2. Description of Proposed Project and Alternatives

2.1 Introduction

This chapter describes in detail the Eldorado–Ivanpah Transmission Project (EITP) proposed by Southern California Edison (SCE; the applicant) and its alternatives. The purpose of the proposed project is to provide the transmission facilities necessary to interconnect with and deliver up to 1,400 megawatts (MW) of energy from renewable sources that is expected to be generated in the Ivanpah Valley area in compliance with federal and state requirements discussed in Chapter 1.

The proposed project would involve several types of transmission upgrades to connect renewable energy generated in the Ivanpah Valley area to the transmission grid controlled by the California Independent Service Operator (CAISO). A new 230/115-kilovolt (kV) Ivanpah Substation, a double-circuit 230-kV transmission line between the existing Eldorado Substation and the Ivanpah Dry Lake area to replace the existing 115-kV line, and a telecommunication system would be constructed. The reliability of the existing 115-kV transmission line would also be improved in compliance with the North American Electric Reliability Corporation (NERC) and Western Electricity Coordinating Council (WECC) planning criteria, the NERC reliability standards, and the applicant's standards. An overview map showing the location of the proposed project components and alternatives is provided in Figure 2-1.

Technical information about the proposed project in this chapter was provided by the applicant. All numbers referring to mileage, land disturbance, equipment, schedule, and workforce are based on preliminary engineering completed by the applicant in the Proponent's Environmental Assessment (PEA) as part of Application A.09-05-027, submitted on May 28, 2009, to the California Public Utilities Commission (CPUC).

In addition to considering the project as proposed by SCE, this Draft EIR/EIS analyzes the potential environmental impacts of a number of alternatives to the proposed project. The Bureau of Land Management (BLM) and the CPUC identified a full range of reasonable alternatives to systematically analyze and screen alternatives. The alternatives considered during the screening process include those proposed by the applicant as part of the design of the proposed project, those proposed by the lead agencies as part of environmental review, and ideas for potential alternatives suggested by agencies and the public during the 30-day EITP scoping period that began after publication of the Notice of Preparation and the Notice of Intent for the project. A total of 18 alternatives were analyzed in four major categories: system, transmission line routing, telecommunication, and technology. Alternatives that were determined to meet the CEQA/NEPA criteria agreed upon by the CPUC and the BLM were retained for full analysis in the Draft EIR/EIS.

This chapter first provides general transmission system information (Section 2.1.2) and further describes the proposed project (Section 2.2), starting with an overview of the core project features, including the different transmission lines, substations, and telecommunication system. In addition, it describes related renewable energy projects, as part of the CEQA Whole of the Action approach. Section 2.3 describes the major features of the EITP alternatives, including routing, telecommunication, and technology, and explains their selection as a result of the alternatives screening process. Sections 2.4 and 2.5 describe the construction techniques and operation and maintenance activities applicable to the proposed project and its alternatives. Lastly, Section 2.6 introduces the cumulative projects in the area to be further analyzed in Chapter 5 of this Draft EIR/EIS.

2.1.1 Transmission System Background Information

This section contains general information on transmission systems and defines technical terms used throughout this document. It is intended to help the non-technical reader understand the description of the proposed project and its alternatives by explaining how transmission systems operate and defining transmission system components.

2.1.1.1 Electric Transmission Systems Overview

Electric transmission systems deliver electricity to consumers from power generating facilities. Delivering large quantities of power from remote locations such as the Ivanpah Valley area to high-consumption developed areas requires several steps. High-voltage transmission lines deliver the electricity from the generating facility to a transmission substation. The transmission substation contains transformers, which lower the voltage of the electricity and distribute the power through numerous lower-voltage subtransmission lines. Subtransmission lines then deliver the power to distribution substations, which further lower the voltage and distribute the power through distribution lines to individual consumers (Figure 2-2).

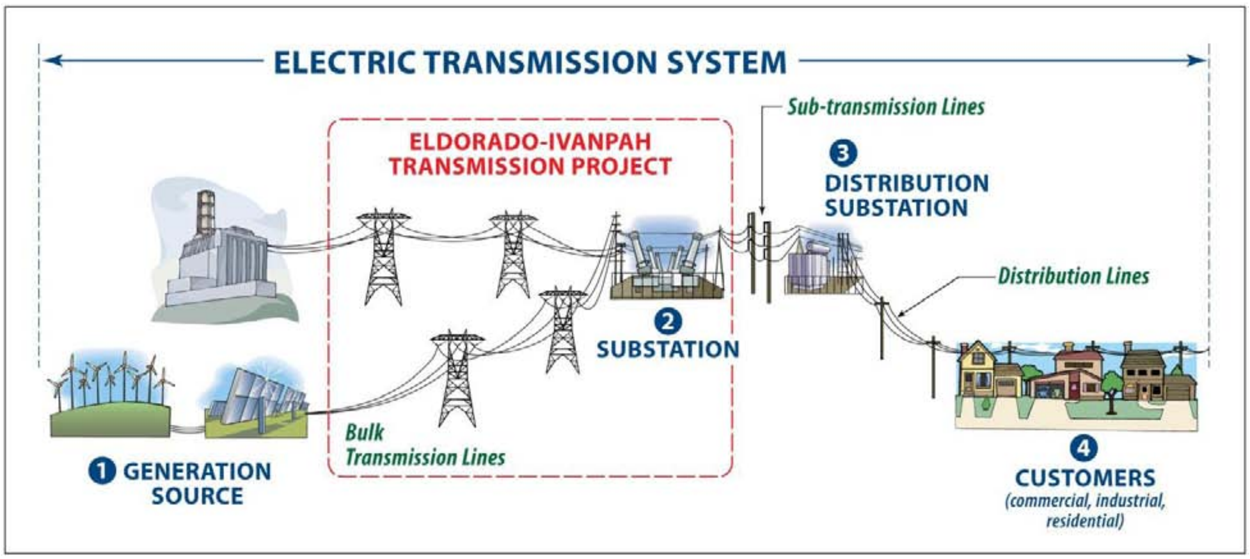

Figure 2-2 Electric Transmission System

Transmission systems also have a telecommunication component, which facilitates communication between substations and allows substations to be monitored for system safety and reliability. Safety and reliability standards require two redundant telecommunication paths, physically separated from each other, so that if the integrity of one path is compromised, the substations will be able to maintain communication. Telecommunication paths can be installed aboveground or in underground ducts, or they can use microwave towers.

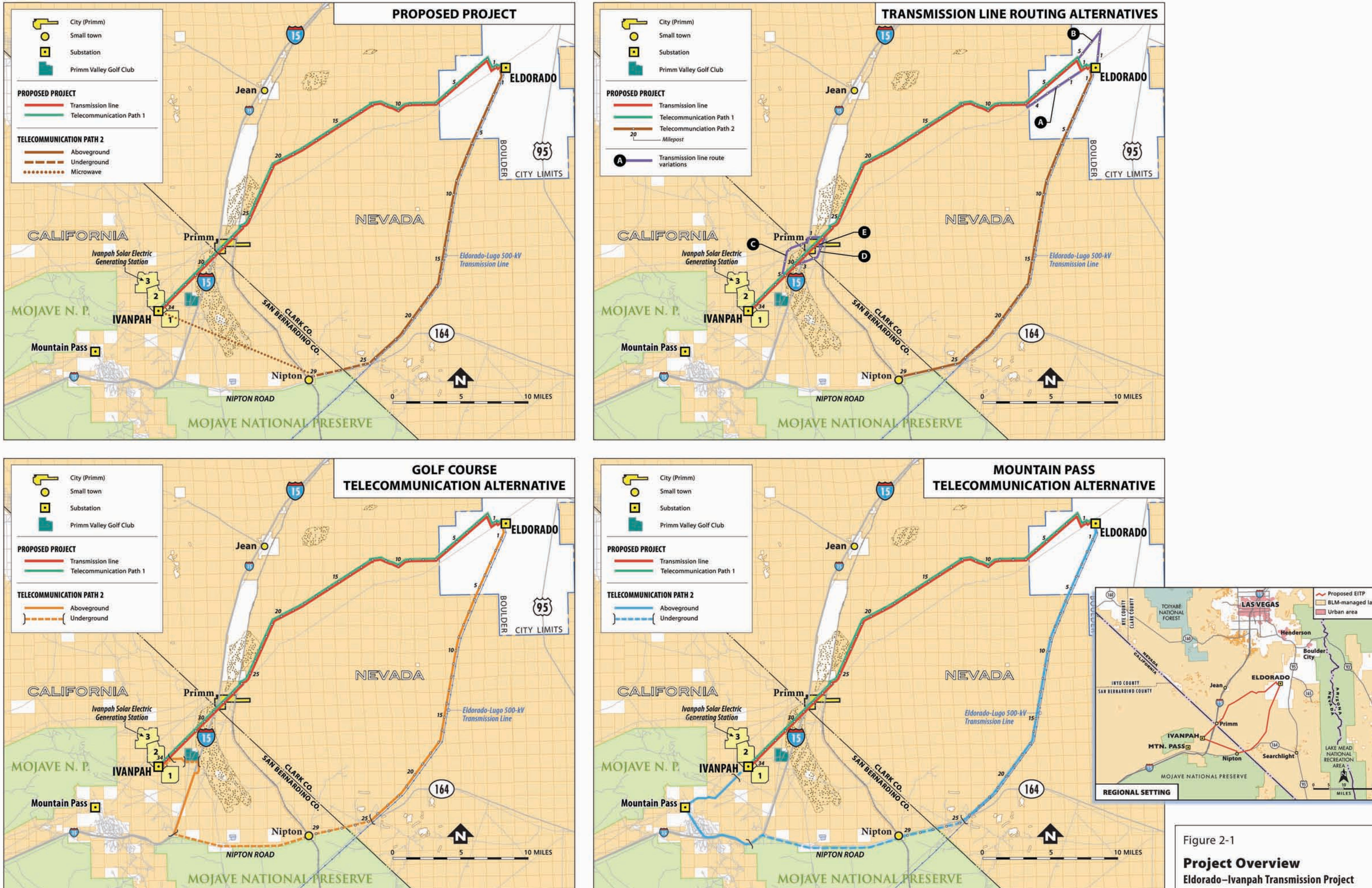

Figure 2-1

Project Overview

Eldorado–Ivanpah Transmission Project

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2.1.1.2 Transmission System Components

Structures

Transmission lines can be installed underground in ducts or strung overhead on transmission structures. Underground transmission line installation is not proposed for this project. To select the appropriate structure for a transmission line, a number of factors are considered, including the technical feasibility of installing the structure in different terrains, the space available for the footprint of the structure, and aesthetic regulations or concerns. A single transmission line can be constructed on multiple types of structures. The structures discussed in this document include the following (see Section 2.2.1.3 for more detail):

- Lattice Steel Towers (LSTs), which consist of a steel framework that is bolted or welded together.
- Tubular Steel Poles (TSPs), which are hollow steel poles consisting of one or two pieces welded together.
- H-frame Structures, which can be constructed with a lattice steel structure or with tubular steel. They have two separate footprints as opposed to the standard single foundation.

Conductors and Insulators

Conductors are wires that carry the electrical current. They typically consist of many aluminum wires wrapped around a steel core for reinforcement, and are strung along the transmission structures from generation facility to substation or substation to distribution station or distribution station to electricity consumer.

To prevent the electrical current from transferring to the transmission structures, conductors are connected to transmission structures via glass, porcelain, polymer, or silicon insulators. Electrical current can flow freely through metal; non-metal insulators serve as a buffer between the aluminum and steel conductors and the steel transmission structures. The two common types of insulators are:

- Horizontal post-type insulators, which extend perpendicular to the transmission structure and support the conductor on the side of the structure.
- Suspension-type insulators, which suspend the conductor below the top of the structure.

Ground Wires

Ground wires, also called “shield wires” or “earth wires,” are placed on the tops of transmission structures above the conductors to guard against lightning strikes. Accordingly, they are also called overhead ground wires. Ground wires may also contain a fiber optic communication line so that a signal can be directed to a nearby substation if a problem occurs along a portion of the line; this type of cable is called an optical ground wire.

Circuits

Transmission lines consist of multiple conductors along which the electrical current flows; these are called circuits. Alternating current (AC) power transmission lines generally use a three-phase system for each circuit. The three-phase system consists of three conductors that carry electric current at the same frequency and different time cycles, thus providing power transfer capacity. Each phase typically consists of only one wire, but may contain two or more bundled conductors.

Transmission structures can be designed to support either single circuits or double circuits. Single-circuit structures are typically used for voltages up to 200 kV and can help reduce unwanted side effects such as noise and radio interference (Figures 2-5 and 2-8). Double-circuit structures support two circuits, each circuit consisting of three phases. Each phase typically consists of two or more conductors, to increase the line’s capacity for voltages over 200 kV (Figure 2-4).

2.2 Description of the Proposed Project

2.2.1 Core Project Description (NEPA/CEQA)

2.2.1.1 Project Overview and Location

The core project includes the transmission upgrades and associated transmission infrastructure and the alternatives included in the application submitted by SCE to the CPUC and the BLM. The applicant proposes to construct, operate, and maintain new and upgraded transmission facilities to deliver electricity from several solar energy facilities proposed to be built in the Ivanpah Valley area. The upgraded transmission lines would extend approximately 35 miles from southern Clark County, Nevada, to northeastern San Bernardino County, California. Approximately 28 miles of the project are in Nevada and 7 are in California (Figure 2-3, Table 2-1). The proposed project would include the following components:

- **Powerlines**
  - **Eldorado–Ivanpah Transmission Line –** A new double-circuit 230-kV transmission line, approximately 35 miles long, would be constructed between the existing Eldorado Substation in Nevada and the proposed Ivanpah Substation in California. It would replace a portion of the existing 115-kV transmission line that runs from Eldorado through Baker, Cool Water, and Dunn Siding to Mountain Pass[1]. The existing 115-kV transmission line that runs west of the proposed Ivanpah Substation to Mountain Pass Substation would remain unchanged.
  - **Subtransmission Line –** A proposed 600- to 800-foot-long addition to an existing 115-kV subtransmission line from a connection point on the existing Eldorado–Baker–Cool Water–Dunn Siding–Mountain Pass 115-kV line would connect the proposed Ivanpah Substation to the existing 115-kV subtransmission system.
  - **Distribution Lines –** A 1-mile extension of the existing Nipton 33-kV distribution line would be constructed with underground circuitry to provide light and auxiliary power to the proposed Ivanpah Substation. In addition, a new 4,300-foot segment from the existing Nipton 12-kV distribution line would be built to provide power to a proposed microwave telecommunications site.
- **Substations**
  - **Ivanpah Substation –** The proposed substation would be located in California near Primm, Nevada, and would serve as a connector hub for solar energy generated in the Ivanpah Valley area. The substation would include a mechanical and electrical equipment room and a microwave tower.
  - **Eldorado Substation –** Changes inside the existing Eldorado Substation would be made to accommodate the new Eldorado–Ivanpah 230-kV transmission line.
- **Telecommunication System**
  - Existing overhead ground wire would be replaced with optical ground wire on an approximately 25-mile section of the existing Eldorado–Lugo 500-kV transmission line.

[1] The Public Utilities Commission of Nevada (PUCN) has determined that the replacement of an existing facility with a like facility does not constitute construction of a utility facility (NRS 704.865).

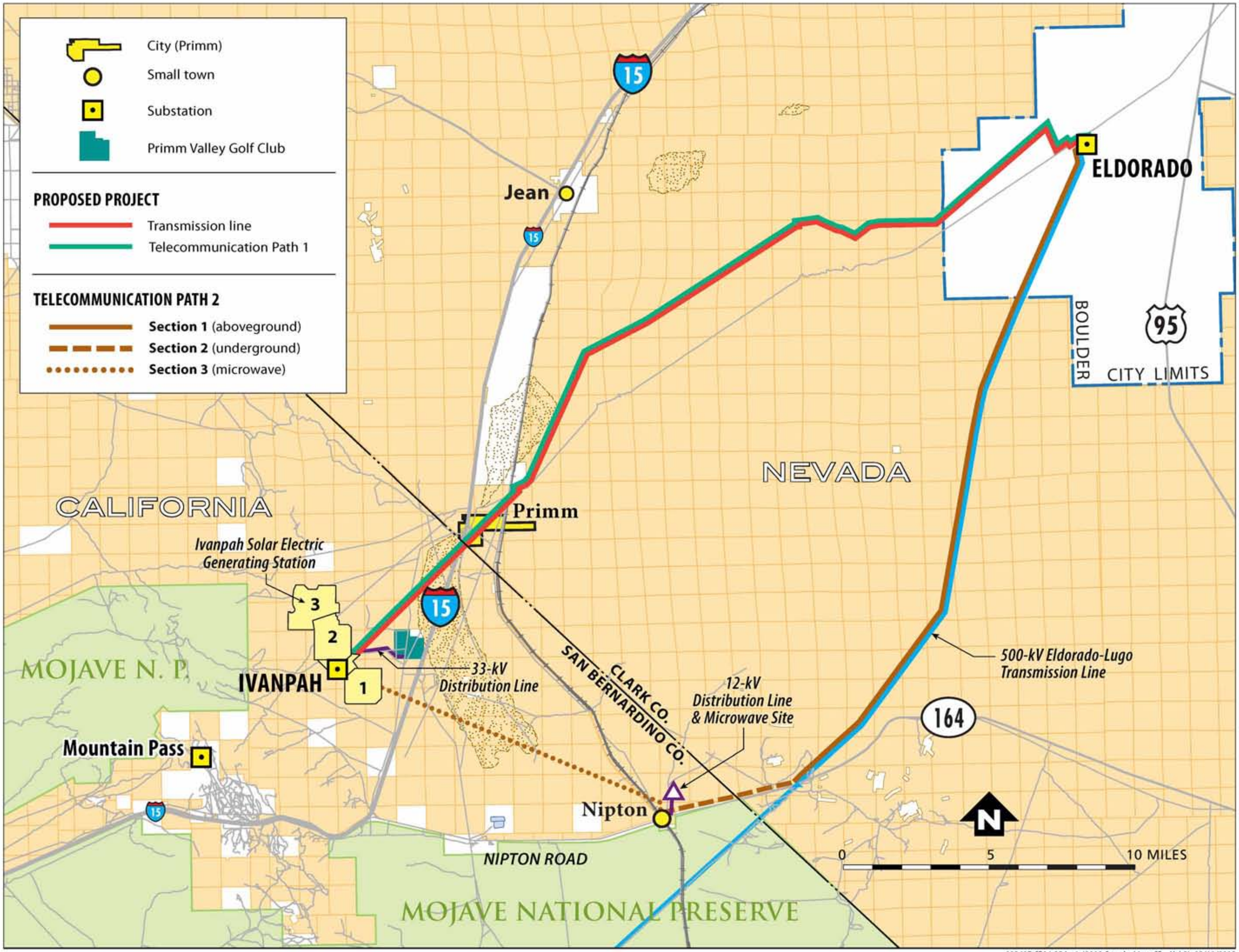

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Figure 2-3 **Proposed Project**

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- A 4.8-mile-long underground duct from the Eldorado–Lugo 500-kV transmission line to a proposed communication site in Nipton, California, would be installed.
- A microwave path (approximately 12 miles) between Nipton and the proposed Ivanpah Substation would be installed that would consist of two 180-foot-tall communication towers.
- A communications room would be installed in the mechanical and electrical equipment room (MEER) at the new Ivanpah Substation to house communication equipment.
- Telecommunication equipment would be installed at the Eldorado Substation.

Table 2-1 Summary of EITP Components

EITP Major Components		Features	Location/ Extension
Powerlines	Eldorado–Ivanpah Transmission Line	Double-circuit 230-kV line replacing a portion of the existing Eldorado–Baker–Cool Water–Dunn Siding–Mountain Pass 115-kV transmission line	Nevada; 28 miles California; 7 miles
	Subtransmission Line	Single-circuit 115-kV line connecting the Ivanpah Substation to the existing system	California; 600 to 800 feet
	Distribution Lines	Single-circuit 33-kV and 12-kV lines to provide power to Ivanpah Substation	California; 33-kV line: 1 mile 12-kV line: 4,300 ft
Substations	Ivanpah Substation	Connector hub for solar energy generated in the Ivanpah Valley area. Major components: • 230-kV and 115-kV switchracks • Mechanical and electrical equipment room • Microwave tower	California (near Primm, Nevada); 1,650 by 1,015 feet
	Eldorado Substation Upgrades	Extension of the existing yard to install two 230-kV line positions to accommodate the new double-circuit line.	Nevada (14 miles from Boulder City)
Telecommunication System	Fully diverse and redundant telecommunication paths: • optical ground wire • Combined optical ground wire and microwave	Support the SPS under specific outage contingencies, and the operation and monitoring of the substation and transmission line equipment. Overhead optical ground wire path: • Path 1: Overhead optical ground wire along the Eldorado–Ivanpah alignment • Path 2, Section 1: Overhead optical ground wire along the Eldorado–Lugo transmission line. Combined optical ground wire and microwave path: • Path 2, Section 2: Underground duct between Eldorado–Lugo 500-kV line and a new communication site in Nipton, California • Path 2, Section 3: Microwave telecommunication path between Nipton and the Ivanpah Substation.	Path 1 (overhead) Nevada; 28 miles California; 7 miles Path 2, Section 1 (overhead) Nevada; 25.5 miles Path 2, Section 2 (underground) California; 4.8 miles Path 2, Section 3 (microwave) California; 12 miles
	Communication facilities: • Telecommunication facilities at Eldorado Substation • Communication Room (MEER) at Ivanpah Substation	Support the SPS under specific outage contingencies, and the operation and monitoring of the substation and transmission line equipment.	

Key: kV = kilovolt; SPS = Special protection system

Construction of the EITP components would also involve the temporary use of areas and facilities on public and private lands for equipment and material storage, structure assembly and erection, conductor pulling and tensioning, helicopter landing, and other uses. A complete description of the construction activities is provided in Section 2.4.

2.2.1.2 Existing System

The applicant would construct, operate, and maintain new and upgraded transmission facilities to deliver electricity from expected solar generation development in the Ivanpah Valley area (mostly under BLM jurisdiction) to accommodate projected load growth in the applicant's service area. The applicant's existing transmission system includes various low and high voltage lines and facilities that are part of the WECC Path 49 (East of River) and Path 46 (West of River), linking Southern California to Arizona and Southern Nevada. In addition, other utility companies, such as the Los Angeles Department of Water and Power (LADWP) and NV Energy, operate and maintain AC and direct current (DC) transmission facilities within the proposed project location.

The proposed project and its alternatives would be located on BLM land and private lands and would generally follow the applicant's right-of-way (ROW) for the Eldorado–Baker–Cool Water–Dunn Siding–Mountain Pass 115-kV transmission line. The proposed EITP 230-kV transmission line would head generally west from Eldorado Substation (14 miles from Boulder City, Nevada) and cross below the following existing transmission lines:

- LADWP Eldorado–McCullough (500 kV)
- LADWP Mead–Victorville (287 kV)
- LADWP McCullough–Victorville 1 (500 kV)
- LADWP McCullough–Victorville 2 (500 kV)
- LADWP Intermountain–Adelanto (500 kV), and
- Nevada Power Powerline (115 kV).

The applicant operates several electric power transmission and distribution facilities near the EITP locations (west of the California/Nevada border). These facilities consist of a single-circuit 115-kV line that connects three substations located between the Cool Water Substation (San Bernardino County) and the Eldorado Substation (Clark County): Dunn Siding Substation (1 MW), the Baker Substation (9 MW), and the Mountain Pass Substation (3 MW). The applicant's studies indicate that the capacity of the existing 115-kV line is limited to a maximum output of 80 MW.

2.2.1.3 Components of the Proposed Project

<u>Powerlines</u>

Eldorado–Ivanpah Transmission Line

The route of the proposed EITP 230-kV transmission line would begin at the existing Eldorado Substation, head north, and then head west following the existing Eldorado–Baker–Cool Water–Dunn Siding–Mountain Pass 115-kV transmission line corridor, as shown in Figure 2-3. This existing 115-kV transmission line corridor is 70 to 100 feet wide. Construction and operation of the proposed 230-kV line would require widening the applicant's existing 115-kV transmission line corridor to a 130-foot-wide ROW, while a 250-foot ROW would be required at specific locations, as indicated in Table 2-2. These widened ROW areas would be mainly required for five major utility transmission line crossings below existing LADWP transmission lines. Transmission lines and other major existing utilities crossings along the proposed project 230-kV transmission line are shown in Figure 2-3a.

Table 2-2 250-Foot-Wide ROW Locations

Location	Between MPs
1	MP 0 and MP 1
2	MP 1 and MP 2
3	MP 7 and MP 8
4	MP 12 and MP 13
5	MP 25 and MP 26

The proposed project transmission line route would generally follow the Eldorado–Baker–Cool Water–Dunn Siding–Mountain Pass 115-kV transmission line corridor, with six major deviations along the proposed 35-mile length. The segments where the proposed project would deviate from the existing 115-kV ROW are summarized in Table 2-3.

Table 2-3 Major Deviations from the Existing ROW

Location (Milepost)	Distance from Existing ROW (miles)
7	> 1
11	> 1
12	> 1
25	> 1
25–26	> 1
34–35	> 1

Transmission structures for the proposed transmission line would consist primarily of LSTs (Figure 2-4); however, at the crossings, side-by-side steel H-frame structures would be used (Figure 2-5). Existing transmission lines might need to be modified at crossings.

Transmission Line Routing Description

The proposed 230-kV transmission line route would exit the northern side of the Eldorado Substation and follow the existing Eldorado–Baker–Cool Water–Dunn Siding–Mountain Pass 115-kV transmission line within existing designated utility corridors within private lands administered by BLM. In the proximity of the Eldorado Substation, there is one segment of approximately 3,000 feet – granted by BLM - that connects two designated utility corridors and would require authorization by the City of Boulder. At the end of this segment (milepost [MP] 2.1), the line would turn to the southwest and run for approximately 5 miles within the existing 115-kV transmission line corridor. At MP 7, the proposed route would turn west and immediately cross below the existing LADWP Intermountain–Adelanto 500-kV DC transmission line. The applicant would evaluate additional survey information to determine the optimum crossing alignment at this crossing location (Figure 2-3b).

After the first major utility crossing, the proposed 230-kV transmission line would follow the existing Eldorado–Baker–Cool Water–Dunn Siding–Mountain Pass 115-kV transmission line corridor west for approximately 3.6 miles until MP 10.7, where it would cross again under the Intermountain–Adelanto 500-kV DC transmission line (Figure 2-3b). To provide adequate space to fit the transmission tower structures necessary to cross under the Intermountain–Adelanto 500-kV DC transmission line, and to avoid multiple crossings at sharp angles, the applicant would reroute a 0.4-mile-long section of the 230-kV line on the northern side of this proposed crossing.

The proposed 230-kV line would then parallel the LADWP Intermountain–Adelanto 500-kV DC transmission line for approximately 0.9 miles and then would turn to the south and cross under the same 500-kV DC transmission line, at a location with adequate space to widen the ROW from 130 to 250 feet. It would then turn west and rejoin the existing ROW.

The line would continue southwest for approximately 13 miles (MPs 24 and 25) before new additional utility crossings, at LADWP's McCullough–Victorville No. 1 and No. 2 500-kV transmission lines, the Nevada Power 115-kV transmission line, and the applicant's Mead–Victorville 287-kV transmission line. The applicant would select crossing locations with adequate space to widen the existing ROW to the required width (250 feet). Following these three major crossings, the proposed EITP 230-kV transmission line would continue within the existing Eldorado–Baker–Cool Water–Dunn Siding–Mountain Pass 115-kV transmission line corridor for another 7.8 miles to finish at the proposed Ivanpah Substation site.

Sections of the proposed EITP transmission line route, especially the segment between MP 24 and 28.5, would be located near or within the Ivanpah Airport Environs Overlay and would abut the proposed Southern Nevada Supplemental Airport (SNSA) site around MP 26. The SNSA is currently under environmental review; however, the applicant would be required to consult with the Federal Aviation Administration (FAA) on lighting of EITP structures and any additional safety recommendations, in compliance with FAA Part 77 regulations (see Section 3.7, "Hazards, Health, and Safety").

Transmission Structures and Lines

The proposed EITP 230-kV transmission line would consist of 258 galvanized transmission structures that would support a double-circuit transmission line (two arrays of conductors) at the top. Each circuit would be composed of three phases (three separate cables), each phase consisting of two conductors with a cross section of 1,590 kilo circular mils (kcmil; a circular area with an approximately 1.26-inch diameter).[2] The conductors are commonly made of aluminum strands with internal steel reinforcement. In addition, the proposed transmission structures would have an optical ground wire and suspended single polymer insulators installed at the top, to provide protection and to support telecommunication.

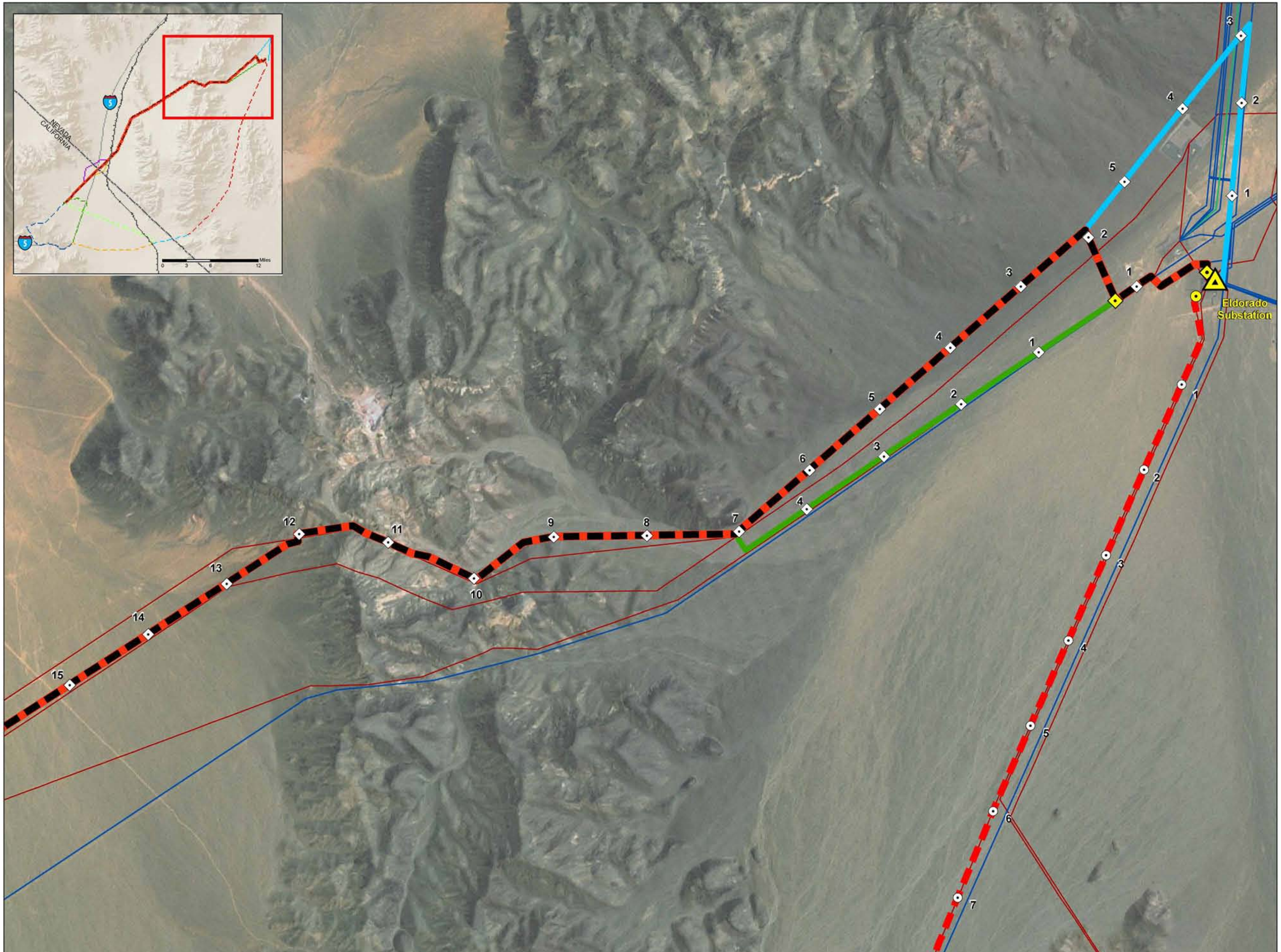
LST and steel H-frame structures (Figures 2-4 and 2-5, respectively) would be the main types of transmission structures used for the proposed project, as shown in Table 2-4. The proposed structures' heights are comparable to the heights of the structures used for the surrounding existing utilities. Where needed, the applicant would reduce structure heights to cross other utilities while maintaining proper clearances. These new structures would replace approximately 250 of the existing Eldorado–Baker–Cool Water–Dunn Siding–Mountain Pass 115-kV line structures (Table 2-5).

Table 2-4 Estimated Number and Type of Proposed New Transmission Structures

Type of Structure	Height (feet)	Number
Double-Circuit Lattice Steel Towers	110 to 180	216
Single-Circuit H-Frame Structures	45 to 75	42
TOTAL		**258**

Source: SCE 2009

[2] A circular mil (cmil) is a standard unit used in electrical systems for referring to the area of the cross section of larger conductor sizes. A mil is 0.001 inch. One cmil is equal to the area of a circle with a 1 mil diameter (Blume 2007). One kcmil is equal to one thousand cmils.



Legend

230-kV Transmission Line

- Proposed Route
- Alternative A
- Alternative B
- Milepost (Numbered)
- Milepost 0 (New Line)

Telecommunications Facilities

- Path 1
- Path 2: Section 1
- Milepost (Numbered)
- Milepost 0 (New Line)

Utilities

- Existing Substation
- Existing 500kV Transmission Line
- Existing 230kV Transmission Line
- Existing 69kV Transmission Line

0 0.5 1 2
Miles

Figure 2-3a

EITP
Major Utility Crossings
(Map 1 of 5)

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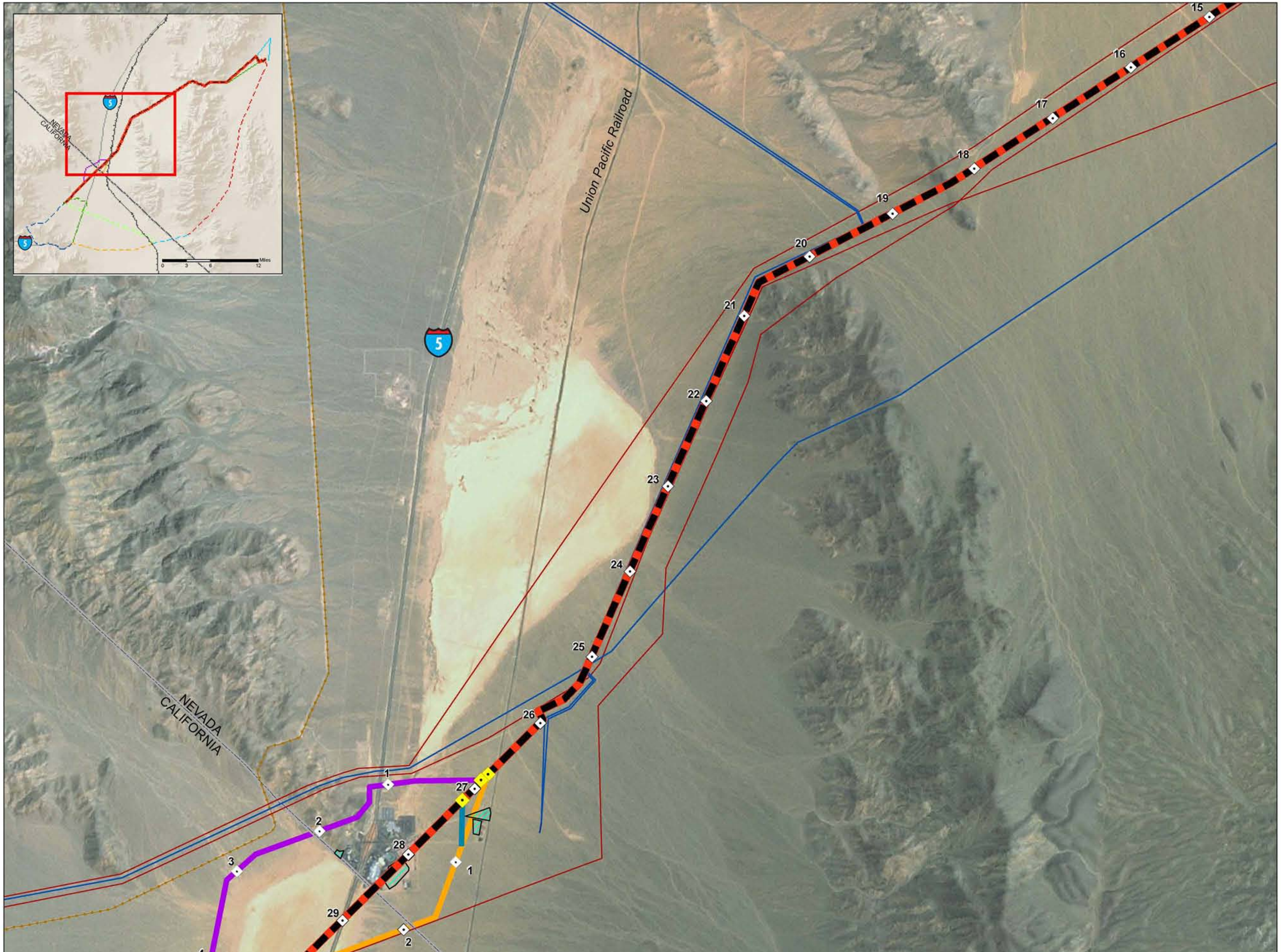

Legend

230-kV Transmission Line

- Proposed Route
- Alternative C
- Alternative D
- Alternative E
- Milepost (Numbered)
- Milepost 0 (New Line)

Telecommunications Facilities

- Path 1

Utilities

- Existing 500kV Transmission Line
- Existing 230kV Transmission Line
- Natural Gas Pipeline
- Laydown Area

N

0 0.5 1 2
Miles

Figure 2-3a

EITP
Major Utility Crossings
(Map 2 of 5)

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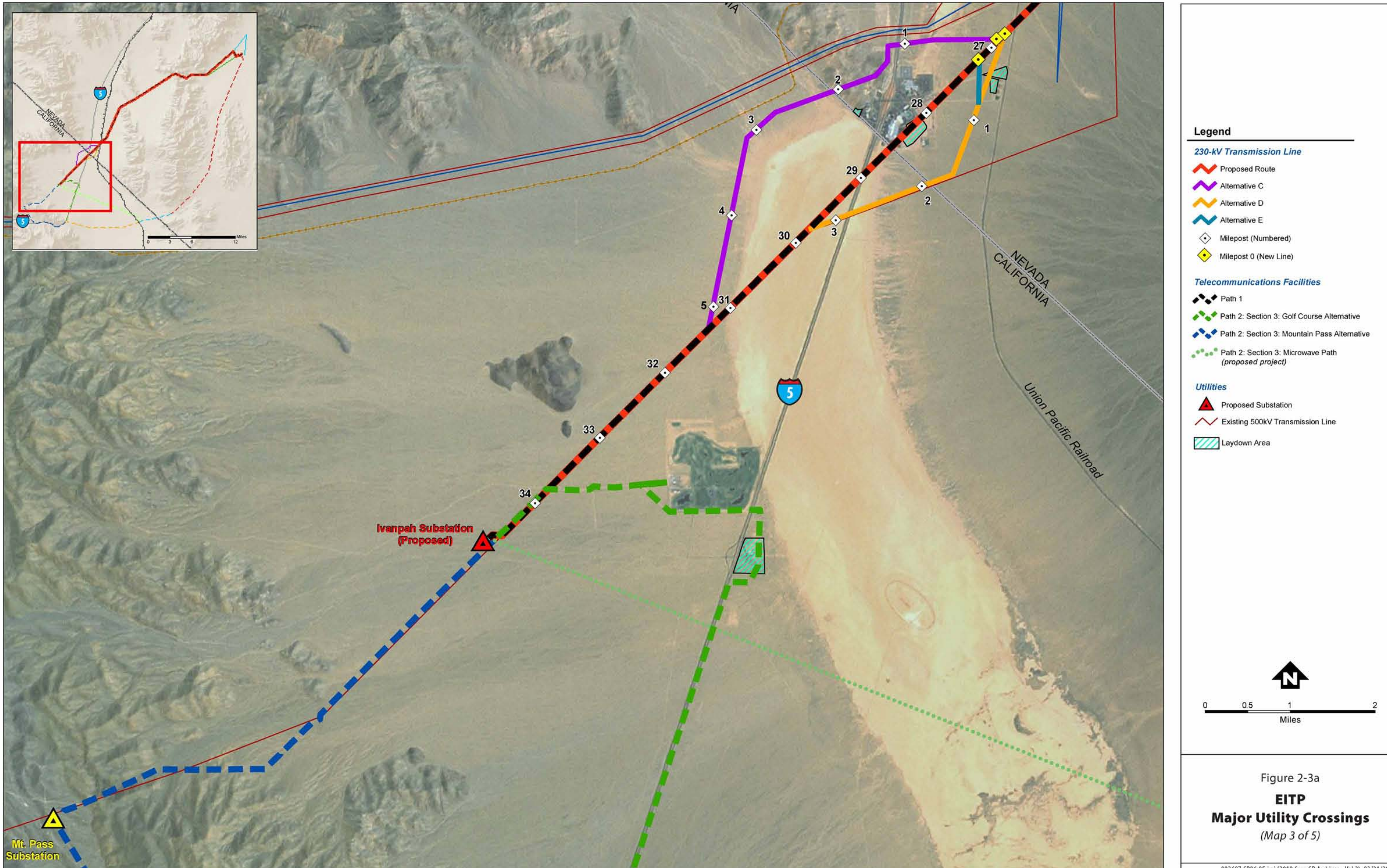

Figure 2-3a

EITP

Major Utility Crossings

(Map 3 of 5)

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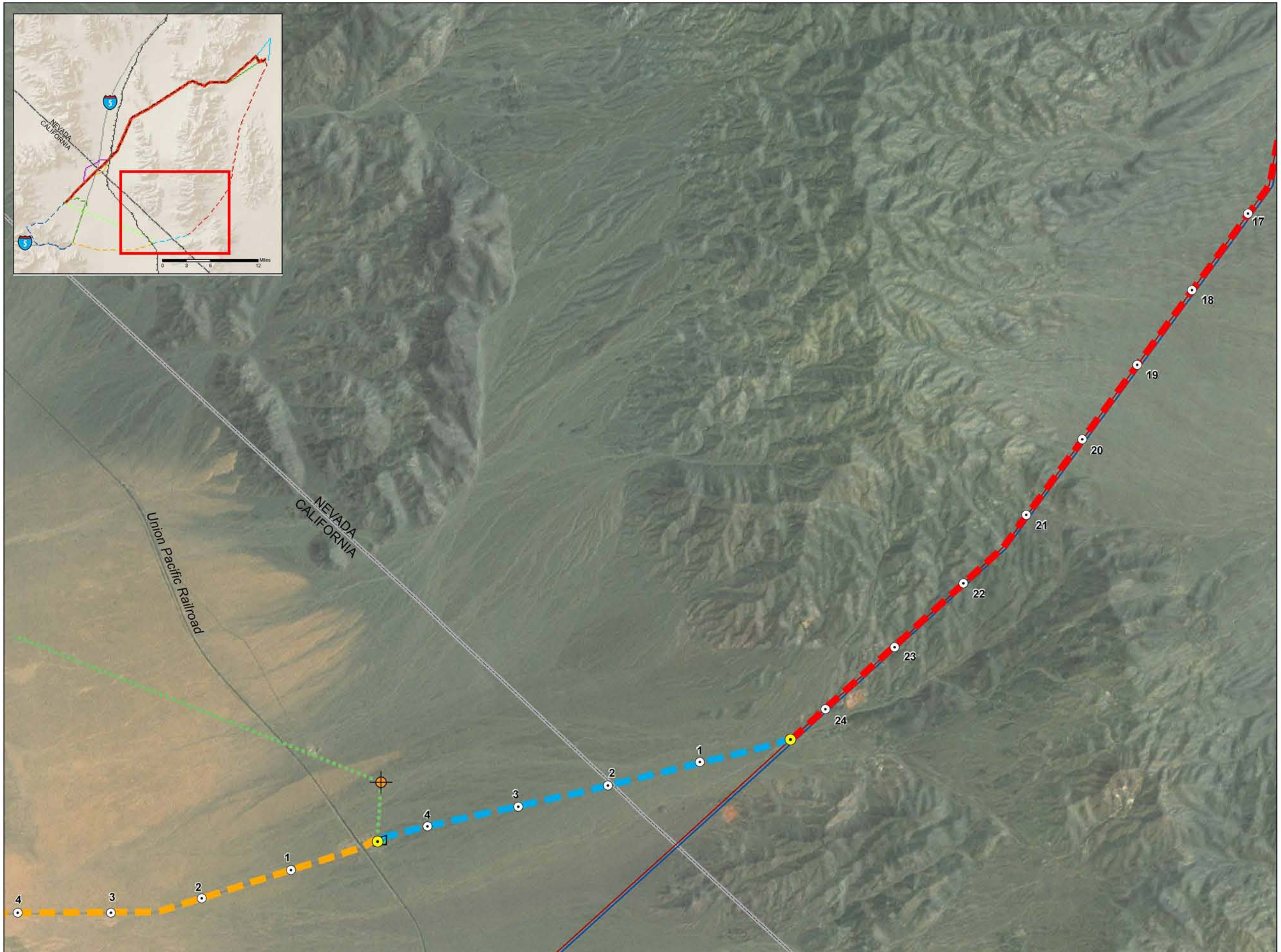

Figure 2-3a
EITP
Major Utility Crossings
(Map 4 of 5)

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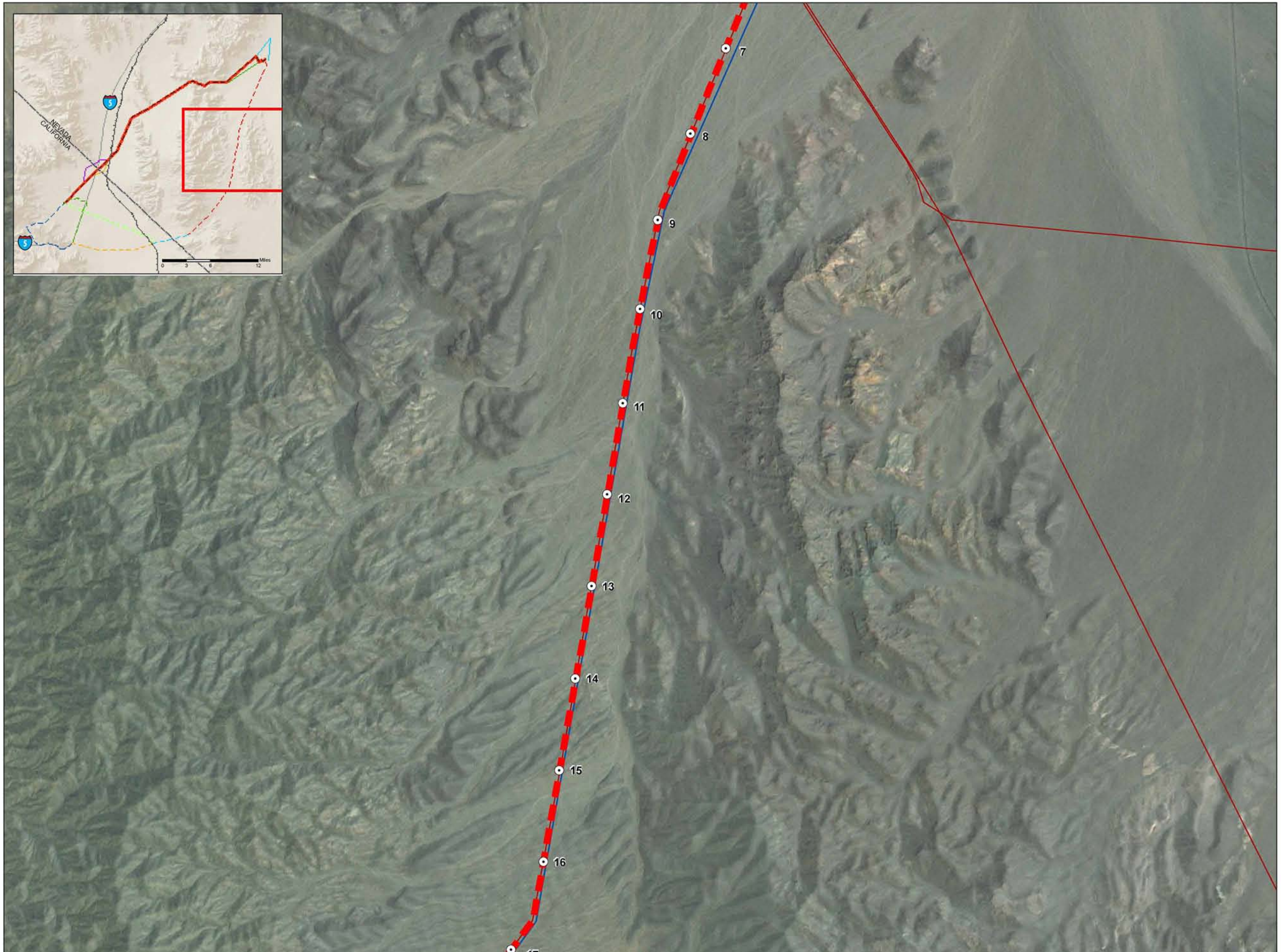

Legend

Telecommunications Facilities

Path 2: Section 1

Milepost (Numbered)

Utilities

Existing 500kV Transmission Line

Existing 230kV Transmission Line

N

0 0.5 1 2
Miles

Figure 2-3a

EITP
Major Utility Crossings
(Map 5 of 5)

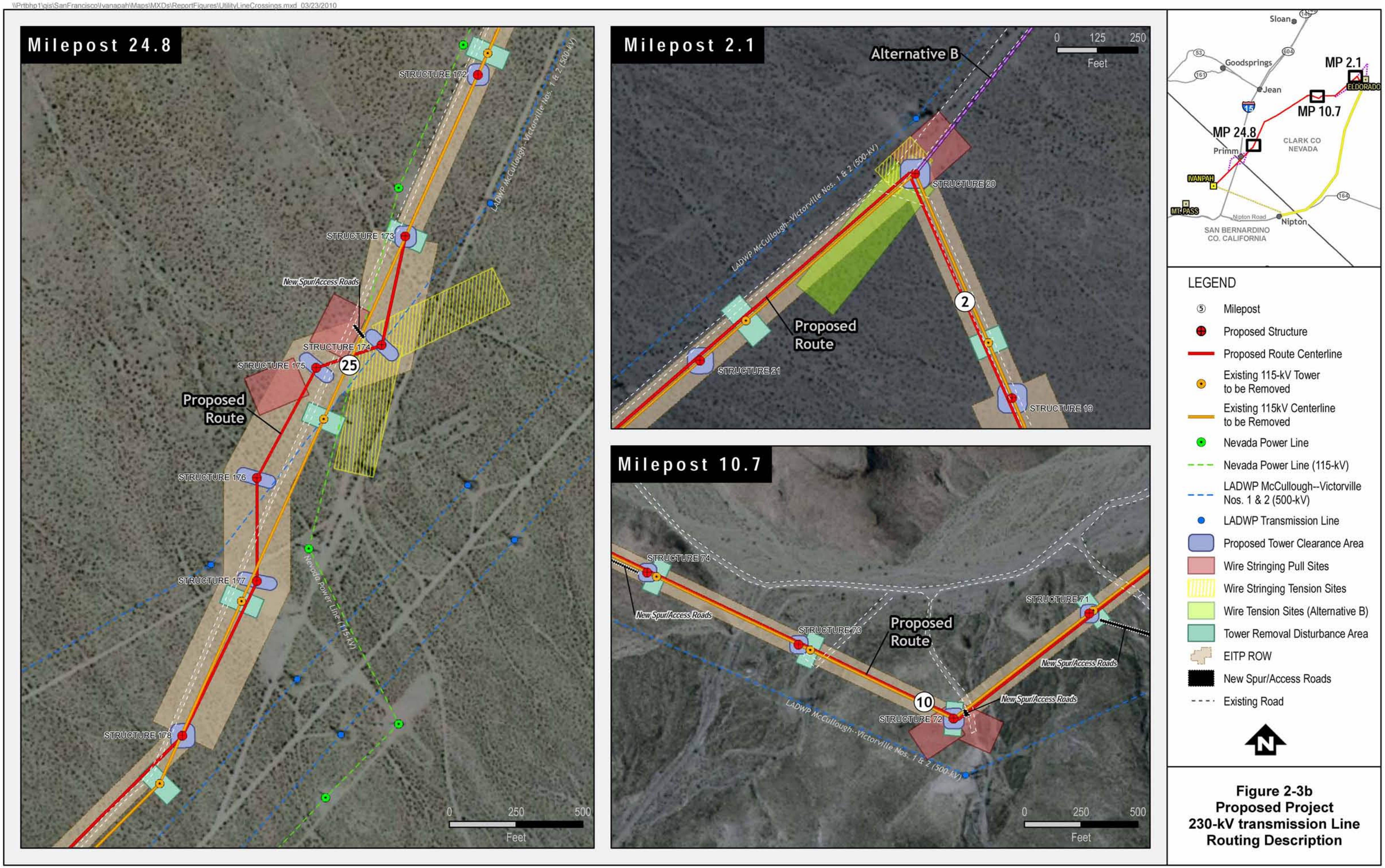

Figure 2-3b
Proposed Project
230-kV transmission Line
Routing Description

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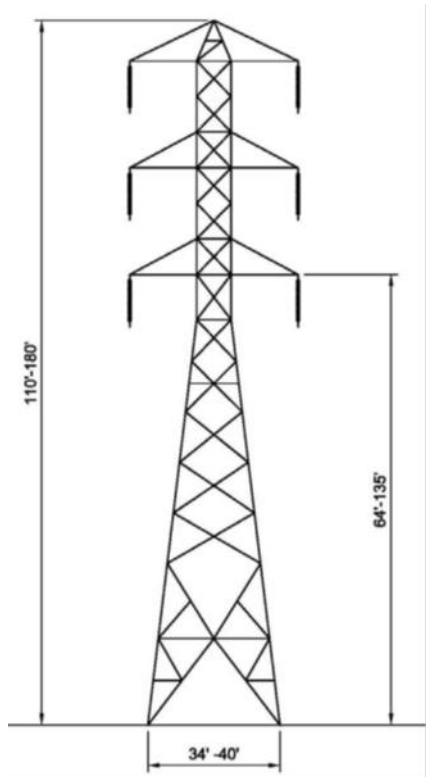


Figure 2-4 Double-Circuit 230-kV Lattice Steel Tower

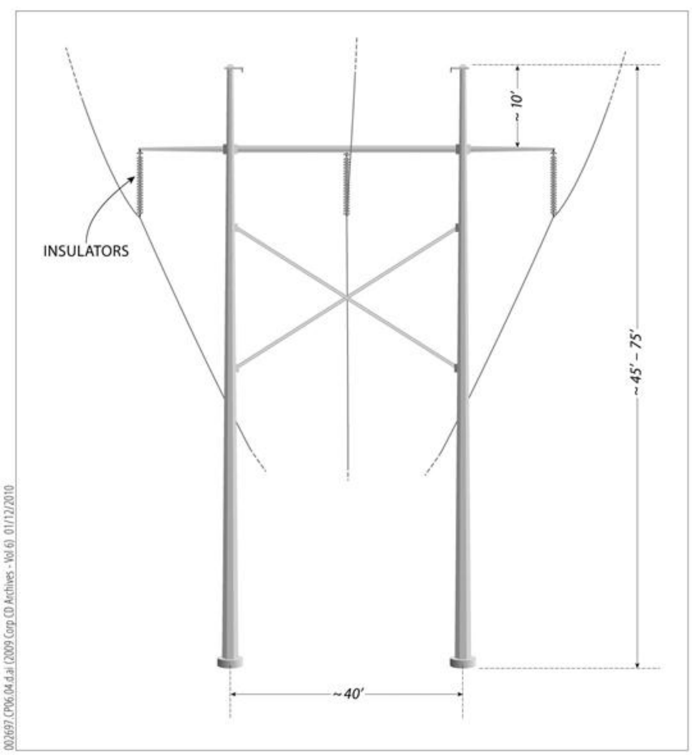


Figure 2-5 Single-Circuit 230-kV H-Frame Structure

Table 2-5 Existing 115-kV Transmission Structures to be Replaced by the Proposed Project

Type of Structure	Number
Lattice H-frame suspension dead end towers	150
Associated concrete footings	1
Lattice H-frame with two storm guys	2
Associated concrete footings	4
Lattice H-frame with four storm guys	19
Associated concrete footings	26
Lattice H-frame with six storm guys	5
Associated concrete footings	1
Four-legged lattice structures	13
Wood pole H-frame structures set in CMP	23
Wood pole structures set in CMP	5
Single steel cable hardware	1
TOTAL	**250**

Source: SCE 2009
Key:
CMP = corrugated metal pipe
kV = kilovolt

As mentioned above, sections of the proposed EITP 230-kV transmission line, especially between MPs 24 and 28.5, would be close or within the Ivanpah Airport Environs Overlay for the SNSA, currently under environmental review. Therefore, the applicant is required to consult with the FAA on lighting of the proposed transmission structures and additional safety recommendations, in compliance with FAA Part 77 regulations (see Section 3.7, “Hazards, Health, and Safety”).

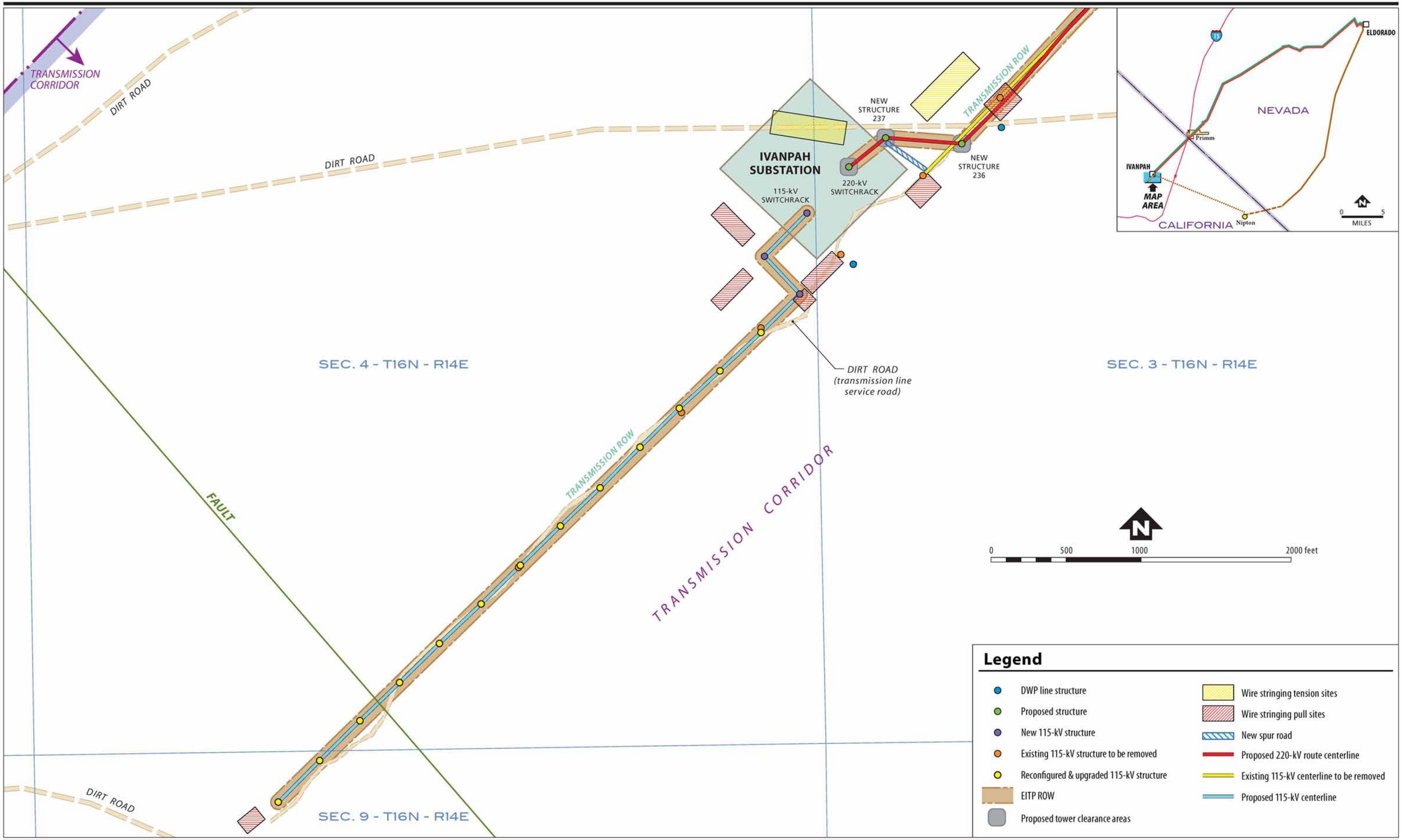
California and Nevada Electrical Standards

At MP 28.5 (near tower 195), the new 130-foot ROW would cross from Clark County, Nevada, into San Bernardino County, California. All of the transmission line located within California would be designed to General Order 95 standards. All of the transmission line located within Nevada would be designed to National Electric Safety Code standards.

Subtransmission Line

A new 600- to 800-foot section of 115-kV line would be strung from a connection point at MP 34 on the existing Eldorado–Baker–Cool Water–Dunn Siding–Mountain Pass 115-kV line to a new rack position at the proposed Ivanpah Substation, to create the Cool Water–Baker–Dunn Siding–Mountain Pass–Ivanpah 115-kV subtransmission line (Figure 2-6).

Seven existing H-frame lattice structures would be removed and replaced with one TSP and six lightweight steel (LWS) H-frames (Figures 2-7 and 2-8). Six additional LWS H-frames would be installed between these structures. The structures would be approximately 60 to 75 feet tall and span 150 to 450 feet, depending on the local topography. In addition, approximately 300 feet of new spur roads would be required to access these structures.



Ecology and Environment, Inc.

Figure 2-6 **115-kV Subtransmission Line Location**
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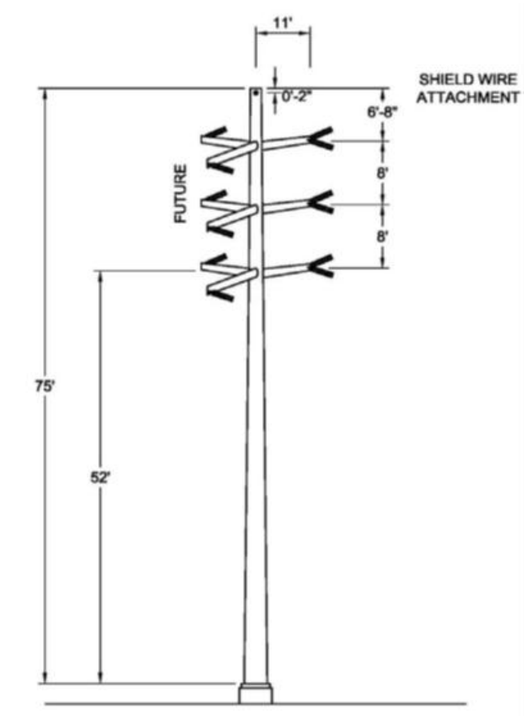

Figure 2-7 Single-Circuit 115-kV Tubular Steel Pole

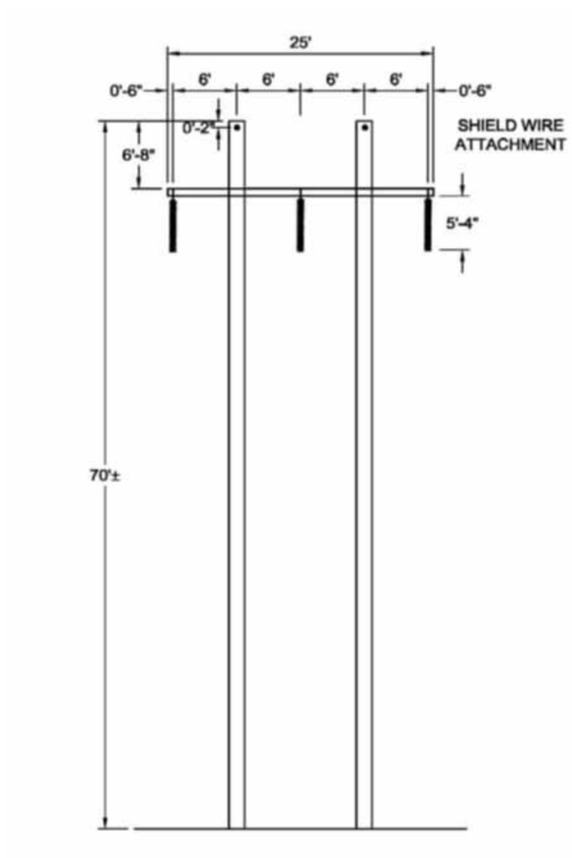

Figure 2-8 Single-Circuit 115-kV Light Weight Steel H-Frame

The existing conductors would be removed and replaced with approximately 654 Aluminum Conductor Steel Reinforced (ACSR) conductors with two 3/8-inch high-strength galvanized shield wires. The new Cool Water–Baker–Dunn Siding–Mountain Pass–Ivanpah 115-kV subtransmission line would have one conductor per phase and three phases per circuit.

Distribution Lines

A 33-kV distribution line would be installed to provide reliable lighting and power service to the new Ivanpah Substation. This component would consist of approximately 1 mile of new underground 33-kV circuitry and two new Remote Control Switches that would be installed adjacent to Densmore Drive at the California state line, near Primm, Nevada. One of the switches would be located south of the Ivanpah Substation and the second would be located next to the Primm Valley Golf Club's Desert Course.

In addition, approximately 4,300 feet of a new 12-kV overhead line would be installed between the town of Nipton and the new microwave site proposed to be located northeast of Nipton. A transformer would be installed on this overhead line connecting to the microwave site using an underground duct. The line would be installed along the side of an existing unnamed dirt road.

Access Roads

The applicant has proposed constructing an access road along the transmission line that would be used to haul construction materials overland to the project site. The road system proposed includes spur roads to individual towers where the access road would need to deviate from the transmission line due to topographic constraints. The access and spur road system would be maintained over the life of the facility to be used for maintenance of the transmission line. In general, access and spur roads are dirt roads that are at least 14 feet wide (7 feet from the road centerline). Access roads follow the transmission ROW. Spur roads branch from access roads toward the transmission structures and would be an average of 200 feet long.

Existing access roads would be used to construct the project, but some might require improvements or upgrades to allow passage of construction vehicles. There are approximately 35 miles of existing main access roads. In addition, longer or slightly wider spur roads might be needed at some locations. Depending on the site, spur roads might require grading or need to be re-developed. Approximately 1.2 miles of new spur roads would be required for the proposed project route, disturbing approximately 2.1 acres.

It is anticipated that most of the spur roads constructed to accommodate new construction would be left in place to facilitate future action for operations and maintenance purposes. Roads would be used by maintenance crews and to inspect or maintain the transmission structures. These roads would be restored after construction by removing loose rock and slide material to construct dikes, fill washouts, or flatten fill slopes, and by filling or repairing all washouts, ruts, and irregularities. The roads would be maintained to facilitate drainage and use by construction and maintenance equipment.

Access and spur roads would be leveled so that grades would not exceed 12 percent. Grades of approximately 14 percent would be permitted if they would not exceed 40 feet in length and were located more than 50 feet from curves or other excessive grades. All curves would have a curvature radius not less than 50 feet (measured at the center line of the usable road surface). All dead-end spur roads over 500 feet long would include a Y-type or circle-type turnaround.

Substations

Ivanpah Substation

The proposed 230/115-kV Ivanpah Substation would be located 6.1 miles west of the California-Nevada border. The proposed substation site (Figure 2-9) area would be approximately 1,650 by 1,015 feet (38.5 acres), located within the proposed Ivanpah Solar Generating System (ISEGS) project area (see Section 2.2.2) and would consist of a 885-by-850-foot fenced area containing the transformer banks and lines, a 10-foot perimeter buffer surrounding the transformer banks, and two 1,015-by-400-foot areas (9 acres each) containing cut and fill slopes that would flank the fenced area on the east and west. Ground disturbance in these areas would be limited to that needed for construction and access to the structures/poles located within the areas.

The Ivanpah Substation would be a 1,120–megavolt ampere (MVA) facility to be developed in two stages or configurations based on projected electrical transmission demand. The initial configuration would include three 280-MVA 230/115-kV transformer banks, five 230-kV and four 115-kV lines, and associated switchracks. The final substation configuration would include four 280-MVA 230/115-kV transformer banks, eight 230-kV lines, and fourteen 115-kV lines.

In addition, a 24-foot-wide paved road, fencing, areas for future 115-kV and 230-kV switchrack capacitor banks, and an emergency generator would be installed as part of the Ivanpah Substation facility. A 180-foot microwave tower and 65-by-55-foot MEER would also be installed in the southern central area of the substation site.

Upgrades to Eldorado Substation

The existing Eldorado Substation is approximately 14 miles southwest of Boulder City, Nevada. The project would require two 230-kV line positions at the Eldorado Substation to terminate the new Ivanpah No. 1 and No. 2 230-kV transmission lines. Installation of the two positions would require that the existing 230-kV switchyard be extended 165 feet to the west within the existing substation fence. No surface grading would be required for the extension. Upgrades to existing 230-kV circuit breakers and 500-kV series capacitors might also be required. An existing 230/115-kV transformer bank would be removed.

Telecommunication System

The proposed telecommunication system, as shown in Figure 2-3, would consist of two different and redundant telecommunication paths and related facilities and equipment. This telecommunication system would allow the EITP components to operate under a Special Protection System (SPS), as required by the WECC and NERC Planning Standards (WECC 2006). An SPS detects abnormal conditions within the electric transmission system and takes corrective actions to provide an acceptable system performance, including changes in demand, generation, or system configuration to maintain system stability, acceptable voltages, and other desirable conditions.

Redundant Telecommunication Paths

WECC and NERC guidelines on SPS, also known as Remedial Action Schemes, require full redundancy—two separate and identical communication schemes or paths—to detect and alarm when essential components fail or critical functions of the transmission system are not operational, to avoid a thermal overload and/or voltage collapse of the transmission system. The purpose of redundancy is to allow removal of one circuit scheme following a failure or to allow maintenance while keeping full capability in service with the remaining scheme (WECC 2006). In addition, WECC requires redundant telecommunication circuits to be on geographically distinct routes where practical, as long as they are not subjected to the same common mode outage risk factors.

To meet the WECC requirements, the project would include construction, operation, and maintenance of two fully redundant and geographically separated telecommunication paths, Paths 1 and 2. Path 1 would be along the proposed 230-kV EITP transmission line, and Path 2 (Section 1) would be along the existing 500-kV Eldorado–Lugo transmission line. Both telecommunication paths would require installation of optical ground wire, which would provide the same grounding protection function as the overhead ground wire (protect against lightning strikes and provide ground return for faults along the transmission line) and would also provide a communication circuit via a fiber cable embedded inside the wire. The optical ground wire segments would be located at the upper section of Path 1 and Path 2 tower structures.

Telecommunication Path 1

Path 1 would require installation of approximately 35 miles of new OPGH, approximately 0.7 inches in diameter, along the new Eldorado–Ivanpah 230-kV transmission line.

Telecommunication Path 2

Path 2 would comprise three sections. In Section 1, an existing overhead ground wire would be replaced with new optical ground wire on an approximately 25-mile section of the existing Eldorado–Lugo 500-kV transmission line. In Section 2, approximately 5 miles of fiber optic cable would be installed in an underground duct from the Eldorado–Lugo transmission line to the town of Nipton. Section 3 would provide microwave telecommunication transmission from a new communication site proposed to be located in Nipton to the proposed Ivanpah Substation.

Section 1

The Path 2, Section 1 route would extend from the Eldorado Substation to a 500-kV tower (MP 152, tower 2) of the existing Eldorado–Lugo 500-kV transmission line near the intersection of Highway 164 and the 500-kV ROW. Approximately 25 miles of the existing Eldorado–Lugo 500-kV transmission line would have one of the two existing 0.5-inch steel overhead ground wires replaced with optical ground wire.

Approximately 45 of the existing structures along this route would require some form of structural modification, at either the static peak or the mid to upper body or both, to accommodate the replacement of the overhead ground wire with optical ground wire. The exact number of structures and the specific type of modifications would be determined when final engineering had been completed. All construction work for the structure modifications would be performed within the existing access road and ROW.

Section 2

The Path 2, Section 2 route would extend in an underground duct from the Eldorado–Lugo 500-kV transmission line tower (M152-T2) to the town of Nipton. Tower M152-T2 is approximately 4.8 miles east of the town of Nipton, on the north side of Highway 164. The Path 2, Section 2 route would parallel Nipton Road on the north side in an underground duct that would be installed along a new roadside ROW. According to the applicant's general construction practice, the underground fiber duct would be installed approximately 3 feet from the edge of the Highway 164 pavement.

Section 3

A communication site northeast of the town of Nipton would be built to maintain an approximately 180-foot-tall microwave tower. The communication site would be approximately 100 by 100 feet. The Path 2, Section 3 fiber cable would extend from the town of Nipton in an underground duct that would terminate at the communication site. At the Ivanpah Substation, another microwave tower (also approximately 180 feet tall) would be built to link to the Nipton microwave tower. In addition, 4,300 linear feet of the 12-kV overhead distribution line would be extended from the existing 12-kV Nipton line ROW to the proposed microwave site to provide electrical service. The applicant anticipates that only one pole with conductor span would need to be replaced.

Source: ***Plot Plan for P.E.A.***, Southern California Edison, June 17, 2008

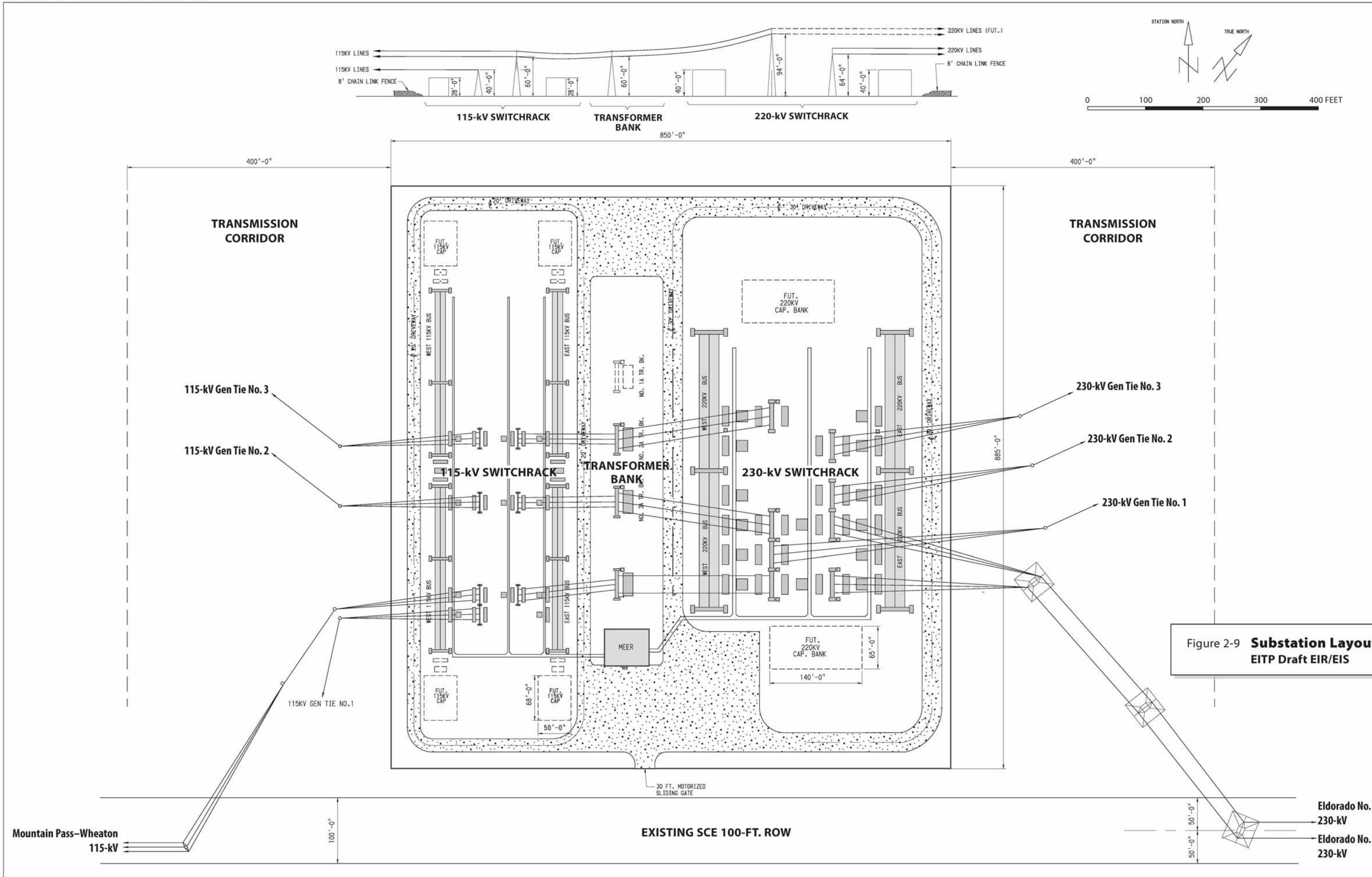

Figure 2-9 **Substation Layout**
EITP Draft EIR/EIS

Telecommunication at the Eldorado Substation

New telecommunication infrastructure would be installed in the Eldorado Substation to provide a protective relay circuit, a supervisory control and data acquisition (SCADA) circuit, data services, and telephone services to the Ivanpah Substation.

2.2.2 Whole of the Action Description (CEQA)/Cumulative Action (NEPA)

As discussed in Section 1.1.2, under both CEQA and NEPA, the lead agency is required to assess all environmental impacts that would occur as a result of the proposed project or action; both CEQA and NEPA stipulate that assessment is not limited to only the project components as defined in a single permit application.

Under CEQA, "project" is defined as "the whole of an action, which has a potential for resulting in either a direct physical change in the environment, or a reasonably foreseeable indirect physical change in the environment" (CEQA Guidelines 15378(a)). The CEQA Guidelines also state that the "project" may require several discretionary approvals by governmental agencies and that each separate governmental approval does not necessarily constitute a separate project (CEQA Guidelines 15378(c)).

Under NEPA, related actions can be considered in an environmental document as connected actions, cumulative actions, or similar actions. BLM has determined that the ISEGS project constitutes a cumulative action, as explained in Section 2.2.2.1 (below) and Section 1.1.2.2, "NEPA Cumulative Action." NEPA regulation requires that the federal agency consider in the same environmental impact statement the proposed action and other connected or cumulative actions (40 CFR 1508.25). An agency may, but is not required to consider other similar actions in the same environmental document.

This section presents a "whole of the action" description, which comprises a summary of renewable energy projects proposed to be developed in the Ivanpah Valley area that would be directly related to the proposed project. Because many of the renewable generation projects in the Ivanpah Valley area are being developed, applied for, and analyzed under CEQA and/or NEPA concurrently with the proposed EITP, their status and the level of publicly available information varies. For this reason, the level of detail and the consideration under CEQA and NEPA varies.

2.2.2.1 Additional Related Renewable Energy Projects

As defined in Section 1.2, the purpose and need for the EITP is to connect renewable generation sources in the Ivanpah Valley area to the existing electrical transmission grid, and to enable SCE to comply with California's Renewables Portfolio Standard (RPS). To date, three proposed renewable generation projects are directly related to the proposed EITP and currently under review for discretionary approvals by governmental agencies. These projects – Ivanpah 1, 2 and 3 - are all part of the ISEGS, a proposed solar-thermal electricity generation facility located on public lands managed by the BLM in San Bernardino County, California. The ISEGS project is currently under review at the BLM and the CEC under Docket 07-AFC-05, and has executed Purchase Power Agreements (PPA) with electric utilities, including the applicant, to connect the proposed solar generation to the proposed EITP facilities.

The following subsections describe the features described in the Final Staff Assessment / Draft EIS (FSA/DEIS) of the ISEGS project conducted by the CEC and BLM (Application for Certification 07-AFC-5; CEC and BLM 2009). A Supplemental DEIS was published on 4/16/2010.

The BLM has determined that the ISEGS proposal qualifies as a cumulative action to the EITP. The ISEGS FSA/DEIS concludes that the ISEGS project would result in significant impacts. Given the geographical proximity and the overlapping schedules of the EITP and the ISEGS project, it is reasonable to assume that the EITP, when considered in combination with ISEGS, would contribute to cumulatively significant impacts. A cumulative action differs from a cumulative impact in that it is considered to be part of the scope of the action; pursuant to CEQ regulation (40 CFR 1508.25(a)(2)), the ISEGS project will be discussed as part of the action within this EIS.

The BLM has determined that the ISEGS project is not a connected action. While the ISEGS project at full build-out would be dependent on the EITP because the existing transmission line without the EITP proposed line and substation upgrades would provide insufficient transmission capacity for the power generated by all phases of the ISEGS project, the EITP is not dependent on the ISEGS project. Based on planned renewable development in the Ivanpah Valley area, there is need for the EITP even if ISEGS is not constructed.

2.2.2.2 ISEGS Project Overview

The ISEGS project would consist of a solar-concentrating thermal power plant and related facilities proposed by BrightSource Energy, Inc.,[3] to be located in the Ivanpah Valley area in San Bernardino County, California. The proposed ISEGS site would be 6.1 miles west of the California/Nevada border.

The proposed ISEGS solar thermal power plant would comprise fields of heliostat mirrors that would transfer solar energy into boilers located on centralized power towers. Each mirror would track the sun throughout the day and reflect the solar energy to several receiver boilers. Steam turbine generators would receive steam from the receiver boilers to produce electricity. The solar field and power generation equipment would operate each morning after sunrise and shut down in the evening when insolation drops.

The applicant proposes to develop the ISEGS project in three phases designed to generate a total of 400 MW of electricity:

- Ivanpah 1 (southernmost site) – 100-MW capacity, approximately 914 acres
- Ivanpah 2 (middle site) – 100-MW capacity, approximately 921 acres
- Ivanpah 3 (northern site) – 200-MW capacity, approximately 1,836 acres

The ISEGS total project footprint is estimated to be 4,073 acres. All three phases would share an administration building, an operation and maintenance building, and the Ivanpah Substation, which would be located in between Ivanpah 1 and 2 and would require approximately 25 additional acres. Additional facilities, including re-routing of an access road (Colosseum Road, also known as Densmore Road), and natural gas, water, and transmission lines would require an additional 56 acres, while an additional 321 acres would be needed for construction staging activities.

2.2.2.3 ISEGS Project Components

The proposed ISEGS project would comprise three major components: three solar power plants (Ivanpah 1, 2, and 3), transmission system interconnections, and telecommunication facilities. These major components are summarized below.

<u>Solar Power Plants</u>

Each of the proposed ISEGS power plants would consist of three major components: heliostats mirrors, solar power towers, and power blocks. Related facilities and utilities for the proposed solar power plant would include a natural gas pipeline, water supply and discharge, air pollution control and fire protection, and access and maintenance roads.

Heliostats

[3] Specifically, the ISEGS project has been proposed by Solar Partners I, LLC; Solar Partners II, LLC; Solar Partners IV, LLC; and Solar Partners VIII, LLC, all subsidiaries of BrightSource Energy, Inc.

A heliostat consists of two mirrors placed in portrait position. The ISEGS project design calls for one heliostat field per phase, with up to 214,000 heliostat units for all the project phases; however, some of them may not be constructed. Each mirror would be 7.2 feet high by 10.5 feet wide, providing a reflective surface of 75.6 square feet per mirror. The heliostats would be connected to each other with communication cables strung aboveground. The communications cables would transmit signals from a control system to direct the movement of each heliostat to track the movement of the sun.

Solar Power Towers

The ISEGS project would require seven 459-foot-tall power towers, one each for Ivanpah 1 and 2 and five for Ivanpah 3. Each solar power tower would be a metal structure designed to support a solar power boiler and efficiently move high-quality steam through a steam turbine-generator (STG) at its base. The height of the power towers allows heliostats from significant distances to accurately reflect sunlight to the receiving boiler. The receiving high-efficiency boiler is positioned on top of the power tower and converts the concentrated energy of the sun reflected from the heliostats into superheated steam. The boiler's tubes are coated with a material that maximizes energy absorbance.

The power tower support structure would be approximately 393 feet high. The receiving boiler, which sits on top of the support structure, would be approximately 66 feet tall, including the added height for upper steam drum and protective ceramic insulation panels. Additionally, a lightning pole, required by the FAA, would extend above the top of the towers approximately 10 feet.

The central power tower of Ivanpah 3 would include a power block with one STG that would receive steam from five separate power tower boilers. Steam from these solar power tower boilers would be conveyed by an aboveground pipeline.

Power Blocks

Each power block would be located in the approximate center of each of the three solar thermal power plant areas. The power block would include a solar power tower, a receiver boiler, an STG set, air-cooled condensers, and other auxiliary systems, including:

- Natural gas-fired start-up boiler and associated air pollution control system
- Feed-water heaters
- De-aerator
- Emergency diesel generator
- Diesel fire pump
- A 250,000-gallon raw water tank for plant use and fire fighting
- A water treatment system

Related Equipment and Facilities

Natural gas pipeline

When solar conditions were insufficient, the steam produced by solar heat would be supplemented by burning natural gas to heat a partial load of water in the boiler. Each power plant would include a natural gas-fired start-up boiler to provide additional heat for plant start-up and during temporary cloud cover.

Natural gas would be supplied to the site through a new 6-mile-long distribution pipeline ranging from 4 to 6 inches in diameter. The line would run east along the northern edge, and then south along the eastern edge of Ivanpah 3 to a metering station. From there, a supply line would extend northwest into the Ivanpah 3 power block. The main pipeline would continue along the eastern edge of Ivanpah 2 to another metering station at the southeast corner of Ivanpah 2. A branch supply line would extend northwest into the center of the Ivanpah 2 power block. From that location, the pipeline would follow the paved access road past the administration/warehouse building to the Ivanpah 1 power block. A new tap metering station of approximately 100 feet by 150 feet would be located at the Kern River Gas Transmission pipeline. From there, the pipeline would extend 0.5 miles south to the northern edge of Ivanpah 3.

Water supply

Water would be required to support operations (process water for the steam system, wash water for the heliostats, and potable water for domestic water needs). Groundwater would be supplied from one of two wells that would be constructed at the northwest corner of Ivanpah 1 within the proposed construction logistics area. Each of the three power blocks would be connected to the groundwater wells by underground water pipelines.

The ISEGS applicant estimates that project water consumption would not exceed a maximum of 100 acre-feet per year for all three solar plants combined. The water would primarily be used for washing heliostats and to replace boiler feed-water blow-down. A water treatment system would be used, consisting of activated carbon filters, de-ionization media, and a mixed-bed polisher.

Each power plant would have a 250,000-gallon raw water storage tank. Approximately 100,000 gallons would be usable for plant process needs and 150,000 gallons would be reserved for fire protection. Demineralized water would be stored in a 25,000-gallon storage tank. Boiler feed-water make-up water would be stored in another 25,000-gallon tank.

Air Pollution Control Practices

Air pollution emissions from the combustion of natural gas in the start-up boiler would be controlled using best available control technologies and practices, such as low-nitrogen-oxide (NO_x) burners for NO_x control and burner and control adjustments based on oxygen continuous monitoring, operator training, and proper maintenance. Particulate and volatile organic compounds (VOCs) emissions would also be minimized by using natural gas as fuel.

Fire Protection

The fire protection system would protect personnel and limit property loss and plant downtime in the event of a fire. All fire protection systems would be focused on the power blocks, administration/warehouse building, and other areas of active operations. The primary source of fire protection water would be the raw water storage tank to be located in each power block. Approximately 150,000 gallons from each tank would be reserved for fire protection. The project would not include any specific facilities to address potential wildland fires.

Access and Maintenance Roads

Access to the ISEGS project site would occur from the Yates Well Road exit from I-15 to Colosseum Road (also known as Densmore Road). Colosseum Road would be paved to a 30-foot wide, two lane road for a distance of 1.9 miles from the Primm Valley Golf Club to the ISEGS facility entrance. The road would be re-routed around the southern end of Ivanpah 2 before re-joining the current road to the west of the proposed facility.

Within the heliostat fields, maintenance roads would be established concentrically around the power blocks to provide access for heliostat washing and maintenance. The roads would be established between every other row of heliostats. An additional maintenance road would be established on the inside perimeter of the boundary fence.

Within each project area, a diagonal dirt road would be established to provide access to the concentric maintenance roads and the power blocks. Off-highway recreational vehicle trails currently authorized by BLM that run through the ISEGS site would be re-located outside of the ISEGS project boundary fence.

Transmission System Interconnection and Upgrades

The ISEGS project would deliver power from Ivanpah 1, 2, and 3 via three separate 115-kV transmission generation tie lines to the proposed Ivanpah Substation, which would be located in the common construction logistics area between Ivanpah 1 and 2, and constructed and operated as part of EITP (Section 2.2.1.3). Each of the ISEGS power plants would have a switchyard with a step-up transformer to increase the 13.8-kV generator output voltages to 115 kV. Each switchyard would connect to the Ivanpah Substation. The existing Eldorado–Baker–Cool Water–Dunn Siding–Mountain Pass 115-kV line would loop in and out through the newly built Ivanpah Substation to interconnect the ISEGS project to the SCE's transmission grid.

Telecommunication Facilities

The proposed Ivanpah Substation would also require the installation of new telecommunication infrastructure to provide protective relay circuit and a supervisory control and data acquisition circuit together with data and telephone services. The telecommunication path from Ivanpah Substation to the local carrier facility interface at Mountain Pass area consists of approximately eight miles of fiber optic cable to be installed overhead on existing poles and through new underground conduits to be constructed in the substation and telecom carrier interface point. The fiber cable would be installed on the existing 12-kV distribution line poles.

2.2.2.4 ISEGS Project Construction

The ISEGS project construction would take place over approximately 48 months, following the sequence below (subject to change):

- Construction logistics area
- Ivanpah 1 and other shared facilities
- Ivanpah 2
- Ivanpah 3

The construction logistics area would be used temporarily for staging contractor equipment and trailers, assembly yards, storing materials, equipment laydown and wash, construction personnel parking, and assembling heliostats. It would be located between Ivanpah 1 and 2 and would comprise approximately 377.5 acres. Following construction, most of the area would undergo site closure, rehabilitation, and revegetation based on an approved plan.

The facilities to be shared by all three plants would be constructed during the first plant construction phase. Prior to construction, geotechnical testing, heliostat installation tests, and heliostat load tests would be performed in each of the three plants.

Stormwater Management

The ISEGS project site is located on an alluvial fan that acts as an active stormwater conveyance between the Clark Mountain Range to the west and Ivanpah Dry Lake to the east. The ISEGS project would include a low-impact development stormwater design and management system, which attempts to minimize disruption to natural stormwater flow pathways by minimizing the areas of direct removal of vegetation, the areas of grading and leveling, and the amount of active management of stormwater in engineered channels, ponds, and culverts.

Fencing

The outer perimeter of each power plant, the substation, and the administrative building would be surrounded by a security fence, which would be constructed of 8-foot-tall galvanized steel chain link with barbed wire at the top, as required.

Tortoise barrier fence would also be installed in accordance with the U.S. Fish and Wildlife Service (USFWS) guidelines in Recommended Specifications for Desert Tortoise Exclusion Fencing. The tortoise fence would consist of galvanized welded wire. The fence would be installed to a depth of 12 inches. It would extend 22 to 24 inches above the ground surface and be integrated with the security fence.

Some ISEGS-related activities would also occur outside of the project fence, on land not included within the proposed ROW. These would include inspection and maintenance of the fence, underground utility repairs, maintenance of drainage systems, and possible installation of new stormwater drainage systems. In addition to these activities, a roadway would need to be maintained outside of the ISEGS project fence to allow vehicle and equipment access.

Waste Management

Solid waste generated during the ISEGS project construction would include approximately 280 tons of scrap wood, concrete, steel/metal, paper, glass, scrap metals, and plastic waste. All non-hazardous waste would be recycled to the extent possible and non-recyclable waste would be collected and disposed in a Class III solid waste disposal facility. Hazardous wastes would be recycled to the extent possible and disposed in a Class I or II waste facility, as appropriate.

2.2.2.5 ISEGS Operation and Maintenance

The ISEGS project operations would be supported by a variety of operational, maintenance, and monitoring activities. Operational activities within the proposed power blocks would include transmission of water and natural gas and operation of process equipment, including the natural gas-fired start-up boiler, the air emission control system, the steam turbine generator, the air-cooled condensers, and other auxiliary equipment.

Routine maintenance activities would include washing heliostat mirrors on a bi-weekly rotating basis. Washing would require the use of a truck-mounted pressure washer. Maintenance would also include removing vegetation that could interfere with mirror movement to a height of 12 to 18 inches, managing weeds, and using soil binders and weighting agents (chemicals that agglomerate and retain soil particles for erosion control) to minimize fugitive dust accumulation on the mirrors as a result of winds or vehicle traffic.

All operational wastes produced at ISEGS would be properly collected, treated, and disposed of at a Class I or II waste facility, as appropriate. Wastes would include process and sanitary wastewater, nonhazardous waste, and hazardous waste, both liquid and solid. A septic system for sanitary wastewater would be located at the administration building/operations and maintenance area between Ivanpah 1 and 2. Portable toilets would be placed in the power block areas of each of the three solar facilities and pumped by a sanitary service provider. Process wastewater from all equipment, including the boilers and water treatment equipment, would be recycled.

Hazardous materials used during operations and maintenance activities would include paints, epoxies, grease, transformer oil, and caustic electrolytes (battery fluid). Several methods would be used to properly manage and dispose of hazardous materials and wastes. Waste lubricating oil would be recovered and recycled by a waste oil recycling contractor. Chemicals would be stored in appropriate chemical storage facilities. Bulk chemicals would be stored in large storage tanks, while most other chemicals would be stored in smaller returnable delivery containers. All chemical storage areas would be designed to contain leaks and spills in concrete containment areas.

2.2.2.6 ISEGS Decommissioning

The ISEGS project estimated lifetime is 50 years. Following this estimated period, the project owner would perform site closure activities to meet federal and state requirements for the rehabilitation of the site after decommissioning. Decommissioning and restoration would be subject to many of the same environmental protection plans required for construction, including an approved Closure, Revegetation, and Rehabilitation Plan. Under this plan, the ISEGS applicant would remove all aboveground structures and facilities to a depth of 3 feet below grade and transport them off site for recycling or disposal. Concrete, piping, and other materials existing below 3 feet in depth would be left in place. Areas that had been graded would be restored to original contours. Succulent plant species would be salvaged prior to construction, transplanted into windrows, and maintained for later transplanting following decommissioning. Shrubs and other plant species would be revegetated by collecting seeds and re-seeding following decommissioning.

2.3 Project Alternatives

Both NEPA and CEQA require governmental decision-makers to consider the identification and assessment of reasonable alternatives that could avoid or minimize the adverse impacts of a proposed project or action. Under CEQ regulations, federal agencies are required to explore and evaluate all reasonable alternatives to a proposed action in order to provide a clear basis for choice among options by the decision-makers and the public (Title 40 CFR Sec.1502.14). Likewise, Sections 15126.6(c) and 15.126.6(d) of the CEQA Guidelines emphasize selecting a reasonable range of feasible alternatives and assessing them adequately to allow for a comparative analysis.

In accordance with CEQA and NEPA, this Draft EIR/EIS presents a reasonable range of alternatives but does not consider every possible alternative. Discussion focuses on alternatives that could substantially avoid or lessen adverse project effects. The selected range of alternatives is intended to facilitate meaningful discussion among decision-makers and the public. In addition, this Draft EIR/EIS considers the No Project / No Action Alternative.

The CPUC and the BLM evaluated 18 potential alternatives or combinations of alternatives to determine a reasonable range of alternatives that would meet the following CEQA/NEPA requirements: feasibility, consistency with project objectives and purpose and need, and potential to eliminate adverse environmental effects. The project alternatives were organized into four major categories: (1) system, (2) transmission line routing, (3) telecommunication path routing, and (4) technology.

Section 2.3.1 below summarizes the alternative screening process. Section 2.3.2 describes those alternatives that were carried forward for analysis in the EIR/EIS, including the No Project Alternative. Section 2.3.3 briefly describes alternatives considered but not carried forward for analysis. Lastly, Section 2.3.4 introduces the agencies' preferred alternative for the Draft EIR/EIS. Further environmental impact analysis and comparison of alternatives carried forward in this Draft EIR/EIS are provided in Chapter 3 and Chapter 4.

2.3.1 Alternatives Screening Process

This section summarizes the information presented in Appendix A-1 of this Draft EIR/EIS. The alternatives evaluated during the screening process were identified through the CEQA/NEPA scoping process, through applicant consultation with the CPUC and the BLM early in the planning process, and through supplemental studies and consultations conducted by the CPUC and the BLM as part of the environmental review process. The alternatives considered in the screening analysis (Table 2-6) were (1) identified by the applicant as part of the PEA, (2) requested by the CEQA lead agency (the CPUC) or the NEPA lead agency (the BLM), or (3) identified by the general public and other agencies during the 30-day public scoping period in accordance with CEQA and NEPA requirements.

Table 2-6 Alternatives Considered in the Screening Analysis

Category	Alternative
System	Non-transmission System (System Alternative 1)
	Reconductoring (System Alternative 2)
	Lower Voltage – New 115-kV Transmission Line (System Alternative 3)
	Higher Voltage – New 500-kV Transmission Line (System Alternative 4)
	Single Circuit – New 230-kV Transmission Line (System Alternative 5)
Transmission Line Routing	Parallel to Los Angeles Department of Water and Power (Transmission Alternative Route A)
	North of Eldorado (Transmission Alternative Route B)
	North Dry Lakes Reroute (Transmission Alternative Route C)
	South Dry Lakes Reroute (Transmission Alternative Route D)
	South Dry Lakes Bypass (Transmission Subalternative Route E)
	New ROW (Transmission Alternative Route F)
Telecommunication	Golf Course Telecommunication Alternative
	Mountain Pass Telecommunication Alternative
	Microwave-only Telecommunication Alternative
Technology	Composite Core Conductor (Tech 1 – Alternative to Standard Core Conductor)
	Painted Structures (Tech 2 – Alternative to Galvanized Structures)
	Underground Construction (Tech 3 – Alternative to Overhead)
	Use of Tubular Steel Poles (Tech 4 – Alternative to LST)

Key:
kV = kilovolt
LST = Lattice steel tower

2.3.1.1 Alternatives Screening Methodology

The alternatives screening process consisted of the following steps:

- **Step 1 –** Clarify the description of each alternative to facilitate comparison
- **Step 2 –** Evaluate the advantages and disadvantages of each alternative compared with the proposed project, based on the following CEQA/NEPA criteria and requirements:
  - Project Objectives, Purpose, and Need: Does the alternative accomplish all or most of the basic project objectives as agreed upon by the CPUC and the BLM? Does the alternative meet the BLM's and the CPUC's statements of purpose and need?
  - Feasibility: Is the alternative feasible from an economic, environmental, legal, social, and technological standpoint? Are there any conflicts between the alternative and the objectives of federal, regional, state, and local land use plans, policies, or regulations for the area concerned?
  - Environmental Effects: Does the alternative avoid or substantially lessen any significant effects of the proposed project, or, conversely, would the alternative create significant effects potentially greater than those of the proposed project?
- **Step 3 –** Based on the results of Step 2, alternatives that met the CEQA/NEPA criteria were retained for full analysis in the Draft EIR/EIS. Alternatives that did not meet the CEQA/NEPA criteria were eliminated from further consideration.

2.3.1.2 Summary of Screening Results

As a result of the alternatives screening process, seven of the initial 18 alternatives were carried forward for detailed analysis in the Draft EIR/EIS. Each alternative was described in detail and a determination was made based on the advantages and disadvantages identified as part of the alternatives screening process. The results for each criterion are summarized below. Table 2-7 summarizes the results of the whole alternatives screening process. Table 2-8 compares alternatives that were carried forward for analysis in this Draft EIR/EIS with the proposed project.

Table 2-7 Results of the Alternatives Screening Process

Category	Alternatives	Retained for Further Analysis	Not Carried Forward
System	Non-transmission System (System Alternative 1)		X
	Reconductoring (System Alternative 2)		X
	Lower Voltage – New 115-kV Transmission Line (System Alternative 3)		X
	Higher Voltage – New 500-kV Transmission Line (System Alternative 4)		X
	Single Circuit – New 230-kV Transmission Line (System Alternative 5)		X
Transmission Line Routing	Parallel to Los Angeles Department of Water and Power (Transmission Alternative Route A)	X	
	North of Eldorado (Transmission Alternative Route B)	X	
	North Dry Lakes Reroute (Transmission Alternative Route C)	X	
	South Dry Lakes Reroute (Transmission Alternative Route D)	X	
	South Dry Lakes Bypass (Transmission Subalternative Route E)	X	
	New ROW (Transmission Alternative F)		X
Telecommunication	Golf Course Telecommunication Alternative	X	
	Mountain Pass Telecommunication Alternative	X	
	Microwave-only Telecommunication Alternative		X
Technology	Composite Core Conductor (Tech 1 – Alternative to Standard Core Conductor)		X
	Painted Structures (Tech 2 – Alternative to Galvanized Structures)		X
	Underground Construction (Tech 3 – Alternative to Overhead)		X
	Use of Tubular Steel Poles (Tech 4 – Alternative to LST)		X

Key:
kV = kilovolt
LST = Lattice steel tower

Criterion 1: Project Objectives, Purpose, and Need

Several of the alternatives are modifications to the applicant's proposed transmission line route or telecommunication paths. All the transmission route variations would meet the basic project objectives, purpose, and need, as would most of the telecommunication paths alternatives. Other alternatives to the proposed transmission system and technology would involve different project components, techniques, or materials. Although some of the technology alternatives would meet the objectives, purpose, and need, their implementation might not be feasible, or they would result in environmental impacts either the same as or more significant than those of the other alternatives.

Table 2-8 Comparison of Retained Alternatives with the Proposed Project

Category	Alternatives	Preliminary Environmental Comparison with the Proposed Project	
		Advantages	**Disadvantages**
Transmission Line Routing	Parallel to Los Angeles Department of Water and Power (Transmission Alternative Route A)	• Eliminates several transmission crossovers near Eldorado Substation • Located within BLM-designated utility corridor • Reduces impacts to cultural resources • Reduces impacts to intermittent streams	• Potential for greater habitat disturbance. The construction area west of Eldorado Substation consists of an undisturbed desert habitat • Potential for greater impact to tortoise habitat, other wildlife, rare plant species, and desert vegetation
	North of Eldorado (Transmission Alternative Route B)	• Reduces impacts to cultural resources • Reduces impacts to intermittent streams due to fewer crossings • Located within BLM-designated utility corridor	• Requires 5.3 miles of new transmission line ROW • Greater potential for ground disturbance from new transmission line ROW
	North Dry Lakes Reroute (Transmission Alternative Route C)	• Avoids crossing Ivanpah Dry Lake • Reduces visual impacts compared with the proposed project; existing transmission line would be removed and relocated and it would not be visible from nearby residential use • Reduces impacts to paleontological resources • Reduces impacts to intermittent streams due to fewer crossings	• Potential for greater impacts to desert tortoise and its habitat. This alternative has a higher quality desert tortoise habitat than does the proposed route • Potential for greater impacts to cultural resources associated with disturbance of Arrowhead Trail Highway • Requires 5.3 miles of new 130-foot ROW north of the Ivanpah Dry Lake and Primm, Nevada
	South Dry Lakes Reroute (Transmission Alternative Route D)	• Reduces overall transmission footprint on the Ivanpah Dry Lake • Reduces visual impacts compared with the proposed project; existing transmission line would be removed and relocated and it would not be visible from nearby residential use • Reduces potential for the presence of other sensitive wildlife or plant species occurring within the limits of this alternative • Reduces impacts to intermittent streams	• Potential for greater impacts to cultural resources • Potential for greater ground disturbance for new access roads • Requires approximately 3.3 miles of new ROW

Table 2-8 Comparison of Retained Alternatives with the Proposed Project

Category	Alternatives	• Preliminary Environmental Comparison with the Proposed Project	
		• Advantages	• Disadvantages
		due to fewer crossings	
	South Dry Lakes Bypass (Transmission Subalternative Route E)	• Similar to those identified for Alternative D	• Similar to those identified for Alternative D
Telecommunication	Golf Course Telecommunication Alternative	• Potentially reduces visual impacts for certain portions of the telecommunication line that would be located underground	• Potential for greater ground disturbance and impacts to paleontological resources due to underground construction • Underground construction has potential for greater impacts to sensitive habitat and to cultural and paleontological resources
	Mountain Pass Telecommunication Alternative	• Potentially reduces visual impacts for certain portions of the telecommunication line that would be located underground or out of line-of-sight of sensitive resources	• Greater potential for ground disturbance and impacts to paleontological resources due to underground construction • Potential for greater construction-related hazards due to transport, use, or disposal of hazardous materials and for upsets or accidents involving releases of hazardous materials

Key:
LST = Lattice steel tower
ROW = right-of-way

Criterion 2: Feasibility

The alternatives vary in their ability to meet economic, environmental, legal, social, and technical feasibility criteria. Technical feasibility issues were primarily related to physical constraints, such as engineering/design limitations for construction on steep slopes. Other alternatives had legal feasibility issues related to consistency with regulatory standards for operational reliability.

Criterion 3: Environmental Effects

Environmental impacts of each alternative were compared to evaluate overall ability to reduce or avoid significant effects. In some cases, an alternative might reduce or eliminate a proposed project effect but create a new significant impact in a different resource area.

2.3.2 Alternatives Fully Analyzed in the Draft EIR/EIS

This section summarizes alternatives that were carried forward for analysis in the Draft EIR/EIS, including the No Project Alternative. For alternatives that were eliminated from Draft EIR/EIS consideration, Appendix A-1 explains in detail the rationale for elimination.

2.3.2.1 Transmission Line Routing Alternatives

The alternatives carried forward for analysis that were minor route variations to the proposed transmission line route are called the Transmission Alternatives (Figure 2-10). 6Two of the Transmission Alternatives are near the existing Eldorado Substation and are designed to avoid an area not designated as a BLM utility corridor. Although this area contains the ROW for the existing 115-kV line, because it falls outside of a BLM-designated corridor, the applicant would need to obtain Clark County and City of Boulder City approval to widen the ROW to the 100 or 130 feet required for the upgraded 230-kV line. The alternatives have therefore been designed to parallel existing transmission ROW within the officially designated corridors.

The other three Transmission Alternatives are near Primm, Nevada, and are designed to avoid potential impacts to Ivanpah Dry Lake. All the Transmission Alternatives diverge from the proposed transmission line route for a portion of the route, but are not an entire project alternative. Major existing utilities that would cross the transmission route alternatives are shown in Figure 2-3a.

Parallel to LADWP Line Segment (Transmission Alternative Route A)

The Eldorado–Ivanpah 230-kV Transmission Alternative Route A (Figure 2-11) would begin at the Eldorado Substation. The line would leave the substation heading north, and then immediately would head west to join the existing Eldorado–Baker–Cool Water–Dunn Siding–Mountain Pass ROW. The line would proceed generally west on a 130-foot ROW and cross three LADWP transmission lines (McCullough–Victorville No. 1, 500 kV; McCullough–Victorville No. 2, 500 kV; and Mead–Victorville, 287 kV) to the north before heading west again.

The route would then cross the LADWP 500-kV transmission line (Marketplace–Adelanto). Transmission Alternative Route A would continue west for approximately 5.0 miles on a new ROW, and then turn north for approximately 1,000 feet before crossing the LADWP Marketplace–Adelanto 500-kV transmission line again and joining the proposed project route at MP 7.

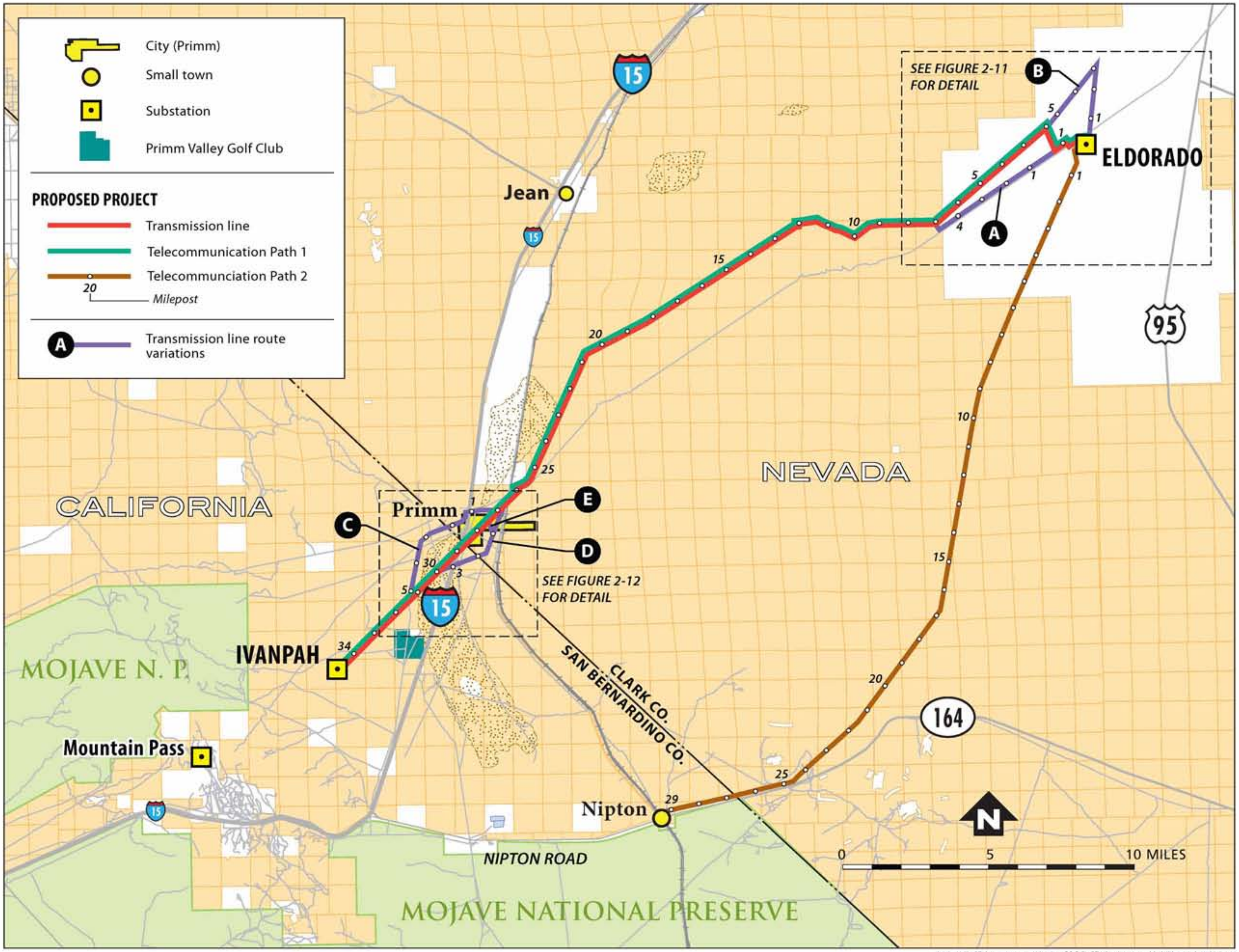

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Figure 2-10

Transmission Line Routing Alternatives

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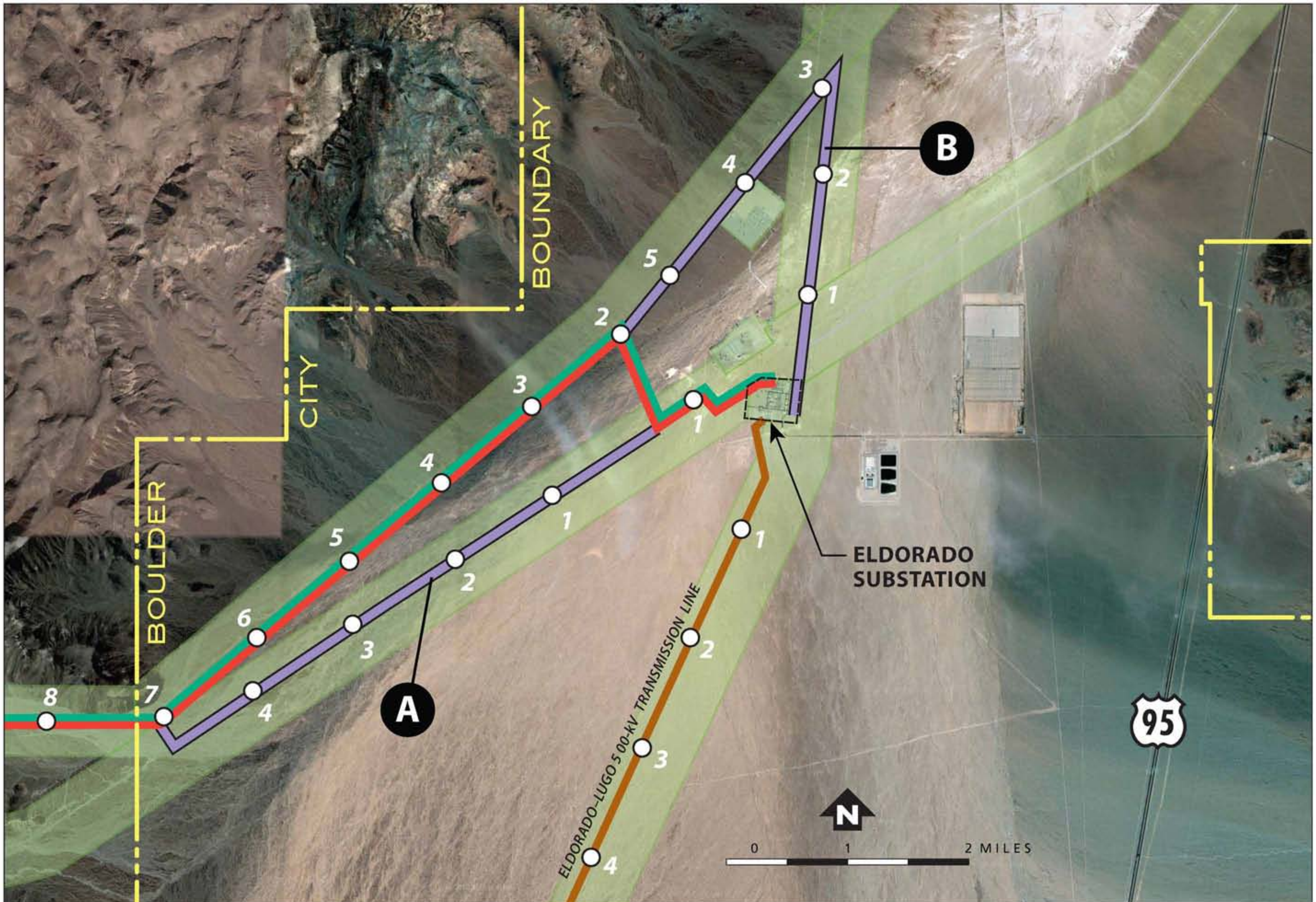

Legend

- Transmission line
- Telecommunication Path 1
- 20 — *Milepost*
- E — Transmission line route variations
- BLM-designated energy ROW corridors
- Telecommunication Path 2, Section 1

Figure 2-11

Transmission Line Routing Alternatives A and B

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The purpose of this alternative is to bypass a segment of the proposed project route where the proposed project would deviate from designated transmission corridors and would cross an approximately 0.8-mile segment within the Boulder City Conservation Easement. Although this 0.8-mile ROW currently contains the existing 115-kV line, as stated above, it falls outside of the BLM-designated corridors. Therefore, the applicant may need to obtain Clark County and City of Boulder City approval to widen the ROW to the 100 to 130 feet required for the upgraded 230-kV line. Transmission Alternative Route A would bypass this segment by heading north from the Eldorado Substation following existing designated transmission corridors.

North of Eldorado (Transmission Alternative Route B)

Transmission Alternative Route B (Figure 2-11) would begin at the Eldorado Substation. The line would exit the substation to the north and parallel the Eldorado–Mead 230-kV transmission line on existing ROW for approximately 2.5 miles before turning southwest. The route would continue southwest for approximately 2.8 miles and re-join the existing Eldorado–Baker–Cool Water–Dunn Siding–Mountain Pass 115-kV transmission line ROW at MP 2 of the proposed route. This alternative would require numerous, difficult transmission crossings, and several of these overhead utility lines would require modification or relocation to accommodate passage of the Transmission Alternative Route B transmission line.

Similar to Transmission Alternative Route A, the purpose of Transmission Alternative Route B is to bypass a segment of approximately 0.8 miles where the proposed project would deviate from existing designated transmission corridor and would cross lands administered by the City of Boulder (Boulder City Conservation Easement). Transmission Alternative Route B was created to bypass these segments by heading southwest from the Eldorado Substation to join the existing ROW.

North Dry Lakes Reroute (Transmission Alternative Route C)

Transmission Alternative Route C (Figure 2-12) would begin at the Eldorado Substation and follow the proposed route to the point where the line reaches the northeastern edge of the Ivanpah Dry Lake (MP 27, tower 185). Transmission Alternative Route C would then continue west and southwest on new 130-foot ROW around Ivanpah Dry Lake for approximately 5.3 miles before rejoining the proposed project route at MP 32, tower 218. Transmission Alternative Route C was developed to minimize potential impacts to the Ivanpah Dry Lake.

South Dry Lakes Reroute (Transmission Alternative Route D)

Transmission Alternative Route D (Figure 2-12) would parallel the existing LADWP Marketplace–Adelanto 500-kV transmission line as it crosses through the Ivanpah Dry Lake. This route would reduce the overall transmission footprint, since the EITP towers would follow to the extent feasible the existing LADWP 500-kV ROW. Transmission Alternative D begins at the Eldorado Substation and follows the proposed route until it approaches the northeastern edge of the Ivanpah Dry Lake (MP 27, tower 184). Transmission Alternative D would then continue south and then southwest on a new 130-foot ROW around Primm for approximately 3.3 miles before rejoining the proposed project route at MP 30, tower 203.

South Dry Lakes Bypass (Transmission Subalternative Route E)

Transmission Subalternative Route E is a subalternative to Transmission Alternative Route D. Subalternative E would use a shorter length of new 130-foot ROW (approximately 0.25 miles shorter than Alternative D) from MP 27 of the proposed EITP transmission line to the corridor that would parallel the existing LADWP Marketplace–Adelanto 500-kV transmission line. As would Transmission Alternative D, this route would reduce the overall transmission footprint, since the EITP towers would follow to the extent feasible the existing LADWP 500-kV ROW. Transmission Subalternative Route E would proceed south from MP 27 for approximately 1 mile and then follow the route proposed for Transmission Alternative D (Figure 2-12).

2.3.2.2 Telecommunication Alternatives

The two alternatives to the proposed telecommunication system are the Golf Course Telecommunication Alternative and the Mountain Pass Telecommunication Alternative. These alternatives include additional undergrounded segments and installation of telecommunication wires along existing distribution lines. The telecommunication alternatives were designed to minimize potential visual impacts of an aboveground microwave tower. Both alternatives would follow the same path as the proposed telecommunication route until the town of Nipton, California.

Telecommunication Alternative (Golf Course)

The Golf Course Telecommunication Alternative route would extend from Nipton to the point on the north side of Nipton Road where it intersects with I-15. This alternative would consist of a combination of all-dielectric self-supporting fiber cable installed on existing Nipton 33-kV wooden distribution lines and underground in new duct banks (Figure 2-13).

Approximately 1 mile of all-dielectric self-supporting fiber cable would be installed overhead on an existing Nipton 33-kV distribution line immediately west of Nipton, on the north side of Nipton Road. Pole replacement for this alternative is not anticipated; however, the detailed project engineering design process might indicate that pole replacement would be necessary. From the westernmost pole on the Nipton line before it crosses Nipton Road to the south, fiber optic cable would be installed in a new underground duct along the north side of Nipton Road in new roadside ROW to the intersection of Nipton Road and I-15. The underground cable length for this segment would be approximately 9 miles.

From the I-15–Nipton Road junction, the Golf Course Telecommunication Alternative route would parallel I-15, running north on an existing Nipton 33-kV distribution line and crossing I-15 near the Primm Valley Golf Course. This alternative route would cross the Primm Valley Golf Course in a new underground duct (Figure 2-13), then continue on an existing Nipton 33-kV distribution line to a point approximately 1 mile north of the Ivanpah Substation. The telecommunication line would then be installed in a new underground duct for approximately 1 mile to the Ivanpah Substation. The entire route from the I-15 junction to the Ivanpah Substation would be approximately 10 miles.

Telecommunication Alternative (Mountain Pass)

The Mountain Pass Telecommunication Alternative route would extend from Nipton to the point on the north side of Nipton Road where it intersects with I-15. This alternative would consist of all-dielectric self-supporting fiber cable installed on existing Nipton 33-kV wooden distribution lines and underground in new duct banks (Figure 2-14).

Approximately 1 mile of all-dielectric self-supporting fiber cable would be installed overhead on an existing Nipton 33-kV distribution line immediately west of Nipton, on the north side of Nipton Road. Pole replacement for this alternative is not anticipated; however, the detailed project engineering design process might indicate that pole replacement would be necessary. From the westernmost pole on the Nipton line before it crosses Nipton Road to the south, fiber optic cable would be installed in a new underground duct along the north side of Nipton Road in new roadside ROW to the intersection of Nipton Road and I-15. The underground cable length for this segment would be approximately 9 miles.

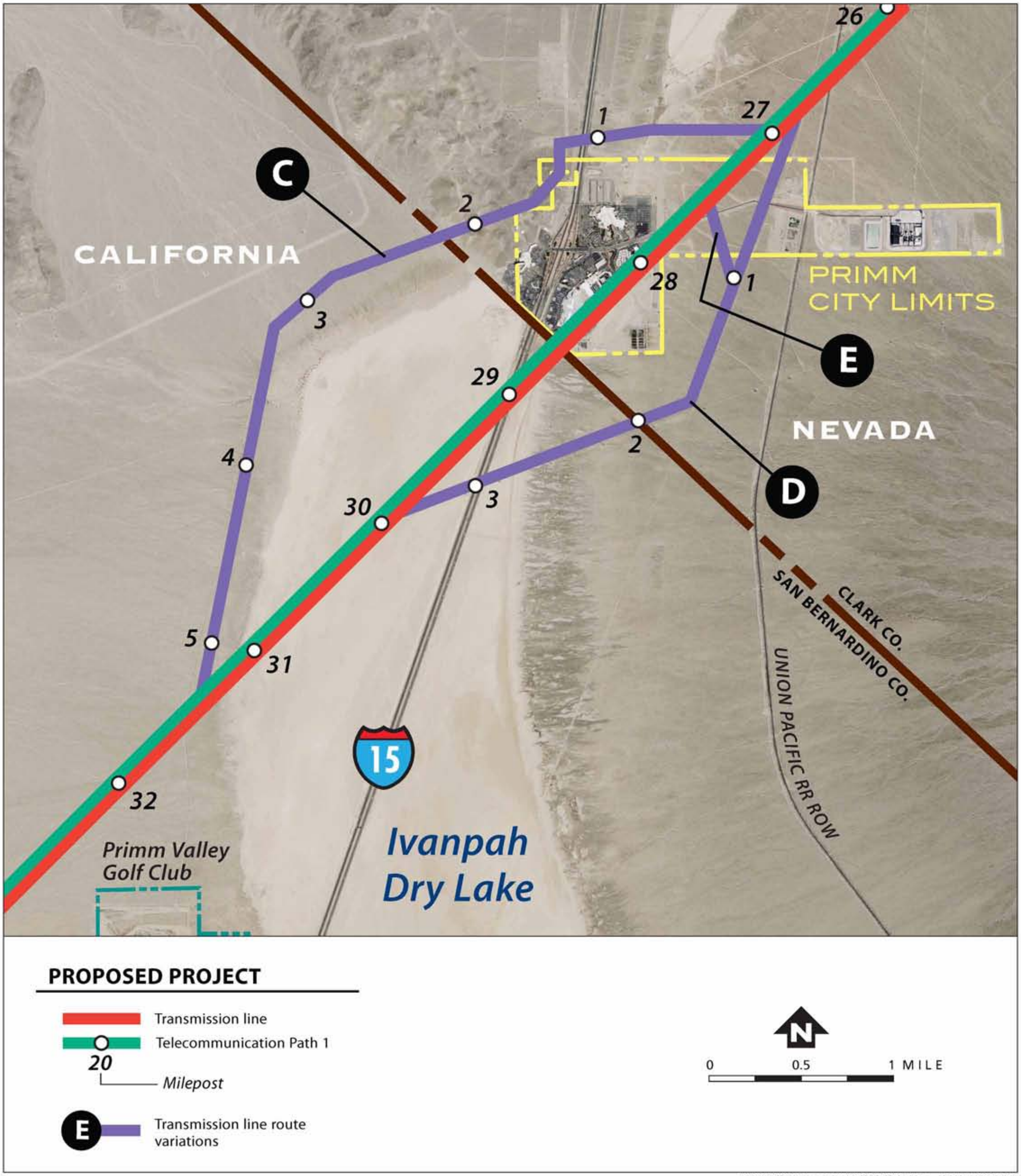

Figure 2-12

Transmission Line Routing Alternatives C, D and E

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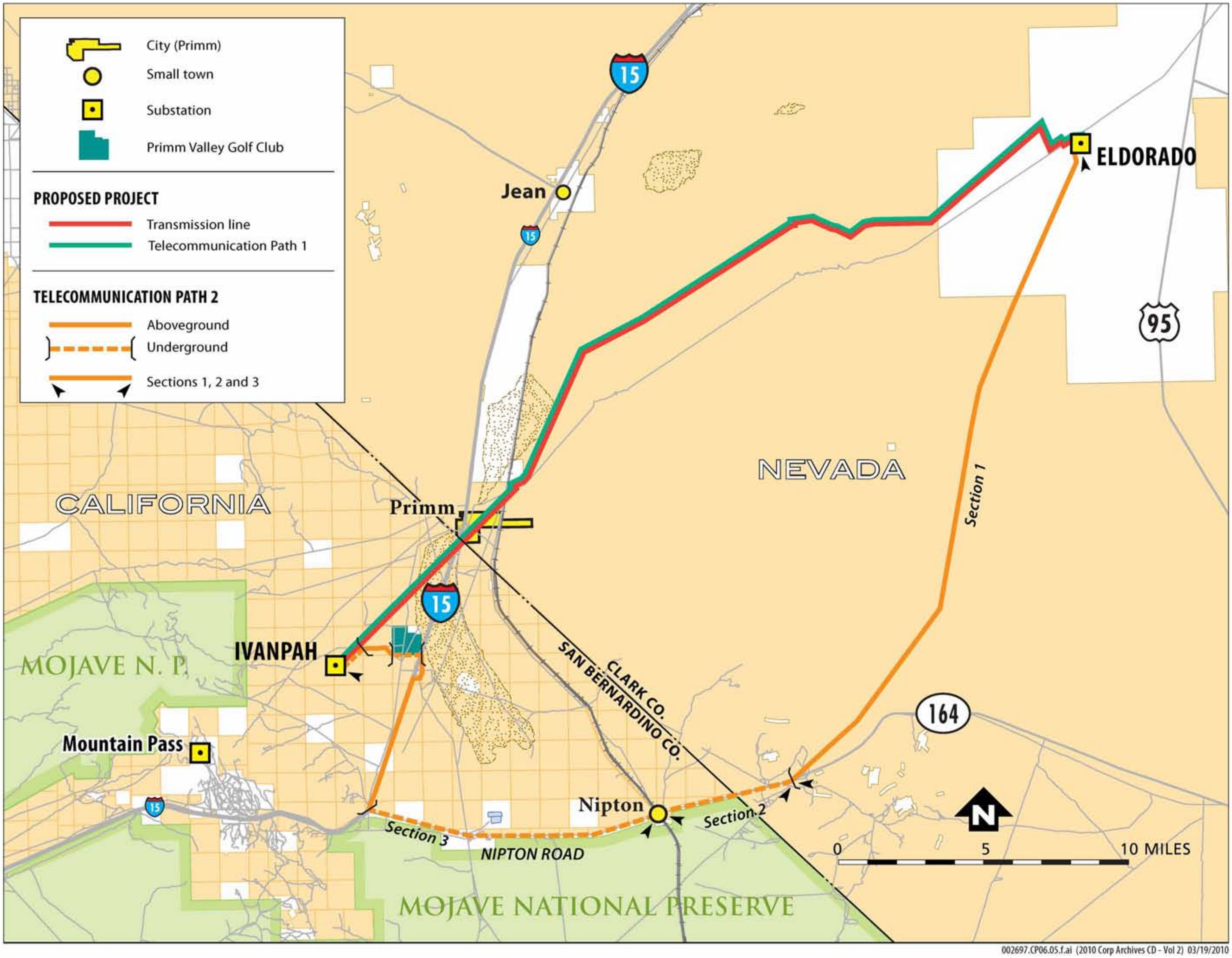

Figure 2-13 **Golf Course Telecommunication Alternative**

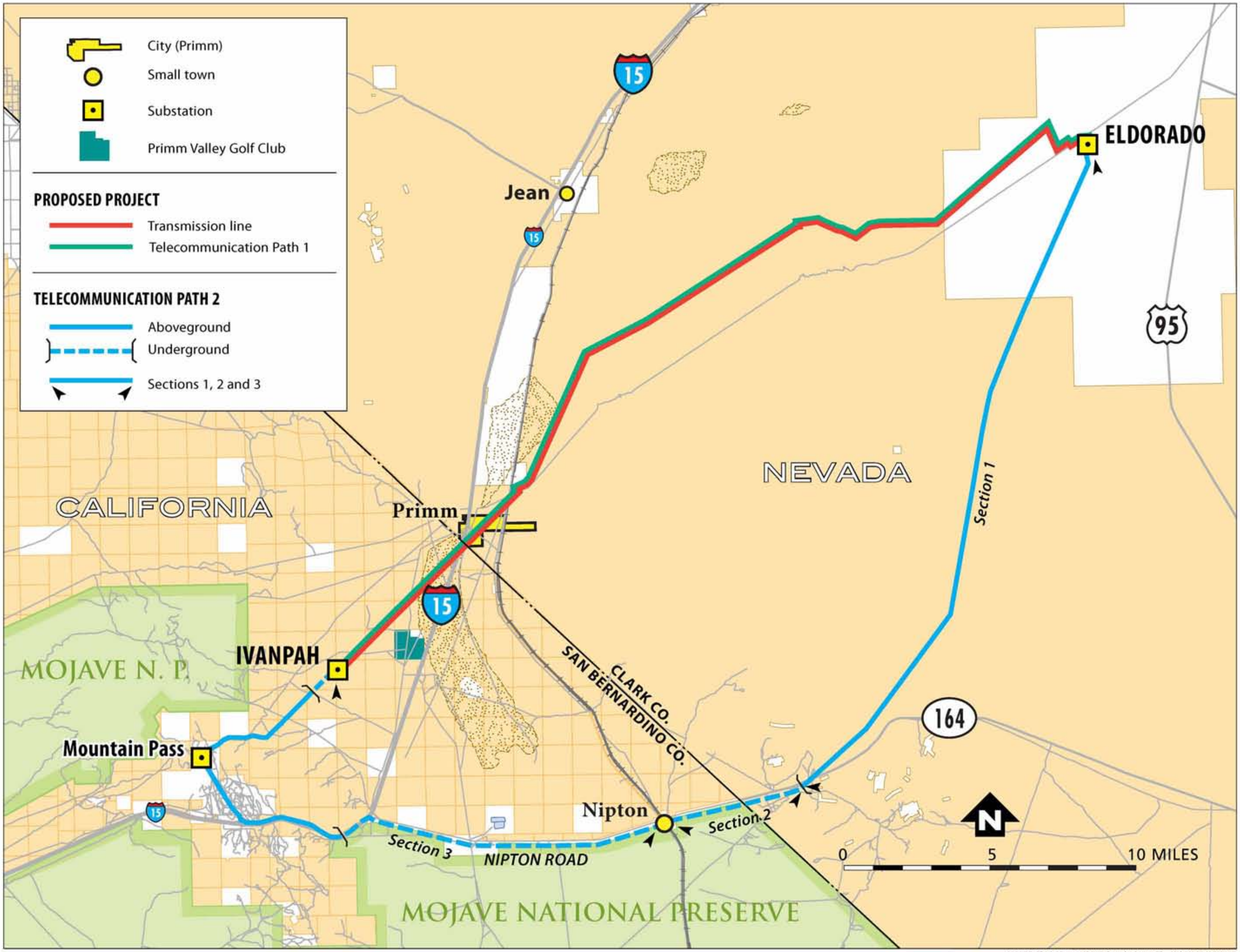

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Figure 2-14 **MOUNTAIN PASS TELECOMMUNICATION ALTERNATIVE**

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From the I-15 junction point, the route would parallel I-15 in an underground duct for approximately 1.0 mile and then would exit the underground duct and be strung on an existing Nipton 33-kV distribution line. The alternative route would then continue west to the town of Mountain Pass, then north to the Mountain Pass Substation. From there, the cable route would proceed northeast on an existing Nipton 33-kV distribution line to the Ivanpah Substation. The route would enter the proposed Ivanpah Substation from the south via approximately 500 feet of underground conduit that would be installed from the last Nipton 33-kV distribution line pole to the substation. The Mountain Pass Telecommunication route, from the I-15 junction point to the Ivanpah Substation, would be approximately 15.0 miles.

Communication Enclosure at the Mountain Pass Substation

Dedicated communication enclosures would be included within the Mountain Pass Substation (6.0 miles southwest of the Ivanpah Substation) to house communication equipment. The communication equipment would be needed to repeat (re-generate) optical signals from/to Eldorado via telecommunication Path 2, Section 3. The enclosures would be equipped with an AC electrical power interface, batteries and battery chargers, air conditioners, and conduits for connection to fiber optic cables from distribution pole lines.

2.3.2.3 No Project / No action Alternative

The No Project Alternative / No Action alternative considers the environmental impacts if the proposed project and its alternatives are not built. Under this alternative, none of the activities or potential environmental impacts described in Chapter 3 would occur. Analysis of the No Project Alternative and the corresponding No Action Alternative is required by CEQA and NEPA, respectively, to allow federal (BLM) and state (CPUC) decision-makers to compare the impacts of the project and its alternatives with the impacts of not approving the project. A CPUC No Project decision would be the denial of the CPCN application filed by SCE. A BLM No Action decision would be the denial of the ROW application filed by SCE.

Under the No Project / No Action alternative, the objectives of the proposed project would not be accomplished. The electrical transmission system proposed to connect renewable energy sources in the Ivanpah Valley area would not be constructed. Therefore, the applicant and other California utilities might not be able to comply with the provisions of Executive Order 13212, the Energy Policy Act of 2005, the Federal Power Act, California Senate Bill 1078, or California Senate Bill 107.

The applicant would continue to operate and maintain the existing 115-kV transmission structures and the existing Eldorado Substation. The applicant would also continue to use existing access and spur roads for operations and maintenance.

The applicant is required to interconnect and integrate power generation facilities into its electric system, under Sections 210 and 212 of the Federal Power Act (16 U.S.C. § 824 (i) and (k)) and Sections 3.2 and 5.7 of the CAISO's Tariff. Further, state mandates require the applicant to increase its percentage of renewable generation sources in its overall energy portfolio. As of November 2009, a total of 68 applications had been submitted for solar and wind energy projects on BLM lands near the Ivanpah Valley and Eldorado Valley areas. CAISO has also identified other projects in the area that are in planning stage and for which applications are expected in the future. While many of these projects may not be constructed due to environmental issues discovered during the environmental review process or due to funding or legal issues, it is reasonable to assume that some of these projects will be approved and constructed.

The existing transmission system in the Ivanpah Valley area cannot support the interconnection of these renewable generation projects planned for the Ivanpah Valley area. With the proposed transmission system, the applicant would be able to connect some of the planned renewable generation projects in the Ivanpah Valley area to the existing CAISO-controlled grid, which would help the applicant meet the renewable generation goals set by the state.

Under the No Project Alternative / No Action , the following events or actions (scenarios) related to electric generation and transmission could be reasonably expected to occur in the foreseeable future:

- As currently conceived, solar projects proposed in the Ivanpah Valley area would be postponed or cancelled. Applicants for certain projects planned in the area have stated their intention to connect to an upgraded 230-kV transmission network, and it can be reasonably assumed that other planned projects in the area have the same intention. These proposed renewable energy projects would have to find alternate means to connect to the existing transmission system without compromising system reliability.
- The California RPS[4], which requires retail sellers of electricity to increase their sales share produced by renewable energy sources to 20% by 2010, might not be achieved without access to renewable energy from the Ivanpah Valley. While access to renewable energy from the Ivanpah Valley could be provided via other methods, the location of the existing SCE transmission corridor in relation to the planned renewable generation projects in the Ivanpah Valley area make it a likely candidate for providing access to the CAISO-controlled grid.
- Other renewable energy resources would need to be identified and transmission studies would need to be conducted to connect these newly identified sources to the transmission grid. This could delay SCE's, and other utilities', ability to reach the RPS goal of 20% renewable generation sources by 2010.
- If the generation projects currently planned (mentioned above) were approved and constructed, transmission providers such as the applicant, Pacific Gas and Electric, or the LADWP would be required to accommodate the power load by upgrading existing transmission infrastructure or building new transmission facilities along a different alignment, and/or developers of solar and wind generation facilities would need to build their own transmission facilities to connect to the existing grid. These renewable generation facilities could also connect with a transmission system that serves customers outside of California.
- If the proposed transmission system is not constructed, the planned renewable generation facilities would need to find alternative means for transmitting their power to load centers and customers. This alternative might not meet the objectives outlined by the CPUC and the BLM. Specifically, under the No Project Alternative, access to the CAISO-controlled grid might but might not be provided to solar generation projects planned for the Ivanpah Valley area, because these projects might not be constructed or could connect to transmission systems that service customers outside of California.
- Under the No Project Alternative, the applicant would need to identify alternate renewable generation sources to meet the state RPS goals. This could result in delaying the applicant's ability to comply with the RPS mandate and, depending on the alternate sources identified, could result in greater environmental impacts than the proposed project as they might require creation of a new ROW or might require ground disturbance in previously undisturbed areas.

Further, if the proposed transmission system is not developed but the planned renewable generation facilities are developed, an alternative method for connecting renewable generation facilities in the Ivanpah Valley area would need to be developed. It is possible that other electrical utilities with transmission facilities in the area, such as LADWP, might purchase some of the power from the developers and integrate the electricity into its system. Another possibility is the development of a private transmission line, which would connect renewable generation projects to the grid. Currently, these options are not planned and have not been analyzed for environmental impacts; however, because the proposed project would involve only the replacement of an existing transmission line within an existing ROW, it is reasonable to assume that these alternatives could result in greater impacts than the proposed project because they might require the creation of new ROW or might require ground disturbance in previously undisturbed areas.

[4] The Renewable Portfolio Standard—regulated by the CPUC—was established in 2002 under Senate Bill 1078 and accelerated in 2006 under Senate Bill 107.

2.3.3 Alternatives Considered but Eliminated from Further Analysis

This section briefly describes the alternatives that will not be considered for further environmental analysis in this Draft EIR/EIS and the basis for those determinations, as a result of the alternatives screening process. These alternatives are not evaluated in detail in this Draft EIR/EIS. Detailed descriptions of these alternatives and explanations for their elimination are provided in Appendix A-1.

System Alternatives

Non-Transmission System Alternative (System Alternative 1)

This alternative would not meet the project's purpose, need, or objectives since it would not interconnect solar resources in the Ivanpah Dry Lake area with the SCE transmission system. In addition, new sources of in-basin generation would need to be identified, evaluated, and built. Transmission upgrades may also be required to integrate new in-basin generation sources into the transmission system. These new sources of in-basin generation would result in site-specific impacts associated with construction and operation of new power plants. This could result in air quality, biology, cultural resources, land use, noise, and visual impacts, among others.

Reconductoring Alternative (System Alternative 2)

The use of reconductoring would avoid and/or lessen construction-related environmental impacts identified for the proposed project because it would replace low capacity conductors on the existing towers. However, this alternative would not meet the purpose, need, and objectives because it would not provide sufficient capacity. It also would not meet the project objective of interconnecting planned solar resources in the Ivanpah Dry Lake area with the existing grid. Operations impacts would be similar to impacts of existing conditions.

Lower Voltage Alternative – New 115-kV Transmission Line (System Alternative 3)

This alternative would not meet the project purpose, need, and objectives because it would not interconnect or integrate new generation resources (up to 1,400 MW) expected to be developed in the Ivanpah Dry Lake area. It would also not meet the objective of maximizing the use of existing ROW and corridors. Construction-related impacts would be similar to those of the proposed project if new poles would be installed.

Higher Voltage Alternative – New 500-kV Transmission Line (System Alternative 4)

This alternative would not meet the project purpose, need, and objectives. It would require a wider ROW to accommodate the 500-kV transmission line. Additionally, there would be the potential for greater visual impacts than those of the proposed project because existing transmission structures would be replaced with structures that are taller, wider, and bulkier than those of the proposed project.

230-kV Single Circuit Transmission Line

This alternative would not meet the project purpose and need. It would only provide capacity for interconnecting a maximum of 1,500 MW. It would not meet the purpose and need of providing transmission capacity of 1,400 MW.

Transmission Line Route Alternatives

New ROW for 230-kV Transmission Line Alternative (Transmission Alternative F)

This alternative would not meet the purpose and need of providing transmission capacity for 1,400 MW. It would require new ROW that is 2,000 feet away from the existing SCE 100-foot corridor. In addition, this alternative would have the potential for greater land disturbance due to the need of a wider ROW, and greater impacts to sensitive resources for any area that is undisturbed and undeveloped.

Telecommunication Alternatives

Microwave Tower Only (Microwave Telecommunication Alternative)

This alternative would meet the project purpose and need, but would not meet the project objective of minimizing environmental impacts. The use of multiple microwave towers for telecommunications would avoid the use of overhead or underground wires, reducing the potential for visual impacts compared with the proposed project. However, this alternative would also have the potential for greater ground disturbance and impacts to sensitive biological, cultural, visual, and other resources from the construction of six new microwave towers.

Technology Alternatives

Composite Core Conductor Alternative (Technology Alternative 1)

This alternative meets the project purpose and need. However, the composite core is more expensive and fragile than the standard core conductor. Moreover, implementation of this alternative would not meet the project objective of providing reliability.

Painted Structures Alternative (Technology Alternative 2)

This alternative would meet the project purpose and need, but only partially meets the project objectives. Although this alternative would reduce aesthetic impacts, this effect would only be temporary; the aesthetic quality may be reduced over time as structures are exposed to weather, and paint may peel or chip and become unsightly. Repainting structures would increase safety concerns associated with mobilizing personnel and equipment, since repainting of structures might be needed over the life of the project. In addition, painting would take longer and increase potential for spills, hazards, and air quality impacts. Increased air quality impacts and exposure to hazardous materials would occur due to the release of volatile organic compounds and/or spills during the painting process.

Underground Construction (Technology Alternative 3)

Underground construction would meet the project purpose and need; however, it would only meet some of the project objectives. Undergrounding would not minimize environmental impacts and construction could take longer. Although this alternative would reduce visual impacts and potential impacts on avian species due to electrocution, it would require greater land disturbance due to construction activities, and greater potential for long-term impacts to air quality, biological resources, traffic, noise, and geology/soils (erosion) due to higher incidence of maintenance problems or system failures, which would require excavation to replace underground cables.

All Tubular Steel Poles Alternative (Technology Alternative 4)

This alternative would meet the project purpose and need. However, the use of TSPs for all transmission structures would not be technically feasible for 230-kV double circuit systems, and therefore would have special manufacturing and construction requirements. Additionally, the use of TSPs would have the potential for greater disturbances of habitat, soils, and surface water, cultural and paleontological resources, and hazardous waste due to construction activities.

2.3.4 Identification of the Environmentally Superior Alternative (CEQA) / Preferred Alternative (NEPA)

CEQA Guidelines require identification of the environmentally superior alternative. If the No Project Alternative is environmentally superior, it requires identification as a superior alternative among all of those considered (California Code of Regulations [CCR], Title 14 §15126.6(e)(2)). The rationale and supportive information for the selection of the environmentally superior alternative under CEQA is provided in Chapter 4, “Comparison of Alternatives.”

Under Title 40 CFR Section 1502.14(e), lead federal agencies are required to “identify the agency’s preferred alternative or alternatives, if one or more exists, in the draft statement and identify such alternative in the final statement unless another law prohibits the expression of such a preference.” In determining which alternative is preferred, lead federal agencies consider both the “environmentally preferable alternative” and the “agency preferred alternative.” The “agency preferred alternative” is the alternative that the agency believes would fulfill its statutory mission and responsibilities, considering economic, environmental, technical, and other factors. Based on the conclusions of the environmental analysis, the BLM has determined that the preferred alternative is the proposed project / proposed action. The rationale and supportive information for this determination is provided in Chapter 4, “Comparison of Alternatives.”

In contrast, the “environmentally preferable alternative,” is the alternative that would promote the national environmental policy, as expressed in NEPA Section 101. Ordinarily, this means the alternative that would cause the least damage to the biological and physical environment; however, it also means the alternative that best protects, preserves, and enhances historic, cultural, and natural resources (CEQ 1981). The environmentally preferable alternative will be identified by the BLM in the Record of Decision (ROD) for the project.

2.4 Project Construction

This section describes the main features of the construction of the proposed project and its alternatives. Since the project alternatives mainly consist of route variations of the proposed ROWs for transmission and telecommunication lines, general construction techniques and features for the alternatives would be similar to those described for the proposed project. Special considerations for specific alternatives are detailed in each subsection, as required.

Construction of each component of the proposed project and alternatives would involve a sequence of pre-construction and construction activities. Pre-construction activities include surveys, clearing, grading, and other site preparation activities and access and spur road works, as well as dismantling of existing facilities such as transmission line structures, transmission hardware, overhead ground wires, and transformer banks.

In general, construction of transmission, subtransmission, and distribution lines involves the following steps (Grigsby 2007):

- Preparing site and clearing ROW
- Framing – erecting poles, towers, or other transmission- and distribution-supporting structures, including foundations and anchors on guyed structures
- Installing conductors – pulling, stringing, and splicing conductors
- Installing optical ground wire – pulling, stringing, and splicing
- Grounding – bonding and connecting all equipment, conductors, and structures to a ground source for maximum safety at the construction sites
- Energizing – connecting the existing line in service to the new conductor
- Cleaning up and restoring the temporary disturbed sites

Additionally, construction of the proposed telecommunication system would involve overhead installation of optical ground wire and underground construction of duct banks for fiber optic cables.

2.4.1 Eldorado–Ivanpah Transmission Line Construction

The proposed Eldorado–Ivanpah 230-kV transmission line construction would require the removal of approximately 250 existing towers along 35 miles of the existing Eldorado–Baker–Cool Water–Dunn Siding–Mountain Pass 115-kV transmission line corridor. These transmission structures would be replaced by 216 new LSTs and 42 steel H-frames. Each structure would require multiple drilled, poured-in-place, concrete footings that would form the structure foundation. Construction would also include support activities, such as establishing material staging yards, and the development of access roads and spur roads.

The steps involved in the construction of the EITP would be:

- Conducting pre-construction surveys
- Establishing seven construction yards and two helicopter staging areas
- Upgrading and establishing access and spur roads
- Dismantling and removing existing 115-kV transmission facilities
- Preparing sites for the LST and H-frame structures
- Installing foundations for the LST and H-frame structures
- Assembling and erecting LST and H-frame structures
- Installing conductors (guard structures, wire stringing, pulling, tensioning, and splicing)
- Grounding
- Cleaning up and restoring the site

Pre-construction surveys

Technical pre-construction surveys would be required to complete the detailed engineering designs, to evaluate necessary erosion and other environmental controls, and to determine final locations of the proposed transmission structures. During this phase, the project design would be modified to avoid environmentally sensitive areas or to ensure structural integrity and sustainability. During the surveys, crews would locate spur road centerlines, grades, and soil boring locations. Using results from the pre-construction surveys, the applicant would make final determinations of road location curvature, cuts and fills, grades and drainage, and necessary erosion controls in accordance with design standards and practices and/or landowner requirements.

Pre-construction surveys would also result in adjustments of the size and location of the proposed excavation and tower foundation sites, depending on the type of the transmission structure (LSTs or H-frames) and the soil conditions at each site. Adjustments of the proposed excavation sites might be necessary to address excavation difficulties, avoid an environmental sensitivity, or maintain structural integrity and sustainability.

Construction Yards and Helicopter Staging Locations

Project construction would begin with establishment of approximately seven temporary construction yards and two helicopter landing sites located at strategic points along the route. Two construction yards would be in California and five in Nevada. The proposed location and current condition of each yard and landing site are listed in Table 2-9. The applicant or its contractors might use additional construction yards.

Table 2-9 Proposed Construction Yards and Helicopter Staging Locations

No.	Location	MP	Distance to ROW (miles)	Current Condition	Area (acres)(1)
CY 1	Eldorado Substation, NV	0	0	Previously disturbed	9.8
CY 2	Jean, NV	15	11.5	Previously disturbed	13.6
CY 3	Generating Station Yard, NV	27	0.4	Previously disturbed	16.5
CY 4	Primm Valley Casino Vacant Lot, NV	28	0.1	Previously disturbed	28.3
CY 5	Whiskey Pete's Casino Vacant Lot, NV	28	1.1	Previously disturbed	2.4
CY 6	BrightSource Generating Station Yard, CA	35	0	Unknown (public land)(2)	10+
CY 7	Nipton, CA (3)	n/a	4.7	Previously disturbed	2.5
HL 1	East of McCollough Pass	9	0.2	Not disturbed (4)	3.6
HL 2	West of McCollough Pass	15	0.01	Not disturbed (4)	5.7

Source: SCE 2009
Notes:
(1) Approximate areas based on current design
(2) Only Construction Yard #6 is located on public (BLM) land
(3) Construction Yard #7 is proposed for tower retrofit activities
(4) Based on aerial imagery
Key:
CY = Construction Yard
HL = Helicopter Landing site
n/a = not applicable

Each yard would be used as a reporting location for workers, and for vehicle and equipment parking and material storage. The yards would have offices for supervisory and administrative personnel. Maintenance of construction equipment would be conducted at these yards.

The number of workers reporting to any one construction yard is not expected to exceed approximately 100 workers at any time. Construction yards would range between 2 and 28 acres, depending on land availability and intended use. Construction of the Ivanpah Substation would not require a temporary laydown area outside the substation fenced area.

The applicant would arrange temporary electrical and telephone connections at the construction yards with local electrical and communication service providers. Water also would be provided by local vendors. During the peak construction period, approximately 80 private commuting vehicles and the construction vehicles/equipment would also be parked at the construction yards. Crews would load materials onto work trucks and drive to the current construction location. At the end of each day, crews would return to the yard in their work vehicles and depart in their private vehicles. Materials stored at the construction yards would include:

- Conductors
- Wood poles
- Optical ground wire cable
- Hardware
- Construction equipment
- Steel structural components
- Insulators
- Signage
- Fuel and joint compound

- Storm Water Pollution Prevention Plan (SWPPP) materials, such as straw wattles, gravel, and silt fences
- Waste materials for recycling or disposal

Due to greater efficiency and lower cost, the applicant would use conventional ground supported access construction methods for the transmission line construction. Helicopters would be mainly used during the transmission line stringing activities (sock or pilot line threading), as described further in this section. The applicant would develop a preliminary access plan and detailed engineering design to identify specific structures and/or portions of the proposed transmission line that would require helicopters as an alternate method of construction. Final location of helicopter staging areas for the proposed project would be determined with the input of the helicopter contractor and affected private landowners and land management agencies.

During stringing activities, preliminary helicopter operations would be based at the Jean Sport Aviation Center located in Jean, Nevada, and on roads adjacent to the pulling/tensioning sites. Helicopter fueling would occur at staging areas or at the local airport using the helicopter contractor's fuel truck, and would be supervised by the helicopter fuel service provider. The helicopter and fuel truck would stay overnight at a local airport, under security measures to be implemented by the applicant in coordination with the Clark County Department of Aviation (CCDOA) or at a staging area if adequate security is in place. Use of the existing Jean Sport Aviation facilities for helicopter staging and fueling would require coordination between the applicant and the CCDOA.

The size of each material or helicopter staging area would depend on the size and number of structures to be removed and installed. Staging areas would likely change as the work progressed along the transmission lines.

Access and Spur Roads

Transmission line roads are classified into two main groups: access roads and spur roads. Access roads run between tower sites and serve as a main transportation route along the transmission line ROW. Spur roads usually lead from the access roads and terminate at one or more structure sites.

Approximately 35 miles of existing main roads would need to be upgraded to support the proposed 230-kV line construction and operations. In addition, more access roads would be required for construction and maintenance of the telecommunications facilities, as well as additional access roads for connecting the project facilities to support and logistics areas, such as the road coming from Jean to the project ROW. Additionally, 1.2 miles of spur roads would be constructed to allow passage of construction vehicles to the construction sites. Upgrades and new construction might require vegetation clearing and grading based on site conditions. The new spur roads would be a minimum of 14 feet wide. It is anticipated that most of the spur roads would be left in place to access the facilities for operations and maintenance.

The existing access and spur roads might require reconstruction and maintenance prior to construction activities. Reconstruction works would include clearing, grading, and compacting the existing roads to remove potholes, ruts, and other surface irregularities to provide a smooth and dense surface capable of supporting heavy equipment. Specific locations for reconstruction works would depend on impacts of weather conditions over the existing roads and final project engineering design.

Dismantling and Removal of Existing 115-kV Transmission Facilities

The project would involve removing 208 existing 115-kV LST H-frames, 13 existing 115-kV LSTs, 23 wood pole H-frames, 6 wood poles and associated hardware (cross arms, insulators, vibration dampeners, suspension clamps, ground wire clamps, shackles, links, nuts, bolts, washers, cotter pins, insulator weights, and bond wires), and the transmission line conductor.

The applicant proposes to remove the existing 115-kV structures and conductors in the following sequence:

- Road work – Existing access roads would be used to reach structures, but some rehabilitation and grading might be necessary before removal activities were begun to establish temporary crane pads for structure removal.
- Wire-pulling locations – Wire-pulling sites would be located every 15,000 feet along the existing utility corridor, and would include locations at dead-end structures and turning points. Many of the locations used for the removal of existing 115-kV lines would be used for installation of the new 230-kV lines.
- Cable removal – A 3/8-inch pulling cable would replace the old conductor as it was removed. The cable would then be removed under controlled conditions to minimize ground disturbance, and all wire-pulling equipment would be removed. The old conductor wire would be wound onto “breakaway” reels as it was removed and would be transported to a construction yard where it would be prepared for recycling.
- Structure Removal – For each type of structure, a crane truck or rough-terrain crane would be used to support the structure during removal; a crane pad of approximately 50 by 50 feet might be required to allow a removal crane to be set up at a distance of 60 feet from the structure center line. The crane rail would be located transversely from the structure locations.
- Footing Removal – The existing LST and H-frame footings would be removed to a depth of approximately 1 to 2 feet. Holes would be filled with removed soil and compacted, and then the area would be smoothed to match the surrounding grade.

Site Preparation

Installation of the 230-kV transmission line would require construction of approximately 216 new LSTs and approximately 42 steel H-frame structures. Each LST and H-frame structure would be installed onto a flat, vegetation-free area or pad. The applicant would grade and/or clear to create a vegetation-free surface for footing construction. Grading would be conducted so that water would run in the direction of the natural drainage and ponding and/or erosion would be prevented. The graded area would be compacted and would be capable of supporting heavy vehicular traffic.

Ideally, structure laydown areas with sparse vegetation would not require vegetation clearing. The applicant would apply alternative methods such as drive and crush, mowing, and trimming of the laydown areas instead of clearing vegetation, although use of such methods might increase the risk of fire during the assembly erection process. The structure locations themselves and the 25-foot clearance area around the structures would require clearing.

The LSTs and steel H-frame structures would be assembled near the locations where they would be installed. Typically, they would be assembled in an approximately 200-by-200-foot laydown area. Depending on the condition of the area, clearing and/or grading would be necessary to prepare it for construction.

To erect either the LSTs or the steel H-frame structures, a crane pad (a flat, vegetation-free area) may need to be established within the laydown area described above. Crane pads would be located 60 feet from the centerline of each structure.

In mountainous areas, special techniques might be required to provide access for construction, assembly, erection, and wire-stringing activities during the transmission line construction. These special techniques would be used to help ensure the safety of personnel during construction activities.

Foundation Installation

Each of the 216 new LSTs and approximately 42 steel H-frame structures for this project would require multiple drilled, poured-in-place concrete footings to form the structure foundation. The size of the foundation would depend on the type of structure, soils conditions, and topography. LST foundations would consist of four concrete footings, while H-frames would have two concrete footings.

The foundation construction process would start with drilling the boreholes for each footing. The boreholes would be drilled using truck- or track-mounted drill rigs. LSTs typically require a borehole 3 to 4 feet in diameter and 20 to 45 feet deep. Steel H-frame structures typically require a borehole up to 6 feet in diameter and up to 40 feet deep. On average, each footing for an LST and steel H-frame structure would project approximately 1 to 4 feet above ground level. The actual depth of footings would depend on specific site soil conditions and topography and would be determined during final engineering; however, the maximum anticipated depth below ground surface is 45 feet.

Where excavation holes needed to be drilled in soft or loose soil or if they extended into groundwater, they would be stabilized with casings or drilling mud slurry. Mud slurry would be placed in the hole after drilling to prevent sloughing. The slurry would be pumped into the footing excavation hole. The concrete would then be pumped to the bottom of the excavation hole in a rigid pipe. As the slurry mud was displaced by the concrete, it would be pumped from the excavation hole into a vacuum truck. The drilling/slurry mud would be disposed at an approved facility, in accordance with the applicant's waste management practices.

In areas not accessible by road, equipment and material could be deposited at structure sites using helicopters or by workers on foot, and crews could prepare the footings using hand labor assisted by hydraulic or pneumatic equipment or other methods.

Prior to drilling excavation holes in California, the applicant would contact Underground Service Alert to identify any underground utilities in the construction zone. In Nevada, a similar organization would be contacted for the same purpose.

Following excavation of the foundation footings, steel reinforced cages and stub angles would be set, survey positioning would be verified, and concrete would then be placed. Steel reinforced cages and stub angles would be assembled at laydown yards and delivered to each structure location by flatbed truck. LST foundations would require between 25 and 100 cubic yards of concrete, depending on the type of structure being constructed. H-frame structure foundations would require between 80 and 120 cubic yards of concrete.

During construction, existing concrete suppliers would be used when feasible. If no concrete suppliers exist in certain areas, a temporary concrete batch plant would be established. If necessary, the applicant would consider setting up a temporary concrete batch plant in a 2-acre site within the construction area. Equipment would include a central mixer unit (drum type); three silos for injecting concrete additives, fly ash, and cement; a water tank; portable pumps; a pneumatic injector; and a loader for handling concrete additives not in the silos. Dust emissions would be controlled by watering the area and by sealing the silos and transferring the fine particulates pneumatically between the silos and the mixers.

Structure Assembly and Erection

Structural components of the LSTs and H-frames would be bundled and shipped by rail or truck to the construction yards, and then trucked to the individual sites. LSTs and H-frames would be assembled at laydown areas at each site, and then erected and bolted to the foundations. Ground disturbance would generally be limited to the laydown areas, which would typically occupy an area of 200-by-200 feet (40,000 square feet). Vegetation would be removed and the areas would be graded.

LSTs assembly would begin with hauling and stacking the bundles of steel, using several tractors with 40-foot trailers and a rough-terrain forklift. After the steel was delivered and stacked, the construction crew would begin assembling the leg extensions, body panels, boxed sections, and bridges. The steel work would be completed by a combined erection and torquing crew with a lattice boom crane. The construction crew would install insulators and wire rollers (travelers) at this time.

For steel H-frame structures, steel work would consist of hauling the poles in sections to their designated sites using semi-trucks with 40-foot trailers and rough-terrain cranes. At the site, the poles would be set on the foundations once the concrete foundation had been cured. The poles could either be assembled into a complete structure or set one piece at a time by stacking and jacking them together. This would depend on the terrain and available equipment. Laydown areas would be established for the assembly process at each H-frame structure location.

Where road access was available, assembled sections would be lifted into place by an 80-ton crane. The crane pad would be located transversely to the structure and set up approximately 60 feet from its centerline. The crane would move along the ROW to erect subsequent structures.

For structures that would be located in terrain inaccessible to a crane, helicopters might be used for structure erection. Helicopter use is expected only in the McCullough Pass area and for line stringing. The final decision on helicopter use will be made by the applicant and the construction contractor.

The use of helicopters for the erection of structures would be conducted in accordance with the applicant's specifications and would be similar to methods detailed in Institute of Electrical and Electronic Engineers 951-1996, Guide to the Assembly and Erection of Metal Transmission Structures, Section 9, Helicopter Methods of Construction. The operations area of the helicopters would be limited to helicopter staging areas near construction locations that are considered safe locations for landing.

Final siting of staging areas would be conducted with the input of the helicopter contractor and affected private landowners and land management agencies. The size of each staging area would depend on the size and number of structures to be installed.

Conductor Installation

Wire-Stringing

Stringing includes all activities associated with installation of the transmission line conductors onto the LSTs and/or the steel H-frames, including the installation of primary conductor and optical ground wire, vibration dampeners, weights, spacers, and suspension and dead-end hardware assemblies. Insulators and stringing sheaves (rollers or travelers) are usually attached to the conductors as part of the stringing activity if the work consists of replacing conductors on existing towers (also known as reconductoring); otherwise, they are attached to the new structures during the steel erection process. Stringing conductors and optical ground wires on new transmission lines would begin once a number of structures had been erected and inspected. The dimensions of the area needed for the stringing setups associated with conductor installation depend on terrain.

Prior to stringing activities, several items used during the 115-kV conductor removal would be inspected or reinstalled, such as bucket trucks, wood pole guard structures, and temporary protective net systems used at the crossings for roads, streets, railroads, highways, or other transmission, distribution, and communication facilities.

The following four steps describe the wire stringing activities proposed by the applicant:

> **Step 1.** Stringing the sock or pilot line – a lightweight sock line (also known as a pilot line) would be transported and installed tower to tower using a helicopter. This pilot line would be threaded structure to structure through wire rollers, which are attached to each tower insulator so the conductor can be pulled through. On average, the

helicopter would operate approximately 6 hours per day during stringing operations. The operations area of the helicopter would be limited to helicopter staging areas considered safe locations for landing.

Step 2. Pulling – The sock line would be used to pull in the conductor pulling cable. The conductor pulling cable would be attached to the transmission line conductor using a special swivel joint to prevent damage to the conductor and to allow the wire to rotate freely to prevent complications from twisting as the conductor unwinds off the reel. A piece of hardware known as a running board would be installed to properly feed the conductor into the roller; this device keeps the bundle conductor from wrapping during installation. The conductors would then be pulled through the length of the span by a puller machine. Another machine called a tensioner would be located at the other end of the span, near the reel of conductor. The puller and tensioner are operated together during the pulling phase to ensure that the conductor complies with technical specifications, such as maintaining the proper ground clearance.

Conductor pulling locations would occur every 15,000 to 18,000 feet on flat terrain and would be more closely spaced in rugged terrain. Wire pull locations would be selected, where possible, based on the geometry of the line as affected by changes in routing directions, changes in the terrain, and suitability of stringing and splicing equipment setups.

Step 3. Splicing, Sagging, and Dead-ending – Once each conductor is pulled through the length of the transmission line, all temporary pulling splices would be removed and replaced with permanent splices. Conductor splices would occur every 7,500 to 9,000 feet on flat terrain or more closely in rugged terrain. Once the splicing was completed, the conductor would be sagged to proper tension to avoid effects in the conductor length due to changes in temperature (conductors expand or contract with high or low temperatures). In addition, all phases to be installed between two towers would be sagged to the same tension. After splicing and sagging, conductors would be fixed to dead-end towers.

Step 4. Clipping-in and Spacers – After the conductors were fixed to dead-end towers, the conductors would be clipped in or attached to tangent structures. This process would involve removing the existing wire rollers and replacing them with final insulator hardware to secure the conductors to the insulators. Once this was complete, spacers would be attached between the conductors of each phase to maintain uniform separation.

An overhead optical ground wire would be installed on the transmission line for shielding and communication, as described in Section 2.4.5. On the EITP 230-kV transmission line, the pulling and tensioning sites would be used for both wire and optical ground wire installations, while the proposed stringing activities on the Eldorado–Lugo 500-kV line (Telecommunication Line Path 2, Section 1) would be for the optical ground wire installation only. The optical ground wire is typically installed in continuous segments, each up to 19,000 feet long, if installed in conjunction with the conductor, depending on factors including line direction, inclination, and accessibility. Following installation of the optical ground wire, the strands in each segment would be spliced together to form a continuous length from one end of the transmission line to the other.

Stringing would be conducted in accordance with the applicant’s specifications, which are similar to process methods detailed in Institute of Electrical and Electronic Engineers Standard 524-2003, Guide to the Installation of Overhead Transmission Line Conductors. The applicant has developed a standard wire-stringing plan that includes a sequenced program of events starting with determination of wire pulls and equipment set-up positions, pulling times, and safety protocols needed for safe and quick installation of wire. To protect the safety of workers and the public, safety devices such as grounding, guard structures, and radio-equipped public safety roving vehicles and linemen would be in place prior to initiation of wire-stringing activities.

Guard Structures

During installation, conductors can fall. Public agencies differ on their preferred methods to protect public safety during conductor stringing operations. For major roadway and utility crossings, typically one of the following four methods is employed to protect the public:

- Erection of a highway net guard structure system
- Detour of all traffic off a highway at the crossing position
- Implementation of a controlled continuous traffic break while stringing operations are performed
- Strategic placement of special line trucks with extension booms on the highway deck

Guard structures are temporary facilities that protect underlying areas during wire stringing operations. They are designed to stop the movement of a conductor if it falls during installation. Typical guard structures are 60- to 80-foot-tall wooden poles. The number of guard poles installed on either side of a crossing varies between two and four depending on the width of the conductor being installed. Temporary nets also could be installed to protect some structures located under the transmission lines. Guard structures are usually removed once a conductor is installed. None of the other public safety methods require ground disturbance.

Based on the number of road crossings that would be needed along the proposed project route, the applicant has estimated that approximately 16 guard structures (Table 2-10) would be necessary. The exact number and type of guard structures would be field-verified upon completion of final design.

Table 2-10 Proposed Guard Structure Locations

GS #	Location of Guard Structure	Type of Guard Structure
1	West side distribution line between MPs 32 and 33	H-frame
2	East side distribution line between MPs 32 and 33	H-frame
3	South side of dirt road near MP 33	Bucket truck
4	North side of dirt road, near MP 33, crossing over distribution line	Bucket truck
5	South-bound I-15, west side of highway, near MP 29, south of state line	H-frame w/net
6	South-bound I-15 in center median, near MP 29, south of state line	H-frame w/net
7	North-bound I-15 in center median, near MP 29, south of state line	H-frame w/net
8	North-bound I-15 east side of highway, near MP 29, south of state line	H-frame w/net
9	Southwest side of Lotto Store Road, between MPs 28 and 29, at southern edge of outlet mall	H-frame
10	Northeast side of Lotto Store Road, between MPs 28 and 29, at southern edge of outlet mall	H-frame
11	Southwest side of Fashion Outlet Way, between MPs 28 and 29, at eastern edge of outlet mall	H-frame
12	Northeast side of Fashion Outlet Way, between MPs 28 and 29, at eastern edge of outlet mall	H-frame
13	South side of E. Primm Boulevard, between MPs 28 and 29	H-frame
14	North side of E. Primm Boulevard, between MPs 28 and 29	H-frame
15	West side of Union Pacific Railroad, between MPs 26 and 27	H-frame
16	East side of Union Pacific Railroad, between MPs 26 and 27	H-frame

Key:
GS = Guard Structure
MP = Milepost

Pulling and Splicing

The puller, tensioner, and splicing set-up locations associated with the proposed project would be temporary and the land would be restored to its previous condition following completion of pulling and splicing activities. The final number and locations of the puller, tensioner, and splicing sites would be determined during final engineering for the project, depending on the construction methods chosen by the applicant or its contractor. The puller, tensioner, and splicing set-up locations require level areas to allow for maneuvering the equipment. When possible, existing level areas and existing roads would be used, to minimize the need for grading and cleanup.

The minimum areas needed for pulling, tensioning, and splicing equipment setup sites would be:

- 150 by 500 feet for tensioning equipment,
- 150 by 200 feet for pulling equipment, and
- 150 by 100 feet for splicing equipment.

However, crews can work from within slightly smaller areas when space is limited.

At a splice location, the fiber cables are routed down a structure leg where the splicing occurs. The splices are housed in a splice box (typically a 3-by-3-by-1–foot metal enclosure) that is mounted to one of the structure legs some distance above the ground. On the last structure at each end of a transmission line, the overhead fiber is spliced to another section of fiber cable that runs in underground conduit from the splice box into the communication room inside the adjacent substation.

Grounding

Grounding is a general industrial safety procedure implemented for construction of electric facilities. It entails connecting to the ground all equipment, conductors, anchors, and structures within a defined work area. It can also be accomplished by fully insulating equipment and operators, and by isolating equipment and personnel (Grigsby 2007).

Grounding techniques for electric transmission facilities and equipment depend on the ability of materials to oppose the electric current flow, also known as electrical resistance. Soil resistivity and the foundation-to-ground resistance are basic criteria commonly used for grounding electrical facilities and equipment. In particular, the applicant would consider a foundation-to-ground resistance criterion (with dry soil conditions) of 30 ohms or less to be safe, for transmission structures that are located more than 700 feet from a substation. If this condition cannot be met, the applicant would install special counterpoise systems at the structure footings to reduce the resistance to safe levels. Those structures within the Ivanpah Substation boundary would be grounded to the substation ground grid.

Site Cleanup

The applicant would restore all areas that were temporarily disturbed by proposed project activities (including material staging yards, pulling and tension sites, and splicing sites) following the completion of construction. Restoration would include grading, restoring sites to original contours, and reseeding, where appropriate. In addition, all construction materials and debris would be removed from the area and recycled or properly disposed of off site. The BLM will require the applicant to mitigate by monitoring restoration for a given period after reclamation, to assure that cleanup activities were successfully completed and satisfactory reclamation was achieved.

During construction, water trucks would be used to minimize the quantity of airborne dust created by construction activities. Any damage to existing roads as a result of construction would be repaired once construction was complete.

2.4.2 Subtransmission Line Construction

At the transition point of the proposed project transmission line route going north into the Ivanpah Substation, seven existing LST H-frame structures would be removed and replaced with one single-circuit engineered TSP (Figure 2-7) and six LWS H-frames (Figure 2-8) within the existing Eldorado–Baker–Cool Water–Dunn Siding–Mountain Pass 115-kV transmission line ROW. In addition, six LWS H-frames would be installed at replaced structures to meet current requirements.

Approximately three single-circuit engineered TSPs would be installed and looped in to the proposed Ivanpah 115-kV rack position. These TSPs would require concrete footings. The LWS H-frames would be buried and backfilled with native soils. One circuit of 653.9 ACSR conductors (three phases per circuit, one conductor per phase) and two 3/8-inch high-strength shield wires would be placed on the new poles.

Construction of these structures would follow the general steps described in Section 2.4.1 for site preparation, foundation installation, structure assembly, and conductor installation. The final step in completing construction of the new 115-kV subtransmission line segment would be to energize the new conductor. To accomplish this, the existing lines in service would be de-energized and the connections to the new segment would be made.

2.4.3 Distribution Line Construction

A 33-kV distribution system would be constructed to provide auxiliary power to the Ivanpah Substation. This system would consist of approximately 1 mile of new underground 33-kV circuitry and two new Remote Control Switches (RCSs) that would be built to close the loop in the Nipton 33-kV circuit. The proposed work would be done next to Densmore Drive Road. One RCS would be south of Ivanpah Substation, and one would be next to the Primm Golf Course.

Ivanpah Substation power would be served from approximately 400 feet of new ducts and one run of cable from the Nipton 33-kV circuit to the location of the new station light and power transformer in the Ivanpah Substation. The exact location of the transformer would be determined during final engineering.

Additionally, about 4,300 feet of new 12-kV overhead distribution line would be constructed between the town of Nipton and the new microwave site northeast of Nipton. An overhead transformer would be installed with underground service to the microwave site. The line would be installed along the side of an existing dirt road.

Pole Upgrades

The telecommunication alternatives would include installation of fiber cables from Nipton to the Ivanpah Substation on the existing Nipton 33-kV distribution line wood poles. Distribution line poles would be replaced if the poles did not meet wind load requirements with the addition of fiber cable. A hole about 8 feet deep would be drilled next to the existing pole, and a new pole would be erected. The conductor would be transferred from the existing pole to the new pole. The old pole would be removed.

2.4.4 Ivanpah Substation Construction

Construction of the Ivanpah Substation would involve the following steps:

- Site preparation
- Excavation
- Substation equipment installation
- Paving
- Rock surfacing
- Spill prevention, control, and countermeasure
- Storm water pollution prevention
- Fencing and security

Site Preparation

The substation area would be a 1,650-by-1,015-foot rectangle covering approximately 38.5 acres. It would be bounded by the applicant's existing 115-kV ROW on the southeastern side and open BLM land on the other three sides, currently proposed as the ISEGS project development areas described in Section 2.2.2.

Grading of the substation site and an access road to the site would be completed as part of the scope of the ISEGS project facilities described in Section 2.2.2.2 and would include grading of the 885-by-850-foot substation site and the 10-foot perimeter buffer. In addition, the ISEGS scope would grade the following areas at the substation site: the entire 17-acre substation pad, the cut and fill side slopes to blend the existing terrain with the new pad, and an earthen berm along the upslope pad boundaries to protect the substation from storm water runoff. In addition, the substation access roads and surface flow diversion/control measures would be graded and installed as part of the ISEGS project.

Two transmission line access areas would be included within the proposed substation site, approximately 1,015 by 400 feet (approximately 9 acres) each. These areas would provide room for the 115-kV and 230-kV transmission lines to turn into the station from the adjacent ROWs.

Land disturbance for the EITP substation construction would be limited to the actual structure erection locations, staging/pulling areas, and unpaved access roads. Other site preparation activities would include:

- Final grading
- Installation of approximately 3,500 feet of 8-foot-high perimeter fence with barbed wire surrounding the entire substation pad and one 30-foot-wide rolling gate
- Installation of a new conductor ground grid to cover the entire pad

Excavation

After the substation site was graded, excavation would be required to install below-grade facilities, including a ground grid, trenches, and equipment and structure foundations. The design of the substation ground grid would be based on soil resistivity measurements collected during a geotechnical investigation that would be conducted prior to construction. Approximately 145 foundations of various sizes would be constructed throughout the substation pad to support equipment and steel structures. In addition, a network of partially buried concrete trenches and a buried grounding grid would be installed. Excavations of these foundations and trenches would begin following the completion of grading and other yard improvements and would continue for several weeks. The estimated total volume of soil that would need to be excavated for foundation and trenches is 1,250 cubic yards; the soil would be spread on a portion of the substation property.

Substation equipment installation

Following the excavation and below-grade construction, installation of substation equipment and ancillary facilities, such as buses, capacitors, circuit breakers, transformers, steel structures, and the MEER would take place. The transformers would be delivered by heavy-transport vehicles and off-loaded on site by large cranes with support trucks.

Paving

Asphalt concrete paving would be applied to internal driveways over an aggregate base material and a properly compacted sub-grade as recommended by the geotechnical investigation during final engineering. Asphalt concrete paving would be installed after all major construction had been completed.

Rock Surfacing

All areas within the substation perimeter that were not paved or covered with concrete foundations or trenches would be covered with a 4-inch layer of untreated, ¾-inch crushed rock. This crushed rock layer would provide a safe work environment in those areas of the substation not previously insulated or electrically grounded. The rock would be applied to the finished grade surface after all construction had been completed.

Spill Prevention, Control, and Countermeasures Plan

It is estimated that the proposed substation would store more than 1,320 gallons of transformer oil, requiring the development and implementation of a Spill Prevention, Control, and Countermeasures (SPCC) plan. The quantity of oil contained in any one of the planned 230/115-kV transformers would exceed the quantity above which the plan is required by law. The facility would be designed so the transformers would have secondary containment that would comply with all applicable regulations.

Storm Water Pollution and Prevention Plan

An SWPPP would be developed and implemented to prevent the potential discharge of contaminants and to prevent erosion during construction. The SWPPP would define areas where hazardous materials such as concrete would be stored; where trash would be placed; where rolling equipment would be parked, fueled, and serviced; and where construction materials such as reinforcing bars and structural steel members would be staged.

Erosion control during grading of the unfinished site and during subsequent construction would be in place and monitored as specified by the SWPPP. A siltation basin would be established to capture silt and other materials that might otherwise be carried from the site by rainwater surface runoff. Approximately 20 percent of the completed substation would consist of impervious materials such as concrete foundations and asphalt concrete paving.

Fencing and security

As described in Section 2.2.2.2, the entire substation area would be enclosed by perimeter gates and fencing. Perimeter fencing would conform to the applicant's requirements for electrical substations and have a minimum height of 8 feet above the adjacent finished grade to the outside of the substation. All perimeter fences and gates would be fitted with barbed wire. A motion sensing system would be attached to the perimeter fence to detect attempted unauthorized entry. Additionally, as part of the mitigated ISEGS Ivanpah 3 project (according to the FSA Amendment of March 2010), tortoise barrier fence would also be installed in accordance with the USFWS Recommended Specifications for Desert Tortoise Exclusion Fencing.

2.4.5 Telecommunication System Installation

Contractors would construct the telecommunication system. The applicant would be responsible for administration and inspection. During some stages of the proposed project, multiple locations would be under construction simultaneously. This could involve independent construction teams. Modifications of the existing Eldorado–Lugo 500-kV towers might include reinforcing or extending the structure body, installing horizontal diaphragms, and reinforcing structure legs. The applicant would develop detailed engineering drawings and procedures for fabrication and installation for each of the structure modifications.

The modifications to be performed on each structure would be identified by bundles. Each bundle would contain those components necessary to complete the required modifications, such as new steel angles to form back-to-back angles to the existing leg diagonals, redundant braces to the longitudinal and transverse faces, oblique braces between leg diagonals, and a new horizontal diaphragm. New redundant members would also be designed and installed at the ground peaks to support the optical ground wire clip-in hardware. The loading capacity of the upgraded structures would be able to support the loads for the new optical ground wire installation and meet the requirements of CPUC General Order 95 (State of California) and the National Electric Safety Code (State of

Nevada). Final structure modification and associated construction activities would be determined once final engineering was completed by the contractor.

Optical Ground Wire Installation

For proposed project communications, optical ground wire segments would be installed on both the EITP 230-kV transmission line structures (Telecommunication Path 1), and along 25 miles of the Eldorado–Lugo 500-kV transmission line (Telecommunication Path 2, Section1). Optical ground wire installation would be performed in the same manner as the conductor installation, as described in Section 2.4.1. Optical ground wire is typically installed in continuous segments, each up to 19,000 feet long, depending on various factors including line direction, inclination, and accessibility. For Telecommunication Path 1, the pulling and tensioning sites would be the same as those proposed for the 230-kV conductor installation. For Telecommunication Path 2, the stringing activities on the existing Eldorado–Lugo 500-kV line would be conducted for the optical ground wire installation only.

Following installation of the optical ground wire, the strands in each segment would be spliced together to form a continuous length from one end of the transmission line to the other. At a splice structure, the fiber cables would be routed down the structure leg where the splicing would occur. The splices would be housed in a splice box (typically a 3-by-3-by-1–foot metal enclosure) mounted to one of the structure legs some distance above the ground.

Distribution line poles would be replaced if a pole did not meet wind load requirements with addition of fiber cable. Replacing a distribution line pole requires a five-person crew, one pole trailer truck, one pole digger truck, and one crew truck. An approximately 30-by-40-foot work area is required for the work. A hole about 8 feet deep would be drilled next to the existing pole, and a new pole would be erected. A conductor would be transferred from the existing pole to the new pole and the old pole would be cut or removed.

Underground Installation

Following installation of the optical ground wire, on the last tower at each end of a transmission line, the overhead fiber would be spliced to another section of fiber cable that would run in underground conduit from the splice box into the communication room inside the adjacent substation. To install the fiber optic cable in existing and new underground conduits, a high-density polyethylene smooth-wall innerduct would be used to facilitate installation and to protect and help identify the cable. The innerduct would be installed first inside the conduit, and then the fiber optic cable would be installed inside the innerduct.

Connecting the optical ground wire with the substation would require several steps. The splice box would be mounted 20 to 30 feet above ground on the last transmission structure to the substation fence line. About 25 feet of 5-inch vertical riser conduit would be installed to reach the splice box from the ground. A trench about 3 feet deep and 1.5 feet wide would be dug from the structure to the substation fence line. A 5-inch conduit would be placed inside the trench from the structure to the substation fence line. A layer of slurry would be poured over the conduit for additional protection, and the dug-up soil would be used to backfill the trench.

At the substation fence line, the conduit would be connected to a trench inside the substation. Optical fiber nonconducting riser-type fiber cable would be pulled from the substation MEER to the splice box located on the last transmission structure. After the optical ground wire and optical fiber nonconducting riser-type cables were spliced, the splice case would be placed inside the substation site. About 40 by 60 feet of work area, two splice trucks with pulling equipment, and a four-person crew would be required for the underground cable installation. In addition, a three-person crew would be required to complete the fiber optic splicing.

Fiber Optic Cable Installation

The overhead fiber optic cable would be installed by attaching cable to structures in a manner similar to that described above for the transmission line stringing. Installation would involve attaching the cable to cross arms on distribution poles. This would require the use of a bucket truck. One four-person crew and two trucks would be used. A crew can install up to 2,000 feet of cable and complete three splices in 1 day.

Overhead fiber optic cable stringing includes all activities associated with the installation of cables onto cross arms on existing wood pole structures. This activity includes installation of vibration dampeners and suspension and dead-end hardware assemblies. Stringing sheaves (rollers or travelers) are attached during the framing process. As part of the applicant's standard wire stringing plan, the fiber optic installation would follow a sequenced program of events starting with determination of the number of cable pulls and cable pulling equipment set-up positions, pulling locations, times, and safety protocols needed for safe and quick cable installation.

Fiber optic cable pulls typically occur every 10,000 to 20,000 feet over flat or mountainous terrain. Fiber optic cable splices are required at the ends of each cable pull. Fiber optic cable pulls are the length of any given continuous cable installation process between two selected points along the existing overhead or underground structure line. Fiber optic cable pulls are selected, where possible, based on availability of pulling equipment and designated dead-end structures at the ends of each pull, geometry of the line as affected by points of inflection, terrain, and suitability of fiber optic cable stringing and splicing equipment set ups. The dimensions of the area needed for stringing setups vary depending on the terrain; however, a typical stringing setup is 40 by 60 feet. Where necessary due to space limitations, crews can work from within a smaller area.

Installation of Microwave Tower and Communication Site

An approximately 100-by-100-foot area would be required for constructing each new communication site. Chain link fencing would be installed around the communication site perimeter. A typical communication site consists of a communication building, microwave tower, and generator/fuel tank. A typical communication building is either a block wall-type building to be constructed on site or a prefabricated building delivered to the site. Prefabricated buildings are set on a concrete foundation using a crane. The typical building size is 36 by 12 feet; the building consists of a generator room and an equipment room. The generator room houses an emergency backup generator and manual/automatic AC switch equipment. Dimensions of the communication building would be determined during final engineering design.

Microwave equipment, DC power equipment, and other telecommunication equipment would be installed in the MEER. A separate concrete pad with a 10-foot separation from the communication building would be constructed for fuel tank installation.

The required area for a typical free-standing, four-legged lattice steel communication tower is 25 by 25 feet. For the proposed project, the tower would be built outside the communication room or next to the MEER within the substation. Concrete footings would be installed to support the tower. Heavy equipment needed for construction would include ready-mixed concrete trucks for the footings and a crane for tower erection and antenna installation. Tractor-trailer vehicles would be used to transport steel tower components. A six- to eight-person crew might be on site at any given time for tower construction and antenna installation.

Construction of the new communication site would take approximately 6 months and would consist of the following steps:

- Prepare site
- Erect temporary fencing
- Set the foundations
- Install prefabricated building, fuel tanks, and emergency generator
- Erect the antenna tower (where necessary)

- Install telecommunication equipment and/or antennas
- Erect permanent fencing
- Clean up the site

2.4.6 Land Disturbance

Both temporary and permanent land disturbance would be associated with the EITP construction activities. Temporarily disturbed areas would be restored after construction and would be mainly associated with construction yards, laydown areas, and areas for tower assembly and erection. Permanent disturbance would occur primarily in the footprints of new structures (lattice towers, poles, H-frames, microwave towers), substation sites, access and spur roads, and other proposed permanent components. The following subsections present detailed tables indicating land disturbance estimates associated with the construction, operation, and maintenance of the proposed project and its alternatives.

2.4.6.1 Proposed Project

The estimated land disturbances associated with the proposed project are summarized in Tables 2-11 to 2-14. All temporary and permanent land disturbance estimations are based on the preliminary engineering design features presented by the applicant. Estimated total land disturbance from all the applicable proposed project components is approximately 466 acres during construction, with a permanent disturbance of 51 acres. Land disturbance would occur at each structure foundation site and also along new or restored access and spur roads. During grading on roads and at the substation sites, and during excavations at the proposed underground construction areas, soil and vegetation would be disturbed by trucks and other mobile equipment.

Table 2-11 230-kV Transmission Line Estimated Land Disturbance

Project Feature	Quantity	Each Disturbed Area (L x W)	Acres Disturbed during Construction	Acres Temporarily Disturbed	Acres Permanently Disturbed
Remove existing lattice steel H-frame (1)	208	150 feet x 75 feet	53.7	53.7	0.0
Remove existing lattice steel structure (1)	13	150 feet x 75 feet	3.4	3.4	0.0
Remove existing wood H-frame (1)	23	100 feet x 75 feet	4.0	4.0	0.0
Remove existing wood pole (1)	6	100 feet x 75 feet	1.0	1.0	0.0
Construct new lattice steel suspension structure (2)	178	200 feet x 200 feet	163.5	137.6	25.9
Construct new lattice steel dead-end structure (2)	35	200 feet x 200 feet	32.1	25.6	6.5
Construct new lattice steel heavy dead-end structure (2)	3	200 feet x 200 feet	2.8	2.2	0.6
Construct new tubular steel double H-frame (3)	21	200 feet x 200 feet	19.3	15.4	3.9
115-kV conductor removal and 230-kV conductor and optical ground wire stringing setup area – puller (4)	23	200 feet x 150 feet	15.8	15.8	0.0
115-kV conductor removal and 230-kV conductor and optical ground wire stringing setup area – tensioner (4)	24	500 feet x 150 feet	41.3	41.3	0.0
230-kV conductor splicing setup areas (4)	12	150 feet x 100 feet	4.1	4.1	0.0
New access roads (5)	0.0 miles	Miles x 14 feet	0.0	0.0	0.0
New spur roads (5)	1.2 miles	Miles x 14 feet	2.4	0.0	2.4
El Dorado Substation material and	1	9.8 acres	9.8	9.8	0.0

Table 2-11 230-kV Transmission Line Estimated Land Disturbance

Project Feature	Quantity	Each Disturbed Area (L x W)	Acres Disturbed during Construction	Acres Temporarily Disturbed	Acres Permanently Disturbed
equipment staging area					
Jean, Nevada – material and equipment staging area	1	13.6 acres	13.6	13.6	0.0
General Construction Yard – material and equipment staging area	1	16.5 acres	16.5	16.5	0.0
Primm Valley Casino vacant lot – material and equipment staging area	1	28.3 acres	28.3	28.3	0.0
Whiskey Pete's Casino vacant lot – material and equipment staging area	1	2.4 acres	2.4	2.4	0.0
ISEGS construction station – material and equipment staging area	1	10 acres	10.0	10.0	0.0
Total (6)			**424.0**	**386.1**	**39.3**

Notes:

(1) Includes removing existing conductor, tearing down existing structure, and removing foundation 2 feet below ground surface.

(2) Includes installing foundation, assembling and erecting structure, installing conductor and optical ground wire. Area to be restored after construction. The portion of ROW within 25 feet of the lattice steel structure to remain cleared of vegetation would be permanently disturbed for each structure (suspension = 0.145 acre; dead-end = 0.187acre; heavy dead-end = 0.188 acres).

(3) Includes assembling and erecting structure, installing conductor and optical ground wire; area to be restored after construction includes a portion of ROW within 25 feet of the tubular steel double H-frame to remain cleared of vegetation; 0.185 acres would be permanently disturbed for each tubular steel double H-frame.

(4) Based on 9,000-foot conductor reel lengths, number of circuits, and route design.

(5) Quantity of this item is provided in linear miles, based on the expected length of road (in miles) and a road width of 14 feet.

(6) The disturbed acreage calculations are estimates based on the applicant's preferred area of use for the described project feature, the width of the existing ROW, or the width of the proposed ROW. These estimations are based on preliminary design information and are subject to revision based on final engineering and review.

Table 2-12 Subtransmission Line Estimated Land Disturbance

Project Feature	Quantity	Each Disturbed Area (L x W)	Acres Disturbed during Construction	Acres Temporarily Disturbed	Acres Permanently Disturbed
Remove existing lattice steel H-frame and construct new TSP (1) (2)	1	200 feet x 100 feet	0.5	0.4	0.1
Remove existing lattice steel H-frame and construct new LWS H-frame (1)(3)	6	200 feet x 100 feet	2.8	2.4	0.4
Construct new tubular steel pole (2)	3	200 feet x 100 feet	1.4	1.2	0.2
Construct new LWS H-frame (1)(3)	6	200 feet x 100 feet	2.8	2.4	0.4
Total (4)			**7.3**	**6.3**	**1.0**

Notes:

(1) Includes removing existing conductor, tearing down existing structure, and removing foundation 2 feet below ground surface.

(2) Includes assembling and erecting structure, installing conductor and shield wire. Area to be restored after construction. The portion of ROW within 25 feet of the TSP would remain cleared of vegetation. Approximately 0.057 acres would be permanently disturbed for each TSP.

(3) Includes structure assembly and erection, conductor, and shield wire installation. Area to be restored after construction. Portion of ROW within 25 feet of the LWS H-frame to remain cleared of vegetation. Approximately 0.067 acres would be permanently disturbed for each LWS H-frame.

(4) The disturbed acreage calculations are estimates based on the applicant's preferred area of use for the described project feature, the width of the existing ROW, or the width of the proposed ROW. These estimations are based on preliminary design information and are subject to revision based on final engineering and review for the project.

Key: LWS = lightweight steel; TSP = tubular steel pole

Table 2-13 Distribution Line Loop Estimated Land Disturbance

Project Feature	Quantity	Each Disturbed Area (L x W)	Acres Disturbed during Construction	Acres Temporarily Disturbed	Acres Permanently Disturbed
Underground trench/duct for conduit [1]	1	2,600 feet x 1.5 feet	0.09	0.09	0.00
Underground manhole installation	2	10 feet x 15 feet	0.01	0.01	0.00
Work area for underground manholes pulling area	2	40 feet x 60 feet	0.11	0.11	0.00
Work area pulling of 3/8 mile of 1/0 ACSR pole line construction	3	40 feet x 60 feet	0.17	0.17	0.00
Total			**0.37**	**0.37**	**0.00**

Note:
(1) Underground trench is approximately 1.5 feet wide at most and 2,600 feet long from the existing transformer to the proposed new underground dip pole. All construction is along existing paved and dirt roads at the perimeter of the Primm Valley Golf Course.
Key: ACSR = Aluminum Conductor Steel Reinforced

Table 2-14 Telecommunication System Estimated Land Disturbances

Project Feature	Quantity	Each Disturbed Area (L X W)	Acres Disturbed during Construction	Acres Temporarily Disturbed	Acres Permanently Disturbed
Telecommunication Path 1					
Underground trench/duct for fiber entrance to Eldorado Substation [1]	1	500 feet x 1.5 feet	0.02	0.02	0.00
Underground trench/duct for fiber entrance to Ivanpah Substation [1]	1	500 feet x 1.5 feet	0.02	0.02	0.00
Work area outside Eldorado Substation	1	40 feet x 60 feet	0.06	0.06	0.00
Work area outside Ivanpah Substation	1	40 feet x 60 feet	0.06	0.06	0.00
Subtotal Estimated Path 1			**0.14**	**0.16**	**0.00**
Telecommunication Path 2, Section 1					
Retrofit existing lattice steel structure [2]	45	150 feet x 150 feet	23.2	12.5	10.7
optical ground wire stringing setup area – tensioner [3]	9	50 feet x 100 feet	1.0	1.0	0.0
optical ground wire stringing setup area – puller [4]	9	50 feet x 100 feet	1.0	1.0	0.0
Nipton – material and equipment staging area	1	~ 2.5 acres	2.5	2.5	0.0
Subtotal Estimated Path 2, Section 1			**27.8**	**17.0**	**10.7**
Telecommunication Path 2, Section 2					
Work area at 500-kV tower M172	1	40 feet x 80 feet	0.07	0.07	0.00
4.8-mile underground fiber cable duct [5]	1	6.8 feet x 25,200 feet	3.93	3.93	0.00
Underground vaults	21	6 feet x 6 feet	0.02	0	0.02
Work area for underground vaults and fiber pulling area	5	40 feet x 60 feet	0.28	0.28	0.00
Subtotal Estimated Path 2, Section 2			**4.30**	**4.28**	**0.02**

Table 2-14 Telecommunication System Estimated Land Disturbances

Project Feature	Quantity	Each Disturbed Area (L X W)	Acres Disturbed during Construction	Acres Temporarily Disturbed	Acres Permanently Disturbed
Telecommunication Path 2, Section 3					
Building new microwave communication site	1	100 feet x 100 feet	0.23	0	0.2
Placing 0.7 miles of fiber optic cable	1	6.8 feet x 3,700 feet	0.58	0.58	0.0
Work area for underground vaults and fiber pulling area	2	40 feet x 60 feet	0.11	0.1	0.0
Subtotal Estimated Path 2, Section 3			**0.92**	**0.69**	**0.2**
Total			**33.2**	**22.1**	**11.0**

Notes:
(1) Underground trench is approximately 1.5 feet wide, at most 500 feet long from the last structure to the substation fence line.
(2) Includes structure assembly and erection, and optical ground wire installation. Area to be restored after construction. The existing portion of ROW within 25 feet of the lattice steel structure footings would remain cleared of vegetation. The 10.8 acres is pre-existing permanently disturbed area around the structure for ongoing operation and maintenance access by the applicant.
(3) Based on 20,000-foot optical ground wire reel lengths and route design.
(4) The disturbed acreage calculations are estimates based on the applicant's preferred area of use for the described project feature, the width of the existing ROW, or the width of the proposed ROW. These estimations are based on preliminary design information and are subject to revision based on final engineering and review.
(5) The calculated disturbed area is based on the trench method. The proposed trench would be 1.5 feet wide; average trenching/excavating machines have a tread width of 68 inches (5.67 feet) and 14 inches (1.17 feet) of ground clearance. The applicant would select other underground construction methods to reduce land disturbance, such as horizontal boring, if feasible.

Additionally, assembly and erection of the new LSTs, H-frames, and TSPs would require laydown areas, material and equipment staging areas, and pulling and tensioning sites. These sites might require vegetation clearing and grading to level areas prior to installation activities. Furthermore, installation of the subtransmission (115-kV) line would disturb 7.3 acres during construction and would result in a 1-acre permanent disturbance, while the proposed 33-kV distribution line segment would create a temporary disturbance of 0.37 acres.

The acreage associated with the Ivanpah Substation is analyzed in the ISEGS FSA/EIR; however, construction of the EITP components associated with the proposed substation would occur without the construction of the ISEGS project. According to the revised ISEGS land disturbance estimations (FSA Addendum), the substation area for SCE use would be 13.3 acres (CEC and BLM 2010). Upgrades to the existing Eldorado Substation would be located on expanded yards within the existing substation boundaries; therefore, no temporary or permanent land disturbance is anticipated for this project component..

Installation of overhead ground wire and optical ground wire along the proposed telecommunication paths and permanent operation and maintenance of additional facilities such as the proposed microwave communication site in Nipton would create both temporary and permanent land disturbances. Temporary disturbance for the telecommunication component would total 33.2 acres, with an estimated permanent footprint of 11 acres.

2.4.6.2 Alternatives

Temporary and permanent additional land disturbance associated with the construction, operation, and maintenance of the transmission line routing and telecommunication alternatives are presented in Tables 2-15 to 2-21. Land disturbances estimated for the subtransmission and distribution lines components would be the same as those presented in Section 2.4.6.1. In addition, Table 2-21 compares the estimated land disturbances of alternatives with those resulting from the proposed project. All temporary and permanent land disturbance estimations are based on the preliminary engineering design features presented by the applicant.

Table 2-15 Estimated Additional Land Disturbance for Transmission Line Alternative Route A

Project Feature	Quantity	Each Disturbed Area (Length X Width)	Acres Disturbed during Construction	Acres Temporarily Disturbed	Acres Permanently Disturbed
Construct new lattice steel suspension structure (1)	26	200 feet x 200 feet	23.9	20.1	3.8
Construct new lattice steel dead-end structure (1)	3	200 feet x 200 feet	2.8	2.2	0.6
Construct new lattice steel heavy dead-end structure (1)	1	200 feet x 200 feet	0.9	0.7	0.2
Construct new tubular steel double H-frame (2)	2	200 feet x 200 feet	1.8	1.5	0.3
230-kV conductor and optical ground wire stringing setup area – puller (3)	2	200 feet x 150 feet	1.4	1.4	0.0
230-kV conductor and optical ground wire stringing setup area – tensioner (3)	3	500 feet x 150 feet	5.2	5.2	0.0
230-kV conductor splicing setup areas (3)	2	150 feet x 100 feet	0.7	0.7	0.0
New access roads (4)	0 miles	Miles x 14 feet wide	0.0	0.0	0.0
New spur roads (4)	2 miles	Miles x 14 feet wide	6.8	0.0	6.8
Total (5)			**43.4**	**31.8**	**11.6**

Notes:

(1) Includes foundation installation, structure assembly and erection, conductor installation, and optical ground wire installation. Area to be restored after construction. Portion of ROW within 25 feet of the lattice steel structure to remain cleared of vegetation would be permanently disturbed for each lattice steel structure (suspension = 0.145 acres; dead-end = 0.187 acres; heavy dead-end = 0.188 acres).

(2) Includes structure assembly and erection, conductor installation, and optical ground wire installation; area to be restored after construction; portion of ROW within 25 feet of the tubular steel double H-frame to remain cleared of vegetation; 0.185 acres would be permanently disturbed for each tubular steel double H-frame.

(3) Based on 9,000-foot conductor reel lengths, number of circuits, and route design.

(4) Quantity of this item is provided in linear miles, based on the expected length of road (in miles) and a road width of 14 feet.

(5) The disturbed acreage calculations are estimates based on the applicant's preferred area of use for the described project feature, the width of the existing ROW, or the width of the proposed ROW. These estimations are based on preliminary design information and are subject to revision based upon final engineering and review.

Table 2-16 Estimated Additional Land Disturbance for Transmission Line Alternative Route B

Project Feature	Quantity	Each Disturbed Area (L X W)	Acres Disturbed during Construction	Acres Temporarily Disturbed	Acres Permanently Disturbed
Construct new lattice steel suspension structure (1)	24	200 feet x 200 feet	22.0	18.6	3.4
Construct new lattice steel dead-end structure (1)	6	200 feet x 200 feet	5.5	4.4	1.1
Construct new lattice steel heavy dead-end structure (1)	3	200 feet x 200 feet	2.8	2.2	0.6
Construct new tubular steel double H-frame (2)	12	200 feet x 200 feet	11.0	8.8	2.2
230-kV conductor and optical ground wire stringing setup area – puller (3)	14	200 feet x 150 feet	9.6	9.6	0.0

Table 2-16 Estimated Additional Land Disturbance for Transmission Line Alternative Route B

Project Feature	Quantity	Each Disturbed Area (L X W)	Acres Disturbed during Construction	Acres Temporarily Disturbed	Acres Permanently Disturbed
230-kV conductor and optical ground wire stringing setup area – tensioner (3)	14	500 feet x 150 feet	24.1	24.1	0.0
230-kV conductor splicing setup areas (3)	0	150 feet x 100 feet	0.0	0.0	0.0
New access roads (4)	0 miles	Miles x 14 feet wide	0.0	0.0	0.0
New spur roads (4)	0.6 miles	Miles x 14 feet wide	0.6	0.0	0.6
Total Estimated (5)			**75.7**	**67.7**	**8.0**

Notes:
(1) Includes foundation installation, structure assembly and erection, conductor and optical ground wire installation; area to be restored after construction; portion of ROW within 25 feet of the lattice steel structure to remain cleared of vegetation would be permanently disturbed for each lattice steel structure (suspension = 0.145ac; dead-end = 0.187ac; heavy dead-end = 0.188ac).
(2) Includes structure assembly and erection, conductor installation, and optical ground wire installation; area to be restored after construction; portion of ROW within 25 feet of the tubular steel double H-frame to remain cleared of vegetation; 0.185 acres would be permanently disturbed for each tubular steel double H-frame.
(3) Based on 9,000-foot conductor reel lengths, number of circuits, and route design.
(4) Quantity of this item is provided in linear miles, based on the expected length of road (in miles) and a road width of 14 feet.
(5) The disturbed acreage calculations are estimates based on the applicant's preferred area of use for the described project feature, the width of the existing ROW, or the width of the proposed ROW. These estimations are based on preliminary design information and are subject to revision based on final engineering and review.

Table 2-17 Estimated Additional Land Disturbance for Transmission Line Alternative Route C

Project Feature	Quantity	Each Disturbed Area (L X W)	Acres Disturbed during Construction	Acres Temporarily Disturbed	Acres Permanently Disturbed
Construct new lattice steel suspension (1)	25	200 feet x 200 feet	23.0	19.3	3.7
Construct new lattice steel dead-end structure (1)	8	200 feet x 200 feet	7.3	5.9	1.4
Construct new lattice steel heavy dead-end structure (1)	1	200 feet x 200 feet	0.9	0.7	0.2
Construct new tubular steel double H-frame (2)	0	200 feet x 200 feet	0.0	0.0	0.0
230-kV conductor and optical ground wire stringing setup area – puller (3)	4	200 feet x 150 feet	2.8	2.8	0.0
230-kV conductor and optical ground wire stringing setup area – tensioner (3)	4	500 feet x 150 feet	6.9	6.9	0.0
230-kV conductor splicing setup areas (3)	1	150 feet x 100 feet	0.3	0.3	0.0
New access roads (4)	1 mile	Miles x 14 feet wide	1.7	0.0	1.7

Table 2-17 Estimated Additional Land Disturbance for Transmission Line Alternative Route C

Project Feature	Quantity	Each Disturbed Area (L X W)	Acres Disturbed during Construction	Acres Temporarily Disturbed	Acres Permanently Disturbed
New spur roads (4)	0.7 miles	Miles x 14 feet wide	0.8	0.0	0.8
Total Estimated (5)			**43.7**	**35.9**	**7.8**

Notes:
(1) Includes foundation installation, structure assembly and erection, conductor installation, and optical ground wire installation; area to be restored after construction; portion of ROW within 25 feet of the lattice steel structure to remain cleared of vegetation would be permanently disturbed for each lattice steel structure (suspension = 0.145 acres; dead-end = 0.187 acres; heavy dead-end = 0.188 acres).
(2) Includes structure assembly and erection, conductor installation, and optical ground wire installation; area to be restored after construction; portion of ROW within 25 feet of the tubular steel double H-frame to remain cleared of vegetation; 0.185 acre would be permanently disturbed for each tubular steel double H-frame.
(3) Based on 9,000-foot conductor reel lengths, number of circuits, and route design.
(4) Quantity of this item is provided in linear miles, based on the expected length of road (in miles) and a road width of 14 feet.
(5) The disturbed acreage calculations are estimates based on the applicant's preferred area of use for the described project feature, the width of the existing ROW, or the width of the proposed ROW. These estimations are based on preliminary design information and are subject to revision based on final engineering and review.

Table 2-18 Estimated Additional Land Disturbance for Transmission Line Alternative Route D

Project Feature	Quantity	Each Disturbed Area (L X W)	Acres Disturbed during Construction	Acres Temporarily Disturbed	Acres Permanently Disturbed
Construct new lattice steel suspension structure (1)	18	200 feet x 200 feet	16.5	13.9	2.6
Construct new lattice steel dead-end structure (1)	3	200 feet x 200 feet	2.8	2.2	0.6
Construct new lattice steel heavy dead-end structure (1)	0	200 feet x 200 feet	0.0	0.0	0.0
Construct new tubular steel double H-frame (2)	0	200 feet x 200 feet	0.0	0.0	0.0
230-kV conductor and optical ground wire stringing setup area – puller (3)	2	200 feet x 150 feet	1.4	1.4	0.0
230-kV conductor and optical ground wire stringing setup area – tensioner (3)	2	500 feet x 150 feet	3.4	3.4	0.0
230-kV conductor splicing setup areas (3)	0	150 feet x 100 feet	0.0	0.0	0.0
New access roads (4)	0 miles	Miles x 14 feet wide	0.0	0.0	0.0
New spur roads (4)	0.4 miles	Miles x 14 feet wide	0.3	0.0	0.3
Total Estimated (5)			**24.4**	**20.9**	**3.5**

Notes:
(1) Includes foundation installation, structure assembly and erection, conductor installation, and optical ground wire installation; area to be restored after construction; portion of ROW within 25 feet of the lattice steel structure to remain cleared of vegetation would be permanently disturbed for each lattice steel structure (suspension = 0.145 acres; dead-end = 0.187 acres; heavy dead-end = 0.188 acres).
(2) Includes structure assembly and erection, conductor installation, and optical ground wire installation; area to be restored after construction; portion of ROW within 25 feet of the tubular steel double H-frame to remain cleared of vegetation; 0.185 acre would be permanently disturbed for each tubular steel double H-frame.
(3) Based on 9,000-foot conductor reel lengths, number of circuits, and route design.
(4) Quantity of this item is provided in linear miles, based on the expected length of road (in miles) and a road width of 14 feet.
(5) The disturbed acreage calculations are estimates based on the applicant's preferred area of use for the described project feature, the width of the existing ROW, or the width of the proposed ROW. These estimations are based on preliminary design information and are subject to revision based on final engineering and review.

Table 2-19 Estimated Additional Land Disturbance for Transmission Line Subalternative Route E

Project Feature	Quantity	Each Disturbed Area (L X W)	Acres Disturbed during Construction	Acres Temporarily Disturbed	Acres Permanently Disturbed
Construct new lattice steel suspension structure (1)	15	200 feet x 200 feet	13.8	11.6	2.2
Construct new lattice steel dead-end structure (1)	4	200 feet x 200 feet	3.7	2.9	0.8
Construct new lattice steel heavy dead-end structure (1)	0	200 feet x 200 feet	0.0	0.0	0.0
Construct new tubular steel double H-frame (2)	0	200 feet x 200 feet	0.0	0.0	0.0
230-kV conductor and optical ground wire stringing setup area – puller (3)	2	200 feet x 150 feet	1.4	1.4	0.0
230-kV conductor and optical ground wire stringing setup area – tensioner (3)	2	500 feet x 150 feet	3.4	3.4	0.0
230-kV conductor splicing setup areas (3)	0	150 feet x 100 feet	0.0	0.0	0.0
New access roads (4)	0 miles	Miles x 14 feet wide	0.0	0.0	0.0
New spur roads (4)	0.4 miles	Miles x 14 feet wide	0.3	0.0	0.3
Total Estimated Disturbance (5)			**22.5**	**19.3**	**3.2**

Notes:

(1) Includes foundation installation, structure assembly and erection, conductor installation, and optical ground wire installation; area to be restored after construction; portion of ROW within 25 feet of the lattice steel structure to remain cleared of vegetation would be permanently disturbed for each lattice steel structure (suspension = 0.145 acres; dead-end = 0.187 acres; heavy dead-end = 0.188 acres).

(2) Includes structure assembly and erection, conductor installation, and optical ground wire installation; area to be restored after construction; portion of ROW within 25 feet of the tubular steel double H-frame to remain cleared of vegetation; 0.185 acres would be permanently disturbed for each tubular steel double H-frame.

(3) Based on 9,000-foot conductor reel lengths, number of circuits, and route design.

(4) Quantity of this item is provided in linear miles, based on the expected length of road (in miles) and a road width of 14 feet.

(5) The disturbed acreage calculations are estimates based on the applicant's preferred area of use for the described project feature, the width of the existing ROW, or the width of the proposed ROW. These estimations are based on preliminary design information and are subject to revision based on final engineering and review.

Table 2-20 Estimated Additional Land Disturbance for the Golf Course Telecommunication Alternative

Project Feature	Quantity	Each Disturbed Area (L X W)	Acres Disturbed during Construction	Acres Temporarily Disturbed	Acres Permanently Disturbed
First Segment – Nipton to I-15					
9-mile underground fiber cable duct (1)	1	6.8 feet x 47,250 feet	7.38	7.38	0.00
Underground vaults	48	6 feet x 6 feet	0.04	0.00	0.04
Work area for underground vaults and fiber-pulling area	10	40 feet x 60 feet	0.55	0.55	0.00
Work area for fiber pulling of 1 mile of all-dielectric self-supporting pole line construction	1	40 feet x 60 feet	0.06	0.06	0.00
Subtotal Estimated First Segment			**8.02**	**7.99**	**0.04**

Table 2-20 Estimated Additional Land Disturbance for the Golf Course Telecommunication Alternative

Project Feature	Quantity	Each Disturbed Area (L X W)	Acres Disturbed during Construction	Acres Temporarily Disturbed	Acres Permanently Disturbed
Second Segment – I-15 to Ivanpah Substation (Golf Course)					
1-mile underground fiber cable duct (1)	1	6.8 feet x 5,280 feet	0.82	0.82	0.00
Underground vaults	6	6 feet x 6 feet	0.00	0.00	0.01
Work area for underground vaults and fiber pulling area	1	40 feet x 60 feet	0.06	0.06	0.00
Work area for fiber pulling of 12 miles of all-dielectric self-supporting pole line construction	12	40 feet x 60 feet	0.66	0.67	0.00
Subtotal Estimated Second Segment			**1.55**	**1.54**	**0.01**
Total Estimated Disturbance			**9.57**	**9.53**	**0.05**

Note:
(1)The calculated disturbed area is based on the trench method. The proposed trench would be 1.5 feet wide; average trenching/excavating machines require a tread width of 68 inches (5.67 feet) and 14 inches (1.17 feet) of ground clearance. The applicant would select other underground construction methods to reduce land disturbance, such as horizontal boring, if feasible.

Table 2-21 Estimated Additional Land Disturbance for the Mountain Pass Telecommunication Alternative

Project Feature	Quantity	Each Disturbed Area (L X W)	Acres Disturbed during Construction	Acres Temporarily Disturbed	Acres Permanently Disturbed
First Segment – Nipton to I-15					
9-mile underground fiber cable duct (1)	1	6.8 feet x 47,250 feet	7.38	7.38	0.00
Underground vaults	48	6 feet x 6 feet	0.04	0.00	0.04
Work area for underground vaults and fiber pulling area	10	40 feet x 60 feet	0.55	0.55	0.00
Work area for fiber pulling of 1 mile of all-dielectric self-supporting pole line construction	1	40 feet x 60 feet	0.06	0.06	0.00
Subtotal Estimated First Segment			**8.02**	**7.99**	**0.04**
Second Segment – I-15 to Ivanpah Substation (Mountain Pass Substation)					
1-mile underground fiber cable duct (1)	1	6.8 feet x 5,280 feet	0.82	0.82	0.00
Underground vaults	6	6 feet x 6 feet	0.00	0.00	0.00
Work area for underground vaults and fiber pulling area	1	40 feet x 60 feet	0.06	0.01	0.05
Work area for fiber pulling of 8 miles of all-dielectric self-supporting pole line construction	8	40 feet x 60 feet	0.44	0.44	0.00
Subtotal Estimated Second Segment			**1.33**	**1.27**	**0.05**
Total Estimated Disturbance			**9.35**	**9.26**	**0.09**

Note:
(1)The calculated disturbed area is based on the trench method. The proposed trench would be 1.5 feet wide and a tread width of 68 inches (5.67 feet) and 14 inches (1.17 feet) of ground clearance for average trenching/excavating machines. The applicant would select other underground construction methods to reduce land disturbance, such as horizontal boring, if feasible.

Table 2-22 Summary of Land Disturbances and Comparison between Alternatives

Project Feature	Proposed Route	Transmission Line Alternative Route A	Transmission Line Alternative Route B	Transmission Line Alternative Route C	Transmission Line Alternative Route D	Transmission Line Subalternative Route E
Permanent Land Disturbance (acres)						
Transmission line ROW (1)	36.8	35.5	41.3	37.9	36.9	37.0
New ROW (route alternatives only)	N/A	4.9	7.3	5.3	3.2	2.9
Access roads	0	0	0	1.7	0	0
Spur roads	2.4	6.8	0.6	0.8	0.3	0.3
Ivanpah Substation (2)	0	0	0	0	0	0
Eldorado Substation (3)	0	0	0	0	0	0
115-kV subtransmission line	1.0	1.0	1.0	1.0	1.0	1.0
33-kV distribution line	0.0	0.0	0.0	0.0	0.0	0.0
Telecommunication system (3)	11.0	11.0	11.0	11.0	11.0	11.0
Project with Microwave Path (4)	**51.2**	**59.2**	**61.2**	**57.7**	**52.4**	**52.2**
Golf Course Alternative (5)	**51.3**	**59.3**	**61.3**	**57.8**	**52.5**	**52.3**
Mountain Pass Alternative (6)	**51.3**	**59.3**	**61.3**	**57.8**	**52.5**	**52.3**
Temporary Land Disturbance (acres)						
Transmission line construction (1)	242.9	273.7	305.0	286.6	282.0	282.0
Alternate route segments	N/A	24.5	34.0	25.9	16.1	14.5
Construction yards and pulling and tensioning sites	141.8	149.1	175.5	151.8	146.6	146.6
Ivanpah Substation (2) (3)	0	0	0	0	0	0
115-kV subtransmission line	7.3	7.3	7.3	7.3	7.3	7.3
33-kV distribution line	0.4	0.4	0.4	0.4	0.4	0.4
Telecommunication system (3)	22.1	22.1	22.1	22.1	22.1	22.1
Project with Microwave Path (4)	**414.9**	**477.1**	**544.3**	**494.1**	**474.5**	**472.9**
Golf Course Alternative (5)	**424.2**	**486.4**	**553.6**	**503.4**	**483.8**	**482.2**
Mountain Pass Alternative (6)	**424.4**	**486.6**	**553.8**	**503.6**	**484.0**	**482.4**

Notes:
(1) Does not include overlapping area between structure removal and new structure installation.
(2) Grading and other ground-disturbing activities of the Ivanpah Substation site would be approved under the ISEGS project, currently under environmental review.
(3) Telecommunication equipment to be installed within the existing fence line. Areas occupied by facilities installed within existing substation and communications site properties are not included in estimates.
(4) Includes proposed Telecommunication Line Path 1 and Path 2 Sections 1, 2, and 3 (Microwave Path).
(5) Golf Course Telecommunication Alternative: Path 1 and Path 2 Sections 1 and 2 and Golf Course segment.
(6) Mountain Pass Telecommunication Alternative: Path 1 and Path 2 Sections 1 and 2 and Mountain Pass segment.

2.4.7 Construction Workforce and Equipment

The proposed project would be managed by the applicant's Project Management Organization using both the applicant's and contract personnel. The estimated number of workers per project component is summarized in Table 2-23. A detailed list of personnel and equipment required for each phase of construction of the proposed project and its alternatives are presented in Appendix A-2. At some stages of the proposed project, multiple locations would be under construction simultaneously. This might involve independent construction teams working at different locations along the proposed project. According to the applicant, no more than four crews would be building four distinct transmission structures at a time during a maximum period of 7 days. Installing an LST would take 7 days to complete (from laying the foundation to erecting the tower), while the same process would last 5 days for installing a TSP.

Table 2-23 Construction Workforce Required for the Proposed Project

Project Component	Summary of Construction Activities	Total Estimated Workforce	Estimated Schedule (days)
230-kV transmission line	Conducting pre-construction surveys Establishing construction yards and helicopter landing areas Conducting road work Installing guard structures Removing existing conductors, structures, foundations, and wood poles Installing lattice steel towers and H-frames Installing conductor Removing guard structures Restoring temporary construction areas and roads	209	1,257
115-kV subtransmission line	Conducting pre-construction survey Conducting road work Removing existing H-frame poles and foundations Installing tubular steel poles	69	35
33-kV distribution line	Trenching Installing overhead line Installing underground cable	20	73
Ivanpah Substation	Conducting pre-construction survey Grading substation site Installing civil and electrical components	22	175
Telecommunication System	***Path 1*** Installing optical ground wire	3	30
	Path 2, Section 1 Establishing construction yards Conducting road work Retrofitting existing towers Removing existing overhead ground wire Installing optical ground wire Restoring temporary construction areas and roads	49	200
	Path 2, Section 2 Trenching Pulling/installing underground fiber optic cable Installing underground duct	12	76
	Path 2, Section 3 – Proposed Project Installing microwave site Trenching Pulling/installing underground fiber optic cable Installing underground duct	16	20
	Path 2, Section 3 – Golf Course Alternative Trenching Pulling/installing underground fiber optic cable Installing underground duct Installing all-dielectric self-supporting cable	24	153
	Path 2 – Section 3 – Mountain Pass Alternative Trenching Pulling/installing underground fiber optic cable Installing underground duct Installing all-dielectric self-supporting cable	28	230

2.4.8 Construction Schedule

The applicant's targeted operating date is July 2013. Work activities would commence upon approval of the proposed project by the CPUC, the BLM, and other permitting agencies. Construction is currently scheduled to commence in the last quarter of year 2011 and to take approximately 19 months to complete, including time for inspection and testing (Figure 2-15).

ID		Task Name	Duration	Start	Finish
1		**Project Engineering**			
2		Preliminary Engineering	9.65 mons	Mon 3/1/10	Wed 12/22/10
3		Final Engineering	12 mons	Wed 12/22/10	Tue 12/27/11
4		**Procurement**			
5		Substation Equipment Procurement (s/ Advance Approval)	29 mons	Tue 8/18/09	Thu 1/26/12
6		**Construction**			
7		Substation Construction	16 mons	Mon 12/26/11	Tue 4/30/13
8		Transmission/Subtransmission Construction	16 mons	Mon 12/26/11	Tue 4/30/13
9		IT/Telecom Construction	12 mons	Thu 4/26/12	Tue 4/30/13
10		Testing	3 mons	Wed 5/1/13	Wed 7/31/13
11		Operations Start Date	0 days	Wed 7/31/13	Wed 7/31/13

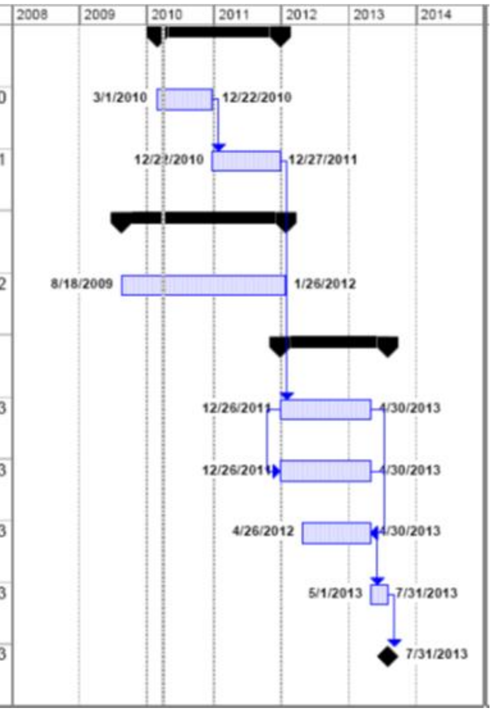

Figure 2-15 EITP High-Level Project Schedule

To facilitate renewable energy interconnections, efforts will be made to accelerate the operating date through shorter agency decision time and compressed procurement and construction schedules. In populated areas, the applicant would post notices on the ROW or at other sites where the public would be affected by construction activities. Notices would be posted approximately 1 month prior to commencing work. At ROW ingress and egress points, postings would be placed along the ROW and at work sites approximately 2 weeks prior to the closing of public access.

2.4.9 Hazardous Materials and Waste Management

The applicant would apply waste management procedures to control and prevent potential environmental, health, and safety issues during project construction. All handling and disposal of hazardous waste would be in accordance with applicable federal, state, and local laws. The following subsections describe the major types of materials to be managed and the general procedures for spill control and storage of hazardous materials anticipated to be handled during the proposed project and alternatives construction activities.

Types of Hazardous Materials

A Hazardous Materials Business Plan would be put in place to control the different types of hazardous materials that are anticipated to be used during the construction activities. These materials would include:

- Transformer oil
- Dielectric fluids
- Fuels (diesel, gas)
- Lube oils and grease
- Used oil
- Solvents, coatings, and paints
- Compressed gas
- Propane
- Sulfur hexafluoride (dielectric medium)

Other hazardous materials could include the equipment and structures that would be removed as part of the proposed construction activities, as described below and in Section 2.2.2. The applicant would develop Hazardous Materials Business Plans for proper control of health and safety concerns. The hazardous materials controls proposed by the applicant would include Material Safety Data Sheets labeling, classification, storage, usage information, incidental spill cleanup, recycling, and waste management.

Transformer Removal

The proposed upgrades at Eldorado Substation would require removal of the existing 230/115-kV transformer, which would be placed in emergency stock or salvaged for reuse. Transformer removal would involve a sequence of activities: (1) oil testing for PCB identification, (2) oil removal and disposal/recycle by specialized contractors, (3) disconnection of all primary and secondary conductors, (4) installation of cap plates to cover bushings mount holes on transformers, (5) removal of all hazardous materials from control cabinets, (6) removal of welded end bed plates, and (7) transportation and shipping to emergency stock or salvage storage room.

Structure Removal

A list of structures and line hardware that would be removed from the existing 115-kV system to construct the proposed Eldorado–Ivanpah transmission line is given in Table 2-5. The structures and hardware would be disassembled into manageable pieces or sections and placed into roll-off boxes or bins for transportation to an approved salvage contractor. Wooden poles and H-frames would be collected in separate containers and transported to an approved disposal facility.

Spill Response

The construction contractor would supply spill response kits and contact information in case of accidents. The applicant's transmission and distribution environmental and safety specialists would provide assistance for further evaluation and support. If substantial spills occurred, the applicant would also involve environmental response contractors. Prevention methods during refueling would minimize any impacts; these methods would include using trained personnel, observing operations, and using refueling pads.

Waste Management

Hazardous materials and solid waste would be stored in accordance with regulatory requirements and applicable standard procedures, such as the applicant's Salvage Services Manual and Waste Management Plan. The applicant would use proper storage cabinets and designated areas at substations, construction yards, and laydown areas. Waste identification, characterization, profiling, packaging, labeling, and transportation to proper disposal sites would be implemented in compliance with the applicant's waste management procedures. Additionally, the applicant would have contracts in place with approved waste contractors and landfill disposal sites prior to commencement of construction activities.

2.5 Operation and Maintenance Procedures

After construction of all project components, the applicant would operate and maintain project facilities and equipment in accordance with the applicant's standard operational procedures and applicable federal and state regulations. The proposed project components would be unstaffed; continuous operations and monitoring would be provided through control and communication systems. Routine maintenance of the proposed project (and alternatives) would occur at least once a year and would involve activities and features related to project components, as described below.

2.5.1 Powerlines

Recurring maintenance activities of the proposed transmission, subtransmission, and distribution lines would occur at least once per year. These inspection and maintenance activities would include the following:

- Routine line patrols by both aircraft and truck
- Routine, patrol-identified structure and wire maintenance
- Routine line washing
- Routine, patrol-identified earth and sand abatement from footings
- Routine ROW road maintenance

The frequency of routine inspection and maintenance activities would depend on several variables, including the length of the line and weather effects. If the magnitude of repairs identified by routine patrols were substantial, other specialized employees such as surveyors, engineers, clerical personnel, and technicians would be added to maintenance crews, as required, to address any unique problem that might arise such as substantial storm damage or vandalism. Routine inspection and maintenance personnel categories would include senior patrolman, foreman, lead lineman, journeyman lineman, apprentice, groundman, helicopter pilot, equipment operator, and laborer.

The entire proposed transmission line corridor would be patrolled at least annually. The patrols would alternate between helicopter and truck. In the first year, the corridor would be patrolled by helicopter, which would take approximately 1 day (8 hours) to accomplish. The next year, a truck patrol would take 5 days. Increases in pollution and population density in the vicinity of the proposed transmission line corridor could lead the applicant to increase the patrol frequency. These additional patrols would be performed by helicopter or patrol truck.

During a typical patrol, a helicopter would fly at or near the elevation of the support for the conductor. In populated areas, patrols would fly at higher elevations or away from the centerline of the transmission lines to avoid flying close to houses or penned animals. In cases where flying near a populated area could not be avoided, the patrolman would use gyrobinoculars to increase the inspection distance between the structures and the helicopter to the greatest extent possible. In rural areas, unless designated otherwise, proximity to the ground would not be restricted except for safety and environmental reasons.

Helicopter operations would be supported by local airports, such as the Jean Sport Aviation Center and the proposed Southern Nevada Supplemental Airport (currently in planning phase; see Chapter 5). Before any helicopter operations would occur for the EITP operations and maintenance, the applicant would be required to coordinate with the CCDOA and/or the FAA.

Approximately 15 years after the initial operational date, maintenance on the proposed transmission line would be expected to increase. Initial additional corridor maintenance would be due principally to weather and vandalism to the new line. As insulators and steel aged on the line, the frequency of lattice steel structure hardware maintenance activities such as bolt torquing would increase.

2.5.2 Substations

Considering the EITP's specific features and the typical climate conditions of the proposed project area (desert), the Ivanpah Substation would require 14 visits per year for operational activities, and 20 to 25 visits per year for maintenance.

Operation of the Ivanpah Substation would require use of electric, fuel, transportation, solid waste, and communication services. Electric service would be provided by the two distribution systems described in Section 2.2.1.3. Leased and internal phone communication line services would be also required. In addition, an emergency backup generator would be placed at the microwave communication site; it would store 499 gallons of fuel.

Currently, the applicant does not anticipate the need for a permanent water supply at the Ivanpah Substation during operations. The applicant is evaluating options for a portable or permanent self-contained restroom facility for use during operation and maintenance activities. Either restroom facility would have a self-contained holding tank and the wastewater would be disposed of by contract service personnel. During construction, the site would be serviced by portable restroom facilities and the wastewater would be disposed of weekly or more frequently depending on the number of construction personnel and usage. The physical location and type (portable or permanent) of self-contained restroom facilities would be determined during final engineering.

Solid waste handling and disposal procedures at the substation sites would be conducted as specified in the applicant's Waste Disposal Plan, the Salvage Services Manual, and the Waste Management Manual. In addition, the applicant would have contracts in place with approved waste contractors and landfill disposal sites prior to commencement of construction activities.

Hazardous materials that might be used during operations and maintenance at the project substations would include transformer oil, dielectric fluids used in capacitors, fuels (diesel and gas), lube oils and grease, used oil, propane, sulfur hexafluoride (SF_6) gas, compressed gases such as argon and nitrogen, and solvents, coatings, and paints. Additionally, any piece of equipment or structure removed as part of operations and maintenance might be hazardous waste. The applicant would manage, control, and dispose of all potentially hazardous materials generated as a result of project operations and maintenance in accordance with applicable regulatory requirements and standard procedures.

Specialized personnel would visit the new Ivanpah Substation to conduct routine maintenance activities. Current regular maintenance activities at the existing Eldorado Substation would also continue after the proposed upgrades. Other visits to the substation might be required to support repairs, outages, and other related work activities as required by maintenance, testing, and engineering personnel. The applicant would mobilize vehicles from other locations to the Ivanpah Substation for both routine and emergency maintenance activities, as required.

2.5.3 Telecommunication System

Maintenance personnel would conduct routine maintenance for the proposed telecommunication equipment and facilities, including the microwave communication site, the emergency generator, and the MEER at the Ivanpah Substation. Other visits to the telecommunication facilities would be necessary if repairs were needed, there were equipment or network faults, or other related work was needed.

Routine maintenance to the telecommunication facilities at the Ivanpah Substation would be performed once a year. In addition, the following maintenance activities would be performed once a year at the proposed microwave site in Nipton:

- Telecom equipment
- Propane tank refuel (contractor)
- Air-conditioning service (contractor)
- Building maintenance (contractor)

2.5.4 Decommissioning

A transmission system's lifetime usually exceeds 80 years with proper maintenance. As mentioned above, approximately 15 years after the operational date, the frequency of maintenance on the proposed line would be expected to increase. In addition, the applicant would implement a regular program to replace damaged structure hardware.

The applicant would maintain the project over its lifetime in accordance with the timeframe to be established by the BLM in the ROW grant. The BLM typically grants a 30 year ROW with a right of renewal for generation and transmission facilities. Within a reasonable time following termination of the BLM ROW grant, the applicant would prepare a removal and restoration plan prior to decommissioning of the facilities. The removal and restoration plan would address removal of the applicant's facilities from the permitted area and any requirements for habitat restoration and revegetation. The removal and restoration plan would then be approved by the BLM before implementation.

2.6 Cumulative Projects

Based on the requirements of both CEQA and NEPA, this Draft EIR/EIS includes a cumulative impact analysis in Chapters 5 and 6. NEPA (40 CFR Section 1508.7) defines a cumulative impact as "the impact on the environment which results from the incremental impact of the project when added to other past, present, and reasonably foreseeable future actions." Under CEQA, "a cumulative impact consists of an impact which is created as a result of the combination of the project evaluated in the EIR together with other projects causing related impacts." The discussion of cumulative impacts presented in Chapter 5 is based on whether incremental effects of a project combined with the effects of other projects are considered as "cumulatively considerable."

The analysis of cumulative impacts is based on a number of variables including geographical and time boundaries, features of each project under consideration, and characteristics of each resource. Actions considered as part of the cumulative analysis provided in this Draft EIR/EIS include those projects that are reasonably foreseeable and that would be constructed or commence operation during the proposed project timeframe. Based on these criteria, projects included in the cumulative analysis comprise the following categories:

- Completed projects

- Projects approved and under construction
- Projects approved but not yet under construction
- Projects proposed but not yet approved

A detailed list of projects by several economic sectors is presented in Chapter 5. Main development sectors include renewable energy, utilities, mining, recreation, and restoration and conservation. Potentially significant adverse impacts resulting from the contribution of cumulative actions would be required to be reduced, avoided, or minimized through the application of mitigation measures.

2.7 Applicant Proposed Measures

The applicant has included the following applicant proposed measures (APMs) to avoid or minimize impacts of the proposed EITP or its alternatives on environmental resources. These APMs are part of the EITP and are distinguished from mitigation measures for potentially significant impacts under CEQA and NEPA. If the proposed EITP (or any of its alternatives) is approved, the applicant will implement the APMs listed in Table 2-24 regardless of whether potential significant impacts were identified during the environmental analysis under this EIR/EIS.

Table 2-24 Applicant Proposed Measures

Applicant Proposed Measure	Description
Aesthetics	
APM AES-1: Road Cut Rock Staining	Where new roads are required in the South McCullough Mountains to access new or existing transmission and subtransmission towers, the applicant would consult with the BLM regarding feasible methods to treat the exposed rock to match the overall color of the adjacent weathered rock.
APM AES-2: Seeding and Inter-Planting	Where new roads are required in the South McCullough Mountains to access new or existing transmission and subtransmission towers, road cuts would be treated by seeding and/or inter-planting into the disturbed areas to restore the area to an appearance that would blend back into the overall landscape context.
APM AES-3: Non-Reflective Finish	LSTs and TSPs would be constructed of steel that was galvanized and treated at the factory to create a dulled finish that would reduce reflection of light off of the tower members. As appropriate to the environment, the galvanized coating would also be treated to allow the towers to blend into the backdrops. Non-specular transmission cable would be installed for the new transmission line to minimize conductor reflectivity.
APM AES-4: Regrade / Revegetate Construction Sites	Areas around new or rebuilt transmission and subtransmission structures that must be cleared during the construction process would be regraded and revegetated to restore them to an appearance that would blend back into the overall landscape context.
APM AES-5: Use Existing Access Roads	To the extent feasible, existing access roads would be used.
APM AES-6: Minimize Road Modifications**.**	Widening and grading of roads would be kept to the minimum required for access by proposed project construction equipment.
APM AES-7: Dust Suppression	During the construction period, dust suppression measures would be used to minimize the creation of dust clouds potentially associated with the use of the access roads.
APM AES-8: Substation Lighting Control	The substation lighting would be designed to be manually operated only when required for non-routine nighttime work. The lighting would be directed downward and shielded to eliminate offsite light spill at times when the lighting might be in use.
Air Quality	
	The applicant has not proposed any measures related to air quality or air emission reduction for the proposed project beyond what is required by applicable regulation.

Table 2-24 Applicant Proposed Measures

Applicant Proposed Measure	Description
Biological Resources	
APM BIO-1: Preconstruction Surveys	Preconstruction biological clearance surveys would be conducted by qualified biologists to identify special-status plants and wildlife.
APM BIO-2: Minimize Vegetation Impacts	Every effort would be made to minimize vegetation removal and permanent loss at construction sites. If necessary, native vegetation would be flagged for avoidance.
APM BIO-3: Avoid Impacts on State and Federal Jurisdiction Wetlands	Construction crews would avoid impacting the streambeds and banks of streams along the route to the extent possible. If necessary, an SAA would be secured from the CDFG. Impacts would be mitigated based on the terms of the SAA. No streams with flowing waters capable of supporting special-status species would be expected to be impacted by the proposed project.
APM BIO-4: Best Management Practices	Crews would be directed to use Best Management Practices (BMPs) where applicable. These measures would be identified prior to construction and incorporated into the construction operations.
APM BIO-5: Biological Monitors	Biological monitors would be assigned to the project in areas of sensitive biological resources. The monitors would be responsible for ensuring that impacts on special-status species, native vegetation, wildlife habitat, or unique resources would be avoided to the fullest extent possible. Where appropriate, monitors would flag the boundaries of areas where activities would need to be restricted in order to protect native plants and wildlife or special-status species. Those restricted areas would be monitored to ensure their protection during construction.
APM BIO-6: Worker Environmental Awareness Program	A Worker Environmental Awareness Program (WEAP) would be prepared. All construction crews and contractors would be required to participate in WEAP training prior to starting work on the project. The WEAP training would include a review of the special-status species and other sensitive resources that could exist in the project area, the locations of sensitive biological resources and their legal status and protections, and measures to be implemented for avoidance of these sensitive resources. A record of all trained personnel would be maintained.
APM BIO-7: Avoid Impacts on Active Nests	SCE would conduct project-wide raptor and nesting bird surveys and remove trees or other vegetation, if necessary, outside of the nesting season (nesting season in the project area is late February to early July). If vegetation or existing structures containing a raptor nest or other active nest needed to be removed during the nesting season, or if work was scheduled to take place in close proximity to an active nest on an existing transmission or subtransmission tower or pole, SCE would coordinate with the USFWS, CDFG, and/or the NDOW as appropriate to obtain written verification prior to moving the nest.
APM BIO-8: Avian Protection	All transmission and subtransmission towers and poles would be designed to be avian-safe in accordance with the Suggested Practices for Avian Protection on Power Lines: the State of the Art in 2006 (APLIC 2006).
APM BIO-9: Facility Siting	Final tower and spur road locations would be adjusted to avoid sensitive biological resources to the greatest extent feasible.
APM BIO-10: Invasive Plant Management	An invasive plant management plan would be developed to reduce the potential for spreading invasive plant species during construction activities.

Table 2-24 Applicant Proposed Measures

Applicant Proposed Measure	Description
APM BIO-11: Desert Tortoise Measures	• A field contact representative would be designated and would oversee compliance monitoring activities and coordination with authorizing agency(s). Compliance activities would at a minimum include conducting preconstruction surveys, assuring proper removal of desert tortoise, staffing biological monitors on construction spreads, and upholding all conditions authorized. The field contact representative would also oversee all compliance documentation including daily observation reports, non-compliance and corrective action reports, and final reporting to any authorized agency upon project completion. • All work area boundaries associated with temporary and permanent disturbances would be conspicuously staked, flagged, or marked to minimize surface disturbance activities. All workers would strictly limit activities and vehicles to the designated work areas. • Crushing/removal of perennial vegetation in work areas would be avoided to the maximum extent practicable. • All trash and food items generated by construction and maintenance activities would be promptly contained and regularly removed from the project site(s) to reduce the attractiveness of the area to common ravens. • Pets would not be allowed in working areas unless restrained in a kennel. • Where possible, motor vehicles would be limited to maintained roads and designated routes. • Vehicle speed within the project area, along ROW maintenance routes, and along existing access roads would not exceed 20 miles per hour. Speed limits would be clearly marked and all workers would be made aware of these limits. • Constructed road berms would be less than 12 inches in height and have slopes of less than 30 degrees. • Construction monitoring would employ a designated field contact representative, authorized biologist(s), and qualified biologist(s) approved by the BLM during the construction phase. At a minimum, qualified biologist(s) would be present during all activities in which encounters with tortoises could occur. A qualified biologist is defined as a person with appropriate education, training, and experience to conduct tortoise surveys, monitor project activities, provide worker education programs, and supervise or perform other implementing actions. An authorized biologist is defined as a wildlife biologist who has been authorized to handle desert tortoises by the USFWS or CDFG. A field contact representative is defined as a person designated by the project proponent who is responsible for overseeing compliance with desert tortoise protective measures and for coordination with agency compliance officer(s). • Preconstruction clearance surveys would be conducted within 48 hours of initiation of site-specific project activities, following USFWS protocol (USFWS 1992). The goal of a clearance survey is to find all tortoises on the surface and in burrows that could be harmed by construction activities. Surveys would cover 100% of the acreage to be disturbed. All potential tortoise burrows within 100 feet of construction activity would be marked. Tortoise burrows would be avoided to the extent practicable, but would be excavated if they would be crushed by construction activities.

Table 2-24 Applicant Proposed Measures

Applicant Proposed Measure	Description
APM BIO-11: Desert Tortoise Measures (Cont.)	• Any tortoise found on the surface would be relocated to less than 1,000 feet away. Tortoises would be handled carefully following the guidelines given in Guidelines for Handling Desert Tortoise during Construction Projects (Desert Tortoise Council 1999). Tortoises would be handled with new latex gloves each time to avoid transmission of disease, and handlers would especially note guidelines for precautions to be taken during high-temperature periods. • If a potential tortoise burrow were required to be excavated, the biologist would proceed according to the guidelines given in Guidelines for Handling Desert Tortoise during Construction Projects (Desert Tortoise Council 1999). Tortoises removed from burrows would be relocated to an artificial burrow (Desert Tortoise Council 1999). The entrance of the artificial burrow would be blocked until construction activities in the area were over (Desert Tortoise Council 1999). • For activities conducted between March 15 and November 1 in desert tortoise habitat, all activities in which encounters with tortoises might occur would be monitored by a qualified or authorized biologist. The biologist would be informed of tortoises relocated during preconstruction surveys so that he or she could watch for the relocated tortoises in case they attempted to return to the construction site. The qualified or authorized biologist would watch for tortoises wandering into the construction areas, check under vehicles, examine excavations and other potential pitfalls for entrapped animals, examine exclusion fencing, and conduct other activities to ensure that death or injuries of tortoises was minimized. • No overnight hazards to desert tortoises (e.g., auger holes, trenches, pits, or other steep-sided depressions) would be left unfenced or uncovered; such hazards would be eliminated each day prior to the work crew and biologist leaving the site. Large or long-term project areas would be enclosed with tortoise-proof fencing. Fencing would be removed when restoration of the site was completed. • Any incident occurring during project activities which was considered by the biological monitor to be in non-compliance with the mitigation plan would be documented immediately by the biological monitor. The field contact representative would ensure that appropriate corrective action was taken. Corrective actions would be documented by the monitor. The following incidents would require immediate cessation of the construction activities causing the incident, including (1) imminent threat of injury or death to a desert tortoise; (2) unauthorized handling of a desert tortoise, regardless of intent; (3) operation of construction equipment or vehicles outside a project area cleared of desert tortoise, except on designated roads; and (4) conducting any construction activity without a biological monitor where one was required. If the monitor and field contact representative did not agree, the federal agency's compliance officer would be contacted for resolution. All parties could refer the resolution to the federal agency's authorized officer. • All construction personnel, including subcontractors, would undergo a WEAP. This instruction would include specific desert tortoise training on distribution, general behavior and ecology, identification, protection measures, reporting requirements, and protections afforded by state and federal endangered species acts.

Table 2-24 Applicant Proposed Measures

Applicant Proposed Measure	Description
APM BIO-11: Desert Tortoise Measures (Cont.)	• Parked vehicles would be inspected prior to being moved. If a tortoise were found beneath a vehicle, the authorized biologist would be contacted to move the animal from harm's way, or the vehicle would not be moved until the desert tortoise left of its own accord. The authorized biologist would be responsible for taking appropriate measures to ensure that any desert tortoise moved in this manner was not exposed to temperature extremes that could be harmful to the animal. • Should any desert tortoise be injured or killed, all activities would be halted, and the field contact representative and/or authorized biologist immediately contacted. The field contact representative and/or authorized biologist would be responsible for reporting the incident to the authorizing agencies. • A report to the USFWS would be produced reporting all tortoises seen, injured, killed, excavated, or handled. GPS locations of live tortoises would be reported. • The applicant would implement a Raven Management Program that would consist of: (1) an annual survey to identify any tortoise remains at the base of the towers; this information would be relayed to the BLM so that the ravens and/or their nests in these towers could be targeted for removal, (2) SCE making an annual or one time contribution to an overall raven reduction program in the California or Nevada desert, with an emphasis on raven removal in the vicinity of this project.
APM BIO-12: Desert Bighorn Sheep Measures	The applicant would consult with the BLM, USFWS, and NDOW regarding conservation measures to avoid impacts on desert bighorn sheep during construction. Project areas with the potential to impact bighorn sheep include the proposed transmission line route through the McCullough Mountains and the telecommunication route segment in the southern Eldorado Valley between the Highland Range and the Southern McCullough Mountains. Avoidance and minimization measures could include such elements as preconstruction surveys, biological monitoring, and timing construction activities to avoid bighorn sheep active seasons. Construction requiring the use of helicopters would be conducted outside of bighorn lambing season (April through October) and the dry summer months when bighorn may need to access artificial water sources north of the propose route in the McCullough Mountains (June through September).
APM BIO-13: Western Burrowing Owl Measures	Where project ground-disturbing activities would occur prior to the burrowing owl breeding season (mid-March to August), all burrows, holes, crevices, or other cavities in suitable habitat on the project, within the limits of proposed ground disturbance, would be thoroughly inspected by a qualified biologist before collapsing. This would discourage owls from breeding on the construction site. Other species using burrows would be relocated prior to collapsing burrows. If construction were to be initiated after the commencement of the breeding season and burrowing owls could be seen within areas to be affected by ground construction activities, behavioral observations would be done by a qualified biologist to determine their breeding status. If breeding were observed, the nest area would be avoided, with an appropriately sized buffer sufficient to prevent disturbance during construction activities until the chicks fledged.

Table 2-24 Applicant Proposed Measures

Applicant Proposed Measure	Description
APM BIO-14: Gila Monster and Chuckwalla Measures	The following measures are the current NDOW construction site protocols for the Gila monster (NDOW 2005). These protocols are applicable for the Gila monster in both the Nevada and California sections of the project, and applicable for the chuckwalla in the Nevada section of the project. Through the WEAP, workers and other project personnel should (at a minimum) know how to: (1) identify Gila monsters and be able to distinguish them from other lizards such as chuckwallas and banded geckos; (2) report any observations of Gila monsters (in Nevada) to the biological monitor for notification of the NDOW; (3) be alerted to the consequences of a bite resulting from carelessness or unnecessary harassment; and (4) be aware of protective measures provided under state law. • Live Gila monsters found in harm's way on the construction site would be captured and then detained in a cool, shaded environment (<85 degrees Fahrenheit) by the project biologist or equivalent personnel until a NDOW biologist can arrive for documentation purposes. Despite the fact that a Gila monster is venomous and can deliver a serious bite, its relatively slow gait allows for it to be easily coaxed or lifted into an open bucket or box, carefully using a long handled instrument such as a shovel or snake hook (note: it is not the intent of NDOW to request unreasonable action to facilitate captures; additional coordination with NDOW will clarify logistical points). • A clean 5-gallon plastic bucket with a secure, vented lid; an 18-inch x 18-inch x 4-inch plastic sweater box with a secure, vented lid; or a tape-sealed cardboard box of similar dimension may be used for safe containment. Additionally, written information identifying the mapped capture location (e.g., GPS record), date, time, and circumstances (e.g., biological survey or construction) and habitat description (vegetation, slope, aspect, and substrate) would also be provided to NDOW. • Injuries to Gila monsters may occur during excavation, blasting, road grading, or other construction activities. In the event a Gila monster is injured, it should be transferred to a veterinarian proficient in reptile medicine for evaluation of appropriate treatment. Rehabilitation or euthanasia expenses would not be covered by NDOW. However, NDOW would be immediately notified during normal business hours. If an animal is killed or found dead, the carcass would be immediately frozen and transferred to NDOW with a complete written description of the discovery and circumstances, habitat, and mapped location. • Should NDOW's assistance be delayed, biological or equivalent acting personnel on site may be requested to remove and release the Gila monster out of harm's way. Should NDOW not be immediately available to respond for photo-documentation, a 35-mm camera or equivalent (5 mega-pixel digital minimum preferred) would be used to take good quality images of the Gila monster in situ at the location of live encounter or dead salvage. The pictures, preferably on slide film (.tif or .jpg digital format) would be provided to NDOW. Pictures would include the following information: (1) Encounter location (landscape with Gila monster in clear view); (2) a clear overhead shot of the entire body with a ruler next to it for scale (Gila monster should fill camera's field of view and be in sharp focus); (3) a clear, overhead close-up of the head (head should fill camera's field of view and be in sharp focus).

Table 2-24 Applicant Proposed Measures

Applicant Proposed Measure	Description
Cultural Resources	
APM CR-1: Conduct Archaeological Inventory of Areas that May Be Disturbed	Conduct an intensive archaeological inventory of all areas that may be disturbed during construction and operation of the proposed project. A complete cultural resources inventory of the project area has been conducted, details of which are contained in a technical report. Should the project substantially change and areas not previously inventoried for cultural resources become part of the construction plan, the applicant would ensure that such additional areas are inventoried for cultural resources prior to any disturbance. All surveys would be conducted and documented according to applicable laws, regulations, and professional standards.
APM CR-2: Avoid and Minimize Impacts on Significant Cultural Resources Wherever Feasible	Avoid and minimize impacts on significant or potentially significant cultural resources wherever feasible. To the extent practical, the applicant would avoid or minimize impacts on archaeological resources, regardless of its CRHR or NRHP eligibility status. This includes siting all ground-disturbing activities and other project components outside a buffer zone established around each recorded archaeological site within or immediately adjacent to the right-of-way.
APM CR-2a. Avoid Direct Impacts on Significant Cultural Resources through Project Final Design	Project Final Design would avoid direct impacts on significant or potentially significant cultural resources. To the extent practical, all ground-disturbing activities and other project components would be sited to avoid or minimize impacts on cultural resources listed as or potentially eligible for listing as, unique archaeological sites, historical resources, or historic properties.
APM CR-2b. Conduct a Preconstruction Worker Environmental Awareness Program (see BIO-6, PALEO-3, and W-11)	The program would be presented to all proposed project personnel who have the potential to encounter and alter unique archaeological sites, historical resources, or historic properties, or properties that may be eligible for listing in the CRHR or NRHP. This includes construction supervisors as well as field construction personnel. No construction worker would be involved in ground-disturbing activities without having participated in the Worker Environmental Awareness Program.
APM CR-2c. Protective Buffer Zones	Establish and maintain a protective buffer zone around each recorded archaeological site within or immediately adjacent to the right-of-way. A protective buffer zone would be established around each recorded archaeological site and treated as an “environmentally sensitive area” within which construction activities and personnel are not permitted. Monitoring would be conducted to ensure that the protective areas are maintained.
APM CR-3. Evaluate Significance of Unavoidable Cultural Resources	Evaluate the significance of all cultural resources that cannot be avoided. Cultural resources that cannot be avoided and which have not been evaluated to determine their eligibility for listing in the CRHR or NRHP would be evaluated to determine their historical significance. Evaluation studies would be conducted and documented according to applicable laws, regulations, guidelines, and professional standards.
APM CR-3a. Evaluate Significance of Potentially Eligible Archaeological Resources	Evaluate the significance of archaeological resources potentially eligible for CRHR or NRHP listing. Evaluation of archaeological sites could include scientific excavation of a sample of site constituents sufficient to understand the potential of a site to yield information to address important scientific research questions per CRHR eligibility Criterion 4 and NRHP eligibility Criterion D. Sites with rock art would be evaluated to consider their eligibility per CRHR Criterion 1 and NRHP Criteria A, C, and D.
APM CR-3b. Evaluate Significance of Potentially Eligible Buildings and Structures	Evaluate the significance of buildings and structures potentially eligible for CRHR or NRHP listing. Evaluation would take into account engineering, aesthetic, architectural, and other relevant attributes of each property. Buildings and structures would be evaluated for historical significance per CRHR eligibility Criteria 1, 2, and 3, and NRHP Criteria A, B, and C. A report of the evaluation of each building or structure would be prepared providing a rationale for an assessment of significance consistent with professional standards and

Table 2-24 Applicant Proposed Measures

Applicant Proposed Measure	Description
	guidelines. The report would be filed with the appropriate Information Center of the California Historical Resources Information System.
APM CR-3c. Assist with Native American Consultations	If necessary, the applicant would assist BLM in consultations with Native Americans regarding traditional cultural values that may be associated with archaeological resources. Archaeological or other cultural resources associated with the project may have cultural values ascribed to them by Native Americans. The applicant would assist the BLM during consultation with Native Americans regarding Native American cultural remains.
APM CR-4. Minimize Unavoidable Impacts on Significant Cultural Resources, including Unique Archaeological Sites, Historical Resources, and Historic Properties	The applicant would make reasonable efforts to avoid adverse project effects to unique archaeological sites, historical resources, and historic properties. Nevertheless, it may not be possible to situate all proposed project facilities to completely avoid impacts on significant cultural resources. Impacts on significant cultural resources would be minimized by implementing the measures listed in APM CR-4a.
APM CR-4a. Implement Measures to Minimize Impacts on Significant Archaeological Sites	Prior to construction and during construction, the following measures would be implemented by the applicant to minimize unavoidable impacts on significant archaeological sites: • To the extent practical, all activities would minimize ground surface disturbance within the bounds of significant archaeological sites, historical resources, or historic properties. • Portions of significant archaeological sites, historical resources, or historic properties that can be avoided would be protected as environmentally sensitive areas and would remain undisturbed by construction activities. • Monitoring by qualified professionals and/or Native Americans to ensure that impacts on sites are minimized would be carried out at each affected cultural resource for the period during which construction activities pose a potential threat to the site, and for as long as there is the potential to encounter unanticipated cultural or human remains. • Additional archaeological studies would be carried out at appropriate sites to ascertain whether project facilities could be located on a portion of a site and cause the least amount of disturbance to significant cultural materials. • If impacts on significant archaeological (NRHP- or CRHR-eligible) sites eligible under NRHP Criterion D or CRHR Criterion 4 cannot be avoided, archaeological data recovery would be carried out in the portions of affected significant sites that would be impacted. A data recovery plan would be prepared, reviewed by the appropriate agencies, and then implemented in order to recover an adequate sample of cultural remains that can be used to address important eligibility research questions for CRHR Criterion 4 or NRHP Criterion D. Archaeological data recovery would involve scientific excavations; identification of recovered cultural and ecological remains; cataloging, scientific analysis, and interpretation of recovered materials; and preparation of a scientific technical report that describes the methods and results of the data recovery program. • Reports of any excavations at archaeological sites would be filed with the BLM and the appropriate Information Center of the California Historical Resources Information System.

Table 2-24 Applicant Proposed Measures

Applicant Proposed Measure	Description
APM CR-4b. Implement Measures to Minimize Impacts on Significant Buildings and Structures	Prior to construction and during construction, the applicant would implement the following measures to minimize unavoidable impacts on significant buildings and structures: • Locate proposed project facilities to minimize effects on significant buildings or structures. • If impacts on significant buildings or structures cannot be avoided, document significant architectural and engineering attributes consistent with the documentation standards of the National Park Service Historic American Buildings Survey/Historic American Engineering Record. • File reports and other documentation with the BLM, the National Park Service, if appropriate, and appropriate Information Center of the California Historical Resources Information System.
APM CR-5. Prepare and Implement a Construction Monitoring and Unanticipated Cultural Resources Discovery Plan	During construction it is possible that previously unknown archaeological or other cultural resources or human remains could be discovered. Prior to construction, the applicant would prepare a Construction Monitoring and Unanticipated Cultural Resources Discovery Plan to be implemented if an unanticipated discovery is made. At a minimum the plan would detail the following elements: • Worker and supervisor training in the identification of cultural remains that could be found in the proposed project area, and the implications of disturbance and collection of cultural resources pursuant with the Archaeological Resources Protection Act of 1979 • Worker and supervisor response procedures to be followed in the event of an unanticipated discovery, including appropriate points of contact for professionals qualified to make decisions about the potential significance of any find • Identities of persons authorized to stop or redirect work that could affect the discovery, and their on-call contact information • Procedures for monitoring construction activities in archaeologically sensitive areas • A minimum radius around any discovery within which work would be halted until the significance of the resource has been evaluated and mitigation implemented as appropriate • Procedures for identifying and evaluating the historical significance of a discovery • Procedures for consulting Native Americans when identifying and evaluating the significance of discoveries involving Native American cultural materials • Procedures to be followed for treatment of discovered human remains per current state law and protocol developed in consultation with Native Americans.
APM CR-6. Inadvertent Discovery of Human Remains	Any human remains discovered during project activities in California would be protected in accordance with current state law, specifically Section 7050.5 of the California Health and Safety Code, Section 5097.98 of the California Public Resources Code, and Assembly Bill 2641. If human remains determined not to be Native American are unclaimed, they would be treated under the appropriate State of Nevada statutes, including but not limited to Nevada Revised Statutes Chapter 440 and the regulations of the applicable land management agency. In the event that human remains are recovered on private lands, the landholder would have the right to designate the repository for the remains if they are determined not to be Native American or if their family affiliation cannot be determined. The provisions of the Native American Grave Protection and Repatriation Act are applicable when Native American human remains are found on federal land (BLM land in California and Nevada). The discovery of human remains would be

Table 2-24 Applicant Proposed Measures

Applicant Proposed Measure	Description
	treated as defined in the Construction Monitoring and Unanticipated Cultural Resources Discovery Plan.
APM CR-7. Native American Participation	Prior to construction, BLM would consult with Native Americans identified by the NAHC as having cultural ties to particular areas of the proposed project. Native Americans would be invited to participate in significance evaluations and data recovery excavations at archaeological sites with Native American cultural remains, as well as in monitoring during project construction. Native Americans would be consulted to develop a protocol for working with each group should human remains affiliated with that group be encountered during project activities.
Geology, Soils, Minerals, and Paleontology	
APM GEO-1: Geotechnical Engineering and Engineering Geology Study	Prior to final design of substation facilities and transmission and subtransmission line tower foundations, a combined geotechnical engineering and engineering geology study would be conducted to identify site-specific geologic conditions and potential geologic hazards in sufficient detail to support sound engineering practices.
APM GEO-2: Recommended Practices for Seismic Design of Substations	For new substation construction, specific requirements for seismic design would be followed based on the Institute of Electrical and Electronics Engineers (IEEE) Standards Association Standard 693, "Recommended Practices for Seismic Design of Substations," which includes probabilistic earthquake hazard analysis. Other project elements would be designed and constructed in accordance with the appropriate industry standards, as well as good engineering and construction practices and methods.
APM GEO-3: Project Construction Stormwater Pollution Prevention Plan Protection Measures Regarding Soil Erosion / Water Quality	Transmission line and substation construction activities would be conducted in accordance with the soil erosion/water quality protection measures to be specified in the project construction stormwater pollution prevention plan (SWPPP). New access roads would be designed to minimize ground disturbance from grading. They would follow natural ground contours as closely as possible, and would include specific features for road drainage. Measures could include water bars, drainage dips, side ditches, slope drains, and velocity reducers. Where temporary crossings would be constructed, they would be restored and repaired as soon as possible after completion of the discrete action associated with construction of the line in the area.
APM PALEO-1: Retention of Paleontologist and Preparation of a Paleontological Resource Management Plan	Prior to construction, a certified paleontologist would be retained by SCE to supervise monitoring of construction excavations and to produce a Paleontological Resource Management Plan (PRMP) for the proposed project. This PRMP would be prepared and implemented under the direction of the paleontologist and would address and incorporate APMs PALEO-2 through PALEO-8. Paleontological monitoring would include inspection of exposed rock units and microscopic examination of matrix to determine whether fossils are present. The monitor would have authority to temporarily divert grading away from exposed fossils in order to recover the fossil specimens. More specific guidelines for paleontological resource monitoring could be found in the PRMP.
APM PALEO-2: Pre-construction Paleontological Field Survey	The paleontologist and/or his or her designated representative would conduct a pre-construction field survey of the project area underlain by Tertiary rock units and older alluvium. Results of the field inventory and associated recommendations would be incorporated into the PRMP.
APM PALEO-3: Worker Environmental Awareness Program (see BIO-6, CR-2b, W-11)	A Worker Environmental Awareness Program would be provided to construction supervisors and crew for awareness of requirements regarding the protection of paleontological resources and procedures to be implemented in the event fossil remains are encountered by ground-disturbing activities.
APM PALEO-4: Construction Monitoring	Ground-disturbing activities would be monitored on a part-time or full-time basis by a paleontological construction monitor only in those parts of the project area where these activities would disturb previously undisturbed strata in rock units of

Table 2-24 Applicant Proposed Measures

Applicant Proposed Measure	Description
	moderate and high sensitivity. Quaternary alluvium, colluvium, and Quaternary landslide deposits have a low paleontological sensitivity level and would be spot-checked on a periodic basis to ensure that older underlying sediments were not being penetrated. Monitoring would not be implemented in areas underlain by younger alluvium unless these activities had reached a depth 5 feet below the present ground surface and fine-grained strata were present. Ground-disturbing activities in areas underlain by rock units of low sensitivity would be monitored on a quarter-time basis or spot-checked if fine grained strata were present.
APM PALEO-5: Recovery and Testing	If fossils were encountered during construction, construction activities would be temporarily diverted from the discovery and the monitor would notify all concerned parties and collect matrix for testing and processing as directed by the project paleontologist. In order to expedite removal of fossil-bearing matrix, the monitor may request heavy machinery to assist in moving large quantities of matrix out of the path of construction to designated stockpile areas. Construction would resume at the discovery location once the necessary matrix was stockpiled, as determined by the paleontological monitor. Testing of stockpiles would consist of screen washing small samples to determine if important fossils were present. If such fossils were present, the additional matrix from the stockpiles would be water screened to ensure recovery of a scientifically significant sample. Samples collected would be limited to a maximum of 6,000 pounds per locality.
APM PALEO-6: Monthly Progress Reports	The project paleontologist would document interim results of the construction monitoring program with monthly progress reports. Additionally, at each fossil locality, field data forms would record the locality, stratigraphic columns would be measured, and appropriate scientific samples would be submitted for analysis.
APM PALEO-7: Analysis of and Preparation of Final Paleontological Resource Recovery Report	The project paleontologist would direct identification, laboratory processing, cataloging, analysis, and documentation of the fossil collections. When appropriate, and in consultation with SCE, splits of rock or sediment samples would be submitted to commercial laboratories for microfossil, pollen, or radiometric dating analysis. After analysis, the collections would be prepared for curation (see APM PALEO-8). A final technical report would be prepared to summarize construction monitoring and present the results of the fossil recovery program. The report would be prepared in accordance with SCE, Society of Vertebrate Paleontology guidelines, and lead agency requirements. The final report would be submitted to SCE, the lead agency, and the curation repository.
APM PALEO-8: Curation	Prior to construction, SCE would enter into a formal agreement with a recognized museum repository, and would curate the fossil collections, appropriate field and laboratory documentation, and final Paleontological Resource Recovery Report in a timely manner following construction.
Hazards, Health and Safety	
APM HAZ-1: Phase I ESA	A Phase I ESA would be performed at each new or expanded substation location and along newly acquired transmission or subtransmission line ROWs. The Phase I ESAs would include an electronic records search of federal, state, and local databases. The electronic records search would be contracted to a company that specializes in this type of work and that would produce a comprehensive report for the new or expanded ROW. The comprehensive report is used to identify sites in federal, state, and local government agency databases that may have the potential to impact the proposed project; based on a review of the report, any potential areas of concern along the ROW would be identified for further assessment. In addition, a Phase I ESA that is compliant with American Society for Testing Materials (ASTM) 1927-05 (ASTM 2005) would be performed on all property to be acquired. Based on the results of the Phase I ESA, additional assessment, characterization, and remediation of potential or known

Table 2-24 Applicant Proposed Measures

Applicant Proposed Measure	Description
	subsurface impacts may be conducted prior to construction activities. Such remediation could include the relocation of transmission line structures as necessary to avoid impacted areas, or the removal and disposal of impacted soils and/or groundwater according to applicable regulations.
APM HAZ-2: Hazardous Materials and Waste Handling Management.	The applicant would develop programs and policies for management of hazardous materials including a Hazardous Materials and Hazardous Waste Handling Program, Construction Stormwater Pollution Prevention Plan, and procedures for Transport of Hazardous Materials, Fueling and Maintenance of Construction Equipment, Fueling and Maintenance of Helicopters, and Emergency Release Response. This plan would be valid during project construction and operation.
APM HAZ-3: Soil Management Plan	The applicant would develop a Soil Management Plan that would provide guidance for the proper handling, onsite management, and disposal of impacted soil that might be encountered during construction activities. This plan would be valid during project construction and operation.
APM HAZ-4: Fire Management Plan	The applicant would implement a Fire Management Plan.
APM HAZ-5: SPCCP and Hazardous Materials Business Plan	The applicant would implement a Spill Prevention, Countermeasure, and Control Plan (SPCCP) for preventing, containing, and controlling potential releases; provisions for quick and safe cleanup and a Hazardous Materials Business Plan (HMBP) that would include hazardous waste management procedures; and emergency response procedures including emergency spill cleanup supplies and equipment.
Hydrology and Water Quality	
APM W-1: Avoid Stream Channels	Construction equipment would be kept out of flowing stream channels.
APM W-2: Erosion Control and Hazardous Material Plans	Erosion control and hazardous material plans would be incorporated into the construction bidding specifications to ensure compliance.
APM W-3: Project Design Features	Appropriate design of tower footing foundations, such as raised foundations and/or enclosing flood control dikes, would be used to prevent scour and/or inundation by a 100-year flood. Where floodplain encroachment is required by the CPUC and/or the BLM, and potential impacts require non-standard designs, hydrology/channel flow analysis would be performed.
APM W-4: Avoid Active Drainage Channels	Towers would be located to avoid active drainage channels, especially downstream of steep hillslope areas, to minimize the potential for damage by flash flooding and mud and debris flows.
APM W-5: Diversion Dikes	Diversion dikes would be required to divert runoff around a tower structure or a substation site if (a) the location in an active channel (or channels) could not be avoided; and (b) where there is a very significant flood scour/deposition threat, unless such diversion is specifically exempted by the CPUC and/or the BLM Authorized Officer.
APM W-6: Collect and Divert Runoff	Runoff from roadways would be collected and diverted from steep, disturbed, or otherwise unstable slopes.
APM W-7: Ditch and Drainage Design	Ditches and drainage devices would be designed to handle the concentrated runoff and located to avoid disturbed areas. They would have energy dissipations at discharge points that might include rip-rap, concrete aprons, and stepped spillways. Where diversion dikes are required to protect towers or other project structures from flooding or erosion, these dikes would be designed to avoid increasing the risk of erosion or flooding onto adjacent property.
APM W-8: Minimize Cut and Fill Slopes	Cut and fill slopes would be minimized by a combination of benching and following natural topography where possible.
APM W-9: Prepare and Implement an Approved SWPPP	As a part of the SWPPP, soil disturbance at tower construction sites and access roads would be the minimum necessary for construction and designed to prevent long-term erosion through the following activities: restoration of disturbed soil, re-vegetation, and/or construction of permanent erosion control structures. BMPs in

Table 2-24 Applicant Proposed Measures

Applicant Proposed Measure	Description
	the project SWPPP would be implemented during construction to minimize the risk of an accidental release.
APM W-10: Emergency Release Response Procedures	The Emergency Release Response Procedures developed pursuant to APM Haz-1 would be maintained onsite (or in vehicles) during construction of the proposed project.
APM W-11: Conduct a Worker Environmental Awareness Program (see BIO-6, CR-2b, PALEO-3)	A Worker Environmental Awareness Program (WEAP) would be conducted to communicate environmental concerns and appropriate work practices, including spill prevention, emergency response measures, and proper BMP implementation, to all field personnel prior to the start of construction. This training program would emphasize site-specific physical conditions to improve hazard prevention. It would include a review of all site-specific plans, including but not limited to the project's SWPPP and Hazardous Substances Control and Emergency Response Plan. The applicant would document compliance and maintain a list of names of all construction personnel who had completed the training program.
APM W-12: Properly Dispose of Hazardous Materials	All construction and demolition waste, including trash and litter, garbage, and other solid waste, would be removed and transported to an appropriately permitted disposal facility. Petroleum products and other potentially hazardous materials would be removed and transported to a hazardous waste facility permitted or otherwise authorized to treat, store, or dispose of such materials.
APM W-13: Identify Location of Underground Utilities Prior to Excavation	Prior to excavation, the applicant or its contractors would locate overhead and underground utility lines, such as natural gas, electricity, sewage, telephone, fuel, and water lines, or other underground structures that may reasonably be expected to be encountered during excavation work.
APM W-14: Prepare or Update SPCC Plans	The applicant would prepare or update SPCC plans for substations to minimize, avoid, and/or clean up unforeseen spill of hazardous materials during facility operations.
Land Use	
APM LU-1: Aeronautical Considerations	The applicant would submit notice to FAA electronically, in accordance with FAA procedures, and as far in advance of construction as possible.
Noise	
APM NOI-1: Compliance with Local Noise Ordinances	The proposed construction would comply with local noise ordinances. There may be a need to work outside the aforementioned local ordinances to take advantage of low electrical draw periods during the nighttime hours. The applicant would comply with variance procedures requested by local authorities if required.
APM NOI-2: Construction Equipment Working Order	Construction equipment would be in good working order.
APM NOI-3: Construction Equipment Maintenance	Construction equipment would be maintained per manufacturer's recommendations.
APM NOI-4: Construction Equipment Muffled	Construction equipment would be adequately muffled.
APM NOI-5: Construction Equipment Idling Minimized	Idling of construction equipment and vehicles would be minimized during the construction.
APM NOI-6: Hearing Protection for Workers	Workers would be provided appropriate hearing protection, if necessary, as described in the Health and Safety Plan.
Public Services and Utilities	
APM PUSVC-1: Work Around High Pressure Pipelines	No mechanical equipment will be permitted to operate within 3 feet of the high-pressure pipelines, and work within 3 feet must be done by hand or as otherwise directed by the pipeline company.
APM PUSVC-2: Monitoring by Pipeline Companies	A representative of applicable owners and operators of major pipeline companies must observe the excavation around or near their facilities to ensure protection and to record pertinent data necessary for operations.

Table 2-24 Applicant Proposed Measures

Applicant Proposed Measure	Description
Recreation	
APM REC-1: Recreation Area Closures	When temporary short-term closures to recreational areas are necessary for construction activities, the applicant would coordinate those closures with recreational facility owners. To the extent practicable, the applicant would schedule construction activities to avoid heavy recreational use periods (e.g., holidays or tournaments). The applicant would post notice of the closure on-site 14 calendar days prior to the closure.
Socioeconomics, Population and Housing, and Environmental Justice	
	The applicant has not included any APMs related to socioeconomics, population and housing, or environmental justice for the proposed EITP.
Traffic and Transportation	
APM TRA-1: Obtain Permits	If any work requires modifications or activities within local roadway and railroad ROWs, appropriate permits will be obtained prior to the commencement of construction activities, including any necessary local permits and encroachment permits.
APM TRA-2: Traffic Management and Control Plans	Traffic control and other management plans will be prepared where necessary to minimize project impacts on local streets and railroad operations.
APM TRA-3: Minimize Street Use	Construction activities will be designed to minimize work on, or use of, local streets.

Key:
ASTM = American Society for Testing Materials
BLM = Bureau of Land Management
BMP = Best Management Practices
CDFG = California Department of Fish and Game
CPUC = California Public Utilities Commission
CRHR = California Register of Historical Resources
EITP = Eldorado–Ivanpah Transmission Project
FAA = Federal Aviation Administration
GPS = Global Positioning System
HMBP = Hazardous Materials Business Plan
LST = Lattice Steel Tower
NAHC = Native American Heritage Commission
NDOW = Nevada Department of Wildlife
NRHP = National Register of Historic Places
PRMP = Paleontological Resource Management Plan
ROW = Right-of-Way
SAA = Streambed Alteration Agreement
SCE = Southern California Edison
SPCC = Spill Prevention, Control, and Countermeasure
SPCCP = Spill Prevention, Control, and Countermeasure Plan
SWPPP = Stormwater Pollution Prevention Plan
TSP = Tubular Steel Poles
USFWS = U.S. Fish and Wildlife Service
WEAP = Worker Environmental Awareness Program

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