <7,000-km of transects each year; USFWS 2006) have allowed us to improve pre-project survey methods. Data about the proportion of tortoises underground in burrows, as well as the probability that an above-ground tortoise will be observed by the surveyor are included in the estimate of the number of tortoises within the action area (P_a and P_d).

This protocol also addresses the potential for using probabilistic sampling when the action area is above the size limits given in Table 2. 100% coverage surveys are *always* an acceptable option, regardless of the size of the action area. For very large action areas, sampling may be an additional option, such that the abundance estimates can be calculated when an appropriate proportion of the action area is surveyed. Estimates of tortoise densities within recovery units from the range-wide monitoring program have been used to calculate how many km^2 of a project site must be surveyed to produce a statistically robust abundance estimate (Table 2).

What happened to the zone of influence transects recommended in the 1992 protocol?

This revised protocol requires that the entire action area, rather than just the project footprint, be included in the survey effort. The **action area** is defined by regulation as "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action" (50 CFR §402.02). The action area is therefore not limited to the "footprint" of the project nor is it limited by the Federal agency's authority. Rather, the action area is a biological determination of the reach of the proposed action on listed species, which must, by definition, encompass the zone of influence of the project.

How did USFWS determine the values for the "probability that a tortoise is above ground"?

The USFWS range-wide monitoring program estimated the proportion of the desert tortoise population that is visible using telemetered animals from focal areas in spring 2001-2005 (USFWS 2006). This probability is related to the previous winter's rainfall, as illustrated in Table 1. The range of fall above-ground activity is similar to spring numbers, but the variability is much higher (Nussear and Tracy 2007; Inman 2008). Until more robust estimates of fall above-ground activity are available, spring estimates based on the previous winter's rainfall (October through March) are used for surveys conducted in either active period.

How did USFWS establish the value for the "probability of detecting a tortoise, if above ground"?

For the past five years, surveyors in the USFWS range-wide monitoring program have undergone training on established transects with artificial tortoises. Trained surveyors detected an average of ~63% of model tortoises that were within 5-m of either side of the transect center-line (USFWS unpublished).

Why are only tortoises over 160-mm MCL used to estimate the number of tortoises within the action area?

The values of P_a and P_d used in the equation to estimate the number of tortoises within the action area are based on USFWS range-wide monitoring data collected for adult tortoises ≥160-mm MCL.

What is the purpose of 100% coverage surveys versus probabilistic sampling?

The purpose of surveying is to determine presence/absence and estimate the abundance of desert tortoises within the action area. For 100% coverage surveys, transects are placed across the entire action area; thus, the entire area for which abundance is estimated is surveyed. A probabilistic sampling approach, on the other hand, uses data from randomly or systematically placed transects to draw inferences about locations where surveys are not conducted. All locations for which abundance will be estimated *must* have an equal probability of being included in the sample.

How were the threshold project sizes calculated for determining whether 100% coverage or probabilistic sampling is appropriate?

The validity of probabilistic sampling requires that all locations for which abundance will be estimated have an equal probability of being included in the sample, as well as the expected sample size. Estimating the number of tortoises within the project area using probabilistic sampling is limited by the number of tortoises encountered during the survey effort. Therefore, whether or not the project area must be surveyed using 100% coverage or can be probabilistically sampled is based on the area expected to yield a survey count of 20 tortoises (Krzysik 2002). Table 2 uses tortoise densities and detection probabilities estimated from 2001-2005 range-wide line-distance sampling efforts for each tortoise Recovery Unit (USFWS 2006) to calculate that area of a project site that must be surveyed to produce a statistically robust estimate. If the project area is large enough to allow the option of probabilistic sampling, Table 2 provides the minimum transect kilometers (10-m wide) that must be surveyed.

What if the minimum length of 10-m wide transect kilometers are completed but 20 tortoises were not found in the action area?

If probabilistic sampling is used and < 20 tortoises are found after surveying the total transect length prescribed by Table 2, number of tortoises within the action area may be estimated using number found.

Do I keep surveying if 20 tortoises are found before the minimum transect kilometers that must be surveyed are completed?

If probabilistic sampling was used and the transects have been completed in a random order, project area surveys may be considered complete when 20 tortoises have been found or the specified number of kilometers have been sampled, whichever happens first. It is okay if more that 20 tortoises are found, this will decrease the width of the 95% confidence interval for the abundance estimate.

Why do small and linear projects where no tortoises were found have to do additional surveys at 200-m (~655-ft) intervals parallel to the project area perimeter?

Even though neither tortoises nor tortoise sign were found within the action area at the time of the survey, the area may be part of an animal's home range. The home range of a female desert tortoise averages around 0.15 to 0.16 km^2 (35 to 40 acres), about one third the size of male home ranges, which are variable and can be > 2 km^2 (O'Conner et al. 1994; Duda et al. 1999; Harless et al. In press). Therefore, projects that are ≤ 0.8 km^2 (200 acres) or linear may overlap only part of a tortoise's home range and the possibility that a resident tortoise was outside the project area at the time surveys were conducted must be addressed. In these cases, USFWS recommends three additional 10-m (~30-ft) belt transects at 200-m (~655-ft) intervals parallel to and/or encircling the project area perimeter (200-m, 400-m, and 600-m from the perimeter of the project site). Record any tortoises or sign encountered during these surveys. These transects are employed only as part of the presence/absence determination; they are not included in the estimation of tortoise abundance within the project area.

What does the 95% confidence interval for the number of tortoises within the action area mean?

Confidence intervals are used to indicate the reliability of an estimate. The interval gives an estimated range of values, calculated from a set of sample data, which is likely to include an unknown population parameter (in this case, the true number of tortoises within the action area). A wider confidence interval indicates that less certainty is associated with the estimate (see Appendix 2). The Table 3 spreadsheet calculates the abundance and associated 95% confidence interval for the estimated number of tortoises within the project area (Buckland et al. 2001).

Acknowledgments

The USFWS Desert Tortoise Recovery Office is grateful to the many individuals and agencies that were instrumental in development and review of this revised protocol. Specifically, we thank Jim Nichols (USGS) and Tony Krzysik (Prescott Audubon Society) for assistance with concept design; Alice Karl (independent tortoise biologist) and Andrew Thompson (USFWS) for development discussion, and Kirk Waln (USFWS) for GIS support.

This protocol has undergone extensive review. We would like to thank the 2008/2009 USFWS desert tortoise coordination group (Ashleigh Blackford, Ray Bransfield, Michael Burroughs, Renee Chi, Brian Croft, Tannika Engelhard, Tyler Grant, Michael Glenn, Judy Hohman, Leilani Takano, and Brian Wooldridge) for invaluable thoughts and suggestions. We would also like to thank Bob Steidl (University of Arizona), Kathy Ralls (Smithsonian National Zoo), Alice Karl (independent tortoise biologist), Andrew Thompson (USFWS), Bill Boarman (Conservation Science Research & Consulting), Phil Medica (USGS), Paulette Conrad (NDOW), Steve Ferrand (Nevada Biological Consulting), and the California Department of Fish and Game (including Kim Nicol, Julie Vance, Scott Flint, and Becky Jones) for insightful comments on the document.

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Appendix 1. Detailed description of desert tortoise abundance and CI estimation

The estimated abundance of adult desert tortoises within the action area is given by:

$$\begin{pmatrix}\text{Estimated number of tortoises}\\ \text{within action area}\end{pmatrix} = \frac{\begin{pmatrix}\text{Number of tortoises}\\ \text{observed above ground}\end{pmatrix}}{\begin{pmatrix}\text{Probability that}\\ \text{a tortoise is}\\ \text{above ground}\end{pmatrix}\begin{pmatrix}\text{Probability of}\\ \text{detecting a tortoise,}\\ \text{if above ground}\end{pmatrix}}\left(\frac{\text{Action area}}{\text{Area surveyed}}\right),$$

which is equivalent to:

$$\hat{N} = \left[\frac{(n)}{(Table2)(0.63)}\right]\left[\frac{(A)}{(a)}\right],$$

where $\hat{N}$ = estimated abundance within entire action area, n = number of tortoises observed above ground, A = total action area, and a = actual area surveyed (= total # km surveyed * 0.01). For 100% coverage surveys, A/a = 1.

Table 3 uses the following equations to calculate the 95% confidence interval for the estimate of tortoise abundance within the action area (Buckland et al. 2001), assuming all replicate transect lines are the same length, 10-km.

$$\hat{\text{var}}(n) = L\sum_{i=1}^{k} l_i\left(\frac{n_i}{l_i} - \frac{n}{L}\right)^2 /(k-1)$$

where $\hat{\text{var}}(n)$ = the spatial variation in the number of tortoises detected through the total transect length L, n_i = the number of tortoises seen on transect i, l_i = the length of individual transect i, and k = total number of transects walked.

Putting the sources of variability together, the variance of density is:

$$\text{var}\,\hat{D} = \hat{D}^2\left[\frac{\text{var}(n)}{n^2} + \frac{\text{var}(\hat{P}_a)}{(\hat{P}_a)^2} + \frac{\text{var}(\hat{P}_d)}{(\hat{P}_d)^2}\right]$$

Because the tortoise density sampling distribution is positively skewed, the confidence interval is calculated using a log-distribution for density and built with division and multiplication, rather than addition and subtraction from the mean as with a symmetrical interval (Buckland et al. 2001).

Thus, the 95% confidence interval for $\hat{N}$ is:

$$\left(\hat{N}/C_N, \hat{N}\cdot C_N\right),$$

where $C_N = \exp\left[z_\alpha\sqrt{\text{var}(\log_e \hat{D})}\right]$ and $\text{var}(\log_e \hat{D}) = \log_e\left[1 + \frac{\text{var}(\hat{D})}{\hat{D}^2}\right]$.

Given the simplifying assumptions in this protocol, the 95% confidence interval around the estimated number of tortoises within the action area will be wide (e.g., the estimate of the number of tortoises will be imprecise). While this level of imprecision would not be appropriate for recovery planning and decision making at large scales, this protocol provides estimates at local scales that most efficiently utilize the best information that is available to provide statistically defensible results.

Appendix 2. Example

Project location = near Beatty, NV (within the Eastern Mojave RU)

Action area = 12 km^2 (3,000 acres)

According to this protocol's Site Assessment key, the proposed action is within the known range of the desert tortoise. The local USFWS and appropriate state agency offices were contacted and a species list, which includes the desert tortoise, was obtained for the action area. Therefore, pre-project survey and consultation are necessary.

The project footprint is only 10 km^2, but since the project will include blasting, the reach of the proposed action on listed species extends to 12 km^2. Thus, the action area (and therefore the area which needs to be surveyed for desert tortoises) is 12 km^2 (which is more inclusive than the 10 km^2 project footprint).

According to Table 2 of the pre-project survey protocol, the project size of 12 km^2 is above the threshold project area to allow probabilistic sampling in the Western Mojave RU (10.8 km^2 threshold). Therefore, at a minimum, 1,083 km of transects must be walked. For this example, 108 10-km transects (10-m wide) were placed systematically across the project site and were completed in a random order. Surveys of 100% coverage in which 10-m wide transects were placed across the entire 12 km^2 action area would also have been acceptable.

Transects totaling 1,083 km were conducted and 19 adult tortoises (> 160 mm carapace length) were found (as well as tortoise sign, both of which were catalogued using the USFWS 2009 DT pre-project survey protocol data sheet). If 20 adult tortoises had been encountered before the 1,083 km of transects were completed, and transects were conducted in a random order, then surveys could have been considered complete after the 20th tortoise was catalogued.

Data collected from the108 transects (live animals encountered <160-mm MCL)

Number of tortoises (n_i)	Number of transects on which n_i tortoises were seen
0	93
1	11
2	4

Using the Western Regional Climate Center website, it was determined that the Beatty area had received 97-mm (3.8 inches) of rain in the October through March preceding the survey effort, which is above the 40-mm (1.5 inches) in Table 1. Therefore, P_a of 0.80 will be used in this estimation.

Thus, from

$$\hat{N} = \left[\frac{(n)}{(Table2)(0.63)}\right]\left[\frac{(A)}{(a)}\right], \text{ we get } \hat{N} = \left[\frac{(19)}{(0.80)(0.63)}\right]\left[\frac{(12\,km^2)}{(10.8\,km^2)}\right], \text{ or } \hat{N} = \sim 42 \text{ tortoises}$$

$$\text{Density} = \frac{(\hat{N})}{(A)}, \text{ we get } \hat{D} = \frac{(42)}{(12\,km^2)}, \text{ or } \hat{D} = \sim 3.5 \text{ tortoises/km}^2$$

To calculate the 95% confidence interval for our abundance estimate, we use:

$$\hat{\text{var}}(n) = L\sum_{i=1}^{k} l_i\left(\frac{n_i}{l_i} - \frac{n}{L}\right)^2 /(k-1),$$

$$\text{we get } \hat{\text{var}}(19) = 1080\left[(93)(10)\left(\frac{0}{10} - \frac{19}{1080}\right)^2 + (11)(10)\left(\frac{1}{10} - \frac{19}{1080}\right)^2 + (4)(10)\left(\frac{2}{10} - \frac{19}{1080}\right)^2\right]/(108-1), \text{ or}$$

$$\hat{\text{var}}(19) = 23.88$$

And for,

$$\text{var}\,\hat{D} = \hat{D}^2\left[\frac{\text{var}(n)}{n^2} + \frac{\text{var}(\hat{P}_a)}{(\hat{P}_a)^2} + \frac{\text{var}(\hat{P}_d)}{(\hat{P}_d)^2}\right], \text{ we get } \text{var}\,\hat{D} = 3.5^2\left[\frac{23.88}{19^2} + \frac{0.05}{0.80^2} + \frac{0.011}{0.63^2}\right], \text{ or } \text{var}\,\hat{D} = 2.107$$

Using our log-transformation because the tortoise density sampling distribution is positively skewed,

$$\text{var}(\log_e \hat{D}) = \log_e\left[1 + \frac{\text{var}(\hat{D})}{\hat{D}^2}\right], \text{ we get } \text{var}(\log_e \hat{D}) = \log_e\left[1 + \frac{2.107}{3.5^2}\right], \text{ or } \text{var}(\log_e \hat{D}) = 0.15$$

Then,

$$C_N = \exp\left[z_\alpha\sqrt{\text{var}(\log_e \hat{D})}\right], \text{ we get } C_N = \exp\left[(1.96)\sqrt{0.15}\right], \text{ or } C_N = 2.18$$

And,

$\left(\hat{N}/C_N, \hat{N}\cdot C_N\right)$, we get $\left((42/2.18), (42\cdot 2.18)\right)$, or ~$(19, 92)$.

Summary

Using the Site Assessment key, it was determined that survey and consultation were necessary for the proposed action. Thus, the pre-project field survey protocol was implemented. In this case, probabilistic sampling with equal length transects (10-km long) was used and 19 adult tortoises and tortoise sign were found during the sampling of the action area, indicating presence. Using the equations and data presented in Appendix 1 of this protocol, Table 3 estimated the actual number of tortoises within the project was estimated to be ~42, with a 95% confidence interval of ~(19, 92).

USFWS 2009 DESERT TORTOISE PRE-PROJECT SURVEY DATA SHEET

Date of survey: _____ Survey biologist(s): _____
(day, month, year)

Site description: _____
(project name and size; general location)

County:_____ Quad:_____ Location:_____
(UTM coordinates, lat-long, and/or TRS; map datum)

Transect #: ____ Transect length: _____ Type of survey: _____
(project area size to be surveyed; 100% coverage/probabilistic sampling)

GPS Start-point: _____ _____ Start time: _____am/pm
(easting, northing, elevation in meters)

GPS End-point: _____ End time: _____am/pm
(easting, northing, elevation in meters)

Start Temp: _____ºC Weather: _____

End Temp: _____ºC

Live Tortoises

Detection number	GPS location Easting	GPS location Northing	Time	Tortoise location (*in burrow*: all of tortoise beneath plane of burrow opening, or *not in burrow*)	Approx MCL >160-mm? (*Yes, No or Unknown*)	Existing tag # and color, if present
1						
2						
3						
4						
5						
6						
7						
8						

Tortoise Sign (burrows, scats, carcasses, etc)

Detection number	GPS location Easting	GPS location Northing	Type of sign (*burrows, scats, carcass, etc*)	Description and comments
1				
2				
3				
4				
5				
6				
7				
8				

Date of survey: _____

Transect number: _____

Appendix C

Authorized Biologist Qualifications

GENERAL DESERT TORTOISE QUALIFICATIONS STATEMENT

This form should be used to provide your qualifications to agency officials if you monitor project activities or intend to handle or survey desert tortoises during construction or other projects authorized under Sections 7 (Biological Opinions) or 10 (HCPs) of the Endangered Species Act. If you seek approval to attach/remove/insert any devices or equipment to/into desert tortoises, withdraw blood, or conduct other procedures on desert tortoises, a recovery permit or similar authorization may be required.

Application for a recovery permit requires completion of Form 3-200-55, which can be downloaded at http://www.fws.gov/forms/3-200-55.pdf. Supplemental information for the recovery permit application should be provided with the form, *Statement of Skills and Experience with Specialized Desert Tortoise Procedures,* which is available from a U.S. Fish and Wildlife Service (USFWS) Field Office.

1. Contact Information:

Name	Jim Shurtliff
Address	4827 W Soft Wind D.4
City, State, Zip Code	Glendale, Az, 85310
Phone Number(s)	(702)-501-9023 Cell (623) 587-0523 Home
Email Address	jshurtliff@epgaz.com Work j.shurtliff@att.net Home

2. Date of Statement:

3. States in which project occurs (check all that apply):

☐ California X☐ Nevada ☐ Utah ☐ Arizona

4. Please provide information on the project:

USFWS Biological Opinion or HCP No.		**Date: April 14, 2009**
Project Name	Southern Nevada Intertie Project	
Federal Agency	Bureau of Land Management	
Proponent or Contractor	Great Basin, LLC	

5. Education: Provide up to three schools, listing most recent first:

Institution	Dates attended	Major/Minor	Degree received
a.			
b.			
c.			

6. Desert Tortoise Training.

Name/Type of Training	Dates (From/To)	Location	Instructor/Sponsor
1. Az. Game and Fish, Tortoise Study	4/97 to 8/05	Phoenix, Az	Roy Avril-Murry Daren Ridle
2. Desert Tortoise Handling Class		Ridge Crest, Ca.	
3.			
4.			

7. Experience – Include only those positions relevant to the requested work with desert tortoises. Distinguish between Mojave desert tortoise and other experience. Include only your experience, not information for the project you worked on (*e.g.*, if 100 tortoises were handled on a project and you handled 5 of those tortoises, include only those 5). List most recent experience first. Handling a Mojave desert tortoise must be authorized by a Biological Opinion or other permit and reported to the USFWS. Information proved in this section will be used by the USFWS to track the numbers of tortoises affected by previous projects (baseline). **Be sure to include a project contact that can verify your skills and experience.** Attach additional sheets as necessary.

Experience by project and activity:

Project Name, Biological Opinion or Permit No., Job Title	Dates (From-To)	Project Contact-name, phone no., & Email address		Conduct clearance surveys (Hrs/Days)	Excavate tortoise burrows (No.)	Locate tortoises (No. < 100mm, No. ≥ 100mm)	Relocate tortoises (No.)	Locate, excavate, and relocate tortoise nests (No.)	Construct artificial burrows (No.)	Present desert tortoise awareness training (No.)	Monitor project equipment and activities (Hrs/Days)	Oversee project compliance (Hrs/Days)	Supervise field staff (Hrs/Days)	Collect data on tortoise sign and activity (Hrs/Days)	Tortoise fence inspection (Hrs/Days)	Other (specify)Telemetry
1.Goodsprings to Sandy Vally Pole Replacement Nevada Power	2006	Paul Aguirrie 702-227-2647 PAguirre@nvenergy.com		43 d		22	1			21 d	43 d	43 d	33 d	43 d		
2.Magnolia Sub Station Construction Nevada Power	2006	Paul Aguirrie 702-227-2647 PAguirre@nvenergy.com		54 d	3	29	19			54 d	54 d	54 d	3d	54 d	50 d	
3. Lincoln Co Line **Nevada Power**	2007	Paul Aguirrie 702-227-2647 PAguirre@nvenergy.com		2d							2d	d		2d		
4.Harry Allen Peaker Nevada Power	2007	Paul Aguirrie 702-227-2647 PAguirre@nvenergy.com		34 d		8				34 d	34 d	34 d	22 d	34 d		
5.Harry Allen Water Line	2007	Paul Aguirrie 702-227-2647 PAguirre@nvenergy.com		46 d	3		1		1	7d	46 d	46 d	40 d	46 d		
6.Sugarloaf Mt DT Project Az. Game and Fish	4-97 to 8-05	**Roy Averil-Murry**		49 0+ d		80 0+ T				30 0+ d						80 0+ T
Are you seeking approval to independently conduct this activity (Y or N)?				y	y	y	y	y	y	y	y	y	y	y	y	

Summary of experience:

a. Total time spent for all desert tortoise-related field activities (referenced above): **Specify: Total number of hours: 1,000 plus hours** **-OR Total number of 8-hour days:**
b. Total number of miles/kilometers walked conducting survey transects: 1000 plus kilometers walked
c. Total number of wild, free-ranging desert tortoises you personally handled: **<100 mm: 3** **≥100 mm: 800 plus desert tortoises**

9. References. Provide 3 references that can verify your field qualifications and skills. Include project managers, training instructors, biologists, agency representatives, etc. Avoid using co-workers or employers:

Name	Employer/Position	Address/Location	Phone Number	Email
1. Dr Glenn Darrington	EPG	Las Vegas	702-263-4921	gdarrington@epgaz.com
2. Paul Aguirrie	NVPower	Las Vegas	702-227-7647	PAguirre@nvpower.com
3. Darin Riedle	Az Game & Fish		806-676-6732	macrochelys@hotmail.com

I certify that the information submitted in this form is complete and accurate to the best of my knowledge and belief. I understand that any false statement herein may subject me to the criminal penalties of 18 U.S.C. Ch.47, Sec. 1001.

Signed: **_Original signed by Jim Shurtliff____** **Date:__4/7/2009_____**

GENERAL DESERT TORTOISE QUALIFICATIONS STATEMENT

This form should be used to provide your qualifications to agency officials if you monitor project activities or intend to handle or survey desert tortoises during construction or other projects authorized under Sections 7 (Biological Opinions) or 10 (HCPs) of the Endangered Species Act. If you seek approval to attach/remove/insert any devices or equipment to/into desert tortoises, withdraw blood, or conduct other procedures on desert tortoises, a recovery permit or similar authorization may be required.

Application for a recovery permit requires completion of Form 3-200-55, which can be downloaded at http://www.fws.gov/forms/3-200-55.pdf. Supplemental information for the recovery permit application should be provided with the form, *Statement of Skills and Experience with Specialized Desert Tortoise Procedures,* which is available from a U.S. Fish and Wildlife Service (USFWS) Field Office.

1. Contact Information:

Name	Denise Garcia
Address	69 N Kimberly Dr.
City, State, Zip Code	Casa Grande, AZ, 85222
Phone Number(s)	(520) 876 – 2130
Email Address	deniser81@msn.com

2. Date of Statement:

3. States in which project occurs (check all that apply):

☐ California X Nevada ☐ Utah ☐ Arizona

4. Please provide information on the project:

USFWS Biological Opinion or HCP No.		**Date: April 14, 2009**
Project Name	Southern Nevada Intertie Project	
Federal Agency	Bureau of Land Management	
Proponent or Contractor	Great Basin, LLC.	

5. Education: Provide up to three schools, listing most recent first:

Institution	Dates attended	Major/Minor	Degree received
a. University of Arizona	May 2000 – May 2006	Natural Resources – Wildlife	Wildlife, Watershed, Rangeland Resources
b.			
c.			

6. Desert Tortoise Training.

Name/Type of Training	Dates (From/To)	Location	Instructor/Sponsor
1. Tortoise ecology, physiology, and handling techniques (weighing, measuring, physicals) 9 captive tortoises handled	July 2006 – September 2006	Las Vegas, Nevada	Jim Shurtliff
3. Tortoise ecology, physiology, and handling techniques (weighing, measuring, physicals) palpatng for eggs, artificial burrow construction **16 captive tortoises handled**	August 2007 – September 2007	Phoenix, Arizona	Jim Shurtliff
3. Care for captive desert tortoises for Arizona Game and Fish Department – Region 5	June 2005	Care for captive sonoran desert tortoises (feeding, watering, veterinarian visits). Maintaining pens (maintenance on artificial burrows). Handled 15 captive tortoises	Elissa Ostergaard

7. Experience – Include only those positions relevant to the requested work with desert tortoises. Distinguish between Mojave desert tortoise and other experience. Include only your experience, not information for the project you worked on (*e.g.*, if 100 tortoises were handled on a project and you handled 5 of those tortoises, include only those 5). List most recent experience first. Handling a Mojave desert tortoise must be authorized by a Biological Opinion or other permit and reported to the USFWS. Information proved in this section will be used by the USFWS to track the numbers of tortoises affected by previous projects (baseline). **Be sure to include a project contact that can verify your skills and experience.** Attach additional sheets as necessary.

Experience by project and activity:

Project Name, Biological Opinion or Permit No., Job Title	Dates (From-To)	Project Contact-name, phone no., & Email address		Conduct clearance surveys (Hrs/Days)	Excavate tortoise burrows (No.)	Locate tortoises (No. < 100mm, No. ≥ 100mm)	Relocate tortoises (No.)	Locate, excavate, and relocate [illegible]	Construct artificial burrows (No.)	Present desert tortoise awareness training (No.)	Monitor project equipment and activities (Hrs/Days)	Oversee project compliance (Hrs/Days)	Supervise field staff (Hrs/Days)	Collect data on tortoise sign and activity (Hrs/Days)	Tortoise fence inspection (Hrs/Days)	Other (specify)
Nevada Energy Harry Allen Expansion Project	December 2008 – February 2009	Paul Aguirre, (702) 402 -2647, paguirre@nvenergy.com		30 hours	2					45	180 hours	180 hours	180 hour		180 hours	
El Paso Natural Gas Cathodic Protection Station	November 2008	Lori Stranger, (719) 667-7623, loristranger@elpaso.com		2 hours						12	154 hours	154 hours	154 hours			
Southern California Edison	May 2008	Adelina Munoz, (623) 302 – 3088, adelina.munoz@sce.com								170 hrs	170 hrs	170 hrs	170 hrs			
El Dorado Meterological Towers	March – April 2008	Shaun Brooks, (303) 980 – 3526, shaun.brooks@tteci.com		10 hrs						1	50 hrs	50 hrs	50 hrs			
Catamount Searchlight Meterological Towers – Oregon Power	September 2007 – October 2007	Liahna Fuller – Noon, (206) 387 – 4246, lfuller-noon@globalenergyconcepts.com				3 > 100 mm, 2 carcasses < 100 mm				5	154 hours	154 hours	154 hours	5 days		

Southern Nevada Water Authority – Saddle Island Intake drilling project	November 2006 – February 2007	Sonja Kokos (702) 862 - 3440			1 carcass				8	990 hours	990 hours	990 hours	70 hours			
Ashgrove Cement Plant	February 2007	Jim Shurtliff, (705) 501 - 9023, jshurtliff@epgaz.com		16 hours												surveys for possible relocation areas
Harry Allen to Chuck Lenzie Water Line	June – September 2006	Anthony Gantonia (702) 227 - 2185		10 hours		22 (< 100mm) only 10 were handled				5	312 hours	312 hrs		x		
Arizona Game and Fish Presence/ Absence survey	2006	Dave Grandmaison - Arizona Game and Fish Department, Phoenix AZ (218) 341 – 3341 David.grandmaison@earthlink.net		3 days		2(<100mm)										Place telemetors on free ranging tortoises
Are you seeking approval to independently conduct this activity (Y or N)?																

Summary of experience:

a. Total time spent for all desert tortoise-related field activities (referenced above): **Specify: Total number of hours: 2086** **-OR Total number of 8-hour days:**
b. Total number of miles/kilometers walked conducting survey transects: **203**
c. Total number of <u>wild, free-ranging</u> desert tortoises you personally handled: **<100 mm:** **≥100 mm: 15**

9. References. Provide 3 references that can verify your field qualifications and skills. Include project managers, training instructors, biologists, agency representatives, etc. Avoid using co-workers or employers:

Name	Employer/Position	Address/Location	Phone Number	Email
1. Jim Shurtliff	Environmental Planning Group -		(702) 501 – 9023	j.shurtliff@att.net
2. Dave Grandmaison	Arizona Game and Fish		(218) 341 – 3341	David.grandmaison@earthlink.net
3. Elissa Ostergaard	Arizona Game and Fish – Urban Biologist	555 N Greasewood Road, Tucson, Arizona	(520) 628 – 5376	eostergaard@azgfd.gov

I certify that the information submitted in this form is complete and accurate to the best of my knowledge and belief. I understand that any false statement herein may subject me to the criminal penalties of 18 U.S.C. Ch.47, Sec. 1001.

Signed: ____Original signed by Denise Garcia_____ **Date:_____**

Appendix D

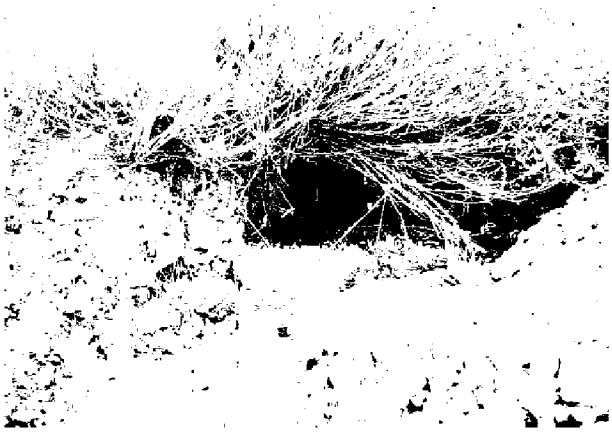
Photo Log and Reference Sheet

APPENDIX D
PHOTOGRAPHS TAKEN DURING 2009 DESERT TORTOISE SURVEYS.

(Note: ID numbers correspond to the table that follows.)

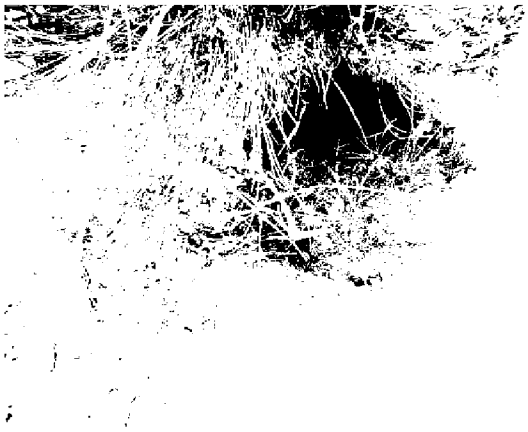
P4230001-Class 3 Burrow

P4230002-Class 2 Burrow

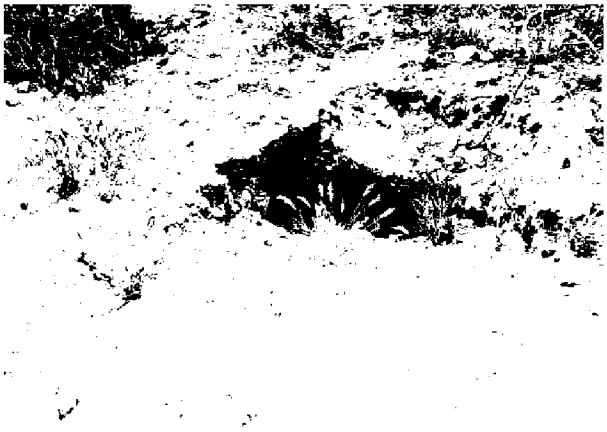


P4230003-Class 1 Burrow

P4230004-Class 3 Burrow



P4230005-Class 3 Burrow



P4230009-Class 2 Burrow

APPENDIX D
PHOTOGRAPHS TAKEN DURING 2009 DESERT TORTOISE SURVEYS.

(Note: ID numbers correspond to the table that follows.)

P4230011-Class 3 Burrow

P4230012-Class 3 Burrow

P4230013-Class 2 Burrow

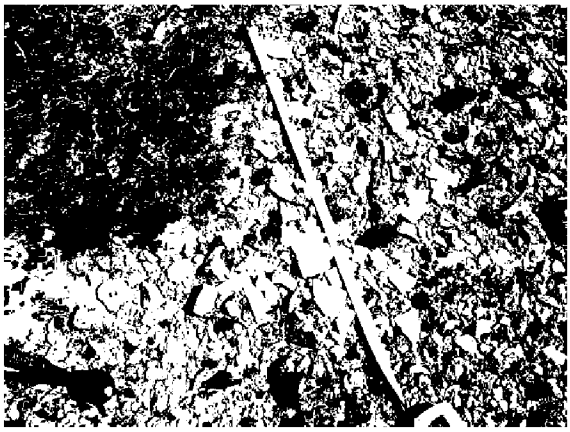
P4230014-C1B in ZOI-2

P4230015-Class 3 Burrow

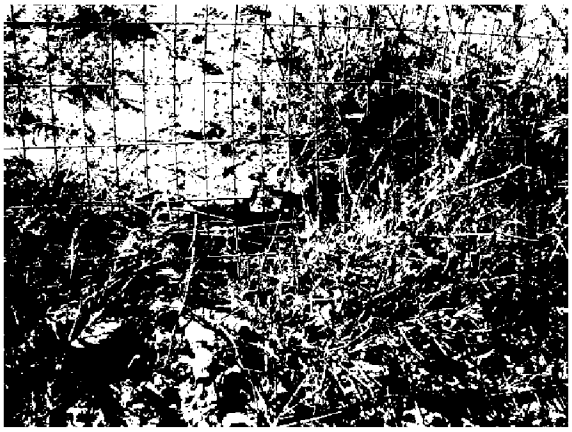
P4230016-South burrow hole

APPENDIX D
PHOTOGRAPHS TAKEN DURING 2009 DESERT TORTOISE SURVEYS.

(Note: ID numbers correspond to the table that follows.)



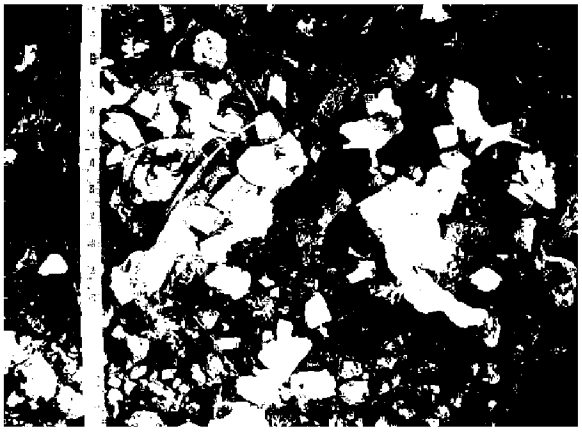
P4270028-Class 5 Carcass



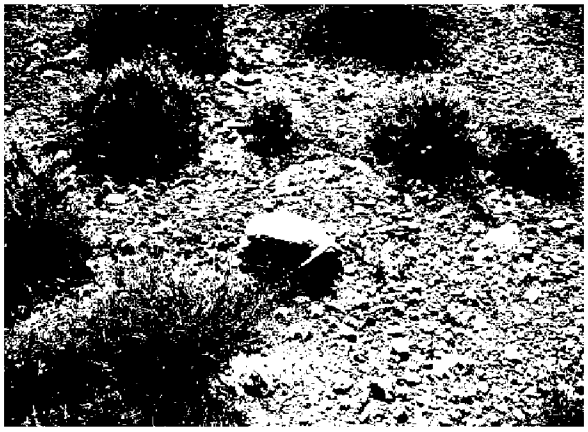
P4280032-Improperly placed tortoise fencing

P4280033-Live tortoise

P4280034-Live tortoise



P4290036-Class 5 Carcass



P4300037-Live tortoise

APPENDIX D
PHOTOGRAPHS TAKEN DURING 2009 DESERT TORTOISE SURVEYS.

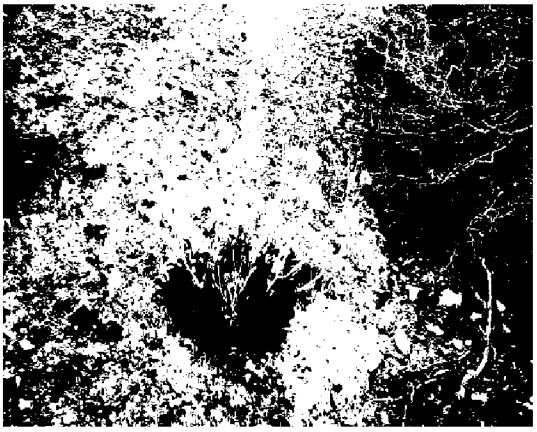
(Note: ID numbers correspond to the table that follows.)

P4300038-Class 1 Carcass

P5040039-Burrow next to cave

P5040040-Caliche cave

P5040042-Live tortoise



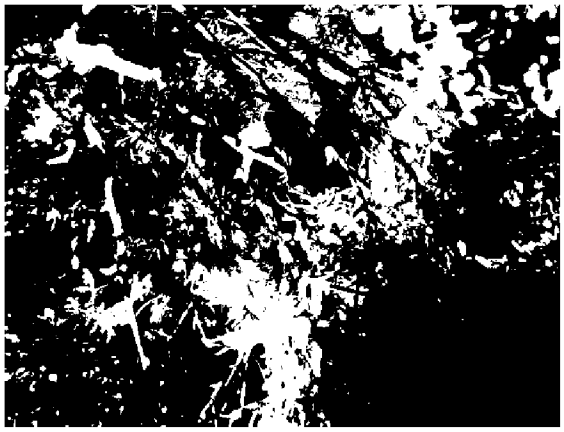
P5050044-Las Vegas bearpaw poppy in bloom

P5050046- Class 3 Carcass

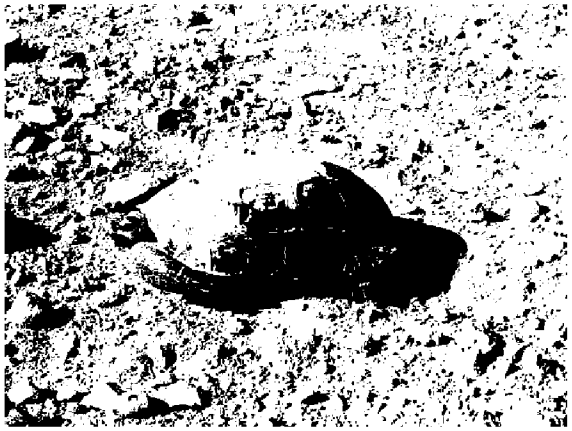
APPENDIX D
PHOTOGRAPHS TAKEN DURING 2009 DESERT TORTOISE SURVEYS.

(Note: ID numbers correspond to the table that follows.)

P5060047-Live male tortoise



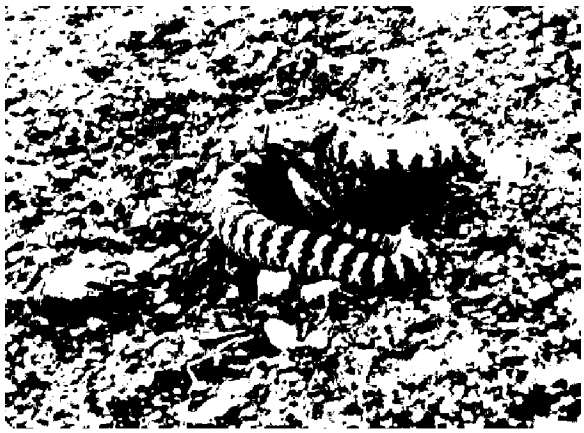
P5060049-Black-throated Sparrow nest



P5070050-Adult female tortoise

P5120051-View of habitat looking to Frenchman Mtn.

P5130052- Potential cultural resource site near PABCO

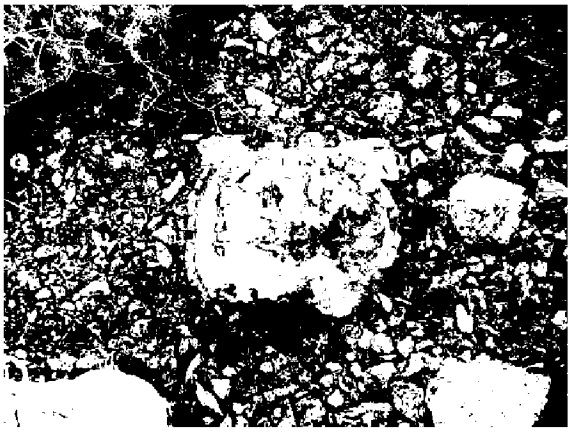


P5190063-Panamint Speckled Rattlesnake

APPENDIX D
PHOTOGRAPHS TAKEN DURING 2009 DESERT TORTOISE SURVEYS.

(Note: ID numbers correspond to the table that follows.)

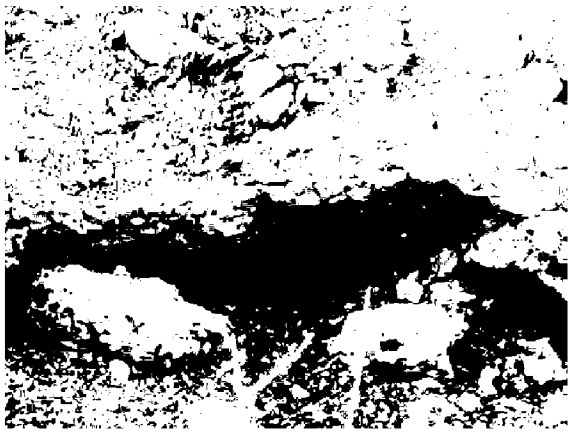
P5190100-Las Vegas Wash



P5200106- Class 3 Carcass

P5200107-Class 3 Carcass

S7300390- Live Tortoise in burrow



S7300370- Live tortoise in burrow

S7300306- Live tortoise foraging under creosote bush

APPENDIX D DATA FOR PHOTOGRAPHS TAKEN DURING 2009 DESERT TORTOISE SURVEYS				
Date	**Easting**	**Northing**	**Photo #**	**Notes**
4/23/2009	694300	4039146	P4230001	C3 Burrow
4/23/2009	693769	4039121	P4230002	C2 Burrow
4/23/2009	693766	4039131	P4230003	C1 Burrow
4/23/2009	693581	4039133	P4230004	C3 Burrow
4/23/2009	693287	4039094	P4230005	C3 Burrow
4/23/2009	693976	4039158	P4230009	C2 Burrow
4/23/2009	694267	4039189	P4230011	C3 Burrow
4/23/2009	694267	4039189	P4230012	C3 Burrow
4/23/2009	694838	4039179	P4230013	C2 Burrow
4/23/2009	694769	4039601	P4230014	C1 Burrow; ZOI-2
4/23/2009	690667	4039669	P4240015	C3 Burrow
4/23/2009	690736	4039643	P4240016	C3 Burrow
4/27/2009	687836	4034181	P4270028	C5 carcass
4/27/2009	694954	4038413	P4280032	Improper tortoise fencing
4/28/2009	695059	4036767	P4280033	Live male tortoise and Miles Elsey
4/28/2009	695059	4036767	P4280034	Live male tortoise; 295 MCL
4/29/2009	695287	4034633	P4290036	C5 carcass
4/30/2009	694621	4026842	P4300037	Live male tortoise
4/30/2009	694813	4027125	P4300038	C1 carcass
4/30/2009	692539	4021548	P5040039	Burrow next to cave
4/30/2009	692539	4021548	P5040040	Caliche cave
4/30/2009	691177	4017501	P5040042	Live male tortoise; ~300 MCL
5/5/2009	689780	4012883	P5050044	Las Vegas bearpaw poppy in bloom
5/6/2009	692998	4023743	P5060046	C3 carcass
5/6/2009	690834	4017946	P5060047	Live male tortoise; ~270 MCL
5/6/2009	unk	unk	P5060049	Black-throated sparrow nest
5/7/2009	695217	4035937	P5070050	Tortoise AF
5/12/2009	690285	4008169	P5120051	View from PABCO looking towards Frenchman Mtn
5/13/2009	unk	unk	P5130052	Rocks in a line = potential cultural resource; near PABCO
5/19/2009	685120	3999682	P5190063	Panamint speckled rattlesnake
5/19/2009	685238	3997187	P5190100	Lots of vegetation in the Las Vegas Wash
5/20/2009	686107	3982969	P5200106- P5200107	C3 carcass
4/28/2009	695059	4036767	S7300306	Live male tortoise; 295 MCL
5/20/2009	686541	3983066	S7300370	Live adult tortoise in burrow opening; ~180 MCL
5/20/2009	688355	3984798	S7300390	Live adult tortoise in cave opening; ~280 MCL

Appendix E

Completed Data Sheets

USFWS 2008 DESERT TORTOISE PRE-PROJECT SURVEY DATA SHEET

Date of survey: 23-4-09 (day, month, year) Survey biologist(s): _____

Site description: _____ (project name and size; general location)

County: _____ Quad: _____ _____ Location: _____ (UTM coordinates, lat-long, and/or TRS)

Transect number: _____ Type of survey: _____ (100% coverage/probabilistic sampling, project acres to be surveyed, transect configuration)

GPS Start-point: _____ (easting, northing, elevation) Start time: _____ am/pm

GPS End-point: _____ (easting, northing, elevation) End time: _____ am/pm

Start Temp: _____ °C Weather: _____

End Temp: _____ °C

Live Tortoises

Detection number	GPS location Easting	Northing	Time	Tortoise location (in burrow, all or tortoise beneath plane of burrow opening, or not in burrow)	Approx MCL >160-mm? (Yes, No or Unknown)	Sex (Male, Female, or Unknown)	Existing tag # and color, if present
1							
2							
3							
4							
5							
6							
7							
8							

Tortoise Sign (burrows, scats, carcasses, etc)

Detection number	GPS location Easting	Northing	Type of sign (burrows, scats, carcass, etc)	Description and comments
1	11S 694300	4039146	class III burrow	
2	11S 693769	4039121	C2B	
3	11S 693766	4039121	C1B	
4	11S 693351	4039133	C3B	
5	11S 693247	4039094	C3B	
6	11S 693976	4039158	C2B	
7	11S 694247	4039189	C3B	
8	11S 694247	4039179	C3B	
	11S 694834	4039179	C2B	

Page: 1 of _____

Date of survey _____

Transect number: _____

USFWS 2008 DESERT TORTOISE PRE-PROJECT SURVEY DATA SHEET

Date of survey: 24-4-09 (day, month, year) Survey biologist(s): _____

Site description: _____ (project name and site, general location)

County: _____ Quad: _____ Location: _____ (UTM coordinates, lat-long, and/or TRS)

Transect number: _____ Type of survey: _____ (100% coverage/probabilistic sampling, project acres to be surveyed, transect configuration)

GPS Start-point: _____ (easting, northing, elevation) Start time: _____ am/pm

GPS End-point: _____ (easting, northing, elevation) End time: _____ am/pm

Start Temp: _____ °C Weather: _____

End Temp: _____ °C

Live Tortoises

Detection number	GPS location Easting	GPS location Northing	Time	Tortoise location (in burrow, all of tortoise beneath, some of burrow opening, or not in burrow)	Approx MCL >150-mm? (Yes, No or Unknown)	Sex (Male, Female or Unknown)	Existing tag # and color, if present
1							
2							
3							
4							
5							
6							
7							
8							

Tortoise Sign (burrows, scats, carcasses, etc)

Detection number	GPS location Easting	GPS location Northing	Type of sign (burrows, scats, carcass, etc)	Description and comments
1	11S 691841	4039824	C3B	Entrance faces west
2	11S 691840	4039824	C3B	Entrance [illegible]
3	11S 691842	4039824	C3B	Entrance faces [illegible]
4	11S 691841	4039860	C3B	
5				
6				
7				
8				

Page: _____ of _____

Date of survey: _____

Transect number: _____

USFWS 2008 Desert Tortoise Pre-Project Survey Data Sheet

Date of survey: 24 - 4 - 2009 (day, month, year) Survey biologist(s): _____

Site description: _____ (project name and size, general location)

County: _____ Quad: _____ Location: _____ (UTM coordinates, lat-long, and/or TRS)

Transect number: _____ Type of survey: _____ (100% coverage/probabilistic sampling; project acres to be surveyed, transect configuration)

GPS Start-point: _____ (easting, northing, elevation) Start time: _____ am/pm

GPS End-point: _____ (easting, northing, elevation) End time: _____ am/pm

Start Temp: _____ °C Weather: _____

End Temp: _____ °C

Live Tortoises

Detection number	GPS location Easting	GPS location Northing	Time	Tortoise location (in burrow, all of tortoise beneath plane of burrow opening, or not in burrow)	Approx MCL >150-mm? (Yes, No or Unknown)	Sex (Male, Female, or Unknown)	Existing tag # and color, if present
1							
2							
3							
4							
5							
6							
7							
8							

Tortoise Sign (burrows, scats, carcasses, etc)

Detection number	GPS location Easting	GPS location Northing	Type of sign (burrows, scats, carcass, etc)	Description and comments
1	115 0692957	4039569	C3B	
2	115 0691129	4039757	C3B	
3	115 0690667	4039669	C3B	
4 S	115 690436	4039642	C3B	
5 N	115 690436	4039642	C3B	
6 N	115 690436	4039643	C3B	
7 S	115 690436	4039643	C3B	
8	115 690067	4039553	C3B	
9	115 690034	4039565	C2B	
10	115 684193	4039601	C3B	

Page: 1 of _____

Date of survey: 24-7-09

Transect number: _____

USFWS 2008 DESERT TORTOISE PRE-PROJECT SURVEY DATA SHEET

Date of survey: [illegible] (day, month, year) Survey biologist(s). _____

Site description: _____ (project name and size; general location)

County. _____ Quad: _____ Location: _____ (UTM coordinates, lat-long, and/or TRS)

Transect number: _____ Type of survey: _____ (100% coverage/probabilistic sampling; project acres to be surveyed; transect configuration)

GPS Start-point: _____ (easting, northing, elevation) Start time: _____ am/pm

GPS End-point: _____ (easting, northing, elevation) End time: _____ am/pm

Start Temp: _____ °C Weather: _____

End Temp _____ °C

Live Tortoises

Detection number	GPS location Easting	GPS location Northing	Time	Tortoise location (in burrow, all of tortoise bodeall; place of burrow opening, or not in burrow)	Approx MCL >160-mm? (Yes, No or Unknown)	Sex (Male, Female, or Unknown)	Existing tag # and color, if present
1			[illegible]				
2							
3							
4							
5							
6							
7							
8							

Tortoise Sign (burrows, scats, carcasses, etc)

Detection number	GPS location Easting	GPS location Northing	Type of sign (burrows, scats, carcass, etc)	Description and comments
1	[illegible]	[illegible]	[illegible]	[illegible]
2	[illegible]	[illegible]	[illegible]	
2	690790	4040159	C II B	
3	690194	4040093	C III B	
5 ~~4~~	~~[illegible]~~	~~[illegible]~~	~~[illegible]~~	~~[illegible]~~
6				
7				
8				

Page: _____ of _____

Date of survey: _____

Transect number: _____

USFWS 2008 DESERT TORTOISE PRE-PROJECT SURVEY DATA SHE

Date of survey: _____ (day, month, year) Survey biologist(s): _____

Site description: _____ (project name and size, general location)

County: _____ Quad: _____ Location: _____ (UTM coordinates, or lat/long, and/or TRS)

Transect number: _____ Type of survey: _____ (100% coverage/probability sampling, project buffer, or transect configuration)

GPS Start-point: _____ (easting, northing, elevation) Start time: _____am/pm

GPS End-point: _____ (easting, northing, elevation) End time: _____am/pm

Start Temp: _____°C Weather: _____

End Temp: _____°C

Live Tortoises

Detection number	GPS location Easting	GPS location Northing	Time	Tortoise location (in burrow, dir. of tortoise beneath or dist. of burrow opening if not in burrow)	Approx MCL >160-mm? (Yes, no or Unknown)	Sex (Male, Female, or Unknown)	Existing tag # and color, if present
1							
2							
3							
4							
5							
6							
7							
8							

Tortoise Sign (burrows, scats, carcasses, etc)

Detection number	GPS location Easting	GPS location Northing	Type of sign (burrows, scats, carcass, etc)	Description and comments
1				
2				
3				
4				
5				
6				
7				
8				

Page: _____of_____

Date of survey: _____

Transect number: _____

USFWS 2008 DESERT TORTOISE PRE-PROJECT SURVEY DATA SHEET

Date of survey: 25/4/09 (day, month, year) Survey biologist(s): _____

Site description: _____ (project name and size, general location)

County: _____ Quad: _____ Location: _____ (UTM coordinates, lat-long, and/or TRS)

Transect number: _____ Type of survey: _____ (100% coverage/probabilistic sampling, project acres to be surveyed, transect configuration)

GPS Start-point: _____ (easting, northing, elevation) Start time: _____ am/pm

GPS End-point: _____ (easting, northing, elevation) End time: _____ am/pm

Start Temp: _____ °C Weather: _____

End Temp: _____ °C

Live Tortoises

Detection number	GPS location Easting	GPS location Northing	Time	Tortoise location (in burrow, at of tortoise beneath plane of burrow opening, or not in burrow)	Approx MCL >150-mm? (Yes, No or Unknown)	Sex (Male, Female, or Unknown)	Existing tag # and color, if present
1							
2							
3							
4							
5							
6							
7							
8							

Tortoise Sign (burrows, scats, carcasses, etc)

Detection number	GPS location Easting	GPS location Northing	Type of sign (burrows, scats, carcass, etc)	Description and comments
1	1168959	4639713	3B	
2	0690268	4638434	3B	
3	469377	4637834	3B	
4				
5				
6				
7				
8				

[illegible]

Page: ____ of ____

Date of survey: _____

Transect number: ____

USFWS 2008 DESERT TORTOISE PRE-PROJECT SURVEY DATA SHEET

Date of survey: 27, 4, 2009 (day, month, year) Survey biologist(s): _____

Site description: _____ (project name and size, generic location)

County: _____ Quad: _____ Location: _____ (UTM coordinates, lat-long, and/or TRS)

Transect number: _____ Type of survey: _____ (100% coverage/probabilistic sampling, project acres to be surveyed, transect configuration)

GPS Start-point: _____ (easting, northing, elevation) Start time: _____ am/pm

GPS End-point: _____ (easting, northing, elevation) End time: _____ am/pm

Start Temp: _____ °C Weather: _____

End Temp: _____ °C

Live Tortoises

Detection number	GPS location Easting	GPS location Northing	Time	Tortoise location (in burrow, all of tortoise beneath plane of burrow opening or not in burrow)	Approx MCL >160-mm? (Yes, No or Unknown)	Sex (Male, Female, or Unknown)	Existing tag # and color, if present
1							
2							
3							
4							
5							
6							
7							
8							

Tortoise Sign (burrows, scats, carcasses, etc)

Detection number	GPS location Easting	GPS location Northing	Type of sign (burrows, scats, carcass, etc)	Description and comments
1	115 642511	4038581	C3B	
2	115 0689198	4038185	C3B	
3	115 0687836	4034181	C5 carcass	total disarticulation
4	115 0688592	4034937	C5 carcass	very disarticulated
5	115 683286	4034431	C5 carcass	total disarticulation
6	115 687676	4033947	C1B · C2 scat	in burrow entrance
7				
8				

Page: _____ of _____

Date of survey: _____

Transect number: _____

USFWS 2008 DESERT TORTOISE PRE-PROJECT SURVEY DATA SHEET

Date of survey: 4/27/09 (day, month, year) Survey biologist(s): _____

Site description: _____ (project name and area general location)

County: _____ Quad: Miles Location: _____ (coordinates, lat-long, and/or TRS)

Transect number: _____ Type of survey: _____ (Survey type of proposed project, including project name, area surveyed, transect configuration)

GPS Start-point: 512 [illegible] (easting, northing, elevation) Start time: _____ am/pm

GPS End-point: 9117 (easting, northing, elevation) End time: _____ am/pm

Start Temp: _____ °C Weather: _____

End Temp: _____ °C

Live Tortoises

Detection number	GPS location Easting	GPS location Northing	Time	Tortoise location (in burrow, all of tortoise beneath plane of burrow opening, or not in burrow)	Approx. MCL >160-mm? (Yes, No or Unknown)	Sex (Male, Female, or Unknown)	Existing tag # and color, if present
1							
2							
3							
4							
5							
6							
7							
8							

Tortoise Sign (burrows, scats, carcasses, etc)

Detection number	GPS location Easting	GPS location Northing	Type of sign (burrows, scats, carcass, etc)	Description and comments
1	0688266	4034835	[illegible]	carcass
2	0688946	4035096	OWL	
3	0688889	4035364		carcass
4				
5	0693[illegible]	4038974		
6	0693754	4038999		
7				
8				

Page _____ of _____

Date of survey: _____

Transect number: _____

USFWS 2008 DESERT TORTOISE PRE-PROJECT SURVEY DATA SHEET

Date of survey: 18. 4. 2009 (day, month, year) Survey biologist(s): _____

Site description: _____ (project name and size, general location)

County: _____ Quad: _____ Location: _____ (UTM coordinates, lat-long, and/or TRS)

Transect number: _____ Type of survey: _____ (100% coverage/probabilistic sampling; project acres to be surveyed, transect configuration)

GPS Start-point: _____ (easting, northing, elevation) Start time: _____ am/pm

GPS End-point: _____ (easting, northing, elevation) End time: _____ am/pm

Start Temp: _____ °C Weather: _____

End Temp: _____ °C

Live Tortoises

Detection number	GPS location Easting	GPS location Northing	Time	Tortoise location (in burrow, 18 of tortoise beneath plane of burrow opening or not in burrow)	Approx MCL >160-mm? (Yes, No or Unknown)	Sex (Male, Female, or Unknown)	Existing tag # and color, if present
1	115 695099	4036767	11:29	not in burrow	195 mm	Male	VL+V3, LM4 LR4 concave
2							
3							
4							
5							
6							
7							
8							

Tortoise Sign (burrows, scats, carcasses, etc)

Detection number	GPS location Easting	GPS location Northing	Type of sign (burrows, scats, carcass, etc)	Description and comments
1	115 [illegible]	4037499	C3B	
2	115 691809	4037214	C3B	
3	115 [illegible]	4037273	C2B	
4	115 069517	4036709	C2B	
5	115 0695172	4036709	C2 scat	
6				
7				
8				

Page: _____ of _____

Date of survey: _____

Transect number: _____

USFWS 2008 Desert Tortoise Pre-Project Survey Data Sheet

Date of survey: 29-4-2009 (day, month, year) Survey biologist(s): _____

Site description: _____ (brief narrative and sketch, general location)

2½ quadrat County: _____ Quad: _____ Location: _____ (e.g. W sec. 6 Tules, Tule Spring, Amargosa TR's)

min. 2203 Transect number: _____ Type of survey: _____ (100% coverage, random, systematic, sampling, project area to be surveyed, transect and quadrat)

max. 2606 GPS Start-point: _____ (Easting, northing, elevation) Start time: _____ am/pm

GPS End-point: _____ (Easting, northing, elevation) End time: _____ am/pm

Start Temp: ___ °C Weather: _____

End Temp: _____°C

Live Tortoises

Detection number	GPS location Easting	GPS location Northing	Time	Tortoise location (in burrow, side of burrow, mammal burrow, plant or burrow opening, or not in burrow)	Approx. MCL >150 mm? (Yes, No or Unknown)	Sex (Male, Female, or Unknown)	Existing tag # and color, if present
1	115695164	4035611	1134	in burrow	250 cm	unk.	
2							
3							
4							
5							
6							
7							
8							

Tortoise Sign (burrows, scats, carcasses, etc)

Detection number	GPS location Easting	GPS location Northing	Type of sign (burrows, scats, carcass, etc)	Description and comments
1	115 695170	4036127	C2S	C4 scat in front as well as C2 Active burrow
2	115 695207	4035208	C2B	C3 scat in front
3	115 695277	4034633	C5 carcass	total disarticulation
4	115 695229	4034334	C3S scat	
5	115 695253	4033940	C2B	C4 scat in back of burrow
6	115 695262	4033044	C3B	
7	115 695 [illegible]	403 322 [illegible]	C2B	
8	115 695 292	4033217	C2B	
	115 695353	403 2455	C3B	
	115 695463	403 1294	C2B	(crack in bank)

Page: ___ of ___

Date of survey: 29-4-2009

Transect number: _____

cont.

	WTM	UTM	Type of sign	Description
11	11S0695472	4031470	C2B	
12	11S0695435	4030164	C1B	
13	11S0695436	4030164	C1B	
14	11S0695397	4030316	C3B	
15	11S0695424	4032976	C3B	
16	11S0695397	4033571	C2B	
17	11S0695245	4034197	C1B	C3 seat inside burrow
18	11S0695242	4034396	C3B	
19	11S0695164	4035641	C1B	
20	11S0695144	4035687	C1B	C3 seat in burrow
21	11S695155	4035813	C1B	
22	11S0695240	4035618	C2 seat	
23	11S0695154	4035842	C5	disarticulated mode enough to determine [illegible]
24				

USFWS 2008 Desert Tortoise Pre-Project Survey Data Sheet

Date of survey: 30, 4, 2009 (day, month, year) Survey biologist(s) _____

Site description: _____ (project name and size; general location)

County: _____ Quad: _____ Location: _____ (UTM coordinates, lat-long, and/or TRS)

Transect number: _____ Type of survey: _____ (100% coverage/probabilistic sampling; project area to be surveyed; transect configuration)

GPS Start-point: _____ (easting, northing, elevation) Start time: _____ am/pm

GPS End-point: _____ (easting, northing, elevation) End time: _____ am/pm

Start Temp: _____ °C Weather: _____

End Temp: _____ °C

Live Tortoises

Detection number	GPS location Easting	GPS location Northing	Time	Tortoise location (in burrow or of tortoise between point of burrow opening or start of burrow)	Approx MCL >160 mm? (Yes, No or Unknown)	Sex (Male, Female or Unknown)	Existing tag # and color, if present
1	11S 0694621	4026842	942	not in burrow	300 mm	Male	
2							
3							
4							
5							
6							
7							
8							

Tortoise Sign (burrows, scats, carcasses, etc)

Detection number	GPS location Easting	GPS location Northing	Type of sign (burrows, scats, carcass, etc)	Description and comments
1	11S 0694656	402.6627	C3B	
2	11S 0694813	4027125	C1 carcass	>166 mm fresh bugs and upside down
3	11S 0693480	4023390	C3B	
4	11S 0693494	4023528	C3B	
5	11S 0693405	4023212	C2B	
6	11S 0693448	4023319	C4 carcass	900 mm seperation
7				
8				

Page: ___ of ___

Date of survey: 30-4-2009

Transect number: _____

USFWS 2008 DESERT TORTOISE PRE-PROJECT SURVEY DATA SHEET

Date of survey: 4 5 2009 (day, month, year) Survey biologist(s): _____

Site description: _____ (project name and site general location)

County: _____ Quad: _____ Location: _____ (UTM coordinates, lat/long, and/or TRS)

Transect number: _____ Type of survey: _____ (100% coverage, probabilistic sampling, project acres to be surveyed, transect configuration)

GPS Start-point: _____ (easting, northing, elevation) Start time: _____ am/pm

GPS End-point: _____ (easting, northing, elevation) End time: _____ am/pm

Start Temp: _____ °C Weather: _____

End Temp: _____ °C

Live Tortoises

Detection number	GPS location Easting	GPS location Northing	Time	Tortoise location (in burrow, out of tortoise because burrow of burrow opening or out of burrow)	Approx MCL >160 mm? (Yes, No or Unknown)	Sex (Male, Female or Unknown)	Existing tag # and color, if present
1	113 692539	4021534	715	in burrow	unk	unk	
2	113 691147	4017501	1005	not in burrow	230 mm	male	
3	113 691154	4017405	1053	not in burrow	250	male	appears to be [illegible]
4	113 6692239	4020606	1237	in burrow		male?	
5							
6							
7							
8							

Tortoise Sign (burrows, scats, carcasses, etc)

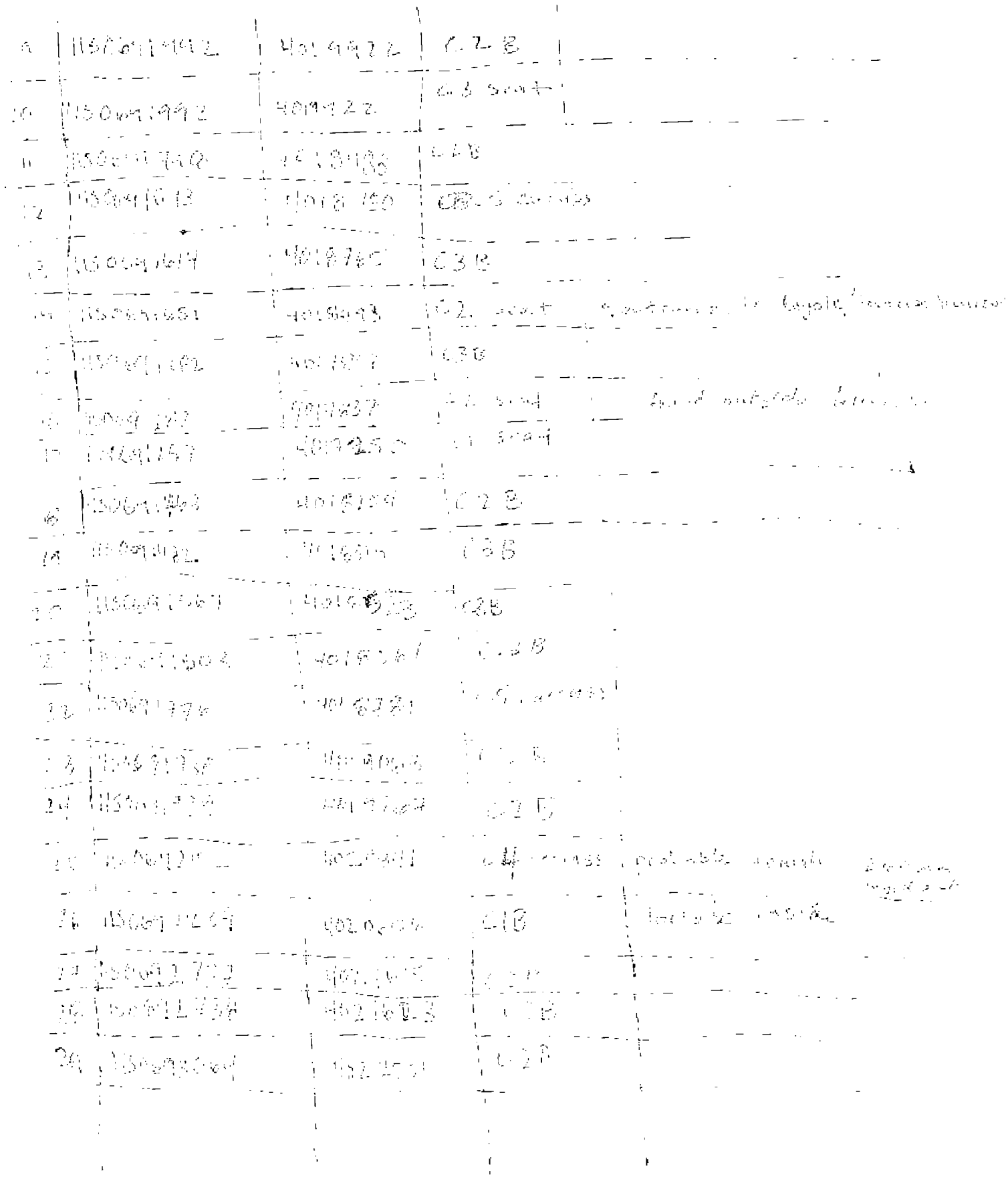
Detection number	GPS location Easting	GPS location Northing	Type of sign (burrows, scats, carcass, etc)	Description and comments
1	113 692666	4021534	C2B	
2	113 692539	4021548	C3S carcass	
3	113 692[illegible]	4021548	C2 S. [illegible]	
4	113 692[illegible]	4021548	C1B	[illegible]
5	113 692200	4020598	C4B carcass	≥ 210 mm female
6	113 692163	4020621	C3B	
7	113 691165	4020407	C2B	
8	113 6692158	4020362	C3B	

[illegible] on back

Page: ____ of _____

Date of survey: _____

Transect number: _____



USFWS 2008 Desert Tortoise Pre-Project Survey Data Sheet

Date of survey: 5 5 2009 (day, month, year) Survey biologist(s): _____

Site description: _____ (project name and site, general location)

County: _____ Quad: _____ Location: _____ (UTM coordinates, lat/long, and/or TRS)

Transect number: _____ Type of survey: _____ (100% coverage probabilistic sampling, project sense to be surveyed, transect, config, intrusion)

GPS Start-point: _____ (easting, northing, elevation) Start time: _____ am/pm

GPS End-point: _____ (easting, northing, elevation) End time: _____ am/pm

Start Temp. _____ °C Weather: _____

End Temp: _____ °C

Live Tortoises

Detection number	GPS location Easting	GPS location Northing	Time	Tortoise location (in burrow, or of tortoise beneath plane of burrow opening or not in burrow)	Approx MCL >160-mm? (Yes, No or Unknown)	Sex (Male, female, or unknown)	Existing tag # and color, if present
1							
2							
3							
4							
5							
6							
7							
8							

Tortoise Sign (burrows, scats, carcasses, etc)

Detection number	GPS location Easting	GPS location Northing	Type of sign (burrows, scats, carcass, etc)	Description and comments
1	11S 0690802	4016460	C3B	
2	11S 0690857	4016244	C2B	
3	11S 0690451	4015304	C2B	
4	11S 0690387	4015240	C3B	
5	11S 0690394	4014834	C2B	
6	11S 0689964	4013918	C3B	
7	11S 0690026	4013706	C2B	
8	11S 0689908	4013708	C3B	

Page: ___ of ___

Date of survey: ___

Transect number: ___

9	1150689758	4012969	C2B	
10	1150689527	4013223	C2B	20I
11	1150690597	4017246	C2B	20I
12	1150691078	4017321	C2B	20I
13	1150689713	4013683	~~C2 Scat~~ C2 Scat	
14	1150690343	4015584	C3 scat	
15	1150690665	4016539	C4 carc	female ≈ 240 mm
16	0691[illegible]	4016753	C1 scat	
17	0690816	4016384	C2 burrow	
18	0690816	4016384	C4 scat	inside burrow
19	0690226	4014564	C4 carcass	+ male ≈ 100 m
20	689908	4013604	C3B	

Jim Shurliff SNIP 5/509

Seat - 2	11s 0689713	4013683
Seat - 2	11s 0691884	4019382
Seat - 3	11s 0690343	4015584
Car-4	11s 0690665	4016539
Car 5	11s 0694764	4027650
Seat 4	11s 0693465	4027699
Car 5	11s 0694763	4018741

USFWS 2008 DESERT TORTOISE PRE-PROJECT SURVEY DATA SHEET

Date of survey: 6.5.2009 (day, month, year) Survey biologist(s): _____

Site description: _____ (project name and size, general location)

County: _____ Quad: _____ Location: _____ (UTM coordinates, lat/long, and/or TRS)

Transect number: Type of survey: _____ (100% coverage, probable sampling, project area to be surveyed, transect configuration)

GPS Start-point: _____ (easting, northing, elevation) Start time: _____ am/pm

GPS End-point: _____ (easting, northing, elevation) End time _____ am/pm

Start Temp: _____ °C Weather _____

End Temp: _____ °C

Live Tortoises

Detection number	GPS location Easting	GPS location Northing	Time	Tortoise location (in burrow, all of tortoise beneath plane of burrow opening or not in burrow)	Approx MCL >160-mm? (Yes, No, or Unknown)	Sex (Male, Female, or Unknown)	Existing tag # and color, if present
1	0690834	4017946	1015	outside	270	Male	
2							
3							
4							
5							
6							
7							
8							

Tortoise Sign (burrows, scats, carcasses, etc)

Detection number	GPS location Easting	GPS location Northing	Type of sign (burrows, scats, carcass, etc)	Description and comments
1	11S 0692998	4023743	C3 carcass	male ≈ 280mm
2			C3 carcass	
3	11S 0692836	4023400	C2B	
4	11S 0692506	4022827	C3B	
5	11S 0692291	4022234	C2 scat	
6	11S 0691456	4019754	C3B	
7	11S 0691406	4019595	C2 scat	
8	11S 0691828	4017946	C2B	

Page: ___ of ___

Date of survey: 5-6-09

Transect number: _____

Detection #	GPS		Type	Description
9	691240	4018166	C2 scat	
10	691779	4020021	C2 burned	
11	692483	4021911	C5 carcass	likely adult
12	693057	4023391	C3 carcass	AF 240mm

USFWS 2008 DESERT TORTOISE PRE-PROJECT SURVEY DATA SHEET

Date of survey: 7/5/09 (day, month, year) Survey biologist(s): _____

Site description: _____ (project name, and site general location)

County: _____ Quad: _____ Location: _____ (UTM coordinates, lat-long, and/or TRS)

Transect number: Type of survey: _____ (100% coverage probable site sampling, project acres to be surveyed, transect configuration)

GPS Start point _____ (easting, northing, elevation) Start time: _____ am/pm

GPS End-point _____ (easting, northing, elevation) End time: _____ am/pm

Start Temp: _____ °C Weather: _____

End Temp: _____ °C

Live Tortoises

Detection number	GPS location Easting	GPS location Northing	Time	Tortoise location (in burrow, all of tortoise beneath plane of burrow opening, or not in burrow)	Approx MCL >160 mm? (Yes, No or Unknown)	Sex (Male, Female, or Unknown)	Existing tag # and color, if present
1	115 0695217	4035737	844	in road	220	female	100 [illegible]
2							
3							
4							
5							
6							
7							
8							

Tortoise Sign (burrows, scats, carcasses, etc)

Detection number	GPS location Easting	GPS location Northing	Type of sign (burrows, scats, carcass, etc)	Description and comments
1	115 0695152	4031615	C3B	
2	115 [illegible]	4031603	C2B	
3	115 0686339	4004582	C3B	
4	0686193	400[illegible]475	C3B	
5				
6				
7				
8				

Page: ___ of ___

Date of survey: ___

Transect number: ___

USFWS 2008 Desert Tortoise Pre-Project Survey Data Sheet

Date of survey: 11 5 2009 (date, month, year) Survey biologist(s): _____

Site description: _____ (project name and size, general location)

County: _____ Quad: _____ Location: _____ (UTM or other sites, lat/long, and/or TRS)

Transect number: _____ Type of survey: _____ (100% coverage probability sampling, projects area to be surveyed, transect configuration)

GPS Start-point: _____ (easting, northing, elevation) Start time: _____ am/pm

GPS End-point: _____ (easting, northing, elevation) End time: _____ am/pm

Start Temp: _____ °C Weather: _____

End Temp: _____ °C

Live Tortoises

Detection number	GPS location Easting	GPS location Northing	Time	Tortoise location (in burrow, lip of tortoise beneath plane of burrow opening, or not in burrow)	Approx MCL >160-mm? (Yes, No or Unknown)	Sex (Male, Female, or Unknown)	Existing tag # and color, if present
1	115Ø688287	4009824	7:15	in burrow 3' back	unk	unk	
2							
3							
4							
5							
6							
7							
8							

Tortoise Sign (burrows, scats, carcasses, etc)

Detection number	GPS location Easting	GPS location Northing	Type of sign (burrows, scats, carcass, etc)	Description and comments
1	115Ø688287	4009824	GIB	tortoise in burrow
2				
3				
4				
5				
6				
7				
8				

Page: _____ of _____

Date of survey: 11-5-09

Transect number: _____

USFWS 2008 DESERT TORTOISE PRE-PROJECT SURVEY DATA SHEET

Date of survey: 12/5/24 (day, month, year) Survey biologist(s): _____

Site description: _____ (project name and size; general location)

County: _____ Quad: _____ Location: _____ (UTM coordinates, lat-long, and/or TRS)

Transect number: _____ Type of survey: _____ (100% coverage/probabilistic sampling; project acres to be surveyed; transect configuration)

GPS Start-point: _____ (easting, northing, elevation) Start time: _____ am/pm

GPS End-point: _____ (easting, northing, elevation) End time: _____ am/pm

Start Temp: _____ °C Weather: _____

End Temp: _____ °C

Live Tortoises

Detection number	GPS location Easting	Northing	Time	Tortoise location (in burrow: all of tortoise beneath plane of burrow opening; or: not in burrow)	Approx MCL >160-mm? (Yes, No or Unknown)	Sex (Male, Female, or Unknown)	Existing tag # and color, if present
1							
2							
3							
4							
5							
6							
7							
8							

Tortoise Sign (burrows, scats, carcasses, etc)

Detection number	GPS location Easting	Northing	Type of sign (burrows, scats, carcass, etc)	Description and comments
1	[illegible]	[illegible]	[illegible]	[illegible]
2				
3				
4				
5				
6				
7				
8				

Page: _____ of _____

Date of survey: _____

Transect number: _____

0688355	4007468	2 Bear Poppy	4 Sticky ring stem
0688270	4008916	4 "	
0687806	4007835	1 Stick Ring stem	

USFWS 2008 Desert Tortoise Pre-Project Survey Data Sheet

Date of survey: ___/___/___ (day, month, year) Survey biologist(s): _____

Site description: _____ (project name and size; general location)

County: _____ Quad: _____ Location: _____ (UTM coordinates, lat-long, and/or TRS)

Transect number: _____ Type of survey: _____ (100% coverage/probabilistic sampling; project acres to be surveyed; transect configuration)

GPS Start-point: _____ (easting, northing, elevation) Start time: _____am/pm

GPS End-point: _____ (easting, northing, elevation) End time: _____am/pm

Start Temp: _____°C Weather: _____

End Temp. _____°C

Live Tortoises

Detection number	GPS location Easting	GPS location Northing	Time	Tortoise location (in burrow, at of tortoise beneath plane of burrow opening or not in burrow)	Approx MCL >160 mm? (Yes, No or Unknown)	Sex (Male, Female or Unknown)	Existing tag # and color, if present
1							
2							
3							
4							
5							
6							
7							
8							

Tortoise Sign (burrows, scats, carcasses, etc)

Detection number	GPS location Easting	GPS location Northing	Type of sign (burrows, scats, carcass, etc)	Description and comments
1				
2				
3				
4				
5				
6				
7				
8				

Page: _____of_____

Date of survey _____

Transect number _____

USFWS 2008 Desert Tortoise Pre-Project Survey Data Sheet

Date of survey: 8 5 09 (day, month, year) Survey biologist(s): _____

Site description: _____ (project name and size, general location)

County: _____ Quad: ____ Location: _____ (UTM coordinates, tag, and/or TRS)

Transect number: _____ Type of survey: _____ (100% coverage/probabilistic sampling, project acres to be surveyed, transect and gradation)

GPS Start-point: _____ (easting, northing, elevation) Start time: _____ am/pm

GPS End-point: _____ (easting, northing, elevation) End time: _____ am/pm

Start Temp: _____°C Weather _____

End Temp: _____°C

Live Tortoises

Detection number	GPS location Easting	GPS location Northing	Time	Tortoise location (in burrow, and tortoise behavior, point of burrow opening or not in burrow)	Approx MCL >160-mm? (Yes, No or Unknown)	Sex (Male, Female, or Unknown)	Existing tag # and color, if present
1	0681448	[illegible]	[illegible]	in burrow	[illegible]		
2	0683[illegible]	[illegible]	[illegible]	in burrow	[illegible]	?	
3							
4							
5							
6							
7							
8							

Tortoise Sign (burrows, scats, carcasses, etc)

Detection number	GPS location Easting	GPS location Northing	Type of sign (burrows, scats, carcass, etc)	Description and comments
1	0683329	3980880	Scat	class 2
2	0683283	398[illegible]	burrow	class 1
3	0683676	3981162	egg shells burrow + scat	burrow - class 1 multiple scat class 2 4
4	[illegible]	398[illegible]	burrow, egg shell, scat	burrow class 1 [illegible]
5	0689482	3982513	burrow + scat	burrow - class 2, multiple scat - class 3, [illegible]
6				
7				
8				

Page ___ of

Date of survey: _____

Transect number

USFWS 2008 Desert Tortoise Pre-Project Survey Data Sheet

Date of survey: _____ (day, month, year) Survey biologist(s): _____

Site description: _____ (project name and size; general location)

County: _____ Quad: _____ Location: _____ (UTM coordinates, lat-long, and/or TRS)

Transect number: _____ Type of survey: _____ (100% coverage/probabilistic sampling, project acres to be surveyed, transect configuration)

GPS Start-point: _____ (easting, northing, elevation) Start time: _____ am/pm

GPS End-point: _____ (easting, northing, elevation) End time: _____ am/pm

Start Temp: _____ °C Weather: _____

End Temp: _____ °C

Live Tortoises

Detection number	GPS location Easting	GPS location Northing	Time	Tortoise location (In burrow, all of tortoise beneath plane of burrow opening or not in burrow)	Approx MCL >150-mm? (Yes, No or Unknown)	Sex (Male, Female, or Unknown)	Existing tag # and color, if present
1	[illegible]						
2							
3							
4							
5							
6							
7							
8							

Tortoise Sign (burrows, scats, carcasses, etc)

Detection number	GPS location Easting	GPS location Northing	Type of sign (burrows, scats, carcass, etc)	Description and comments
1	[illegible]	[illegible]	[illegible]	
2				
3				
4				
5				
6				
7				
8				

Page: _____ of _____

Date of survey: _____

Transect number: _____

USFWS 2008 Desert Tortoise Pre-Project Survey Data Sheet

Date of survey 5/20/09 (day, month, year) Survey biologist(s): _____

Site description: _____ (project name and size, general location)

County _____ Quad: _____ Location: _____ (UTM coordinates, landing, and/or TRS)

Transect number: _____ Type of survey _____ (100% coverage probability, sampling, project acres to be surveyed, transect configuration)

GPS Start-point _____ (easting, northing, elevation) Start time: _____ am/pm

GPS End-point: _____ (easting, northing, elevation) End time: _____ am/pm

Start Temp: _____°C Weather: _____

End Temp: _____°C

Live Tortoises

Detection number	GPS location Easting	GPS location Northing	Time	Tortoise location (in burrow, all of tortoise beneath plane of burrow opening or not in burrow)	Approx MCL >160-mm? (Yes, No or Unknown)	Sex (Male, Female, or Unknown)	Existing tag # and color, if present
1							
2							
3							
4							
5							
6							
7							
8							

Tortoise Sign (burrows, scats, carcasses, etc)

Detection number	GPS location Easting	GPS location Northing	Type of sign (burrows, scats, carcass, etc)	Description and comments
1	11S 0686107	398296	C3 carcass	≈ 220 mm relatively fresh but disarticulated due to predation
2	0688613	3784976	C2B	PIC 106+107
3	0688617	3984699	C3B	
4	[illegible]	[illegible]	[illegible]	[illegible]
5	[illegible]	[illegible]	[illegible]	[illegible]
6				
7				
8				

Page: _____ of _____

Date of survey: _____

Transect number: _____

[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]

USFWS 2008 DESERT TORTOISE PRE-PROJECT SURVEY DATA SHEET

Date of survey: _____ (day, month, year) Survey biologist(s): _____

Site description: _____ (project name and size; general location)

County: _____ Quad: _____ Location: _____ (UTM coordinates, lat-long, and/or TRS)

Transect number: _____ Type of survey: _____ (100% coverage/probabilistic sampling; project acres to be surveyed; transect configuration)

GPS Start-point: _____ (easting, northing, elevation) Start time: _____ am/pm

GPS End-point: _____ (easting, northing, elevation) End time: _____ am/pm

Start Temp: _____ °C Weather: _____

End Temp: _____ °C

Live Tortoises

Detection number	GPS location Easting	GPS location Northing	Time	Tortoise location (in burrow: at or tortoise beneath plane of burrow opening; or not in burrow)	Approx MCL >160-mm? (Yes, No or Unknown)	Sex (Male, Female, or Unknown)	Existing tag # and color, if present
1							
2							
3							
4							
5							
6							
7							
8							

Tortoise Sign (burrows, scats, carcasses, etc)

Detection number	GPS location Easting	GPS location Northing	Type of sign (burrows, scats, carcass, etc)	Description and comments
1				
2				
3				
4				
5				
6				
7				
8				

Date of survey: _____

Transect number: _____

USFWS 2008 DESERT TORTOISE PRE-PROJECT SURVEY DATA SHEET

Date of survey: 21/15/05 (day, month, year) Survey biologist(s): _____

Site description: _____ (project name and size, general location)

County: _____ Quad: _____ Location: _____ (UTM coordinates, Lat/long, and/or TRS)

Transect number _____ Type of survey: _____ (100% coverage/ensemble, line sampling, project acres to be surveyed, transect configuration)

GPS Start-point: _____ (easting, northing, elevation) Start time: _____ am/pm

GPS End-point: _____ (easting, northing, elevation) End time _____ am/pm

Start Temp: _____°C Weather: _____

End Temp: _____°C

Live Tortoises

Detection number	GPS location Easting	GPS location Northing	Time	Tortoise location (in burrow, all of tortoise beneath plane of burrow opening or not in burrow)	Approx MCL >160mm? (Yes, No or Unknown)	Sex (Male, Female or Unknown)	Existing tag # and color, if present
1	623255	3978665	7:07	not in burrow	245	F	
2							
3							
4							
5							
6							
7							
8							

Tortoise Sign (burrows, scats, carcasses, etc)

Detection number	GPS location Easting	GPS location Northing	Type of sign (burrows, scats, carcass, etc)	Description and comments
1	684902	3977577	Scat Et	[illegible]
2				
3				
4				
5				
6				
7				
8				

Page: _____ of _____

Date of survey _____

Transect number: _____

USFWS 2008 Desert Tortoise Pre-Project Survey Data Sheet

Date of survey: _____ (day, month, year) Survey biologist(s): _____

Site description: _____ (project name and size; general location)

County: _____ Quad: _____ Location: _____ (UTM coordinates, lat/long, and/or TRS)

Transect number: _____ Type of survey: _____ (100% coverage/probabilistic sampling; project acres to be surveyed; transect configuration)

GPS Start-point: _____ (easting, northing, elevation) Start time: _____ am/pm

GPS End-point: _____ (easting, northing, elevation) End time: _____ am/pm

Start Temp: _____ °C Weather: _____

End Temp: _____ °C

Live Tortoises

Detection number	GPS location Easting	GPS location Northing	Time	Tortoise location (in burrow, all of tortoise beneath plane of burrow opening, or not in burrow)	Above MCL >160-mm? (Yes, No or Unknown)	Sex (Male, Female, or Unknown)	Existing tag # and color, if present
1							
2							
3							
4							
5							
6							
7							
8							

Tortoise Sign (burrows, scats, carcasses, etc)

Detection number	GPS location Easting	GPS location Northing	Type of sign (Burrows, scats, carcass, etc)	Description and comments
1				
2				
3				
4				
5				
6				
7				
8				

USFWS 2008 DESERT TORTOISE PRE-PROJECT SURVEY DATA SHEET

Date of survey: _____ (day, month, year) Survey biologist(s): _____

Site description: _____ (project name and size, general location)

County: _____ Quad: _____ Location: _____ (UTM coordinates, lat-long, and/or TRS)

Transect number: _____ Type of survey: _____ (100% coverage/probabilistic sampling, project acres to be surveyed, transect configuration)

GPS Start-point: _____ (easting, northing, elevation) Start time: _____ am/pm

GPS End-point: _____ (easting, northing, elevation) End time: _____ am/pm

Start Temp: _____ °C Weather: _____

End Temp: _____ °C

Live Tortoises

Detection number	GPS location Easting	GPS location Northing	Time	Tortoise location (in burrow, at or tortoise beneath plane of burrow opening or not in burrow)	Approx MCL >160 mm? (Yes, No or Unknown)	Sex (Male, Female or Unknown)	Existing tag # and color if present
1							
2							
3							
4							
5							
6							
7							
8							

Tortoise Sign (burrows, scats, carcasses, etc)

Detection number	GPS location Easting	GPS location Northing	Type of sign (burrows, scats, carcass, etc)	Description and comments
1				
2				
3				
4				
5				
6				
7				
8				

Appendix F

Animal and Plant Species Observed During Desert Tortoise Surveys

APPENDIX F ANIMAL AND PLANT SPECIES OBSERVED DURING THE DESERT TORTOISE SURVEYS BETWEEN 23 APRIL AND 3 JUNE, 2009	
Common Name	***Scientific Name***
BIRDS	
American Coot	*Fulica americana*
American Kestrel	*Falco sparverius*
Ash-throated Flycatcher	*Myiarchus cinerascens*
Bendire's Thrasher	*Toxostoma bendirei*
Black-tailed Gnatcatcher	*Polioptila melanura*
Black-throated Sparrow	*Amphispiza bilineata*
Brewer's Blackbird	*Euphagus cyanocephalus*
Burrowing Owl	*Athene cunicularia*
Cactus Wren	*Campylorhynchus brunneicpillus*
Canyon Wren	*Catherpes mexicanus*
Chipping Sparrow	*Spizella passerina*
Cliff Swallow	*Petrochelidon pyrrhonota*
Common Raven	*Corvus corax*
Double-crested Cormorant	*Phalacrocorax auritus*
Eared Grebe	*Podiceps nigricollis*
Evening Grosbeak	*Coccothraustes vespertina*
Gambel's Quail	*Callipepla gambelii*
Great Blue Heron	*Ardea herodias*
Great-tailed Grackle	*Quiscalus mexicanus*
Horned Lark	*Eremophilia alpestris*
House Finch	*Carpodacus mexicanus*
Lesser Nighthawk	*Chordeiles acutipennis*
Loggerhead Shrike	*Lanius ludovicanus*
Mallard	*Anas platyrhynchos*
Mourning Dove	*Zenaida macroura*
Northern Mockingbird	*Mimus polyglottos*
Phainopepla	*Phainopepla nitens*
Red-tailed Hawk	*Buteo jamaicensis*
Red-winged Blackbird	*Agelaius phoeniceus*
Rock Dove	*Columba livia*
Rock Wren	*Salpinctes obsoletus*
Say's Phoebe	*Sayornis saya*
Turkey Vulture	*Cathartes aura*
Vesper Sparrow	*Pooecetes gramineus*
Violet-green Swallow	*Tachycineta thalassina*
Western Tanager	*Piranga ludoviciana*
Wilson's Warbler	*Wilsonia pusilla*
MAMMALS	
Black-tailed Jackrabbit	*Lepus californicus*

APPENDIX F ANIMAL AND PLANT SPECIES OBSERVED DURING THE DESERT TORTOISE SURVEYS BETWEEN 23 APRIL AND 3 JUNE, 2009	
Common Name	***Scientific Name***
Desert Cottontail	*Sylvilagus audubonii*
Desert Kangaroo Rat	*Dipodomys deserti*
White-tailed Antelope Squirrel	*Ammospermophilus leucurus*
INVERTEBRATES	
Ants	
Desert Leafcutter Ant	*Acromyrmex visicolor*
Harvester Ants	*Pogonomyrmex spp.*
Antlions	
Antlion	*Brachynemurus* spp.
Beetles	
Broad-necked Darkling Beetle	*Coelocnemis californicus*
Desert Blister Beetle	*Lytta magister*
Ground Beetle	*Pterostichus spp.*
Butterflies	
Buckeye	*Precis coenia*
Cabbage White	*Peris rapae*
Orange Sulphur	*Colias eurytheme*
Painted Lady	*Vanessa cardui*
Viceroy	*Limenitis archippus*
Dragonflies	
Arid Land Subterranean Termite	*Reticulitermes tibialis*
Variegated Meadowhawk	*Sympetrum corruptum*
Grasshoppers	
Field Cricket	*Gryllus pennsylvanicus*
Three-banded Grasshopper	*Hadrotettix trifasciatus*
Pallid-winged Grasshopper	*Trimerotropis pallidipennis*
Mantids	
Minor Ground Mantis	*Litaneutria minor*
Moths	
Eyed Sphinx Caterpillar	*Smerinthus cerisyi*
Spiders	
Desert Loxosceles	*Loxosceles deserta*
Western Black Widow	*Latrodectus hesperus*
Western Desert Tarantula	*Aphonopelma chalcodes*
Windscorpions	*Eremobates spp.*
Wasps & Bees	
Blue-black Spider Wasp	*Anoplius spp*
Tarantula Hawks	*Pepsis* and *Hemipepsis spp.*

APPENDIX F ANIMAL AND PLANT SPECIES OBSERVED DURING THE DESERT TORTOISE SURVEYS BETWEEN 23 APRIL AND 3 JUNE, 2009	
Common Name	***Scientific Name***
REPTILES	
Lizards	
Chuckwalla	*Sauromalus ater*
Desert Horned Lizard	*Phrynosoma platyrhinos*
Desert Iguana	*Dipsosaurus dorsalis*
Long-nosed Leopard Lizard	*Gambelia wislizenii*
Side-blotched Lizard	*Uta stansburiana*
Tiger Whiptail	*Aspidoscelis tigris*
Zebra-tailed Lizard	*Callisaurus draconoides*
Snakes	
Coachwhip	*Masticophis flagellum*
Great Basin Gophersnake	*Pituophis catenifer deserticola*
Mojave Rattlesnake	*Crotalus scutulatus*
Panamint Speckled Rattlesnake	*Crotalus mitchellii stephensi*
Sidewinder	*Crotalus cerastes*
Western Lyresnake	*Trimorphodon biscutatus*
Turtles	
Desert Tortoise	*Gopherus agassizii*
PLANTS **(Common names from USDA-NRCS Plants Database: http://plants.usda.gov/index.html)**	
Vascular Plants	
	Astragalus spp.
Bristly Fiddleneck	*Amsinckia tessellata*
Brittlebush	*Encelia farinosa*
Brownplume Wirelettuce	*Stephanomeria pauciflora*
Burrobrush	*Ambrosia dumosa*
California Poppy	*Eschscholzia californica*
Canaigre Dock	*Rumex hymenosepalus*
Cleft-leaf Wild Heliotrope	*Phacelia crenulata*
Coues' Cassia	*Senna covesii*
Desert Dodder	*Cuscuta denticulata*
Desert Evening Primrose	*Oenothera primiveris*
Desert Globemallow	*Sphaeralcea ambigua*
Desert Marigold	*Baileya multiradiata*
Desert Poppy	*Eschscholzia glyptosperma*
Desert Trumpet	*Eriogonum inflatum*
Devil's Spineflower	*Chorizanthe rigida*
Eastern Mojave Buckwheat	*Eriogonum fasciculatum*
Flat-crown Buckwheat	*Eriogonum deflexum*
Indian Paintbrush	*Castilleja spp.*
Las Vegas Bearpoppy	*Arctomecon californica*

APPENDIX F ANIMAL AND PLANT SPECIES OBSERVED DURING THE DESERT TORTOISE SURVEYS BETWEEN 23 APRIL AND 3 JUNE, 2009	
Common Name	***Scientific Name***
Lupine	*Lupinus spp.*
Mexican Bladdersage	*Salazaria mexicana*
Moapa Bladderpod	*Lesquerella tenella*
Mormon Tea	*Ephedra spp.*
New Mexico Plumeseed	*Rafinesquia neomexicana*
Panamint Daisy	*Enceliopsis covillei*
Plantain	*Plantago spp.*
Prickly Russian Thistle	*Salsola tragus*
Ragleaf Bahia	*Bahia dissecta*
Redstem Stork's Bill	*Erodium cicutarium*
Shaggyfruit Pepperweed	*Lepidium lasiocarpum*
Southwestern Ringstem	*Anulocaulis leiosolenus*
Spotted Sandmat	*Chamaesyce maculata*
Spreading Fleabane	*Erigeron divergens*
Texas Stork's Bill	*Erodium texanum*
Textile Onion	*Allium textile*
Whitemargin Sandmat	*Chamaesyce albomarginata*
Grasses	
Alkali Sacaton	*Sporobolus airoides*
Arizona Barley	*Hordeum arizonicum*
Arizona Signalgrass	*Urochloa arizonica*
Big Galleta	*Pleuraphis rigida*
Common Mediterranean Grass	*Schismus barbatus*
Common Reed	*Phragmites australis*
Red Brome	*Bromus rubens*
Saltgrass	*Distichlis spicata*
Sedges	*Carex spp.*
Slim Tridens	*Tridens muticus*
Yucca	
Mojave Yucca	*Yucca schidigera*
Trees - Shrubs	
Catclaw Acacia	*Acacia greggii*
Creosote Bush	*Larrea tridentata*
Desert Willow	*Chilopsis linearis*
Desertbroom	*Baccharis sarothroides*
Fremont Cottonwood	*Populus fremontii*
Honey Mesquite	*Prosopis glandulosa.*
Mesquite Mistletoe	*Phoradendron californicum*
Purple Sage	*Salvia dorrii*
Saltcedar	*Tamarix ramosissima*
Woolly Sage	*Salvia funerea*

APPENDIX F ANIMAL AND PLANT SPECIES OBSERVED DURING THE DESERT TORTOISE SURVEYS BETWEEN 23 APRIL AND 3 JUNE, 2009	
Common Name	***Scientific Name***
Cactus	
Barrel Cactus	*Ferocactus sp.*
Beavertail Pricklypear	*Opuntia basilaris*
Branched Pencil Cholla	*Cylindropuntia ramosissima*
Candy Barrelcactus	*Ferocactus wislizenii*
Cholla	*Cylindropuntia spp.*
Cottontop Cactus	*Echinocactus polycephalus*
Engelmann's Hedgehog Cactus	*Echinocereus engelmannii*
Fishhook Cactus	*Echinomastus spp.*
Hedgehog Cactus	*Echinocereus spp.*
Johnson Fishhook Cactus	*Echinomastus johnsonii*
Mammillaria	*Mammillaria spp.*
Wiggins' Cholla	*Cylindropuntia echinocarpa*