B. Description of Proposed Project/Action and Alternatives

B.1 Introduction

Section B provides a detailed description of the construction and operation of the Antelope-Pardee 500-kV Transmission Project (proposed Project) proposed by Southern California Edison (SCE) and alternatives to the proposed Project. Specifically, Section B.2 provides a description of the proposed Project and its components, including: Proposed Transmission Facilities (B.2.1.1), Proposed Substation Modifications (B.2.1.2), Proposed Information Technology Facilities (B.2.1.3), and the Planned Generation Facility (B.2.1.4). Section B.2.2 provides a description of construction activities associated with the proposed Project, including: Transmission Facility Construction (B.2.2.1), Substation Facility Construction (B.2.2.2), and Information Technology Facility Construction (B.2.2.3). Section B.2.3 provides a description of Facility Operations and Maintenance for the proposed Project. Section B.3 provides an overview of the alternatives and discusses the alternatives screening process, including alternatives eliminated from full consideration in the EIR/EIS. Section B.4 provides detailed descriptions of each alternative (1 through 6), and Section B.5 addresses the cumulative impacts scenario.

B.2 Description of the Proposed Project/Action

The proposed Antelope-Pardee 500-kV Transmission Project would involve the construction of a new 25.6-mile 500-kV transmission line between SCE's existing Antelope and Pardee Substations, partially traversing the Angeles National Forest (ANF). The Antelope Substation is located in the City of Lancaster and the Pardee Substation is located in the City of Santa Clarita, both of which are situated in northern Los Angeles County (see Figure B.2-1). The proposed Project would consist of the following major components:

- Construction of a single-circuit 500-kV transmission line along an existing SCE 66-kV transmission line ROW for 22.8 miles, where the existing ROW would be widened from 50 to 180 feet northeast of the ANF and from 100 feet to 160 feet within the ANF (12.6 miles on NFS lands);
- Establishment of a new 500-kV ROW for 2.8 miles southwest of ANF (entirely on non-NFS lands);
- Removal of existing 66-kV and 500-kV facilities (i.e., towers, conductors, and associated hardware) and relocation of 66-kV and 12-kV facilities;
- Installation of new double-circuit 500-kV towers in existing ROW for 5.3 miles northeast of the Pardee Substation and removal of existing single-circuit 500-kV towers;
- Modification and expansion of the Antelope Substation to increase its rating from 220 kV to 500 kV and installation of four additional 220-kV line positions to the south;
- Installation of two new 220-kV circuit breakers, four new 220-kV disconnect switches, and new protective relaying at the Pardee Substation; and
- Installation of associated telecommunication infrastructure.

The proposed Project (action), related to Forest Service jurisdiction, would be to approve SCE's Special Use Application by issuing a 50-year term Special Use Easement to SCE authorizing the construction, maintenance, and use of approximately 12.6 miles of improvements (500-kV transmission line along with ancillary improvements) within a 160-foot-wide easement, on NFS lands. The proposed Project would also include issuing one or more temporary Special Use Permits for any ground disturbing activities on NFS lands that would occur during construction activities and would be located outside the proposed 160-foot ROW

width. Additional resource review may be needed prior to issuing this temporary permit(s). In addition, the proposed Project would require several amendments to the ANF Land Management Plan, including changing the Scenic Integrity Objectives along the proposed utility corridor (see Table A.5-3); modifying the Forest Standard related to the Pacific Crest Trail (S1) specifically regarding this Project, as the proposed utility corridor would adversely affect the foreground views from the Pacific Crest Trail.

A summary of the major components of the Project is presented in Table B.1-1. The following sections provide additional detail regarding each of the Project components.

Table B.1-1. Summary of Proposed Project Components

Overall Project Construction
• Proposed construction duration of 13 months (estimated to begin March 2008) • Transmission facility construction scheduled for Monday through Saturday, 6:30 a.m. to 5:00 p.m. • Substation construction scheduled for Monday through Friday, daylight hours – extended hours would require a variance • Workforce ranging from approximately 20 to 120 persons, with daily average workforce of approximately 50 persons • Disturbance of approximately 122 acres, with restoration of approximately 64 acres total; where approximately 44 acres of disturbance would be on NFS lands, with restoration of approximately 22 acres.
Transmission Facility Construction
• Establishment of one primary marshalling yard adjacent to Antelope Substation, and four secondary marshalling yards • Grading of existing access and spur roads; construction of approximately new spur roads for approximately 20 towers; grading or approximately 10 Forest Service roads currently closed • Removal of approximately 119 66-kV towers and associated hardware from SCE's Saugus-Del Sur Utility Corridor, where approximately 86 towers would be removed from NFS lands and 33 towers removed from non-NFS lands • Construction of 114 lattice steel towers and three tubular steel poles along the Project route • Use of helicopters to deposit equipment and materials, to install new 500-kV towers (only one new 500-kV tower is recommended to be installed by helicopter, and it is located on NFS lands), and to remove the existing 66-kV towers from the Saugus-Del Sur Utility Corridor • Wire installation onto the lattice steel towers and tubular steel poles using one to two small helicopters • Establishment of approximately 24 new pulling locations (10 located on NFS lands) and 15 new splicing locations (11 located on NFS lands)
500-kV Transmission Line: Mile 0 to Mile 1.1
• Initiated at Antelope Substation • Constructed within a new 180-foot ROW • Mile 0 to Mile 0.1: uses three 70-foot tall double-circuit 220-kV tubular steel poles • Mile 0.1 to Mile 1.1: uses four-legged single-circuit 500-kV towers that range in height from 113 to 178 feet
500-kV Transmission Line: Mile 1.1 to Mile 5.7
• Constructed within Saugus-Del Sur Utility Corridor; ROW to be expanded from 50 to 180 feet • Replaces existing Antelope-Pole Switch 74 66-kV line • Uses four-legged, single-circuit 500-kV towers that range in height from 113 to 178 feet
500-kV Transmission Line: Mile 5.7 to Mile 18.6 (This portion involves NFS lands)
• Enters the ANF at Mile 5.7 • Constructed within Saugus-Del Sur Utility Corridor; ROW to be expanded from 100 to 160 feet • Includes 12.6 miles of NFS lands within the ANF • Replaces existing Antelope-Pole Switch 74 66-kV line • Uses four-legged single-circuit 500-kV towers that range in height from 113 to 178 feet
500-kV Transmission Line: Mile 18.6 to Mile 20.3
• Constructed within a new 180-foot ROW • Exits the ANF at Mile 19.3 • Uses four-legged single-circuit 500-kV towers that range in height from 113 to 178 feet

Table B.1-1. Summary of Proposed Project Components
500-kV Transmission Line: Mile 20.3 to Mile 25.6
• Constructed within existing Pardee-Vincent 500-kV ROW, which is 600-feet wide between Mile 20.3 to Mile 22.3 and reduces to a width of 350 feet between Mile 22.3 and 25.6 • Replaces existing single-circuit 500-kV towers between Mile 20.3 and 25.6 with double-circuit 500-kV towers • Uses a total of approximately 21 four-legged double-circuit 500-kV towers that range in height from 175 to 220 feet between Mile 20.3 and Mile 25.6 • Uses one existing double-circuit 500-kV tower at Mile 22.3 • Terminates at Pardee Substation
Subtransmission Line Relocation
• Relocation of three 1,000-foot segments of double-circuit, 66-kV lines; replaces 18 70-foot wood poles with 18 70-foot light weight steel poles • Relocation of 12-kV circuit on Antelope-Pole Switch 74 66-kV line to a new 12-kV distribution wood pole line within the Saugus-Del Sur Utility Corridor
Antelope Substation
• 1,145-foot by 1,185-foot expansion (approx. 33 acres) • Upgrade from 220 kV to 500 kV • Grading of 220-foot by 330-foot area for installation of expansion equipment • Creation of new line positions 10, 11, 12, 13 • Construction of new Mechanical Electrical Equipment Room (MEER) • Installation of approximately 4,155 feet of perimeter fencing
Pardee Substation
• Installation of aboveground structures and electrical equipment (i.e., circuit breakers, disconnect switches, conductors) • Installation of additional protective relaying • Upgrade of 15 220-kV 50 kA circuit breakers to 60 kA rating
Information Technology Facilities (This portion involves NFS lands)
• Construction of two telecommunication paths between Antelope and Pardee Substations; one on existing SCE infrastructure and one using optical ground wire (OPGW) installed on the proposed transmission line

Source: SCE, 2004. Note: The alignment and total number of lattice steel towers for the proposed Project is representative of the data known as of December 2004. Project details are subject to change as the design is finalized.

B.2.1 Proposed Facilities and Modifications

The proposed Project would include the removal of a total of 17.5 miles of existing 66-kV transmission line (12.6 miles traversing NFS lands), including a total of 119 existing 66-kV towers (86 towers are located on NFS lands) between Mile 1.1 and Mile 18.6, and construction of a new 25.6-mile 500-kV transmission line (12.6 miles on NFS lands) from the Antelope Substation in the City of Lancaster to the Pardee Substation in the City of Santa Clarita. The proposed Project would also involve the modification of the existing Antelope and Pardee Substations, and the expansion of the Antelope Substation to permit its future upgrade to a 500-kV substation.

Along the proposed 500-kV transmission line route, the Project would add approximately 117 new transmission tower structures. For the first 0.1 miles (starting at the Antelope Substation), three double-circuit 220-kV tubular steel poles would be constructed. From Mile 0.1 to Mile 20.3, approximately 93 new single-circuit 500-kV lattice steel towers would be constructed (58 towers would be located on NFS lands). From Mile 20.3 to Mile 25.6, 21 new double-circuit 500-kV towers would be constructed, and existing single-circuit 500-kV towers would be removed (see Figures B.2-2a to B.2-2e). The proposed transmission facilities are described in detail below.

B.2.1.1 Proposed Transmission Facilities

The proposed transmission facilities include a new 500-kV transmission line (consisting of new towers and conductor), relocation of three double-circuit 66-kV subtransmission lines at the Antelope Substation, modifications to the Antelope and Pardee Substations, and installation of associated telecommunication infrastructure.

500-kV Transmission Line

SCE proposes to construct one new 500-kV circuit between the Antelope and Pardee Substations. A circuit consists of a set of three wires, referred to as conductors, which would be strung between new transmission towers. The proposed 500-kV circuit would be strung with two-conductor bundled (2B) 2,156 kcmil[1] aluminum conductor steel reinforced wire (ACSR) with nonspecular[2] finish. Approximately 783,000 feet of conductor would be strung. Approximately 549,000 feet of 4/0 copper conductor would be removed as part of the removal of the Antelope-Pole Switch 74 66-kV transmission line. The 500-kV transmission towers would consist of the following:

- Three double-circuit 220-kV tubular steel poles (see Figure B.2-3) constructed of dull galvanized steel;
- 93 new single-circuit 500-kV towers (see Figure B.2-4), 21 new double-circuit 500-kV towers (see Figure B.2-5), and one existing 500-kV tower (Mile 22.3) constructed of dull galvanized lattice steel angle members connected by steel bolts; and
- Tangent and angle 500-kV insulator assemblies that consist of two strings of insulators in the form of a "V," to be installed on the towers. Each leg of the "V" assembly would contain one or two one-piece gray polymer insulators, depending on the load. On dead-end structures, the insulators would be arranged in a "barrel" configuration that consists of four polymer insulators.

The proposed ROW and configuration of the 500-kV line from the Antelope Substation to the Pardee Substation are described below.

Mile 0 (Antelope Substation) to Mile 1.1. From the Antelope Substation, the first 1.1 miles of the proposed Project would be constructed within a new 180-foot ROW. Within this new ROW, three double-circuit 220-kV poles would be installed to carry the new line for the first 0.1 miles from the Antelope Substation (see Figure B.2-6). At Mile 0.1, the line would connect to new single-circuit 500-kV lattice steel towers (see Figure B.2-7). The Project route would cross SCE's existing Antelope-Magunden 220-kV ROW and the Midway-Vincent No. 3 500-kV ROW within the first 0.1 miles.

Mile 1.1 to Mile 5.7. At Mile 1.1, the proposed Project route would turn southwest and would enter the existing Saugus-Del Sur Utility Corridor. The proposed Project would replace the existing Antelope-Pole Switch 74 66-kV line that is located within the Saugus-Del Sur Utility Corridor with single-circuit 500-kV towers (see Figure B.2-8).

Mile 5.7 to Mile 18.6. The proposed Project route would follow the Antelope-Pole Switch 74 66-kV ROW within the Saugus-Del Sur Utility Corridor as it traverses the ANF on NFS lands from Mile 5.7 to Mile 18.6, except between Mile 9.2 and Mile 9.5 where the proposed Project would cross private land in-holdings at Bouquet Reservoir. The existing Antelope-Pole Switch 74 66-kV line would be replaced with single-circuit 500-kV towers (see Figure B.2-9). At Mile 8.3, the proposed Project would cross the Midway-Vincent No. 1 and No. 2 500-kV transmission lines and, as mentioned above, at Mile 9.2 the proposed Project would cross the

[1] cmil, or circular mill, is a unit of measure for area and corresponds to the area of a circle having diameter of 1 mil, where 1 mil = 10^{-3} inches, or 1000 mils = 1 inch. kcmil is 1,000 cmils.
[2] Nonspecular conductors do not reflect light and are less visible from a distance.

Figure B.2-1. Regional Location Map

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Figure B.2-2a. Proposed Project (Map 1 of 5)

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Figure B.2-2b. Proposed Project (Map 2 of 5)
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Figure B.2-2c. Proposed Project (Map 3 of 5)

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Figure B.2-2d. Proposed Project (Map 4 of 5)
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Figure B.2-2e. Proposed Project (Map 5 of 5)

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Figure B.2-3. Example of 220-kV Double-Circuit Tubular Steel Pole (Mile 0 to Mile 0.1)
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Figure B.2-4. Typical 500-kV Single-circuit Tower

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Figure B.2-5. Typical 500-kV Double-circuit Tower
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Figure B.2-6. Proposed New ROW Configuration for Proposed Project Mile 0 to Mile 0.1
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Figure B.2-7. Proposed New ROW Configuration for Proposed Project Mile 0.1 to Mile 1.1
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Figure B.2-8. Existing and Proposed ROW Configuration for Proposed Project Mile 1.1 to Mile 5.7
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Figure B.2-9. Existing and Proposed ROW Configuration for Proposed Project Mile 5.7 to Mile 18.6
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Bouquet Reservoir. The single-circuit 500-kV towers that cross Bouquet Reservoir may be specially designed to permit clearance of low-flying fire suppression aircraft (SCE, 2004). At Mile 18.6, the Project route would exit the Saugus-Del Sur Utility Corridor and NFS lands.

Mile 18.6 to Mile 20.3. From Mile 18.6 to Mile 20.3, the proposed Project would turn south and would be constructed within a new 180-foot ROW on single-circuit 500-kV towers (see Figure B.2-10). From Mile 18.6 to Mile 19.3 the proposed Project would traverse the ANF on private land in-holdings (non-NFS lands).

Mile 20.3 to Mile 25.6 (Pardee Substation). At Mile 20.3, the proposed Project would turn west and enter the existing Pardee-Vincent 500-kV ROW. Between Mile 20.3 and Mile 22.3, the Project would replace eight of the existing single-circuit 500-kV towers within the ROW with double-circuit 500-kV towers (see Figure B.2-11). At Mile 22.3, both the proposed Project and the Pardee-Vincent 500-kV transmission lines would turn southwest and cross over the Pardee-Vincent 220-kV transmission line and the Eagle Rock-Pardee 220-kV transmission line that are located on existing double-circuit 500-kV lattice steel towers. One existing double-circuit 500-kV tower would be used to allow the proposed Project to cross over the 220-kV transmission lines. From Mile 22.3 to the point of termination at Pardee Substation (Mile 25.6), double-circuit 500-kV towers would be built in the vacant position of the existing Pardee-Vincent ROW (see Figure B.2-12), and the existing single-circuit 500-kV towers would be removed.

At Mile 20.3, the proposed Project would span Haskell Canyon, where it would cross over several Los Angeles Department of Water and Power (LADWP) lines, including the Sylmar-Celilo 1,000-kV direct current (DC) transmission line and the Owens Gorge-Rinaldi 220-kV transmission line at Mile 20.5. The proposed transmission line would also cross over some gas, water, and telecommunication lines (SCE, 2005a). From Mile 20.8 to the Pardee Substation (Mile 25.6), the proposed Project would traverse open space, residential neighborhoods, commercial land uses, and light industrial uses located adjacent to the ROW through the Santa Clarita and unincorporated Los Angeles County areas.

Subtransmission Relocation

Southeast of the Antelope Substation, three double-circuit 66-kV subtransmission lines would be relocated to allow for the expansion of the Antelope Substation. New conductor along each line segment would have to be installed to facilitate the relocation, and a 200-foot-wide strip of ROW would be located adjacent to the expanded substation's south and east perimeter fences. The following 66-kV lines would be relocated to allow for the expansion of the Antelope Substation:

- **Sequence 1: Antelope-Acton-Palmdale-Shuttle 66-kV and Antelope-Anaverde 66-kV lines.** This section would be relocated 25 feet south of the new fence line that is to be constructed at the south side of Antelope Substation. Relocating Sequence 1 would require the grading of a new 16-foot wide access road; the construction of six 70-foot tall light weight, direct buried steel poles with 20-inch diameter bases; and the installation of 6,000 feet of overhead 954 kcmil Stranded Aluminum Conductor (SAC). The double-circuit poles would be configured with two conductors at the 61-foot level, two conductors at the 56-foot level, and two conductors at the 51-foot level.
- **Sequence 2: Antelope-Anaverde-Helijet 66 kV and Antelope-Oasis-Palmdale-Quartz Hill 66-kV lines.** This section would be relocated 25 feet south of Sequence 1. Relocating Sequence 2 would require the grading of a new 16-foot wide access road; the construction of six 70-foot tall light weight, direct buried steel poles with a 20-inch base diameter; the installation of 3,000 feet of overhead 954 kcmil SAC; and the installation of 3,000 feet of 653.9 kcmil ACSR conductor. The poles would be configured the same as in Sequence 1.
- **Sequence 3: Antelope-Lancaster-Oasis-Quartz Hill 66-kV and Antelope-Shuttle 66-kV lines.** This section would be relocated 25 feet south of Sequence 2. Relocating Sequence 3 would require the construction of six 70-foot tall light weight, direct buried steel poles with a 20-inch base diameter; the installation of 3,000 feet of 653.9 kcmil ACSR; and the installation of 3,000 feet of 336.4 ACSR conductor. Configuration of the poles would be the same as for Sequences 1 and 2.

Figure B.2-10. Proposed New ROW Configuration for Proposed Project Mile 18.6 to Mile 20.3
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Figure B.2-11. Existing and Proposed ROW Configuration for Proposed Project Mile 20.3 to Mile 22.3

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Figure B.2-12. Existing and Proposed ROW Configuration for Proposed Project Mile 22.3 to Mile 25.6

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An existing 12-kV circuit that runs approximately four miles from Elizabeth Lake Pine Canyon Road to Avenue J is located on one side of the Antelope-Pole Switch 74 66-kV line structures in the Antelope area. From Mile 1.2 to Mile 4.7 (3.5 miles), the 12-kV circuit would be relocated. SCE is considering two options for relocating the 12-kV circuit. First, the circuit may be relocated to a new 12-kV distribution wood pole line within the expanded 180-foot Saugus-Del Sur ROW, 7.5 feet from the eastern side of the ROW (SCE, 2005b). Second, SCE may replace an existing 8.9-mile, single-circuit, 12-kV wood pole line located along Johnson Road with a new double-circuit, 12-kV wood pole line.

In addition to the subtransmission lines described above, the construction of the proposed Project and anticipated future 500-kV lines that would enter the Antelope Substation would require the relocation of the existing Vincent and Mesa 220-kV transmission lines from Positions 6 and 8 to Positions 12 and 13. See Section B.2.1.2 for discussion of the relocation of these lines.

B.2.1.2 Proposed Substation Modifications

Antelope Substation

The proposed Project includes the acquisition and fencing of approximately 33 acres of land adjacent to the existing Antelope Substation, which would be necessary to increase the substation rating from 220 kV to 500 kV. During this expansion, four additional 220-kV line positions would be installed to the south. Two positions are required to accommodate the proposed Project in addition to a third party's proposed 220-kV generation tie line. The 220-kV switchyard expansion would create the following new line positions:

- Position 10 would accommodate SCE's proposed 26-mile, 500-kV transmission line from Antelope Substation to a proposed substation in the Mojave area;
- Position 11 would accommodate SCE's proposed 17-mile, 500-kV transmission line from Antelope Substation to Vincent Substation;
- Position 12 would accommodate the existing Vincent 220-kV transmission line that would be relocated from Position 6; and
- Position 13 would accommodate the existing Mesa 220-kV transmission line that would be relocated from Position 8.

The existing Antelope Substation would include an expansion of about 33 acres (1,145 feet by 1,185 feet) for the 500-kV substation. Within this larger expansion area, a 205-foot by 300-foot area would be fenced off for the 220-kV substation improvements.

The proposed Project would also require the following improvements and upgrades:

- Upgrade of the existing 220-kV buses to 3,700 ampere (A) rating;
- Installation of six new 220-kV circuit breakers, four line and eight bus dead-end structures, and 14 220-kV disconnect switches;
- Construction of a new Mechanical Electrical Equipment Room (MEER) adjacent to the east wall of the existing relay room. The MEER would house the following equipment: battery charger, batteries, light and power panel, AC and DC distribution panels, circuit breaker control switches, and protection relays and associated equipment.

See Figure B.2-13 for a diagram of the proposed substation modifications, and future 500-kV substation expansion.

Pardee Substation

The proposed 500-kV transmission line would terminate into an existing switchrack position. Two new 220-kV circuit breakers and four new 220-kV disconnect switches would be installed. New protective relaying would be installed on 19-inch racks inside the existing control building (SCE, 2005b). See Figure B.2-14 for an aerial view of the existing Pardee Substation, showing the termination of the proposed 500-kV transmission line.

B.2.1.3 Proposed Information Technology Facilities

The proposed Project would install telecommunication infrastructure for operation of the existing substations and to protect the new transmission lines from electrical interruptions. The types of circuits to be installed would include fault protection, Supervisory Control and Data Acquisition (SCADA), telephone, Wide Area Network (WAN), and, if necessary, Remedial Action Scheme (RAS).

Two telecommunication paths would be provided for redundancy. The primary path would use the existing SCE infrastructure between Antelope and Pardee Substations. The secondary path would be provided by optical ground wire (OPGW) that would be installed on the new transmission line between the Antelope and Pardee Substations (located above ground on the towers along with the conductors). One ground wire would contain optical fibers for communications and line protection.

B.2.2 Project Construction

Construction Schedule. Construction activities for the proposed Project are anticipated to take 13 months (estimated to begin in March 2008), preceded by nine months (3 months overlap) for procurement of necessary materials. See Table B.2-1 for the proposed Project construction schedule. SCE proposes that crews would work Monday through Saturday, 6:30 a.m. to 5:00 p.m., on all SCE-owned properties and approved ROWs (SCE, 2004). It is anticipated that overhead construction activities at a particular site (i.e., across a road or trail) would last a few hours, but no more than one day (worst-case scenario).

All construction work would be performed with conventional construction techniques in accordance with an SCE construction specification, CPUC General Order 95, Institute of Electrical and Electronic Engineers, American Concrete Institute, and other industry-specific standards. As part of the SCE specification requirements, construction crews would be required to work within the stipulations of documents governing compliance with regional environmental, Forest Service, storm water pollution prevention, and fire prevention criteria (SCE, 2004).

Workforce. The workforce necessary for construction of the proposed Project is anticipated to range from approximately 20 to 120 persons, with an estimated average daily workforce of 50 persons. Table B.2-2 provides a summary of the labor force requirements for the proposed Project.

Construction Equipment. A summary of the primary equipment to be used during the various construction activities for the proposed Project is provided in Tables B.2-3 and B.2-4. A checkmark is used to denote the equipment to be used.

Table B.2-1. Proposed Project Construction Schedule

Activity	Duration (months)[1]
Engineering	19
ROW and Substation Site Acquisition	21
Procurement	12
Construction and Testing:	13
• Removal of Antelope-Pole Switch 74 66-kV Line; 12-kV Relocation	3
• 500-kV Transmission Line Construction	13
• Subtransmission Work	2
• Antelope Substation	10
• Pardee Substation	5
Antelope-Pardee 500-kV Transmission Project In-Service Date[1]	April 2009

Source: SCE, 2005b (AQ-09).
[1] Site acquisition, procurement, and construction has been delayed. The forecast start date is March 2008.

Table B.2-2. Project Labor Force Requirements

Construction Element	No. of Crews	No. Persons per Crew
500-kV Transmission Line Construction and Demolition		
Survey	1	3
Marshalling Yards	1	6
Road Work	1	8
Foundations	4	20
Steel (Shake-out, Hauling, Light Assembly, Heavy Assembly, Erection)	8	48
Conductor (Sheaves, Insulators, Stringing, Deadening, Clipping and Spacing, Anchors)	8	39
Cleanup and Guard Poles	2	6
Wreck-Out (Remove Conductors, Structures, Foundations)	4	30
Bypass Transmission Line (Install Structures and Conductors)	2	12
Bypass Transmission Line (Removal of Conductors and Structures)	2	12
Antelope Substation		
66-kV Relocation at Antelope Substation	2	8
Grading 205 ft by 300 ft at Antelope Substation	1	8
Civil at Antelope Substation	1	50
Electrical at Antelope Substation	1	75
Pardee Substation		
Civil at Pardee Substation	1	8
Electrical at Pardee Substation	1	30

Source: SCE, 2005b.

Figure B.2-13. Antelope Substation with Proposed Project Modifications
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Figure B.2-14. Pardee Substation with Proposed Project Modifications

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Table B.2-3. Construction Equipment for Transmission Line Removal and Construction

Equipment	Survey	Marshalling Yards	Road Work	Foundations	Steel[1]	Conductor[2]	Cleanup and Guard Poles	Wreck-Out[3]	Installation[4]: Bypass Transmission Line	Removal[5]: Bypass Transmission Line
No. of Crews	1	1	1	4	8	8	2	4	2	2
Back Hoe, w/ Bucket			✓	✓		✓	✓	✓	✓	✓
Compressor, Air					✓					
Crane, Hydraulic, 150-Ton					✓					
Crane, Hydraulic, Rough Terrain, 25-Ton		✓			✓	✓				
Crane, Hydraulic, Rough Terrain, 35-Ton								✓		
Crawler, Track Type, Drill Rig, Pneumatic				✓						
Crawler, Track Type, Sagging (D8 type)						✓			✓	✓
Crawler, Track Type, w/ Blade (D6 type)			✓	✓	✓		✓	✓		✓
Crawler, Track Type, w/ Blade (D8 type)			✓			✓			✓	
Digger, Transmission Type, Truck Mount				✓		✓			✓	
Forklift, 10-Ton		✓								
Forklift, 5-Ton		✓								
Loader, Front End w/ Bucket		✓		✓						
Motor Grader			✓			✓	✓			
Motor, Auxiliary Power				✓				✓	✓	✓
Tension Machine						✓			✓	✓
Trailer, Flatbed, 40'		✓			✓			✓	✓	✓
Trailer, Lowboy						✓		✓		
Trailer, Lowboy, 30'			✓	✓	✓		✓		✓	✓
Trailer, Office, 40' to 60'		✓								
Trailer, Storage, 40'		✓		✓						
Truck, Concrete, 10-Yd				✓						
Truck, Dump, 10-Ton				✓				✓		
Truck, Flatbed w/ Boom, 5-Ton				✓	✓		✓		✓	✓
Truck, Flatbed w/ Bucket, 5-Ton						✓	✓	✓	✓	✓

Table B.2-3. Construction Equipment for Transmission Line Removal and Construction

Equipment	Survey	Marshalling Yards	Road Work	Foundations	Steel[1]	Conductor[2]	Cleanup and Guard Poles	Wreck-Out[3]	Installation[4]: Bypass Transmission Line	Removal[5]: Bypass Transmission Line
Truck, Flatbed, 1-Ton		✓	✓	✓	✓	✓	✓	✓	✓	✓
Truck, Flatbed, 2-Ton				✓	✓					
Truck, Mechanics, 1-to 2-Ton				✓	✓	✓		✓		
Truck, Pick-Up	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Truck, Semi, Tractor		✓	✓	✓	✓	✓	✓	✓	✓	✓
Truck, Water, 2,000 to 5,000 Gal			✓	✓	✓	✓		✓	✓	✓
Truck, Wire Puller, 1-Drum						✓		✓	✓	✓
Truck, Wire Puller, 3-Drum						✓			✓	

Source: SCE, 2005b.

[1] Shake-out, Hauling, Light Assembly, Erection

[2] Sheaves, Insulators, Stringing, Deadening, Clipping and Spacing, Anchors

[3] Remove Conductors, Structures, Foundations

[4] Installation of Structures and Conductors

5 Removal of Structures and Conductors

Table B.2-4. Construction Equipment for the Antelope Substation and the Pardee Substation

Equipment	*Antelope Substation*				*Pardee Substation*	
	66-kV Relocation	Grading 300 ft by 205 ft	Civil	Electrical	Civil	Electrical
Crews	2	1	1	1	1	1
5-ton Truck			✓	✓		✓
980 Loader		✓				
Back Hoe, w/ Bucket	✓					
Compactor		✓				
Crane			✓			
Crane 150 ton				✓		✓
Crawler, Track Type, w/ Blade (D6 type)	✓					
Crew Trucks			✓	✓	✓	✓
Ditch Digger			✓	✓	✓	✓
Driller			✓			
Dump Truck			✓		✓	
Forklift			✓	✓	✓	✓
Grader		✓				
Manlift				✓		✓
Motor, Auxiliary Power	✓					
Soils Test Crew Truck		✓				
Survey Truck		✓				
Tension Machine	✓					
Tractor/Backhoe			✓		✓	
Truck (Catering), 1-Ton	✓					
Truck, Heavy Line Truck w/ Boom, 22-Ton	✓					
Truck, suburban	✓	✓				
Truck, Water, 2,000 to 5,000 Gal	✓	✓				
Truck, Wire Puller, 1 Drum	✓	✓				
Water Truck		✓				
5-ton Truck			✓	✓		✓
980 Loader		✓				
Back Hoe, w/ Bucket	✓					
Compactor		✓				
Crane			✓			
Crane, 150-ton				✓		✓
Crawler, Track Type, w/ Blade (D6 type)	✓					
Crew Trucks			✓	✓	✓	✓

Sources: SCE, 2004; SCE, 2005a.

Vehicle Trips. Construction crews would use public roads (i.e., Bouquet Canyon Road and Spunky Canyon Road) to access the ANF, in addition to the Forest System Road 6N18 known as Del Sur Ridge Road (SCE access road) that parallels the Saugus-Del Sur 66-kV line in the ANF. Del Sur Ridge Road is open to the public and is a Forest designated OHV route, but does not provide direct access to developed recreational facilities (e.g., trails, picnic grounds or camping areas) (SCE, 2005a). Table B.2-5 lists the number of one-way vehicle trips per day estimated to occur on the various road types in the Project area by construction crews and construction management. The road types include:

- Interstate roads - Limited access paved roads primarily used for through traffic;
- Primary roads - Paved state or federal highways primarily used for traffic flow;
- Secondary roads - Roads that are improved, and may be paved, but can also be dirt and/or gravel coated and well maintained;
- Unimproved roads - Roads that exist for Forest management activities and recreational purposes for access to forest areas (including OHV uses); and
- ROW roads - Roads not normally used by the public and are instead used for construction and maintenance purposes by utility crews. This category would also include roads that are closed to the public but could be used by construction crews with permission from the appropriate authority.

Table B.2-5 summarizes by task the estimated number of one-way vehicle trips per day for each of the road types that will be used as part of the proposed Project. Each data entry in Table B.2-5 does not represent a separate vehicle trip event. Rather each vehicular trip event would be a combination of road-type utilizations. For example, a concrete truck could likely use all five road types on one one-way trip, but that will be numerically summarized in Table B.2-5 as five trips.

Table B.2-5. Daily One-Way Vehicle Trips for the Proposed Project

Activity	Interstate	Primary	Secondary	Unimproved	ROW Roads	No. of Vehicles	Duration (days)
Construction Management	2	2	2	2	2	1	180
Inspection Services	2	2	4	4	4	3 to 4	180
ROW Investigation	1	2	2	3	2	1 to 2	30
Yard Set-up	0	0	2	2	0	1 to 2	10
Material Receiving	3	5	5	2	0	1 to 2	155
Surveying and Road Layout	1	1	2	2	4	1 to 2	30
Road Building	0	2	3	3	2	1 to 2	30
Conductor Removal	0	1	2	3	3	4 to 6	25
Tower Removal	0	1	2	2	2	4 to 6	30
Site Cleanup/Restoration	0	0	1	2	1	2 to 4	30
Material (Rebar) Hauling	0	1	1	0	0	1 to 2	60
Foundation Installation	0	2	3	3	3	4 to 6	60
Tower Hauling	0	2	3	3	0	4 to 6	60
Tower Assembly	0	2	3	3	0	4 to 6	60
Tower Erecting	0	1	1	2	1	6 to 8	60
Wire Reel Layout	0	1	1	2	1	6 to 8	65
Material Hauling	0	2	3	3	3	4 to 6	65
Traveler Installation	0	1	1	2	2	1 to 2	65
Roper Installation	0	1	1	2	1	2 to 4	65
Conductor Pulling	0	1	1	2	1	4 to 6	65
Clipping Installation	0	2	3	3	2	2 to 4	65

Table B.2-5. Daily One-Way Vehicle Trips for the Proposed Project

Activity	Interstate	Primary	Secondary	Unimproved	ROW Roads	No. of Vehicles	Duration (days)
Deadend Installation	0	1	1	2	1	2 to 4	65
Spacing Installation	0	1	1	2	2	1 to 2	65
Aerial Cleanup	0	2	3	3	1	2 to 4	30
Road Removal	0	2	3	3	1	2 to 4	30
ROW Cleanup and Restoration	0	1	1	2	1	2 to 4	30

Source: SCE, 2005a. Note: The vehicle trips for the proposed Project are estimates based on information available as of December 2004. Project details are subject to change as the design is finalized.

From the information provided in Table B.2-5, the total vehicle miles traveled on paved and unpaved road surfaces was estimated for the proposed Project, as shown in Table B.2-6. Refer to Appendix 3, Air Quality Calculations, for detailed assumptions.

Table B.2-6. Estimated Vehicle Miles Traveled for the Proposed Project

	Trips		Miles/Round Trip		Miles		
	Paved	Unpaved	Paved	Unpaved	Paved	Unpaved	Total
Passenger Vehicles							
Construction Workers	8,050	0	30	0	241,500	0	241,500
Professionals	1,380	1,380	30	1.8 - 4.7	41,400	5,586	46,986
Mid-Size Vehicles - "Delivery Trucks"							
Road Construction	990	990	10	1.8 - 4.7	9,900	4,007	13,907
Foundation Construction	2,128	2,128	10	1.8 - 4.7	21,280	8,613	29,893
Steel Construction	4,495	4,495	10	1.8 - 4.7	44,950	18,194	63,144
Heavy-Heavy Duty Vehicles							
Equipment Delivery	151	151	0 - 30	0 - 0.5	4,530	76	4,606
Equipment Shuttling	1,088	1,088	5	1.8 - 4.7	5,440	4,404	9,844
Waste Disposal	144	144	30 - 54.5	1.8 - 5.18	7,054	636	7,691
Materials Delivery (yards)	260	0	110	0	28,600	0	28,600
Materials Delivery (sites)	930	930	30	2.17 -4.7	27,900	3,842	31,742
TOTALS	19,616	---	---	---	432,554	45,356	477,911

Note: These are approximate numbers based on estimates derived from preliminary design concepts. Numbers are subject to change as the design is finalized.

Land Disturbance. During construction of the proposed Project, a total of approximately 122 acres of land would be disturbed, of which approximately 63 acres would be restored; where approximately 44 acres of disturbance would be on NFS lands, with restoration of approximately 21 acres. Permanent land disturbance would occur on a total of approximately 59 acres, approximately 22 acres of which would be on NFS lands, and would result from lattice steel tower grading, the construction of lattice steel tower footing holds and new spur roads, the turning radius from access roads to spur roads, and the expansion of the Antelope Substation (SCE, 2004). An estimate of land disturbance resulting from the proposed Project is listed in Table B.2-7, including estimates of temporary disturbance, the acreage to be restored, and estimates of potential permanent disturbance. Prior to construction, SCE would conduct pre-construction clearance surveys to help ensure (i.e., validate) that no special-status plant species or wildlife species are negatively impacted by the Project. Surveys would be conducted in areas of potentially suitable habitat as determined by habitat mapping and the results of field surveys conducted during 2001, 2002, and 2003 (SCE, 2005a).

Table B.2-7. Estimates of Project Land Disturbance for the Proposed Project

Project Feature	Quantity	Disturbed Acreage Calculation	Acres Disturbed During Construction	Acres to be Restored	Acres Permanently Disturbed
Guard Pole Hole[1] (qty street crossings on quad maps)	10 (NFS) 20	P/4 (28"/12)^2 x 4 locations *1.5	0.006 0.013	0.006 0.013	0 0
Guard Pole Truck Damage[2] (qty street crossings on quad maps)	10 (NFS) 20	2 tracks x 10' x 2' x 4 locations	0.037 0.074	0.037 0.074	0 0
Steel Pole Hole[3] (qty steel poles)	3	P/4 (96"/12)^2	0.004	0	0.004
Steel Pole Hole Truck Damage[4] (qty steel poles)	3	2 tracks x 10' x 2'	0.003	0.003	0
Steel Pole Laydown Area (qty steel poles)	3	175' x 8'	0.097	0.097	0
Steel Pole Crane Pad for Erection (qty steel poles)	3	50' x 50'	0.172	0.172	0
Lattice Steel Tower Footings Holes[5] (qty tower structures)	58 (NFS) 56	P/4(2)^2 x 4 locations	0.0153 0.0147	0 0	0.0153 0.0147
Lattice Steel Tower (1) Truck Damage,[6, 7] (2) Laydown and Assembly Area,[7] (3) Crane Pad[7] (qty tower structures)	57 (NFS) 56	(1) 2 tracks x 10' x 2' x 4 locs (2) 175' x 60' (3) 50' x 50'	17.21 16.91	17.21 16.91	0 0
Lattice Steel Tower Site Grading[8] (0.05 acres each)	12	12' x 50' x 40'	0.60	0	0.60
Pulling Set-ups[9, 10] (qty set-ups)	10 (NFS) 14	100' x 100'	2.30 3.22	2.30 3.22	0 0
Splicing Set-ups (qty set-ups)	11 (NFS) 4	20' x 50'	0.25 0.09	0.25 0.09	0 0
New Spur Roads[11] (qty miles)	1.05 (NFS) 0.65	x 16' wide	2.04 1.26	0 0	2.04 1.26
Existing Roads (impacted areas only)[12] (qty miles)	9.7 (NFS) 0.3	x 16' wide	18.8 0.6	0 0	18.8 0.6
Radius from access road to spur road (no. total spur roads)	37 (NFS) 23	50-foot radius requires 1,464 sq. ft.	1.25 0.77	0 0	1.25 0.77
Spur road related temporary disturbed areas[13]	37 (NFS) 23	566 sq. ft. per spur road	0.49 0.31	0.49 0.31	0 0
Additional Spur Road Radius for Steel Pole Trucks[14]	3	2,285 sq. ft. per spur road	0.16	0	0.16
Primary Marshalling Yard	1	5 acres per yard	5.0	5.0	0
Staging Areas Material and Equipment (Secondary Marshalling Yards)	4	3 to 5 acres per yard	20.0	20.0	0
Antelope-Pole Switch 74 66-kV Line Removal Specific Truck and Ped Damage[15]	19 (NFS) 17	100 sq. ft. per tower site	0.04 0.04	0.04 0.04	0 0
Antelope-Pole Switch 74 66-kV Line Removal Crane Pads	19 (NFS) 17	50' x 50'	1.09 0.98	1.09 0.98	0 0
Antelope Substation Expansion (220-kV)	1	2 acres expansion established	2.00	0	2.00
Antelope Substation Expansion (500-kV)	1	31 acres expansion established	31.00	0	31.00
Total Estimated	---	---	121.8	63.3	58.5
Total on NFS lands	---	---	43.5	21.4	22.1

Source: SCE, 2004. Note: These are approximate numbers based on estimates derived from preliminary design concepts. Numbers are subject to change as the design is finalized.

[1] Assume two guard poles per each side of street, thus four poles for each crossing for standard "football" design; 28" diameter poles; assume that 50 percent more crossings present (1.5 multiplier) due to preliminary engineering undercrossings not showing mapped distribution includes I-10, frontage roads, rural streets, dirt roads, and jeep trails.

[2] Guard pole-augering process, same as above plus, assume "dualie" type rear axle trucks with two 2' wide tracks backing to location.

[3] Assume 96" diameter with 6" overbore for slurry/concrete backfill, thus 102" diameter hole augered.

[4] Assume augering equipment backs in off new spur road 10' with two 2' wide tire tracks.

[5] Assume 36" diameter hole with 6" overbore for a single-circuit tower; assume 42" diameter hole with 6" overbore for a double-circuit tower.

[6] Assume "dual" type rear axle trucks with two 2' wide tracks backing to four locations per lattice steel tower, approximately 10" from spur road.

[7] Towers installed by helicopter are not included as they would not require crane pads, laydown areas, or result in truck damage.

[8] "Lattice Steel Tower Site Grading" refers to additional grading that is only required at 12 of the 114 LST sites, in order to meet topographic and/or drainage needs. For all other LST sites, the grading that would be conducted in accordance with the requirements for the assembly area, crane pad, and access road/s provides a sufficiently level area to install the tower.

[9] Approximately every 15,000' and at points of inflection or DE structures when convenient. A 100' x 100' site is disturbed.

[10] One end of a pulling set-up is 200' x 200' reel and tensioner end, the other is a 40' x 100' puller site. Only 40 percent of the 200' x 200' sites are disturbed. This averages to a 100' x 100' site of disturbance.

[11] Spur road is required when access road is over 50' from structure site.

[12] Existing roads would be cleared of vegetation, blade-graded, and re-compacted to provide a riding surface capable of supporting heavy equipment. Drainage structures would be installed, as well as repair of existing slope failures (slides, washouts, etc.) with retaining walls or by other means.

[13] Parking tracks for 3 utility trucks (180 ft^2), and one turnaround track on an 18' radius (386 ft^2).

[14] Difference between 80' radius and 80' radius from access to spur road for access by 80' trailer bed truck.

[15] Total for stand-alone Antelope-Pole Switch 74 towers only, not overlap towers (i.e., only those Antelope-Pole Switch 74 towers that would not have new towers erected at that location). It is assumed that the towers are will be located on NFS lands (worst-case scenario).

Construction Waste. Construction of the proposed Project would result in the generation of various waste materials and the limited use of hazardous materials that include fuel, lubricants, and cleaning solvents. All hazardous materials would be stored, handled, and used in accordance with applicable regulations, including the Construction Storm Water Pollution Prevention Plan (SWPPP) for the transmission line segment and substation components (SCE, 2004). All waste materials would be disposed of in off-site landfills. See Table B.2-8 for an estimate of construction waste that would be generated from the proposed Project.

Table B.2-8. Estimates of Construction Waste for the Proposed Project

Waste Item	Total Pounds	Reusable Pounds (On Site)	Recyclable/ Disposable Pounds
Transmission Line			
66-kV Antelope-Pole Switch 74 Removal Waste Estimate			
Tower Steel	810,080	0	810,080
Insulators	118,950	0	118,950
Conductor, 4/0 CU and 336 ACSR	458,220	0	458,220
Skyline	0	0	0
Hardware from Tower Demo	36,600	0	36,600
Wood from Cribbing, etc.	2,000	0	2,000
Soil/Vegetation from Crane Pads and ROW	6,387,500	5,871,250	516,250
Miscellaneous	5,000	0	5,000
Sanitation Waste	12,432	0	12,432
66-kV Antelope Relocation Waste Estimate			
Insulators and Cross Arms	8,664	0	8,664
Poles	72,000	0	72,000
Conductor	16,128	0	16,128
500-kV Construction Waste Estimate			
Wood from Cribbing, etc.	160,000	0	160,000
Soil/Veg: Footings, Spurs, and Crane Pads	5,197,488	3,638,242	1,559,246
Removal of single-circuit 500-kV towers from Pardee-Vincent Corridor	1,256,000	0	1,256,000
Miscellaneous	40,000	0	40,000

Table B.2-8. Estimates of Construction Waste for the Proposed Project

Waste Item	Total Pounds	Reusable Pounds (On Site)	Recyclable/ Disposable Pounds
Sanitation Waste	58,368	0	58,368
Concrete	570,000	0	570,000
Antelope Substation			
Grading Element			
Soil/Vegetation	13,500,000	13,500,000	0
Sanitation Waste	500	0	500
Civil Element			
Wood	2,000	0	2,000
Concrete	2,000	0	2,000
Sanitation Waste	1,000	0	1,000
Miscellaneous	1,000	0	1,000
Electrical Element			
Wood	2,000	0	2,000
Steel/Aluminum/Copper	30,000	0	30,000
Sanitation Waste	1,500	0	1,500
Miscellaneous	2,000	0	2,000
Pardee Substation			
Civil Element			
Wood	1,000	0	1,000
Concrete	500	0	500
Sanitation Waste	200	0	200
Miscellaneous	200	0	200
Electrical Equipment			
Wood	1,000	0	1,000
Steel/Aluminum/Copper	5,000	0	5,000
Sanitation Waste	500	0	500
Miscellaneous	500	0	500

Source: SCE, 2004. Note: These are approximate numbers based on estimates derived from preliminary design concepts. Numbers are subject to change as the design is finalized.

B.2.2.1 Transmission Facility Construction

Construction of transmission facilities would consist of the establishment of marshalling yards for staging of materials and equipment, the completion of any roadwork, and the removal of 66-kV transmission line structures. Following construction, clean-up, and demobilization, disturbed areas in the ANF would be restored. The exact removal method and restoration measures employed and the sequence with which tasks are to be completed would depend upon final engineering, award and conditions of permits/authorizations, and contractor preference (SCE, 2004).

In order to allow continued operation of the existing Pardee-Vincent 500-kV transmission lines during construction of the proposed Project, a temporary bypass line would be constructed (see **Removal of Existing Structures**, below). A short outage of the Pardee-Vincent 500-kV line would be required to put this temporary bypass line into service. However, the line outage would occur when load from the Pardee-Vincent 500-kV transmission line could be transferred to other lines that remain in-service (SCE, 2005a).

Marshalling Yards

The marshalling yards would be used to stage materials and equipment, such as steel bundles, spur angles, palletized bolts, rebar, wire reels, insulators and hardware, heavy equipment, light trucks, construction trailers, portable sanitation facilities, and trash and recycle bins. Material that would be removed from the Antelope-Pole Switch 74 66-kV line (e.g., conductor, steel, concrete, and other debris) would also be temporarily stored at these sites. Preparation of the primary and secondary marshalling yards would include the application of road base, installation of perimeter fencing, and implementation of SWPPP conditions (SCE, 2005b).

Primary Marshalling Yard. A primary marshalling yard would be established adjacent to the existing Antelope Substation to take advantage of its central location, proximity to good access roads, and proximity to existing phone and power infrastructure. The primary marshalling yard would require an area of up to approximately five acres in size, and would be established at the onset of the Project for use throughout the construction period.

The exact location of the primary marshalling yard would depend upon the availability of suitable property in the area, and would be determined once the necessary Project permits have been acquired (SCE, 2005b). The process for acquiring marshalling yards would commence approximately nine months prior to construction (SCE, 2005b).

Secondary Marshalling Yards. Secondary marshalling yards would be established for short-term use near the construction sites and, if possible, would be located on previously disturbed property, abandoned excavations, operational industrial yards, or abandoned parking areas (SCE, 2004). The number and size of the secondary marshalling yards would depend upon a detailed ROW inspection; however the following four sites have been preliminarily identified (SCE, 2005b):

- Haskell Canyon Road near intersection of Petinger Canyon Road (non-NFS lands) on unimproved dirt lot(s).
- Larc Ranch at 29890 Bouquet Canyon Road (on stub access to Antelope-Pole Switch 74 66-kV line) (non-NFS lands) on a grass field.
- Spunky Canyon Road approximately 200 feet south of the intersection with Bouquet Canyon Road near existing LADWP facility (non-NFS lands in Green Valley) on a plowed dirt field.
- 12150 Elizabeth Lake Road (non-NFS lands) on an open grass field (fenced).

The final locations would not be chosen until biological and cultural resource studies have been conducted. These surveys would be conducted once the Project engineering has been finalized and the necessary permits have been acquired (SCE, 2005b). Any secondary marshalling yards proposed on NFS lands outside the 160-foot-wide ROW would be authorized under a separate temporary Special Use Permit from the Forest Service.

On average, the secondary yards would each require an area of 200 square feet; however, larger yards may be required (SCE, 2005b). It is assumed that secondary marshalling yards would be similar to the primary marshalling yard and impact an area of approximately 5 acres. Overall, Project staging areas (primary and secondary marshalling yards) would disturb approximately 25 acres of land, all of which would be restored to the conditions agreed upon in SCE's temporary entry permits with the property owners (SCE, 2005b).

Access and Spur Roads

The existing access roads that currently run between the tower sites would form the main transport route for most of the Project. Spur roads that lead from the access road to the tower sites already exist for some of the

proposed tower locations. Temporary new spur roads may be required for pulling locations along the ROW and for access to splice locations. To minimize land disturbance, SCE would use previously disturbed areas where feasible (e.g., existing ROWs and patrol roads) (SCE, 2004). A total of approximately 25.7 acres of land would be disturbed during road grading and clearing activities, of which approximately 22.6 acres would occur on NFS lands. Approximately 0.8 acres would be restored (0.5 acres on NFS lands) following Project construction. See Table B.2-7 for details of land disturbance associated with access and spur roads.

Existing Road Activities. Existing access and spur roads would be cleared of vegetation, blade-graded to remove potholes, ruts, and other surface irregularities, and re-compacted to provide a smooth and dense riding surface capable of supporting heavy equipment. These roads would be maintained throughout the life of the Project. The graded road would have a minimum drivable width of 12 feet, with a preferable shoulder width of two feet on each side. Drainage structures (e.g., wet crossings, water bars, overside drains, pipe culvers, energy dissipators) would be installed along spur and access roads to allow for construction equipment usage as well as to prevent erosion from uncontrolled water flow. Slides, washouts, and other slope failures would be repaired and stabilized along the roads by installing retaining walls or other means necessary to prevent future failures. The type of mechanically stabilized earth-retaining structure to be used would be based on site-specific conditions.

New Road Activities. Where possible, the construction of new lattice steel towers would occur on former tower sites, allowing for a high degree of overlap in spur road grading. The construction of new spur roads would be required for approximately 20 tower locations (1.7 miles per Table B.2-7). New roads would be a minimum of 12 feet wide, with grades varying from flat to approximately 15 percent, and would include the drainage structures and erosion controls described above.

Access Roads on NFS lands. Approximately ten spur roads to ten existing tower sites in the ANF are currently closed (i.e., gated), and the Forest Service has prohibited vehicle traffic. In order to remove existing 66-kV towers and construct the new 500-kV towers, the Forest Service would need to grant permission for the clearance and re-grading of these roads. In addition, new spur roads would be necessary to access new tower locations. Drainage structures would be installed as necessary to prevent erosion damage. The proposed Project includes having these roads remain open and be maintained by SCE.

Road-Building Equipment. Standard road-building equipment (see Table B.2-3) would be used for the grading and clearance of new and existing access and spur roads. Road building and upkeep would be an ongoing process during the construction and operation of all elements of the Project. In mountainous areas, benching may be required to provide access for equipment removal during footing construction, assembly, erection, and wire-stringing activities (i.e., pulling). Benching utilizes a tracked earth mover vehicle to excavate a terraced access to lattice steel towers in extremely steep, rugged terrain. The principal purpose is to ensure personnel safety during construction and to control costs in situations where potentially hazardous, manual excavations would be required. The Project would use benching when other options are not available. If erosion would likely occur at a bench location, SCE would work with the Forest Service to develop a revegetation plan that would minimize erosion while protecting the integrity of the electrical system, and provide safe access for maintenance and inspection (SCE, 2005a).

Removal and Disposal of Existing Structures

Antelope-Pole Switch 74 66-kV Line Removal. The Antelope-Pole Switch 74 66-kV line that is to be removed from Mile 1.1 to Mile 18.6 does not currently support load. The line allows SCE to use a capacitor

bank located at the Saugus 66-kV Substation. As an additional capacitor bank is currently planned to be in-service at the Antelope 66-kV Substation in 2005, no service interruptions are expected to occur during removal of the Antelope-Pole Switch 74 66-kV line (SCE, 2005a).

Within the Saugus-Del Sur Utility Corridor, SCE would remove approximately 119 existing 66-kV towers and associated hardware (i.e., insulators, vibration dampeners, suspension clamps, ground wire clamps, shackles, links, nuts, bolts, washers, cotters pins, insulator weights, and bond wires), including approximately 549,000 feet of 4/0 American Wire Gauge (AWG)[3] copper conductor (SCE, 2005b). Approximately 2.5 days would be required for the removal of each 66-kV tower (SCE, 2004).

SCE proposes to remove the existing 66-kV towers through the following activities:

- **Grading.** Grading activities near the existing 66-kV lattice steel towers may be required to ensure their safe removal.
- **Removal Crane.** For each tower, a crane pad of approximately 50 feet by 50 feet would be constructed to allow a tower removal crane to be set-up at a distance of 60 feet from the tower's center line. The crane rail would be located transversely from the tower locations.
- **Earth Disturbance.** Most of the existing tower footings would be abandoned in place, and earth-moving activities would be limited to pedestrian and light truck approach access only.
- **Steel Removal.** Any exposed steel work would be removed with the use of portable cutting equipment that would cut flush with the surface. To remove the steel, crews would drive a light duty truck to each footing area. No hazards would remain following tower removal.
- **Helicopter Use.** In the event that there are no existing access roads, contractors would hike in to the tower locations. Approximately one or two small helicopters would be used to transport equipment to tower sites for conductor and associated hardware removal. A large, heavy lift helicopter would be used for removal of the existing 66-kV towers. It is estimated that the small helicopter would operate up to eight hours per day, Monday through Saturday, while the large helicopter would operate approximately six to eight hours per day, over a period of eight days (SCE, 2005a). The removal process would take approximately 30 days to complete (SCE, 2005a). The operating area of the large helicopter would be limited to helicopter staging areas (Fox Air Field, Pardee Substation, and marshalling yards), material and equipment yards, and positions along the ROW (SCE, 2005a), which have previously been disturbed for other purposes and are considered to be safe locations for landing.

SCE proposes to remove the existing Antelope-Pole Switch 74 66-kV conductor wire through the following activities:

- **Wire Pulling Locations.** Wire-pulling locations that are an estimated 100 feet by 100 feet (0.23 acres) in size and would be sited no more than every 15,000 feet along the ROW, and would include dead-end towers and points of inflection. It is anticipated that the same locations for installation of the 500-kV line would be used for removal of the 66-kV line. Wire-pulling equipment would be placed intermittently along the ROW. Any wire pulling sites proposed on NFS lands outside the 160-foot wide ROW would be authorized under a separate temporary Special Use Permit.
- **Breakaway Reels.** The old conductor wire would be wound onto "breakaway" reels as it is removed.
- **Pulling Cable.** A 3/8" pulling cable would replace the old conductor as it is pulled out, thereby allowing complete control of the conductor during its removal. The 3/8" line would then be removed under controlled conditions to minimize ground disturbance, and all wire-pulling equipment would be removed.
- **Conductor Disposal.** The conductor would be transported to a material and equipment yard where it would be prepared for recycling.

[3] AWG describes the size of a wire. 4/0 AWG is 0.46 inches in diameter.

Pardee-Vincent 500-kV Line Removal. Within the Pardee-Vincent 500-kV ROW (Mile 20.3 to Mile 22.3), eight of the existing single-circuit 500-kV towers would be removed. The new double-circuit 500-kV towers would be built on the existing tower locations. Approximately 3.2 days would be required for the removal of each existing 500-kV tower (SCE, 2004). To allow for continued operation of the existing Pardee-Vincent 500-kV transmission line, a temporary bypass line would be constructed approximately 150 feet north of the existing line. The bypass line would consist of a wood pole design, and would utilize insulators, guys and anchors, and three conductors. Upon completion of the proposed Project, the bypass line would be removed and the ROW would be restored.

Disposal of Existing Transmission Facilities. Table B.2-8 provides an estimate of the Project construction waste that would be reused, recycled, or disposed. Recyclable or salvageable items would be handled by construction crews processing those materials into roll-off boxes that would be provided by Alpert and Alpert Iron and Metal (SCE, 2005b). Salvageable items (i.e., conductor, steel, hardware) would be received, sorted, and baled at Alpert, and then sold on the open market. Items to be recycled include 100 percent of the steel from lattice steel towers (i.e., towers, nuts, bolts, and washers), 100 percent of the conductor wire (i.e., all 4/0 copper, 336 ACSR overhead wire), and 100 percent of the hardware (i.e., shackles, clevises, yoke plates, links, or other connectors used to support conductor). Sanitation waste (i.e., human generated waste) would be recycled according to sanitation waste management practices (SCE, 2005b).

All waste materials that are not recycled would be characterized by SCE in order to guarantee proper final disposal. Examples of disposable waste include wood from cribbing and packing materials, soil and vegetative matter from excavations and land clearing activity, and miscellaneous refuse generated during construction. The following treatment storage disposal facilities are located in the vicinity of the Project, and may be used for the disposal of construction waste (SCE, 2005b):

- **Hazardous waste:** Clean Harbors Buttonwillow, Clean Harbors Los Angeles;
- **Non-hazardous waste:** Filter Recycling, TPS Technologies, Crosby & Overton, Demenno Kerdoon; and
- **Non-regulated municipal type waste:** Chiquita Canyon Landfill, Sunshine Canyon Landfill, Simi Valley Landfill, Lopez Canyon Landfill, Bradley Landfill.

Construction of Tower Sites and Associated Structures

The construction of three tubular poles would temporarily disturb approximately 0.27 acres of land, while construction of the 114 lattice steel towers and 30 guard poles (used to cross roads during construction) would temporarily disturb approximately 34.9 acres (includes 0.6 acres for twelve graded sites located off NFS lands), of which 17.3 acres would be on NFS lands. SCE has assumed that temporary land disturbance from lattice steel towers would be created from the grading of 12 tower pads specifically to meet topographic and/or drainage needs, the creation of 114 sets of tower footing holes, and for those towers not constructed by helicopter the truck damage during tower footing construction, 113 tower laydown and assembly areas, and 113 crane pads. For tower (LSTs and TSPs) and guard pole construction, approximately 34.5 acres total (17.3 on NFS lands) would be restored following Project construction (SCE, 2004). As such, the permanent land disturbance from three tubular steel poles would be 0.004 acres (all off NFS lands) and for 114 lattice steel towers would be 0.63 acres (includes 0.60 acres for twelve graded sites all located off NFS lands).

Construction of a 500-kV tower, which includes civil work, steel assembly, and erection, would take approximately 42 to 50 days, depending on road access (SCE, 2005a). SCE proposes to construct the 500-kV towers in three steps, as defined below:

Step 1: Creation of Level Pads. Where necessary, tower site would be graded or cleared to provide a reasonably level pad that is free of any vegetation hindering tower construction. Some tower sites would require grading to either widen the pads from the existing 66-kV towers or to create new pads (only 12 tower sites of the 114 tower sites would require this additional grading – all located off NFS lands), while other sites would be on relatively level areas that only require some vegetation removal. The graded tower sites would allow water to drain towards the direction of the natural drainage (minimum 2 percent slope). The drainage pattern would be created to prevent ponding and erosive water flow that could damage the tower footings and minimize the soil loss from erosion. The graded pad would be constructed to at least 90 percent relative density and would be capable of supporting heavy vehicular traffic. In most cases, the level pads could be utilized as part of the crane pads required for tower erection. Crane pads of approximately 50 feet by 50 feet would be used for assembly and erection of the new towers, and would be constructed to allow an erection crane to set-up 60 feet from each tower's centerline. The crane pad would be located transversely from the tower location. In areas where the creation of a level pad is not possible, construction by other means, such as by helicopter, would be considered.

Step 2: Footing Construction. Each of the new lattice steel towers would be constructed on four drilled pier concrete footings. Each tubular steel pole would be constructed on one drilled pier concrete footing. Footing dimensions would be dependent upon topography, tower height, span length, and soil properties. On average, a typical footing would have an aboveground projection of approximately three feet. Footing work would be constructed using standard "poured-in-place" augered excavation techniques. At the time of construction, elevations would be established, rebar cages set, spur angles and concrete placed, and survey positioning verified. Concrete samples would be drawn at the time of pour and tested to ensure that engineered strengths are achieved. On regular terrain, a single footing crew could excavate, place steel cages and spur angles, and pour in place concrete for one complete tower approximately every two days. Standard SCE 602 concrete requires approximately 20 working days to cure to 3,000 pounds per square inch (psi) compressive break strength, which is required for erection activity to commence.

Step 3: Steel Work. Several tractors with 40-foot floats and an on-site loader would haul and stack bundles of steel at each tower location. A combined erection and torqueing crew with a lattice boom crane would perform the steel work, which would include assembly of leg extensions, body panels, boxed sections, and bridges. During the steel work, the construction crew may opt to install insulators and wire rollers.

Remote Construction Sites. Preliminary siting of tower locations for the proposed Project indicate that all towers will be located adjacent to existing or planned access and/or spur roads, except for one tower which would require access by helicopter (see paragraph below). However, exact tower locations would not be determined until final design is completed. At that time, it may be determined that some tower sites would not be located adjacent to or within 50 feet of existing or planned access and/or spur roads. If that situation occurs, equipment and materials would be deposited at each site through the use of helicopters or workers on foot,[4] and the crew would prepare the footings using hand labor assisted by hydraulic or pneumatic equipment or other methods. Power tools and equipment that are walked to the site would be remotely connected to equipment located at the closest road position possible. During footing excavation, auger and concrete trucks that are permitted to drive across native vegetation would drill holes and pour concrete to form new tower footings. Cranes and other trucks would remain on the existing roads, while special rigging techniques and equipment (i.e., ropes, sheaves, winches) would be used to "fail-lead" heavy materials up the towers (SCE, 2005b).

[4] Towers would be accessed by foot only if they are situated within 50 feet of an existing road, and no new stub roads are planned (SCE, 2005b).

For tower sites located greater than 50 feet from the nearest road, a large helicopter would be used for the installation of the new 500-kV towers (SCE, 2005a and 2005b).[5] Use of helicopters for tower installation eliminates land disturbance associated with crane pads, structure laydown areas, and truck damage (specifically for installation of the towers). All digging work would be completed by hand with the assistance of portable compressors, portable hydraulic accumulators, and portable concrete mixers that would be flown into the tower sites (SCE, 2005b). The use of helicopters for the erection of towers would be in accordance with SCE specifications and would be similar to methods detailed in IEEE 951-1966, Guide to the Assembly and Erection of Metal Transmission Structures, Section 9, Helicopter Methods of Construction. During helicopter operations, public access to defined areas within the ANF would be restricted. Temporary road closures, traffic detours, and posted notices and signs would be used to block public access to restricted areas.

Wire Installation

Wire installation includes all activities associated with the installation of conductor wire onto the lattice steel towers and tubular steel poles, such as the installation of primary conductor and ground wire, vibration dampeners, weights, spacers, and suspension and dead-end hardware assemblies. Insulators and wire rollers would either be attached as part of the wire-stringing activity, if the work is a part of a reconductor effort, or would be attached during the steel erection process.

The length of any given continuous wire installation process between two selected points along a transmission line is termed a "wire pull". Wire pulls would be selected based on availability of dead-end towers at the ends of each pull, and on the geometry of the line as it is affected by the points of inflection, terrain, and suitability of pulling and splicing equipment set-ups. Wire pulls generally occur every 15,000 feet on flat terrain, and every 9,000 feet on mountainous terrain, while wire splices generally occur every 4,500 feet. For the proposed Project, a total of approximately 24 pulling set-ups (10 assumed on NFS lands) and 15 splicing set-ups (11 assumed on NFS lands) would be required (see discussion below under "Pulling and Splicing Locations").

On average, pulling and splicing equipment set-ups require an area of 200 feet by 200 feet; however, crews can work from within a substantially smaller area when necessary. SCE may prefer to establish equipment set-up positions between two suspension towers in which anchor rods could be installed, thereby allowing wire to be hard dead-ended against the anchor rods in the event of sagging, and to provide for convenient splicing capability (SCE, 2004). For each wire pull, a puller would be positioned at one end, while a tensioner and wire reel stand truck would be positioned at the other. Specialized support equipment such as skidders and wire crimping equipment would be strategically positioned to support the operations.

Wire-stringing activities would be conducted in accordance with SCE specifications, which is similar to process methods detailed in IEEE Standard 524-1992, Guide to the Installation of Overhead Transmission Line Conductors. A standard wire-stringing plan would include a sequenced program of events, beginning with determination of wire pulls and wire pull equipment set-up positions. Advanced planning by supervision would determine circuit outages, pulling times, and safety protocols required to ensure that safe and quick installation of wire is accomplished. On NFS lands, all work conducted outside the proposed 160-foot ROW width would require a temporary Special Use Permit from the Forest Service.

The following four steps describe the wire installation activities proposed by SCE:

[5] Only one tower, which is located on NFS lands, has been identified as requiring helicopter construction.

Step 1: Threading. A helicopter would fly a lightweight sock line from tower to tower, which would be threaded through the wire rollers in order to engage a cam-lock device that would secure the pulling sock in the roller. This threading process would continue between all towers through the rollers of a particular set of spans selected for a conductor pull.

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 conductor using a special swivel joint to prevent damage to the wire, and to allow the wire to rotate freely to prevent complications from twisting as the conductor unwinds off the reel.

Step 3: Clipping-In. A piece of hardware known as an alligator would be installed to properly feed the conductor into the roller, completing the wire installation phase.

Step 4: Spacers. Spacers would be attached between the bundled conductors of each phase. For this purpose, a lineman would ride a small spacer cart between the wires, which would periodically stop to attach the spacers. Pulling equipment from one end of the pull would be rotated 180 degrees to face the new pull direction, and the equipment from the other end of the pull would be "leapfrogged" to a new pulling position.

Helicopter Use. While only one small helicopter would be required for the wire installation phase, two helicopters may be used to shorten the time for this phase. On average, each helicopter would operate four hours per day during stringing operations. The installation of the conductor wire would take approximately 65 days to complete with the use of helicopters (SCE, 2005a). The operations area of the small helicopter would be limited to helicopter staging areas (Fox Field, Pardee Substation, and marshalling yards) and positions along the ROW that have previously been disturbed for other purposes and are considered to be safe locations for landing. Support trips may also be required to transport material and workers to the material and equipment staging areas. Staging areas (Fox Field, Pardee Substation, and marshalling yards) would be located as close as possible to the operation area, and would be sited through a screening process involving the helicopter contractor, private land owners, and land management agencies (SCE, 2004). On NFS lands, all work conducted outside the proposed 160-foot ROW width would require a temporary Special Use Permit from the Forest Service. The size of each staging area would be dependent upon the size and number of towers to be removed and installed. Staging areas would likely be relocated as work progresses along the transmission line (SCE, 2005a).

Helicopter fueling would occur at staging areas (Pardee Substation and marshalling yards) or at a local airport (Fox Field) 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 or at a staging area if adequate security is in place. It is not anticipated that helicopters would be parked overnight on NFS lands. Helicopter personnel would stay overnight at local lodging establishments (SCE, 2005a).

Public and Worker Safety. To ensure public and worker safety, safety devices such as traveling grounds, guard structures, and radio-equipped public safety roving vehicles and lineman would be in place prior to the initiation of wire-stringing activities. Guard poles or guard structures would be installed at all transportation, flood control, and utility crossings, and may also be installed at parks or near residences. Guard structures are temporary facilities designed to stop the travel of conductor should it momentarily drop below a conventional stringing height, and are removed following conductor installation. Typical guard structures are standard wood poles, 60 feet to 80 feet tall, and may in some cases consist of specially equipped boom type trucks with heavy outriggers. If required, temporary netting would also be installed to protect some types of under-built infrastructure (see Figure B.2-15).

Public agencies differ on their policies for guard structures and their preferred methods for public safety. For highway and open channel aqueduct crossings, SCE would work closely with the applicable jurisdiction to secure the necessary permits to string conductor across the applicable infrastructure. For major roadway crossings, one of the following methods is generally employed for public safety:

- Erection of a highway net guard structure system;
- Detour of all traffic off the highway at the crossing position;
- Implementation of a controlled continuous traffic break while stringing operations are performed; or
- Establishment of special line trucks with extension booms onto the highway deck at strategic positions.

SCE has estimated that approximately 30 guard poles would be required during construction of the proposed Project. A total of approximately 0.13 acres of land (0.04 acres on NFS lands) would be disturbed during guard pole construction (guard pole holes and guard pole trucks), all of which would be restored following removal of the guard poles (SCE, 2004). On NFS lands, if work is conducted outside the proposed 160-foot ROW width, a temporary Special Use Permit from the Forest Service would be required.

Pulling and Splicing Locations

A total of approximately 24 new pulling locations (10 assumed on NFS lands) and 15 new splicing locations (11 assumed on NFS lands) would be needed to construct the proposed Project. For stringing equipment that cannot be positioned at either side of a deadend transmission tower, field snubs (i.e., anchoring and dead-end hardware) would be temporarily installed to sag conductor wire to the correct tension (SCE, 2005b). The pulling and splicing set-up locations would be sited where existing spur roads or level pads are available, either near or between the existing towers. A few locations may require minor grading and vegetation removal. The set-up locations would be used to remove temporary pulling splices and install permanent splices once the conductor is strung through the rollers located on each tower, and are necessary as the permanent splices that join the conductor together cannot travel through the rollers. As shown in Table B.2-7, the pulling set-up locations are anticipated to disturb a total of approximately 5.5 acres (2.3 acres on NFS lands), whereas the splicing set-up locations would disturb a total of approximately 0.34 acres of land (0.25 acres on NFS lands).The total land disturbance for pulling and splicing locations would be approximately 5.9 acres (2.6 acres on NFS lands). This area would be restored following Project construction (SCE, 2004). On NFS lands, if work is conducted outside the proposed 160-foot ROW width, a temporary Special Use Permit from the Forest Service would be required.

Subtransmission Relocation

66-kV Subtransmission Line. Service interruptions are not expected to occur during relocation of the 66-kV subtransmission lines. The temporary outages that are necessary to install the new 66-kV sequences would be scheduled when the remaining 66-kV lines can safely serve the area load (SCE, 2005a).

All materials and equipment for the subtransmission relocation would be stored at the Antelope Substation, including conductor reels, wire-stringing equipment, poles, line trucks, cross arms, and insulators. For each of the three sequences, the first cable pull would occur at the southwesterly portion of the sequence, from which the crews would string to the most easterly pole. An 80-foot by 80-foot area at each pole would be required to negotiate the conductor pull.

Figure B.2-15. Typical Guard Structure
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The 66-kV subtransmission work would be completed in several phases, as described below (SCE, 2004):

- A 1,000-foot access road would be graded with the use of one diesel grader between Sequences 1 and 2 and between Sequences 2 and 3. The grader would run for approximately eight hours at low to medium speeds, with one hour of idling. Grading of the subtransmission line access roads would be completed in one day and would require one two-person crew.
- To construct the 18 new steel poles for relocation of the subtransmission lines, one six-person crew would dig pole holes with a contractor-supplied backhoe and a heavy line truck that has digging capability. The digging equipment would be diesel and would run for approximately six to eight hours with one hour of idling. The digging process would be completed in approximately three days.
- To frame the poles, one crew of five to seven people would work over a period of approximately three days. Equipment for framing poles would include one 22-ton, 235 HP diesel transmission line truck, to be operated five hours per day; a one-ton, 180-HP diesel utility truck, to be operated 7.5 hours per day; and one 180-HP gas Suburban, to be operated 7.5 hours per day (SCE, 2005b).
- The steel poles would be delivered to their locations, and one six-person crew would construct the poles together and set them. Equipment for pole construction would include one 25-ton diesel crane, one heavy line diesel truck, one diesel prefabrication truck, and one gas-powered utility vehicle for crew transport, to be operated as needed for eight to ten hours per day. Setting the poles would be completed in approximately 1.5 weeks.
- To install the overhead subtransmission conductor wire, activities would include splicing, dead-ending, terminating, sagging, and clipping in the conductor. Installing the conductor would require one heavy line diesel truck, one diesel bucket truck, one diesel prefabrication truck, one diesel crane, one gas-powered utility vehicle for crew transport, pulling machines, and cable dollies and traffic arrow boards as required. This equipment would be operated as needed for eight to ten hours per day, and conductor installation would be completed in approximately 1.5 weeks.
- The abandoned poles and conductor would be removed by one six-person crew with the use of a heavy line diesel truck, a diesel bucket truck, a diesel prefabrication truck, a diesel crane, a gas-powered utility vehicle for crew transport, pulling machines, and cable dollies. This equipment would be operated as needed for eight to ten hours per day, and the removal process would be completed in approximately four days.

12-kV Circuit. In order prevent service disruptions during the relocation of the existing 12-kV circuit that parallels the Antelope-Pole Switch 74 66-kV line (Mile 1.2 to Mile 4.7), the existing load would be served from a different distribution circuit until the new 12-kV line section is in service (SCE, 2005a).

To relocate the 12-kV circuit within the new 500-kV ROW, approximately 0.08 acres of land would be disturbed, all of which would be restored following construction (SCE, 2004). None of the existing wood poles would be removed, and an additional 115 new wood poles would be constructed over 4.1 miles. To relocate the 12-kV circuit within the ROW along Johnson Road, approximately 194 wood poles would be removed and 283 new wood poles would be installed. For either location, one six-person crew would work for 280 days to relocate the 12-kV circuit, and would require the following equipment: one 200-HP diesel line truck, to be operated eight hours per day, five days per week; and one 180-HP gas crew truck, to be operated seven hours per day, five days per week (SCE, 2005b).

B.2.2.2 Substation Facility Construction

Antelope Substation

At Antelope Substation, approximately two acres of land would be permanently disturbed during the 220-kV improvements. Construction activities at the substation would include grading and construction of perimeter fences, foundations, and belowground facilities, followed by the installation of aboveground structures and electrical equipment. Antelope Substation would not require any capacitor banks.

SCE's construction crews or contractors would generally be scheduled during daylight hours, Monday through Friday. Extended hours or days may be required in order to meet schedule requirements. In the event that construction must occur outside of the specified hours, a variance would be obtained. A guard service would be utilized on weekends and during non-construction hours during the week.

220-kV Substation Improvements. All materials for the substation improvements would be delivered via truck to the site. Construction material would be staged along the north perimeter fence during construction. Truck traffic would use major streets and would be scheduled for off-peak traffic hours.

Table B.2-9 lists the number of construction personnel and equipment that would be required during the 220-kV improvements. These numbers do not include the 500-kV switchyard expansion, since the timing of this expansion is currently unknown, and the work is not concurrent with or immediately following the 220-kV improvements.

Table B.2-9. Labor Force Requirements for Antelope Substation 220-kV Improvements

Construction Element	No. of Personnel	Equipment Requirements	
Grading Crew	4	(1) 980 Loader	(1) Grader
		(1) Compactor (sheep's foot)	(1) Water truck
		(1) Survey Truck	(1) Soils Test Crew Truck
Survey Crew	2	(1) Survey Truck	
Civil Crew	8	(1) Office Trailer	(2) Crew Trucks
		(1) Dump Truck	(1) 5-Ton Truck
		(1) Ditch Digger	(8) Personal Cars
		(1) Driller	(1) Crane
		(2) Tractors	(1) Forklift
		(1) Trash Dumpster	
Electrical Crew	10	(1) Office Trailer	(1) 5-Ton Truck
		(2) Crew Trucks	(2) Carryall Vehicles
		(1) 150-Ton Crane	(2) Dumpsters
		(10) Personal Cars	(1) Crane Truck
		(1) Pickup	(1) Forklift
		(2) Manlifts	(2) Support Trucks
Maintenance Crew	5	(1) Foreman Truck	(2) Crew Trucks
		(1) Forklift	(1) Gas Processing Trailer
Test Crew	2	(1) Test Truck	

Source: SCE, 2004. Note: These are approximate numbers based on estimates derived from preliminary design concepts. Numbers are subject to change as the design is finalized.

Upon completion of the substation improvements, all construction debris would be placed in appropriate on-site containers and periodically disposed of according to all applicable regulations.

The following is a discussion of the proposed 220-kV substation improvements at Antelope Substation.

- **Grading Activities.** During the 220-kV substation improvements, an area of 220 feet by 330 feet would be graded with untreated crushed rock on the southwest corner of the existing substation site, to be used for a 205-foot by 300-foot expansion of the substation. During grading activities, one water truck would be in continuous usage at the substation and would make approximately eight trips per day. An estimated 8,000 gallons of water per day (or 80,000 gallons over the 10 days) would be used during substation grading. A list of required grading equipment is included in Table B.2-10.

Table B.2-10. Antelope Substation Grading and Fencing Equipment

Type of Vehicle	No. of Vehicles	Fuel Consumption per 8-hr day (gallons)	Duration (Days)
980 Loader	1	60	10
Grader	1	60	10
Compactor (sheep's foot)	1	30	10
Water truck	1	30	10
Survey Truck	1	5	10
Soils Test Crew Truck	1	5	10

Source: SCE, 2004. Note: These are approximate numbers based on estimates derived from preliminary design concepts. Numbers are subject to change as the design is finalized.

Within the graded area, the following expansion equipment would be installed: two bus dead-end structures, four line dead-end structures, two 210-foot segments of bus conductor, six circuit breakers, and 14 disconnect switches. New lighting fixtures would also be installed at the 220-kV switchyard expansion area. These fixtures would be shielded and directed towards the grounds, and would be manually operated.

- **Fencing.** Approximately 710 feet of new fencing would be installed around the substation and the 205-foot by 300-foot expansion, and would include extending the west perimeter fence 205 feet to the south, removing 300 feet of southern fence from the southwest corner and installing 300 feet of new fence along the southern end, and installing 205 feet of new fence along the eastern end. See Table B.2-10 for a list of the equipment required during substation fencing.
- **Control Cable Trench.** The 220-kV substation improvements would include the installation of approximately 1,000 feet of new control cable trench from the new MEER to the four line positions occupying the extended area of the substation.
- **Bus Conductors.** During the improvements, the existing 220-kV buses would be upgraded from a 3,000A rating to a 3,700A rating, which would require the following elements:
  - Six bus dead-end structures;
  - 24 bus dead-end insulator assemblies; and
  - 720 feet of 2B-1590 kcmil ACSR bus conductors (approximately 4,500 feet total).

  Prior to the upgrade of the 220-kV buses, SCE would replace six 38-foot-high by 40-foot-wide lattice bus dead-end structures with six new rigid steel structures that support heavier conductors. The 24 existing bus dead-end insulator assemblies would be removed and salvaged, and 24 new insulator assemblies would be installed. With the removal and salvage of 720 feet of 2B-1590 kcmil ACSR bus conductors, 720 feet of new bus conductors (approximately 4,500 feet total) would be installed. The 220-kV buses would be extended to the south with the use of the following equipment:
  - Two 45-foot-high by 45-foot-wide bus dead-end structures and foundations;
  - 12 insulator dead-end assemblies;
  - Two 210-foot segments of East and West buses equipped with 2B-2156 kcmil ACSR conductors per phase (approximately 2,560 feet total); and
  - Approximately 1,000 feet of new control cable trench from the new switchyard extension to the new MEER.
- **Line Positions.** As discussed in Section B.2.1.3, four new line positions would be installed at the substation. Creation of the 220-kV double-breaker lines for Positions 10, 12, and 13 would require the following equipment:
  - One 60-foot-high by 45-foot-wide line dead-end structure and foundation;
  - Three 60-foot tie-downs with 2B-1590 kcmil ACSR conductors;
  - Three 220-kV capacitor voltage transformers;
  - Two 220-kV 3,000A 40kA circuit breakers and foundations;

- Four 220-kV group operated, horizontally mounted disconnect switches with support structures and foundation, one of which is equipped with grounding attachments; and
- Three 200-foot segment of 2B-1590 kcmil ACSR conductors (approximately 600 feet total).

The 220-kV double-breaker line for Position 11 would be installed with the following equipment:

- One 60-foot-high by 45-foot-wide line dead-end structure and foundation; and
- Two 220-kV group-operated, horizontally mounted disconnect switches with support structures and foundation, with one at each bus. The two bus disconnect switches would be required to minimize outages during the installation of equipment for the future Vincent 500-kV transmission line that has been proposed by SCE.

Line Position 8 would be upgraded to a 3,000A rating to allow a third party to terminate the 220-kV generation tie line, and would require the following upgrade activities:

- Three existing 60-foot 1,033 kcmil ACSR tie-downs would be replaced with new 2B-1590 kcmil ACSR;
- Four existing 1,200A-rated disconnect switches would be replaced with new 3,000A-rated switches;
- Four existing disconnect switch structures and foundation would be replaced;
- Existing 1,033 kcmil ACSR conductors (approximately 150 feet) would be replaced with new 2B-1590 kcmil ACSR (approximately 300 feet); and
- Three existing coupling capacitor voltage transformers would be reconnected to new conductors.

In order to minimize outages during the installation of the future substation, one 500-kV transmission line has been proposed by SCE, and two existing bus disconnect switches and bus leads in Line Position 6 would be upgraded through the following procedures:

- Two existing 1,200A-rated disconnect switches would be replaced with new 3,000A-rated switches;
- Two existing disconnect switch structures and foundations would be replaced; and
- Existing conductors between each bus and the bus disconnect switch would be replaced with new 2B-1590 kcmil ACSR.

500-kV Substation Expansion. Following the 220-kV substation improvements, SCE has proposed a 500-kV expansion of Antelope Substation that would include the following activities:

- **Property Acquisition and Expansion.** For the future 500-kV substation facility, the existing substation would expand an additional 1,145 feet by 1,185 feet, which would include the 205-foot by 300-foot expansion for the 220-kV improvements. Property acquisition would also require an additional 200-foot-wide strip around the southerly and easterly boundaries outside of the newly fenced area for future 66-kV line relocations.
- **Fencing.** During the 500-kV expansion of the Antelope Substation, approximately 4,155 feet of perimeter fencing would be installed around the switchyard. New perimeter fencing would be eight feet in height, chain-link, and topped with barbed wire. A minimum of two, 24-foot wide by eight-foot high, chain-link, double drive gates with barbed wire would also be installed. A list of the fencing equipment required for the substation perimeter and the 205-foot by 300-foot expansion area, and associated fuel consumption, is included in Table B.2-10.

Pardee Substation

At the 500/220-kV Pardee Substation that is currently owned by SCE, the construction of foundations and belowground facilities would be followed by the installation of aboveground structures and electrical equipment. No capacitor banks would be required at the substation, and no additional lighting fixtures would be installed.

To allow the proposed Project to terminate at the substation, the following equipment would be installed at the existing 220-kV Line Position 5:

- Three 80-foot tie-downs with 2B-1590 kcmil ACSR conductors;
- Three 220-kV capacitor voltage transformers;
- Two 220-kV 3,000A 40kA circuit breakers and foundations;
- Four 220-kV group operated, horizontally mounted disconnect switches to be installed on existing support structures and foundations, of which one would be equipped with grounding attachments; and
- Three 200-foot segment of 2B-1590 kcmil ACSR conductors (approximately 1,200 feet total).

The proposed Project would also upgrade 15 existing 220-kV 50-kA circuit breakers to 60-kA rating through the installation of 15 transient recovery voltage line-to-ground capacitors. In the Pardee Substation Control Room, protection relays and associated equipment would be installed as required.

As described for Antelope Substation, SCE's construction crews or contractors would generally be scheduled during daylight hours, Monday through Friday. Extended hours or days may be required in order to meet schedule requirements. In the event that construction must occur outside of the specified hours, a variance would be obtained.

All materials for the substation improvements would be delivered via truck to the site. Construction material would be staged along the east perimeter fence during construction. Truck traffic would use major streets and would be scheduled for off-peak traffic hours. If approved, a landing zone and staging area would be located inside the Pardee Substation on an existing landing pad. Touchdowns of short durations would periodically occur to offload workers and materials (SCE, 2005a).

Table B.2-11 lists the number of construction personnel and equipment that would be required during the modification of the Pardee Substation.

Table B.2-11. Labor Force Requirements for Modification of Pardee Substation

Construction Element	No. of Personnel	Equipment Requirements	
Civil Crew	6	(1) Office Trailer (1) Dump Truck (1) Ditch Digger (1) Driller (2) Tractors (1) Trash Dumpster	(2) Crew Trucks (3) 5-Ton Trucks (8) Personal Cars (1) Crane (1) Forklift
Electrical Crew	8	(1) Office Trailer (2) Crew Trucks (1) 150-Ton Crane (10) Personal Cars (1) Pickup (2) Manlifts	(1) 5-Ton Truck (2) Carryall Vehicles (4) Dumpsters (1) Crane Truck (1) Forklift (2) Support Trucks
Maintenance Crew	5	(1) Foreman Truck (1) Forklift	(2) Crew Trucks (1) Gas Processing Trailer
Test Crew	2	(1) Test Truck	

Source: SCE, 2004. Note: These are approximate numbers based on estimates derived from preliminary design concepts. Numbers are subject to change as the design is finalized.

Following completion of the substation improvements, all construction debris would be placed in appropriate onsite containers and periodically disposed of according to all applicable regulations during construction.

B.2.2.3 Information Technology Facility Construction

The proposed Project would install optical ground wire (OPGW) as part of the new transmission lines. Within the Antelope and Pardee Substations, conduits would be constructed to extend the fiber optic cable to the communication rooms. No new roads, grading, or laydown areas other than those required for transmission line and substation construction would be needed (SCE, 2004).

B.2.3 Facility Operations and Maintenance

The proposed Project would not require any additional personnel during operation of the new transmission facilities (SCE, 2004). Operation and maintenance of the proposed Project would involve a periodic inspection (e.g., once per year) via helicopter and truck. Maintenance of the transmission lines would be performed on an as-needed basis, and would include maintenance of access roads and erosion/drainage control structures (SCE, 2004).

SCE would operate and maintain all of the proposed Project components (i.e., transmission lines and substation facilities) in accordance with existing SCE procedures and personnel (SCE, 2004). SCE would also implement an operation-phase storm water management plan and hazmat business plan to minimize the potential for accidental release of hazardous materials during operation of the substations (SCE, 2005a).

The installation of telecommunications infrastructure would not change staffing for the existing telecommunication sites. All telecommunications equipment would be operated and maintained by SCE technicians. Preventative maintenance of telecommunications infrastructure, which would be located between the Antelope and Pardee Substations on existing SCE infrastructure and on the new transmission line, would typically be scheduled every six months to ensure system reliability and performance (SCE, 2004).

B.3 Project Alternatives Screening Overview

The range of alternatives in this report was identified through the CEQA/NEPA scoping process, and through supplemental studies and consultations that were conducted during the course of this analysis. The range of alternatives considered in the screening analysis encompasses:

- Alternatives identified by SCE and as subsequent refinements to the proposed route;
- Alternatives identified by the Tehachapi Collaborative Study Group (TCSG), which was formed to provide guidance to the CPUC on how to proceed with transmission planning in the Tehachapi region;
- Alternatives identified by the EIR/EIS team as a result of the independent review of the alternatives and meetings with affected agencies and interested parties;
- Alternatives requested by the NEPA Lead Agency (USDA Forest Service); and
- Alternatives identified by the general public during the Scoping period (June-July 2005) held in accordance with CEQA/NEPA requirements.

This section summarizes the alternatives screening process used to formulate the range of alternatives analyzed in this EIR/EIS. Detailed documentation of the alternatives screening process is presented in Appendix 1 (Alternatives Screening Report).

B.3.1 CEQA and NEPA Requirements for Alternatives Assessment

An important aspect of the environmental review process is the identification and assessment of a reasonable range of alternatives. Both the State CEQA Guidelines (Section 15126.6[d]) and the NEPA Regulations (40 CFR Section 1502.14) require the selection of a reasonable range of feasible alternatives to the proposed Project, including a No Project (CEQA)/Action (NEPA) alternative.

The State CEQA Guidelines require consideration of a range of alternatives to the project or project location that: (1) could feasibly attain most of the basic project objectives and (2) would avoid or substantially lessen any of the significant impacts of the proposed project. Per CEQA, an alternative cannot be eliminated on the basis that it would be more costly than other alternatives, or on the basis that it would impede the attainment of project objectives to some degree. The State CEQA Guidelines state that an EIR need not consider an alternative whose effects cannot be reasonably ascertained and whose implementation is remote or speculative. CEQA requires that an EIR include sufficient information about each alternative to allow meaningful evaluation, analysis, and comparison with the proposed Project.

The NEPA Regulations (Section 1502.14 (c)) also identify the need to consider reasonable alternatives, including those not within the jurisdiction of the lead agency. In addition, NEPA (40 CFR Section 1502.23) states that the merits and drawbacks of the alternatives need not be displayed in a monetary cost/benefit analysis and that economic concerns should not outweigh important qualitative considerations. According to NEPA, the EIS should indicate all considerations that may be relevant and important to decision-makers, including factors not related to environmental quality. NEPA requires substantial treatment to each alternative considered in detail, including the proposed action (Project), so that reviewers may evaluate their comparative merits (40 CFR Section 1502.14).

B.3.2 Alternatives Screening Methodology

An alternatives screening process was used for the EIR/EIS analysis to eliminate alternatives that do not conform to CEQA and NEPA requirements. A variety of alternatives to the proposed Project were proposed for consideration in establishing a reasonable range of alternatives during the EIR/EIS scoping process. The Alternatives Screening Report in Appendix 1 describes each of the alternatives in detail and presents the rationale for eliminating or retaining potential alternatives. The alternatives screening process for this EIR/EIS consisted of the following three steps:

Step 1: Develop adequate descriptions of the alternatives to allow comparative evaluation.

Step 2: Evaluate each alternative using the following criteria:

- Technical, economic, and regulatory feasibility;
- Consistency with the Project purpose (objectives) and public policy objectives; and
- Potential to eliminate significant environmental effects over the proposed Project.

Step 3: Determine suitability of the proposed alternative for full analysis in the EIR/EIS. If the alternative is unsuitable, eliminate it from further consideration in the EIR/EIS.

In the final phase of the screening analysis, the advantages and disadvantages of the remaining alternatives were carefully weighed with respect to potential for overall environmental advantage, technical feasibility, and consistency with project and public objectives. These criteria are discussed in the following sub-sections.

B.3.2.1 Potential to Eliminate Significant Environmental Effects

A key CEQA requirement for an alternative is that it must have the potential to "avoid or substantially lessen any of the significant effects of the project" (State CEQA Guidelines Section 16126.6[a]). If an alternative was identified that clearly does not have the potential to provide an overall environmental advantage as compared to the proposed Project, it was eliminated from further consideration. At the screening stage, it is not possible to evaluate all of the impacts of the alternatives in comparison to the proposed Project with absolute certainty, nor

is it possible to quantify impacts. However, it is possible to identify elements of an alternative that are likely to be the sources of impact and to relate them, to the extent possible, to general conditions in the subject area.

Forest Service NEPA guidance states an important criterion for developing alternatives is to produce important environmental changes. The range of alternatives does not prematurely foreclose options that might protect, restore, and enhance the environment (Forest Service Handbook 1909.15, 14.2).

During the alternatives screening process, a preliminary assessment of potential Project impacts was conducted to determine whether an alternative met the CEQA requirement to reduce or avoid potentially significant effects of the proposed Project and NEPA guidelines to produce important environmental changes. This preliminary assessment of potential impacts is presented in the Alternatives Screening Report in Appendix 1.

B.3.2.2 Feasibility

In accordance with CEQA, the EIR is expected to fully analyze all alternatives that are feasible, while still meeting most of the project objectives. According to the State CEQA Guidelines (Section 15126.6[f][1]), among the factors that may be taken into account when addressing the feasibility of alternatives include site suitability, economic viability, availability of infrastructure, general plan consistency, other plans or other regulatory limitations, jurisdictional boundaries, and proponent's control over alternative sites in determining the range of alternatives to be evaluated in the EIR. The State CEQA Guidelines require consideration of alternatives capable of eliminating or reducing significant environmental effects even though they may "impede to some degree the attainment of project objectives or would be more costly" (Guidelines Section 16126.6[b]). For the proposed Project's screening analysis, the overall feasibility of potential alternatives was assessed taking into consideration the specific economic, legal (regulatory), and technical feasibility of each alternative. These factors are described in detail in the Alternatives Screening Report in Appendix 1.

According to Forest Service direction "reasonable" alternatives must meet the purpose and need of the proposed action (Project) and specify any activities that may produce important environmental changes. Alternatives are considered reasonable even if they are outside the jurisdiction of the Forest Service (Forest Service Handbook 1909.15, 14.2). In determining the scope of alternatives to be considered, NEPA places emphasis on whether a potential alternative is reasonable, and not whether the applicant supports or is capable of carrying out a particular alternative. Reasonable alternatives include those that are practical or feasible from the technical and economic standpoint and use common sense, rather than simply desirable from the standpoint of the applicant (Forest Service Handbook 1909.15, 65.12, 2a).

B.3.2.3 Consistency with Project Purpose/Objectives

CEQA (State CEQA Guidelines Section 15124[b]) and NEPA (40 CFR Section 1502.13) both explain that an agency's statement of objectives or purpose and need should describe the underlying purpose of the proposed project and reasons to which an agency is responding. For the proposed Project, the Applicant (SCE) and the two Lead Agencies (CPUC and USDA Forest Service) each have a unique jurisdiction and therefore unique objectives, which are described in Section A.3. These objectives include the following:

- SCE's purpose and need for the approval and implementation of the proposed Project is to provide accommodation of local and regional potential for power generation, while also preventing the overloading of existing transmission facilities and complying with reliability planning criteria. Per CPUC Decision 04-06-010, Ordering Paragraph No. 8, SCE is required to "…file an application seeking a certificate authorizing construction of the first phase of…transmission upgrades consistent with its 2003 conceptual study and the [Tehachapi Collaborative] study group's recommendation…"

- The CPUC's purpose and objectives in approving the proposed Project is to facilitate the achievement of the State of California's goals for the distribution of renewable energy generated by IOUs operating within California. As a crucial step in fulfilling this purpose, the CPUC must explore possibilities for the removal of constraints on the transmission of electricity from its point of generation to its point of use. In addition, the CPUC must attempt to further the implementation of other State policies and programs related to power generation and transmission.
- The purpose and need for action by the USDA Forest Service is to respond to SCE's request for a Special Use authorization to construct, use, and maintain the proposed Project through NFS lands, while complying with the 2005 ANF Land Management Plan (Forest Plan) direction. The Forest Service objectives (purpose) are described in Section A.3.3. In order to authorize SCE to occupy and use NFS lands for the proposed Project, the Forest Service would need to change incompatible management direction in the Forest Plan so that all actions occurring on National Forest System lands are consistent with the Forest Plan, per 36 CFR 219.10(e).

In summary, the combined purpose and need of the proposed Project is to: (1) accommodate local and regional potential for power generation by facilitating the distribution of renewable energy; (2) prevent overloading of existing transmission facilities; (3) comply with reliability planning criteria and other State policies and programs related to power generation and transmission; and (4) minimize adverse effects on NFS lands, minimize adverse effects to Forest Management activities, and comply with 2005 ANF Land Management Plan direction.

As a result of the guidance provided by NEPA and CEQA, the screening analysis did not focus on economic factors other than consideration of whether the alternatives were economically feasible. Therefore, alternatives capable of eliminating or reducing significant environmental effects were considered even though they could impede the attainment of the Project objectives or prove to be more costly.

B.3.3 Screening Results

Proposed alternatives identified by the Applicant (SCE), the CEQA Lead Agency (CPUC), the NEPA Lead Agency (USDA Forest Service), the EIR/EIS team, and the public are discussed in the sections that follow. Section B.3.4 describes alternatives that were eliminated from further analysis and Section B.4 provides a description of all alternatives carried forward for analysis in this EIR/EIS. Alternatives considered included: (1) design variations to the proposed Project; (2) transmission alternatives that would be routed along a new corridor or an existing corridor, other than the proposed Project; and (3) other transmission system alternatives. All potential alternatives were considered during the screening process using the methodology described in Section B.3.2. Below is a summary of the screening criteria as it was applied to the various alternatives.

Criterion 1: Project Objectives, Purpose, and Need

Several of the alternatives that were considered for analysis are design variations to SCE's proposed transmission line route between the Antelope and Pardee Substations. All of these design modification alternatives would meet the objectives, purpose, and need described for the proposed Project. Several other alternatives that were considered would provide for a transfer of electricity to Vincent Substation instead of Pardee Substation. This would meet SCE's objectives, but would introduce reliability considerations that conflict with the purpose and objectives of the CPUC.

Those alternatives which provide for electricity transfer capabilities in amounts less than 500 kV (220-kV single-circuit or double-circuit) would not meet CAISO's approval for installation of a 500-kV transmission line, which would avoid the need to construct and/or tear down and replace multiple 220-kV facilities with 500-kV facilities to accommodate future potential additional wind generation that is expected to occur north of the Antelope Substation based on previous studies of the area.

Criterion 2: Feasibility

The alternatives vary in their ability to meet economic, legal (regulatory), and technical feasibility criteria. Technical feasibility issues for the alternatives were related primarily to physical constraints, such as engineering or design limitations for construction on steep slopes. Other alternatives had legal (regulatory) feasibility problems associated with their compatibility with reliability planning criteria, including that developed by the CAISO, the Western Electricity Coordinating Council (WECC), and the North American Electric Reliability Council (NERC). Economic feasibility issues were related to construction costs, where "reasonable costs" would be passed on to rate payers through retail rates (California Public Utilities Code Section 399.14(e)), as approved by FERC in July 2005 (112 FERC 61,014, Docket No. EL05-80-000).

Criterion 3: Environmental Effects

The potentially significant environmental impacts of the proposed Project were identified during the screening process and are described in the Alternatives Screening Report (Appendix 1, Table 1-1). Each alternative was evaluated as to its overall ability to reduce or avoid significant environmental impacts of the proposed Project. In some cases, an alternative may reduce or eliminate an impact of the proposed Project, but it may create a new significant effect in a different discipline or geographic area. In these cases, the aggregate environmental effects of the proposed Project segment and the alternative segment were compared to determine whether the alternative met the overall CEQA/NEPA requirements of reducing significant environmental effects (CEQA) and producing important environmental change (NEPA).

B.3.4 Alternatives Eliminated from Further Consideration

The following potential alternatives were eliminated from full consideration in this EIR/EIS. A brief summary of each eliminated alternative is provided below. Detailed analysis of each eliminated alternative is presented in the Alternatives Screening Report in Appendix 1.

B.3.4.1 Antelope-Pardee Forest Underground Alternative

Description

The USDA Forest Service requested SCE to evaluate undergrounding the proposed transmission line across NFS lands in the ANF. In this alternative, the Forest Service would issue SCE a 50-year term Special Use Easement (for the improvements as noted below on NFS lands). This alternative was developed in response to the Forest Services purposes (objectives) noted in Section A.3.3. of this document (i.e., minimize the effects of urbanization, or negative effects to open space and natural settings on the ANF, reduce the risk of avian collisions and electrocutions, and reduce the adverse impacts to Forest Management activities).

The Antelope-Pardee Forest Underground Alternative would follow the proposed Project route, but would place the 500-kV transmission line underground through the ANF between Mile 5.7 and Mile 18.6 (12.9 miles) (Refer to Section B.4.1 for a complete description of underground construction) using Solid Dielectric (XLPE) Transmission Cables (Refer to Appendix 1 for a description of the various 500-kV underground technologies commercially available and the rationale for use of XLPE). A transition station would be required at each end of the underground segment to transfer the 500-kV transmission lines from overhead to underground and vice versa. This alternative would also include the removal of 119 existing 66-kV towers from the Saugus-Del Sur Utility Corridor, as would be done for the proposed Project.

Installation of an underground transmission line would require grading and clearing of trees and vegetation along the entire length of the ROW through the ANF (12.9 miles, of which 12.6 miles would be on NFS lands) prior to trenching, similar to pipeline construction, providing for an 85-foot wide construction zone above the continuous trench. Construction of each transition station would require a footprint of approximately 2 to 3 acres. Underground splicing vaults would be constructed along the trench alignment approximately every 1,200 to 2,000 feet depending on the amount of cable stored on a transportation spool or the maximum pulling tension that may be placed on the cables when they are pulled into the pipe. These concrete vaults would consist of an underground room 10 feet wide by 10 feet deep by 35 feet long, or 3,500 cubic feet. Once the pipe and trench system is complete, the transmission cables would be pulled into the pipe sections between vaults and spliced together at each vault. Following construction, the area above the trench and vaults would remain cleared to allow access to the vaults for cable and splice monitoring. Whenever possible, existing roads would be utilized to minimize new access road construction; new access roads would be created or improved to handle large construction vehicles and trucks hauling reels of cable. On steeper slopes, switchback roads may be required for large construction vehicles. As such, construction of an underground transmission line would require substantially more construction activity and ground disturbance than overhead transmission lines resulting in much greater construction-related impacts, such as air quality, biology, traffic, and noise.

In addition to the greater land disturbance, installation of an underground transmission line would require a longer construction schedule than for an equivalent length of overhead line because of the time required for excavating trenches and constructing the duct banks and/or splicing vaults, which are not required for overhead construction. For example, overhead construction activities at a particular site would be anticipated to last no more than a day, whereas underground construction activities at any one location would be expected to last for approximately one month. The construction schedule could also be substantially extended due to restrictions on the times of the year available for construction, the severity of winter weather, and/or efforts to limit the impacts on the environment.

The feasibility of underground construction through the ANF, which would consist of undergrounding for approximately 12.9 miles through rugged terrain, is also a concern due to (1) technical/engineering issues associated with underground construction near an active fault zone, and (2) installation of underground cables on steep slopes. The underground portion of the transmission line route would be located within approximately one mile of the active San Andreas Fault zone (located near Mile 4.7), where a seismic event could expose the cable to potential fault rupture, landslides, local ground cracking and/or subsidence, and groundshaking, which could damage the underground cable and result in it not being able to transmit power. This would present a significant reliability concern, which would challenge the feasibility of underground construction near an active fault zone. Placing cables on a slope for any significant distance is also a concern, as there is a risk of movement of the cable down slope due to either gravity or contraction and expansion effects. While there are no hard and fast specific guidelines on slope limitations, and free-laying cables have been placed on slopes that range from five to eight percent for relatively short distances (less than 500 feet), cable grappling or retention systems would need to be considered if the cable slope is in excess of five percent for distances greater than 500 feet. The topography along the 12.9 mile route through the ANF includes gullies and ravines along narrow ridges. This results in steep slopes in multiple areas over distances greater than 500 feet. Significant cable slopes with cable retention systems are rarely used due to the potential for the attachments to introduce physical, electrical, and thermal stress points that can result in cable failures.

As a result of the considerable construction activities associated with undergrounding transmission lines, the associated costs are substantially greater per mile than the cost of installing overhead transmission lines

(approximately 10 times more expensive). As such, the cost of undergrounding the transmission line within the ANF for approximately 12.9 miles could be cost prohibitive (economically not feasible).

Reasons for Elimination

The rationale for elimination of this potential alternative is fully described in the Alternatives Screening Report (Appendix 1). In summary, this alternative was eliminated from detailed analysis in the EIR/EIS for the following reasons:

- Installation of an underground transmission line across the entire ANF is technically infeasible considering the mountainous terrain and the technical limitations to installing 500-kV conductor underground on steep slopes.
- Compared to overhead construction, underground construction would reduce visual impacts, risk of avian collision and electrocution, and reduce conflicts with wildland fire suppression tactics (strategy); however, it would result in greater impacts to air quality, biology, traffic, and noise during construction, and increase the disturbance duration (extended construction schedule).
- An underground transmission line across the entire Forest raises substantial concerns about the reliability of the line's operation, considering the steep terrain and the potential for ground movement as a result of landslides, subsidence, and seismic activity and would therefore not meet an important objective of the Project.
- The cost of undergrounding the transmission line for 12.9 miles, at a rate approximately 10 times greater than overhead construction, could be cost prohibitive (economically not feasible).

B.3.4.2 Antelope-Pardee 220-kV Single-circuit Partial Underground Alternative

Description

The proposed Project would involve the construction of a new transmission line built to 500-kV standards, but initially energized at 220 kV. The Antelope-Pardee 220-kV Single-Circuit Partial Underground Alternative would involve the construction of a new 220-kV transmission line between the Antelope and Pardee Substations (rather than a 500-kV line, as with the proposed Project). Portions (approximately 4 miles) of the transmission line for this alternative would be built underground in specific, high-impact areas in the ANF (See Section B.4.1 for a detailed description of the underground segment in ANF). In general, the new 220-kV transmission line would follow the same alignment as the proposed Project. This alternative would include removal of 119 existing 66-kV towers from the Saugus-Del Sur Utility Corridor, and would require the Forest Service to issue a 50-year term Special Use Easement to SCE (for those improvements described in this alternative involving NFS lands).

Under this alternative, the 220-kV single-circuit overhead towers would be shorter and narrower than the proposed 500-kV towers (113 to 178 feet tall), which would slightly reduce visual impacts, reduce the risk of avian electrocution and collision along the Del Sur Ridge, and reduce the adverse impacts to Forest Management activities (e.g., wildland fire suppression). Additionally, smaller transmission tower pads would be constructed for the 220-kV single-circuit towers, compared to the 500-kV tower pads, again providing slightly reduced environmental impacts.

As discussed in Appendix 1, the underground segment of this alternative would require the installation of duct banks, splicing vaults, and all-weather access roads. Construction of approximately four miles of underground transmission lines would require substantially more construction activity and ground disturbance than overhead lines resulting in greater impacts to air quality, biology, traffic, and noise, among others, and for a much higher cost per mile (approximately 10 times that of overhead construction). Furthermore, access roads must be created or improved to handle large construction vehicles and trucks hauling reels of cable. While in

operation, the land required for operation and maintenance of underground lines would remain free from secondary surface development and free of any vegetation with deep root systems (which would be compatible with the maintenance requirements of the fuelbreak on Del Sur Ridge).

Reasons for Elimination

The rationale for elimination of this potential alternative is fully described in the Alternatives Screening Report (Appendix 1). In summary, this alternative was eliminated from detailed analysis in the EIR/EIS for the following reasons:

- Installation of a single-circuit 220-kV line would not provide sufficient transmission capacity to meet the objectives of the Project.
- A future need for system upgrades would arise as a direct result of installing a system that meets only partially fulfills the transmission needs identified by SCE and the CAISO, resulting in additional environmental impacts not associated with the proposed Project.

B.3.4.3 Antelope-Pardee 220-kV Double-circuit Partial Underground Alternative

Description

For this alternative, a new double-circuit 220-kV line would be built between the Antelope and Pardee Substations, following generally the same alignment as the proposed Project. Portions (approximately 4 miles) of the transmission line for this alternative would be built underground in specific, high-impact areas in the ANF (See Section B.4.1 for a detailed description of the underground segment in ANF). The intent of developing this alternative was to reduce visual impacts, reduce the potential for avian electrocution and collisions on Del Sur Ridge, and reduce the adverse impacts to Forest Management activities (e.g., wildland fire suppression). The overhead portion of this alternative would be built using shorter 220-kV double-circuit towers (about 140 feet tall), compared to the taller 500-kV towers (up to 178 feet tall). As with the proposed Project, this alternative would include removal of 119 existing 66-kV towers from the Saugus-Del Sur Utility Corridor, and would require the Forest Service to issue a 50-year term Special Use Easement to SCE (for those improvements described in this alternative involving NFS lands).

The 220-kV double-circuit towers would be built in the same ROW as the proposed Project, using similar construction techniques. For the overhead portion, use of existing double-circuit tower designs is not expected to prevent icing above 3,000 feet. High wind conditions coupled with icing may limit the tower loading (conductor weight) to a single circuit tower-line design. Along the Saugus Del Sur Utility Corridor, in areas where overhead construction would occur for this alternative, elevations above 3,000 feet are common, which would affect the reliability of the system due to icing and reduced loading.

As discussed in Appendix 1, the underground segment of this alternative would require the installation of duct banks, splicing vaults, and all-weather access roads. Construction of approximately four miles of underground transmission lines would require substantially more construction activity and ground disturbance than overhead lines resulting in greater impacts to air quality, biology, traffic, and noise, among others, and for a much higher cost per mile (approximately 10 times that of overhead construction). Furthermore, access roads must be created or improved to handle large construction vehicles and trucks hauling reels of cable. While in operation, the land required for operation and maintenance of underground lines would remain free from secondary surface development and free of any vegetation with deep root systems (which would be compatible with the maintenance requirements of the fuelbreak on Del Sur Ridge).

Reasons for Elimination

The rationale for elimination of this potential alternative is fully described in the Alternatives Screening Report (Appendix 1). In summary, this alternative was eliminated from detailed analysis in the EIR/EIS for the following reasons:

- Installation of a double-circuit 220-kV line would not provide sufficient transmission capacity to meet the objectives of the Project.
- A future need for system upgrades would arise as a direct result of installing a system that meets only partially fulfills the transmission needs identified by SCE and the CAISO, resulting in additional environmental impacts not associated with the proposed Project.

B.3.4.4 Antelope-Pardee Relocation of Towers off Del Sur Ridge (Mid-slope) Alternative

Description

This alternative would remove towers from the top of Del Sur Ridge to reduce the visibility of the towers to distant viewers, as well as conflicts with Forest Management activities (e.g., fire suppression), and the potential for avian collision. Two options were considered for this alternative, one which would place the towers to the east of the ridge towards Bouquet Canyon (Option A), and one which would place the towers to the west of the ridge towards San Francisquito Canyon (Option B). Option A was determined to meet the screening criteria and is therefore discussed in Section B.4.2, Alternative 2: Antelope-Pardee East Mid-Slope.

Option B would generally follow the same route as the proposed Project, but would relocate most of the towers off the top of Del Sur Ridge in the ANF, roughly from Mile 5.7 to Mile 18.1 of the proposed Project route, as shown in Figure 3C of Appendix 1. This alternative would traverse the western face of Del Sur Ridge, mid-slope between the ridge top and the canyon bottom. As such, the new towers would fall outside of the boundaries of the 1,000-foot existing transmission corridor. The 1,000-foot utility ROW would therefore need be relocated, where the towers would be placed in the utility corridor at the upslope boundary. The actual distance of the new transmission line alignment from the proposed route depends on slope severity, as gradual slopes require the tower alignment to shift farther downhill than steep slopes in order to prevent visibility on the ridge. As with the proposed Project, this alternative would include removal of 119 existing 66-kV towers from the Saugus Del Sur Utility Corridor, and would require the Forest Service to issue a 50-year term Special Use Easement to SCE (for those improvements described in this alternative involving NFS lands).

The total length of this alternative would be approximately 26.0 miles, of which 13.3 miles would traverse NFS lands, which is an additional 0.7 miles compared to the proposed Project. On NFS lands, 12.8 miles of this alternative route would be within a new ROW.

Reasons for Elimination

The rationale for elimination of this potential alternative (Option B) is fully described in the Alternatives Screening Report (Appendix 1). In summary, this alternative (Option B) was eliminated from detailed analysis in the EIR/EIS for the following reasons:

- The new corridor and access roads would be located in an area with known populations of red-legged frog (federally threatened species and a State species of special concern) and unarmored three-spine stickleback (federally endangered species), as well as riparian vegetation, which would greatly increase the potential for biological impacts.

- The transmission towers and access roads may be placed closer than 98 feet from a seasonally flowing/intermittent stream (i.e., San Francisquito Canyon Creek), which conflicts with the Forest Service Land Management (2005) Plan.
- Construction of the transmission line would occur with a new ROW, which could conflict with the requirements for eligibility in the National Wild and Scenic River System, which San Francisquito Canyon Creek currently meets, resulting in an impact to recreational resources.

B.3.4.5 Antelope-Vincent 500-kV Line in New Corridor Alternative

Description

This alternative would route a 500-kV transmission line from the Antelope Substation to the Vincent Substation. This alternative was developed to respond to Forest Service policy and Forest Plan direction of denying a special use application if a reasonable alternative can be developed off NFS lands. An objective in identifying route(s) off NFS lands included minimizing disruptions to existing land uses and development projects. Two routing options were considered for the new corridor between the Antelope and Vincent Substations: Option A and Option B. For Option A, the Forest Service would deny the special use application; Option B, the Forest Service would issue a 50-year term Special Use Easement for the improvements on NFS lands.

For **Option A**, a transition station would be built at the Antelope Substation, which would take the place of the substation "deadend" structure, to allow for an underground 500-kV line to leave the substation. As shown in Figure 10 of Appendix 1, the underground transmission line would proceed east from Antelope Substation in Avenue J, a two-lane paved road, for 2.6 miles. The line would then turn south along 70th Street West, a two-lane paved road, for 4.1 miles to Avenue N. The transmission line would continue east in Avenue N, which varies between a two-lane paved roadway (70th Street West to 60th Street West, and 45th Street West to 20th Street West) and a four- to five-lane paved road (60th Street West to 45th Street West), for roughly five miles; turn south on to 20th Street West, which is a two-lane paved road between Avenue N and Quick Street and unfinished/unimproved between Quick Street and Elizabeth Lake Road, for three miles; turn east on Elizabeth Lake Road, a five-lane paved road, for one mile; and then turn south on Tierra Subida Avenue, a two-lane paved road, for 0.8 miles. The total length of the underground portion, which would use XLPE technology, would be approximately 16.5 miles (Refer to Appendix 1 for a description of the various 500-kV underground technologies commercially available and the rationale for use of XLPE).

The transmission line would then connect to a transition station, approximately 80 feet high and requiring an area of 2 to 3 acres, situated on a currently undeveloped property located on the west side of Tierra Subida Avenue, south of Avenue Q-10. After transitioning above ground, the transmission line would continue southwest 1.5 miles and then south through the Palmdale 1000 planned development for another approximately 1.5 miles. At this point, the transmission line would turn southeast and run parallel to the existing Antelope-Vincent ROW (approximately 0.25 miles between ROWs) for approximately 3.5 miles, before turning southwest for approximately 1.25 miles to connect to the Vincent Substation. The total length of this alternative is approximately 24.25 miles.

Option B would provide for an entirely overhead transmission line between Antelope and Vincent Substations. As shown in Figure 10 of Appendix 1, this alternative would follow the proposed Project route from Antelope Substation to just north of Bouquet Reservoir, a distance of approximately 8.0 miles. The 500-kV transmission line would then turn east in the existing Midway-Vincent No. 1 and No. 2 corridor and continue within this corridor to the eastern-most boundary of ANF. A new ROW would be established at this point, proceeding

south for 1.7 miles within and along the boundary of ANF, bordering the Ritter Ranch Specific Plan area. At this point, the new ROW would exit ANF and continue southeast for approximately 2 miles, and then east for 3.9 miles, potentially traversing a small portion of public land managed by the Bureau of Land Management (BLM), requiring a Right-of-Way Grant from BLM to SCE. The new 500-kV transmission line would then join the Midway-Vincent No. 2 corridor for the remaining 5.7 miles to Vincent Substation. This option would traverse 8.9 miles within the ANF, of which 1.7 miles would be within a new ROW. A total of 5.9 miles of new ROW would be established outside the Forest. The total length of this alternative is approximately 25.8 miles.

For both Option A and Option B modifications to Vincent Substations would be required to accommodate the new 500-kV transmission line. Currently, there is one 230-kV position not in use at the substation, but this position would not accommodate a new 500-kV line. All necessary 500-kV tie-in equipment would need to be added to Vincent Substation. This alternative would also include the removal of 119 existing 66-kV towers from the Saugus-Del Sur Utility Corridor in the ANF, as would be done for the proposed Project. Note that these towers are not located along the proposed route for Option A or Option B and would result in construction activities occurring in multiple areas.

Reasons for Elimination

The rationale for elimination of this potential alternative is fully described in the Alternatives Screening Report (Appendix 1). In summary, this alternative was eliminated from detailed analysis in the EIR/EIS for the following reasons:

- This alternative would not meet the requirements set forth by the CPUC in Decision 04-06-010, which requires a 500-kV transmission line to be installed between the Antelope and Pardee Substations; therefore, it would not meet a main objective of the Project.
- Because Option A involves underground installation in close proximity to the San Andreas Fault, this alternative has serious reliability concerns associated with underground transmission lines near active fault zones; therefore, it would not meet an objective of the Project.
- Option B would cause substantially greater significant adverse visual impacts to the ANF as a result of placement of towers in prominent ridge top locations. It would also require approximately 7.6 miles of new utility corridor/ROW, of which approximately 1.7 miles would be located in ANF. This alternative would not meet the Forest Service's purpose of action, which explains that the Forest Service's objectives in approving the proposed Project include the minimization of adverse environmental effects to NFS lands and the minimization of negative effects to open space and natural settings in the ANF.
- This alternative would create significant adverse visual and land use impacts to one or all of the four major development projects which are currently planned and/or are under construction, including Ritter Ranch, Anaverde Master Planned Community, Joshua Ranch, and Palmdale 1000. The significant adverse visual impacts would negate the advantages of crossing through a shorter portion of the ANF than the proposed Project.

B.3.4.6 Parallel LADWP ROW Alternative

Description

The Parallel LADWP ROW Alternative was proposed by SCE as an alternative route. This alternative would provide a new 27.9-mile 500-kV transmission line between the Antelope and the Pardee Substations. The Forest Service would issue a 50-year term Special Use Easement to SCE (for those improvements described in this alternative involving NFS lands) and U.S. Department of the Interior (USDI) Bureau of Land Management (BLM) would issue a Right-of-Way Grant for those improvements proposed on those lands managed by BLM.

As shown in Figure 9 of Appendix 1, the route for this alternative would depart the Antelope Substation on tubular steel poles, heading west across the existing Antelope-Magunden 220-kV ROW and the Midway-Vincent No.3 500-kV ROW. At Mile 3.9, it would cross the existing LADWP ROW and turn southwest, paralleling the existing LADWP ROW for the next 18.9 miles. The 500-kV transmission line would switch to the east side of the LADWP ROW at Mile 5.7, just north of Andrade Corner. At Mile 6.8, the line would enter and remain mostly in the ANF for the next 14.4 miles. This portion of the new ROW (14.4 miles) through the ANF would be 160 feet wide. At Mile 8.4 and for the next 2 miles, the line would cross public lands managed by the BLM and private property near the community of Green Valley before re-entering the ANF. At Mile 11.8, the line would cross the Midway-Vincent No.1 and No.2 500-kV transmission lines. The line would stay on the east side of the LADWP ROW until Mile 14.0, where it would switch to the west side of the ROW at Bee Canyon. At Mile 18.9, the line would cross a transmission line from LADWP San Francisquito Power House No. 2. The new 500-kV transmission line would exit the ANF at Mile 21.2 and would continue on private property for 1.5 miles. This section of new ROW would be 180 feet wide. The line would cross the Antelope-Pole Switch 74 66-kV line at Mile 22.4. At Mile 22.8, this alternative would reach Haskell Canyon and join the proposed Project route. For this alternative, the first 22.8-mile segment from Antelope Substation to Haskell Canyon is 2.3 miles longer than the corresponding segment for the proposed Project. The Parallel LADWP ROW Alternative would continue following the proposed Project route for the remaining 5.1 miles between Haskell Canyon and Pardee Substation.

As with the proposed Project, this alternative would include removal of 119 existing 66-kV towers (cut flush with the surface) from the Saugus-Del Sur Utility Corridor. These towers are not located along this proposed route and would therefore result in construction activities occurring in multiple areas. The proposed route for this alternative is situated mostly along the sides and bottom of San Francisquito Canyon, as opposed to on ridge tops. The new transmission line would be within an existing utility corridor, but a new 160- to 180-foot ROW and new spur roads would be required along much of the route.

Reasons for Elimination

The rationale for elimination of this potential alternative is fully described in the Alternatives Screening Report (Appendix 1). In summary, this alternative was eliminated from detailed analysis in the EIR/EIS for the following reasons:

- This alternative would result in significant adverse impacts to recreation in the ANF, due to the higher recreational value and greater potential for off highway vehicle trespass in the new spur roads along this alternative route.
- This alternative is located in much more sensitive area than the proposed Project in terms of biological and cultural resources and would result in greater significant impacts to these resources. San Francisquito Creek and its tributaries have known populations of red-legged frog, which is a federally threatened species and a State species of special concern, as well as unarmored three-spine stickleback, a federally endangered species.
- This alternative is located in San Francisquito Canyon, which is proposed as a Wild and Scenic River Corridor in the 2005 ANF Forest Management Plan, which could result in an impact to recreational resources.
- This alternative would result in a significantly greater area of land disturbance than the proposed Project; therefore, it would cause greater significant adverse impacts. This alternative would require the establishment of a new ROW for most of its length. In the ANF alone, 14.4 miles of new 160-foot wide ROW would be required. Furthermore, additional disturbance would occur as a result of the removal of the 66-kV towers from the Saugus-Del Sur Utility Corridor.
- This alternative would not meet the Forest Service's purpose of action (objective), which explains that the Forest Service's objectives in approving the proposed Project include the minimization of adverse environmental effects to NFS lands and the minimization of negative effects to open space and natural settings in the ANF.

- A greater number of residences would be affected with this alternative in the vicinity of Leona Valley (Mile 5.5 to 6.3), Green Valley (Mile 8.3 to 11.0), and Haskell Canyon (Mile 21.8 to 22.8) than with the proposed Project, which is located in sparsely populated areas, largely removed from direct public access. This would result in potentially greater significant adverse visual and land use impacts.

B.3.4.7 Antelope-Vincent 500-kV Line in Existing Antelope-Vincent Corridor Alternative

Description

This alternative would include the construction of a new 500-kV transmission line from the Antelope Substation to the Vincent Substation in the existing Antelope-Vincent utility corridor, as shown in Figure 9 of Appendix 1, thereby circumventing the ANF. This alternative was developed in response to Forest Service policy and Forest Plan direction of denying a special use application if a reasonable alternative can be developed off NFS lands. In this alternative, the Forest Service would deny SCE's special use application.

The existing corridor between Antelope and Vincent Substations presently contains one 500-kV line (Midway-Vincent No. 3) and three 220-kV lines (Antelope-Vincent, Antelope-Mesa, and a non-SCE line). As this corridor proceeds south, it is joined by two 500-kV lines (Midway-Vincent No. 1 and No. 2). Improvement and expansion of both substations would be required to connect the new transmission line. This alternative would also include the removal of 119 existing 66-kV towers from the Saugus-Del Sur Utility Corridor in the ANF, as would be done for the proposed Project. These towers are not located along this proposed route and would result in construction activities occurring in multiple areas.

Placement of the new transmission line in an existing corridor would reduce potential impacts to biological resources. Furthermore, because transmission lines already exist within the corridor, the addition of another transmission line would not substantially reduce the visual quality of the area. The potential environmental disadvantages of this alternative include construction impacts, particularly to air quality and noise.

Reasons for Elimination

The rationale for elimination of this potential alternative is fully described in the Alternatives Screening Report (Appendix 1). In summary, this alternative was eliminated from detailed analysis in the EIR/EIS for the following reasons:

- Construction of a new transmission line between the Antelope Substation and the Vincent Substation would provide additional capacity to accommodate growth in power generation north of Antelope Substation, but it would not meet the requirement for providing a 500-kV transmission connection between the Antelope and Pardee substations requirements set forth by the CPUC in Decision 04-06-010 and endorsed by the CAISO and is one of the objectives for this Project.
- Use of a common ROW by multiple transmission lines, such as the Antelope-Vincent corridor, must conform to planning criteria developed by the CAISO, the WECC, and the NERC. Placement of an additional 500-kV line in this corridor between the Antelope and Vincent substations would violate these planning criteria and reduce the reliability of the system due to the number of transmission lines already located in the corridor. Violation of these planning criteria is not consistent with the Project objectives.
- The existing Antelope-Vincent corridor is not physically wide enough to support the installation of an additional transmission line without removal of an existing line. According to SCE, it is necessary to keep the current transmission lines the corridor in use and, therefore, none are currently available for removal. As such, this alternative would not meet the feasibility criteria.

B.3.4.8 Antelope-Vincent 220-kV Double-circuit in New Corridor Alternative

Description

This alternative would route a 220-kV transmission line from the Antelope Substation to the Vincent Substation, in order to avoid NFS lands. This alternative was developed in response to Forest Service policy and Forest Plan direction of denying a special use application if a reasonable alternative can be developed off NFS lands. In this alternative, the Forest Service would deny SCE's special use application.

As with the Antelope-Vincent 500-kV single-circuit in New Corridor Alternative, which is discussed in Section B.3.4.5, two routing options were considered for the new corridor between the Antelope and Vincent Substations: Option A and Option B. Option A consists of a combination of overhead and underground construction, whereas Option B is completely overhead. The routes for Options A and B would be the same as the routes described in Section B.3.4.5, above, and are shown in Figure 10 of Appendix 1.

Expansion of Antelope and Vincent Substations would be required for the construction of either Option A or Option B of this alternative. This alternative would also include the removal of 119 existing 66-kV towers from the Saugus-Del Sur Utility Corridor in the ANF, as would be done for the proposed Project. These towers are not located along the proposed route for Options A and B and would result in construction activities occurring in multiple areas.

Reasons for Elimination

The rationale for elimination of this potential alternative is fully described in the Alternatives Screening Report (Appendix 1). In summary, this alternative was eliminated from detailed analysis in the EIR/EIS for the following reasons:

- Construction of a new transmission line between the Antelope Substation and the Vincent Substation would provide additional capacity to accommodate growth in power generation north of Antelope Substation, but it would not meet the requirement for providing a 500-kV transmission connection between the Antelope and Pardee substations requirements set forth by the CPUC in Decision 04-06-010 and endorsed by the CAISO. As such, this alternative would not meet a main objective of the Project.
- Installation of a double-circuit 220-kV line would not provide sufficient transmission capacity to meet the objectives of the Project.
- A future need for system upgrades would arise as a direct result of installing a system that meets only partially fulfills the transmission needs identified by SCE and the CAISO, resulting in additional environmental impacts not associated with the proposed Project.

B.3.4.9 Antelope-Mesa Replacement Alternative

Description

This alternative would involve complete removal of the existing Antelope-Mesa and Antelope-Vincent 220-kV transmission lines and construction of a new 500-kV transmission line from Antelope Substation to Mesa Substation via Vincent Substation, which would alleviate capacity issues associated with the existing Antelope-Mesa line. The replacement would apply to the entire 60 miles of the existing Antelope-Mesa corridor, and would traverse portions of the Santa Clara/Mojave Rivers and Los Angeles River Ranger Districts of the ANF.

The Forest Service would terminate special use authorizations for these removed lines on NFS lands and issue a new 50-year term Special Use Easement for those improvements involved with this alternative on NFS lands. This alternative would also include the removal of 119 existing 66-kV towers from the Saugus-Del Sur Utility

Corridor in the ANF, as would be done for the proposed Project. These towers are not located along this proposed route and would result in construction activities occurring in multiple areas.

There is currently insufficient room within the existing ROW to maintain the existing Antelope-Vincent and Antelope-Mesa 220-kV transmission lines in service during the construction of the new 500-kV line. As such, these lines would be removed from service to allow for construction activities. During the prolonged outage period required for construction, the entire Antelope Valley (Palmdale/Lancaster area) would be served by the remaining two 220-kV lines connecting the Antelope Substation to the Magunden Substation, which is located 60 miles to the north. Due to the radial connection configuration system, voltages cannot be maintained on the two remaining northbound 220-kV lines. As a result, involuntary load interruptions, which are estimated by SCE at over 50 percent, would be necessary to protect system-wide reliability.

This alternative would require a wider ROW to accommodate the 500-kV capacity of the replacement line. By SCE standards, the existing 220-kV Antelope-Mesa transmission line requires a 100-foot ROW, whereas the proposed 500-kV line would require a ROW width of 180- to 200-feet. Over the 60-mile length of the route, this equates to a difference in area of between 581.2 and 727.3 acres. The majority of activities associated with replacing the Antelope-Mesa transmission line would occur within an existing and previously disturbed utility corridor, similar to the proposed Project.

Reasons for Elimination

The rationale for elimination of this potential alternative is fully described in the Alternatives Screening Report (Appendix 1). In summary, this alternative was eliminated from detailed analysis in the EIR/EIS for the following reasons:

- This alternative would not meet the objectives of the Project. WECC Transmission Planning and Operating Criteria, which does not allow unplanned load interruption to occur following the loss of a single transmission line, would be violated during construction of the Antelope-Mesa Replacement Alternative. Construction of this alternative would involve involuntary load interrupts approximately 50 percent of the time.
- While this alternative would provide additional capacity to accommodate growth in power generation north of Antelope Substation, it would not meet the requirement for providing a 500-kV transmission connection between the Antelope and Pardee substations requirements set forth by the CPUC in Decision 04-06-010 and endorsed by the CAISO. As such, this alternative would not meet a main objective of the Project.
- Removal of the two 220-kV and 66-kV existing lines and construction of a new 60-mile line would substantially increase the duration of tear-down and result in greater significant adverse construction-related noise, air quality, traffic, biological, and cultural resource impacts than the proposed Project.

B.3.4.10 Big Creek-Fresno Phase Shifted Tie Alternative

Description

As presented in Appendix B of the "Report of the Tehachapi Collaborative Study Group," the Big Creek-Fresno Phase Shifted Tie Alternative would establish a new interconnection point between the PG&E and SCE systems. The proposal calls for connecting PG&E's Gregg-Helms Pump Storage Plant transmission system with SCE's Big Creek-Rector 220-kV lines at a new switching station. The switching station would include phase shifting devices in order to "push" power from the SCE system into the PG&E system. Studies indicate that operation of a phase-shift transformer is extremely complex and difficult to manage. Since power flow through the phase-shift transformer is dependent on the angle differences between the SCE and PG&E systems, installing a 200 MW phase-shift system tie will necessitate designing the SCE system to enable up to

850 MW of power transfers. Detailed studies covering each hour of the year were performed, where historical data was used to replicate network performance with and without the phase-shifted system tie.

Results of the studies described above indicate that the following network upgrades would be necessary for implementation of this alternative:

- Completion of the planned 20-mile San Joaquin Valley Rector Look 220-kV Project;
- New 60-mile Antelope-Magunden 220-kV Transmission Line Project;
- New 135-mile Magunden-Vestal-Rector-Fresno Tie-Big Creek Transmission Line Project;
- Expansions to the Big Creek 3 Substation, Magunden Substation, Rector Substation, and Vestal Substation;
- Installation of several reactive support facilities (i.e., capacitor banks) throughout San Joaquin Valley in order to maintain adequate voltages; and
- Installation of Complex Protection Schemes, potentially requiring upgrades to existing telecommunication facilities.

In addition to the network upgrades described above, this alternative would also require the following:

- Contractual arrangements between PG&E and SCE on issues such as inadvertent flow;
- An agreement between PG&E, SCE, and CAISO governing the dispatch and operation of existing generators; and
- Resolution of any physical limitations of Gregg-Helms Pump Storage Plant and other operating issues.

This alternative was developed in response to Forest Service policy and Forest Plan direction of denying a special use application if a reasonable alternative can be developed off NFS lands. In this alternative, the Forest Service would deny SCE's special use application. This alternative would also include the removal of 119 existing 66-kV towers from the Saugus-Del Sur Utility Corridor in the ANF, as would be done for the proposed Project.

Reasons for Elimination

The rationale for elimination of this potential alternative is fully described in the Alternatives Screening Report (Appendix 1). In summary, this alternative was eliminated from detailed analysis in the EIR/EIS for the following reasons:

- Part of SCE's purpose and need for the proposed Project is to accommodate growth in power generation north of the Antelope Substation and prevent overloading of existing transmission facilities. Without additional system improvements and larger phase shifting devices, this alternative would only provide the transmission capacity needed to provide initial operation at 220 kV to accommodate the current need to avoid overloading of existing transmission facilities. Therefore, this alternative would not provide the transmission capacity needed to meet the Project objectives.
- This alternative would not meet the CPUC's objectives for the Project. As described in Section A.3.2, the CPUC seeks to facilitate the achievement of the State's goals for the distribution of renewable energy by working to remove constraints on the transmission of electricity. The Big Creek-Fresno Phase Shifted Tie Alternative would not (according to the CAISO) provide the transmission capacity necessary to meet the growth of renewable energy generation north of the Antelope Substation.
- SCE studies indicate that in order to transfer 200 MW from the SCE area into the PG&E area through a tie in the Fresno area, various network upgrades would be required, including three transmission line projects totaling 215 miles, substation expansions, and installation of several reactive support facilities. As a result, significant adverse impacts associated with this alternative would be substantially greater than the proposed Project.
- There are numerous issues that would have to be resolved to implement this alternative, including insufficient room to in the existing ROW to accommodate building a double-circuit line while keeping the other lines in service, schools sited adjacent to the existing ROW limiting the ability to expand the ROW width, the potential

need for approximately 100 MW of reactive support in the area resulting from the transfer, and physical limitations at the Gregg-Helms Pump Storage Plant. These issues raise doubt about the feasibility of this alternative.

B.4 Alternatives Descriptions

During the initial alternatives screening process (see Section B.3 above) a wide range of potential alternatives were considered for analysis in accordance with both CEQA and NEPA. Alternatives were eliminated from full analysis in the EIR/EIS if they: (1) were unable to meet the basic objectives, purpose, and need of the proposed Project; (2) were proven to be infeasible (economically, technically, and/or regulatory); or (3) clearly would not reduce or avoid potentially significant impacts of the proposed Project without creating greater significant impacts of its own. Based on the initial screening process, the following alternatives were determined to meet the necessary criteria for full analysis in the EIR/EIS:

- Alternative 1: Partial Undergrounding of Antelope-Pardee Transmission Line;
- Alternative 2: Antelope-Pardee East Mid-Slope;
- Alternative 3: Antelope-Pardee Single-Circuit 500-kV Towers between Haskell Canyon and Pardee Substation;
- Alternative 4: Antelope-Pardee Re-Routing of New Right-of-Way along Haskell Canyon;
- Alternative 5: Antelope-Pardee Sierra Pelona Re-Route.

These alternatives to the proposed Project meet the CEQA/NEPA alternatives screening criteria discussed in Section B.3.2 and have therefore been brought forward from the Alternatives Screening Report in Appendix 1 for full analysis in this EIR/EIS. The environmental impacts for each issue area are discussed in Sections C.2 through C.15.

B.4.1 Alternative 1: Partial Undergrounding of Antelope-Pardee Transmission Line

B.4.1.1 Alternative 1 Description

For Alternative 1, the proposed 500-kV transmission line would be constructed underground in two specific high-impact segments: along Del Sur Ridge in the ANF, and within the City of Santa Clarita. Underground construction was considered in the ANF to reduce visual impacts, conflicts with Forest Management activities (e.g., wildland fire suppression), and the potential for avian collision associated with overhead lines and related infrastructure. In the City of Santa Clarita, underground construction was considered in response to the City's request to minimize visual impacts.

This alternative would generally follow the same route (and use similar proposed improvements and remove the existing 66-kV line) as the proposed Project, with the exception of the underground segment in Santa Clarita, which would occur within city streets. Underground construction along the Del Sur Ridge would begin just south of Mile 11.0 and continue until just south of Mile 15.0, as shown in Figure B.4-1a. A transition station, approximately 80 feet high and with a footprint of approximately 2 to 3 acres, would be required at each end of the underground segment to transfer the 500-kV transmission lines from overhead to underground and vice versa. In Santa Clarita, underground construction would begin at Mile 22.7 and continue until Mile 25.6 (Pardee Substation), as shown in Figure B.4-1b. Upon leaving the ANF, the transmission line would continue to follow the proposed Project route; however, at Mile 20.3, where the proposed Project enters the existing Pardee-Vincent ROW, new single-circuit 500-kV towers would be placed in the vacant position of this existing ROW, rather than replacing the existing single-circuit 500-kV towers with double-circuit towers to

keep the vacant position open. At Mile 22.7, the overhead transmission line would exit the existing Pardee-Vincent ROW and tie into a new transition station, which would be located west of the corridor on the east side of San Francisquito Canyon Road, near Copper Hill Drive. The transmission line would exit the transition station underground and travel south in a new ROW along San Francisquito Canyon Road for 0.3 miles, head west on Copper Hill Drive for 3.0 miles, where San Francisquito Creek would be crossed by installing casings directly on to an existing bridge, then turn west on Newhall Ranch Road for 0.2 miles before connecting to the Pardee Substation (Mile 26.2). For the underground connection to Pardee Substation, the transition station would take the place of the substation "dead-end" structure required for overhead line terminations.

The technology that would be used for the underground portions of this alternative would consist of Solid Dielectric Cables (XLPE) installed in concrete-encased ductbanks. To date, only one 500 kV XLPE cable system of significant length (several consecutive miles) has been installed in the world. Therefore, this technology has little operating history that can serve as a basis for demonstrating reliability at 500 kV. However, XLPE cable has been successfully installed and operated for long lengths at lower voltages and has been shown to be technically feasible for a 500 kV installation since the fundamental technology is the same.

For Alternative 1, the Forest Service would issue a 50-year term Special Use Easement authorizing the construction, use, and maintenance of the long-term transmission line and infrastructure, 12.6 miles long, within a 160-foot-wide ROW, on NFS lands. Any ground-disturbing activities during construction on NFS lands and outside the proposed 160-foot-wide ROW easement would be authorized by one or more temporary Special Use Permits. Additional resource studies would be necessary to authorize the temporary Special Use Permit for work outside the proposed 160-foot-wide ROW (e.g., secondary marshalling yards, pulling and splicing set up sites, helicopter staging areas). In addition, this alternative would require several amendments to the ANF Land Management Plan, including changing the Scenic Integrity Objectives along the proposed utility corridor (see Table A.5-3); relocating approximately 1.9 miles of the 1,000-foot wide Saugus-Del Sur utility corridor to follow the Alternative 1 underground portion of the route on NFS lands (the underground cables would be placed at the centerline of the relocated utility corridor); and modifying the Forest Standard related to the Pacific Crest Trail (S1) specifically regarding this Project.

B.4.1.2 Alternative 1 Facilities

Infrastructure and facilities for the overhead portion of this alternative would be the same as the proposed Project, which is described in Section B.2.1, except between Mile 20.3 and 22.3 where the existing single-circuit 500-kV towers located in the existing Pardee-Vincent ROW would not be replaced with double-circuit towers. Instead, new single-circuit 500-kV towers would be placed in the vacant position within this existing ROW. As with the proposed Project, three double-circuit 220-kV tubular steel pole structures would be installed between Mile 0.0 and Mile 0.1. From Mile 0.1 to Mile 11.0 (approximately) and from Mile 15.0 (approximately) to Mile 22.7, approximately 86 single-circuit 500-kV lattice steel towers (40 towers on NFS lands), such as those described for the proposed Project in Section B.2.1.1, would be installed. Similar to the proposed Project, Alternative 1 would require modifications to Antelope Substation (see Section B.2.1.2); relocation of the subtransmission facilities at Antelope Substation (see Section B.2.1.1), which would be affected by the substation expansion; modifications to the Pardee Substation (see Section B.2.1.2); removal of existing 66-kV towers, associated hardware, and foundations from Mile 1.1 to Mile 18.6; and construction of information technology facilities (see Section B.2.1.3).

As described above, Alternative 1 varies from the proposed Project from approximately Mile 11.0 to approximately Mile 15.0 and from Mile 22.7 to Pardee Substation (alternative Mile 26.2). These segments would be constructed using underground transmission lines, where the infrastructure and facilities used for underground lines are substantially different than for overhead lines. The primary infrastructure components for underground transmission lines include: XLPE cables and ductbanks; regularly-spaced splicing vaults; thermal fill to cover the buried facilities; a transition station for each end of the underground segments; and temporary pulling and splicing locations for use during the construction phase. These facilities are described below.

- The XLPE cable, or "extruded dielectric cable," would consist of three independent cables, or phases. An individual solid dielectric cable cross-section is shown in Figure B.4-2. Each of the individual phase cables would consist of a stranded copper or aluminum conductor, extruded semi-conducting conductor shield, electrical cable insulation (usually cross-linked polyethylene, XLPE), extruded semi-conducting insulation shield, a metallic shield or sheath, and a plastic jacket. A lead sheath or another type of radial moisture seal would also be used to prevent the exposure of the cable insulation to water.
- For the underground segment, three sets of XLPE cables (each consisting of three phases) would be individually insulated and each buried in a duct bank, instead of direct burial.
- A set of three splicing vaults, one for each set of XLPE cables, would be buried every 1,200 to 1,800 feet for the length of each underground segment. Each splicing vault would measure approximately 10 feet by 10 feet by 35 feet, for a total volume of 3,500 cubic feet. The total underground space required for each set of three buried splicing vaults would be approximately 10,500 cubic feet. For the 4.0-mile segment underground along Del Sur Ridge, approximately 12 to 18 sets of splicing vaults would be required.
- For the 3.5-mile segment underground within Santa Clarita, approximately 11 to 14 sets of splicing vaults would be required. Figure B.4-3 provides a depiction of the area disturbed to install three duct banks and associated splicing vaults within the Forest. Figures B.4-4 and B.4-5 provide cross-sectional and longitudinal views of underground transmission installations within the Forest, respectively. The area disturbed for underground installation within the Forest would also be similar for installation within city streets. Figures B.4-6 and B.4-7 provide cross-sectional and plan views of underground transmission installations within city streets, respectively.
- Up to eight feet of thermal fill may be required over the top of all buried facilities and infrastructure (duct banks and splicing vaults).
- A transition station would be required at each end of each underground segment in order to transfer the transmission line from overhead to underground, and from underground back to overhead. Figure B.4-8 shows a prototypical transition station. Each transition station would be approximately 80 feet high and require an area of 2 to 3 acres. The transition stations would have lighting installed for maintenance purposes, which would be used on an as-needed basis, and may include motion-activated lighting at the gate area to ease access at night. At Pardee Substation, which would be the terminus for the underground segment in Santa Clarita, the transition station would take the place of what would otherwise be a "deadend" structure, which is required for overhead line terminations.
- During the construction phase, pulling (inserting the cable into the trench) locations would be positioned adjacent to each splicing (joining two segments of cable) location. These locations would be temporary, but may need to be re-established if the underground segment/s ever need to be replaced.
- For the Del Sur Ridge underground installation, approximately three miles of roads (not including the 4.0-mile underground segment, which would also be upgraded as a result of underground construction) would be improved or constructed as 16-foot-wide all-weather access roads for equipment access and material deliveries on NFS lands. For the Santa Clarita underground segment, access would be available on existing roadways.
- For the underground segment on NFS lands, a continuous 85-foot wide construction zone would be required above the trench during construction in order to accommodate the necessary infrastructure for the underground facilities. Over the 4.0-mile underground portion in ANF, this construction zone equates to approximately 41.2 acres of surface land disturbance. This portion of transmission line would be located in an existing fuelbreak. The proposed use would be compatible with this fuelbreak.

Figure B.4-1a. Alternative 1: Underground Segment in the ANF

CLICK HERE TO VIEW

Figure B.4-1b. Alternative 1: Underground Segment in Santa Clarita

CLICK HERE TO VIEW

Figure B.4-2. Typical Solid Dielectric Cable Cross-Section
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B.4.1.3 Alternative 1 Construction and Operation

Construction and operational activities for the overhead portions of Alternative 1 would be the same as the proposed Project, as described in Sections B.2.2 and B.2.3, respectively. The description provided in Section B.2.2.1 for "transmission facility construction" would be the same for the overhead portions of Alternative 1, from Mile 0.0 to Mile 11.0 (approximately) and from Mile 15.0 (approximately) to Mile 22.7. This includes the construction of marshalling yards, access roads, removal and disposal of existing structures, construction of tower sites, wire installation, and pulling and splicing locations, and subtransmission relocation at Antelope Substation. Similar to the proposed Project, Alternative 1 would require removal and disposal of the existing66-kV transmission line and ancillary improvements (see Section B.2.2.1), modifications to Antelope and Pardee Substations (see Section B.2.2.2), and installation of information technology facilities (see Section B.2.2.3).

Although there are similarities between Alternative 1 and the proposed Project with regards to the overhead portion, underground transmission facilities tend to be more complex than overhead transmission facilities, thus causing the overall construction and operational requirements for Alternative 1 to be more extensive than the proposed Project. Whereas construction activities for overhead transmission systems would be largely limited to the tower locations and the wire pulling and splicing locations, installation of an underground transmission line would require grading and clearing of trees and vegetation along the entire length of the corridor prior to the onset of any trenching activities. The ground disturbance associated with underground transmission line construction would in effect be similar to pipeline construction (see Table B.4-4, below for land disturbance estimates).

Construction activities for the underground segments of Alternative 1 would include the following:

- Within ANF, an 85-foot wide construction zone would be required for the length of the trench. Terrain must be leveled by grading inclines and filling depressions. All vegetation would be removed within this zone during construction.
- Within Santa Clarita, construction of three duct banks in the roadway would be accomplished in two passes to minimize disruption to traffic in existing roadways. One-half of each road would be closed and two duct banks installed, followed by closure of the second half of each road and installation of the third duct bank.
- New construction of, or upgrades to, access roads in ANF to support large construction vehicles and trucks hauling reels of cable and other infrastructure. As described above in Section B.2, access roads would need to be cut in switchback patterns on steep slopes.
- Trenches would be dug and large areas excavated for the duct banks and splicing vaults. Excavated materials would be stored on-site, if they are suitable for use as fill material. If the excavated materials could not be re-used, they would be transported off-site and disposed of at an appropriate facility off NFS lands.
- The transmission cables would be situated in the duct backs in segments determined by the amount of cable able to be held per reel and by the topography. Cables segments would be joined within the splicing vaults.
- In addition to the transmission cables and duct banks, additional material such as concrete, splicing infrastructure, and thermal fill, among others would be imported to the site, as needed.
- Transition stations would be constructed at each end of both underground segments (4 total transition stations). Each transition station would require an area of two to three acres, which would be permanently cleared and covered with a permeable substance such as crushed rock. At Pardee Substation, the transition station would take the place of what would otherwise be a deadend structure for overhead line termination.

Figure B.4-3. Plan View of Underground Transmission in the ANF
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Figure B.4-4. Underground Transmission Cross-Section in the ANF
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Figure B.4-5. Underground Transmission Along USFS Access Road

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Figure B.4-6. Underground Transmission Cross-Section in Streets
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Figure B.4-7. Plan View of Underground Transmission in Streets

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Figure B.4-8. Prototypical Transition Station
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Construction Schedule. The construction schedule for Alternative 1 would be 29 months for only the underground portion with an in-service date of July 2010 (assuming construction start date of March 2008). The extended construction schedule would result from the time required for excavating trenches, constructing the duct banks and splicing vaults, securing the underground facilities, and other activities specific to underground infrastructure. Underground construction activities at any one location would be expected to last for approximately one month. Furthermore, procurement of underground construction materials, such as XLPE cables, would result in approximately a six month delay in the start of construction. As such, underground construction would start in September 2008 instead of March 2008 (as is estimated for the proposed Project) with an in-service date of January 2011. The construction schedule could also be extended due to restrictions on times of the year available for construction, which is often required to limit the impacts on the environment or due to winter weather. Table B.4-1 shows an estimated construction schedule for Alternative 1. The overhead portion of Alternative 1 would likely be constructed concurrently and would take approximately 10 months. It is anticipated that overhead construction activities at a particular site (i.e., across a road or trail) would last a few hours, but no more than one day (worst-case scenario). It should be noted that the extended construction schedule and increased complexity of underground facilities results in underground construction costs that are at least ten times more per mile than overhead construction costs for transmission facilities.

Table B.4-1. Alternative 1 Construction Schedule

Activity	Duration (months)
Engineering	31
ROW and Substation Site Acquisition	21
Procurement	12 (overhead) 18 (underground)
Construction and Testing:	10 (overhead) 29 (underground)
• Removal of Antelope-Pole Switch 74 66-kV Line; 12-kV Relocation	3
• 500-kV Transmission Line Construction	29
• Subtransmission Work	2
• Antelope Substation	10
• Pardee Substation	6
Antelope-Pardee 500-kV Transmission Project In-Service Date [1]	January 2011

[1] Assumes a construction start date of March 2008 (same as proposed Project) for the overhead portion and September 2008 for the underground portion, which results from the expected 6-month delay for procuring materials necessary for underground construction.

Construction Equipment. The construction equipment required for the overhead portions of Alternative 1 are described in Table B.2-3 (transmission line removal and installation equipment) and in Table B.2-4 (Antelope Substation expansion equipment). The underground segments of Alternative 1, however, would require specialized construction equipment for installation of the underground facilities. Table B.4-2, below, describes the additional construction equipment that would be required for the underground facilities.

Workforce. Table B.4-3 provides a summary of the labor force requirements for Alternative 1. Additional crews for underground construction are required for activities associated with marshalling yards, underground trench and duct banks, underground vaults, and cable pulling and splicing. As with the proposed Project, the workforce is anticipated to range from approximately 20 to 120 persons, with an estimated average daily workforce of 50 persons.

Table B.4-2. Alternative 1: Specialized Construction Equipment for Underground Construction

Equipment	Trench	Vault	Cable
No. of Crews	4	3	2
Back Hoe, w/ Bucket	✓		
Excavator	✓	✓	
Crawler, Track Type, Drill Rig, Pneumatic	✓		
Motor, Auxiliary Power		✓	
Tension Machine			✓
Trailer, Storage, 40'		✓	
Truck, Concrete, 10-Yd	✓	✓	
Truck, Dump, 10-Ton	✓		
Truck, Pick-Up	✓	✓	✓
Truck, Semi, Tractor		✓	✓
Truck, Water, 2,000 to 5,000 Gal	✓		✓
Truck, Wire Puller, 1-Drum			✓
Truck, Wire Puller, 3-Drum			✓

Note: These are approximate numbers based on estimates derived from preliminary design concepts for Alternative 1. Numbers are subject to change as the design is finalized.

Table B.4-3. Alternative 1 Labor Force Requirements

Construction Element	No. of Crews	No. Persons per Crew
500-kV Transmission Line Construction and Demolition		
Survey	1	3
Marshalling Yards	2	6
Road Work	1	8
Foundations	3	20
Steel (Shake-out, Hauling, Light Assembly, Heavy Assembly, Erection)	6	48
Conductor (Sheaves, Insulators, Stringing, Deadening, Clipping and Spacing, Anchors)	6	39
Cleanup and Guard Poles	2	6
Wreck-Out (Remove Conductors, Structures, Foundations)	4	30
Bypass Transmission Line (Install Structures and Conductors)	2	12
Bypass Transmission Line (Removal of Conductors and Structures)	2	12
Underground Trench and Duct Bank	4	12
Underground Vaults	3	8
Cable Pulling and Splicing	2	10
Antelope Substation		
66-kV Relocation at Antelope Substation	2	8
Grading 205 ft by 300 ft at Antelope Substation	1	8
Civil at Antelope Substation	1	50
Electrical at Antelope Substation	1	75
Pardee Substation		
Civil at Pardee Substation	1	8
Electrical at Pardee Substation	1	30

Note: These are approximate numbers based on estimates derived from preliminary design concepts for Alternative 1. Numbers are subject to change as the design is finalized.

Vehicle Trips. The total vehicle miles traveled on paved and unpaved road surfaces was estimated for Alternative 1, as shown in Table B.4-4. Refer to Appendix 3, Air Quality Calculations, for detailed assumptions. Unlike the proposed Project, additional vehicle trips are required for underground trenching, construction of cable vaults, and cable pulling activities. In addition, many more vehicle trips are required for the additional workforce requirements associated with underground construction (see discussion above), as well as importing and exporting of materials.

Table B.4-4. Estimated Vehicle Miles Traveled for Alternative 1

	Trips		Miles/Round Trip		Miles		
	Paved	Unpaved	Paved	Unpaved	Paved	Unpaved	Total
Passenger Vehicles							
Construction Workers	47,955	0	30	0	1,438,650	0	1,438,650
Professionals	5,164	5,164	30	5	154,920	23,370	178,290
Mid-Size Vehicles - "Delivery Trucks"							
Road Construction	1,923	1,923	10	5	19,230	8,392	27,622
Foundation Construction	1,389	1,389	10	5	13,890	5,140	19,030
Steel Construction	3,440	3,440	10	5	34,400	13,235	47,635
Heavy-Heavy Duty Vehicles							
Equipment Delivery	433	433	30	0.5	12,990	217	13,207
Equipment Shuttling	2,764	2,764	5	5	13,820	12,281	26,101
Waste Disposal	8,601	8,601	54.5	5.18	467,961	44,444	512,404
Materials Delivery (yards)	601	0	110	0	66,110	0	66,110
Materials Delivery (sites)	13,162	13,162	30	5	394,860	61,332	456,192
Mid-Size Vehicles - "Delivery Trucks"							
Trenching	960	960	10	5	9,600	4,512	14,112
Vaults	960	960	10	5	9,600	4,512	14,112
Cable Pulling	1,440	1,440	10	5	14,400	6,768	21,168
TOTAL	88,792	---	---	---	2,650,431	184,202	2,834,633

Note: These are approximate numbers based on estimates derived from preliminary design concepts for Alternative 1. Numbers are subject to change as the design is finalized.

Land Disturbance. During construction of Alternative 1, a total of approximately 218 acres of land would be disturbed, of which approximately 142 acres would be restored; approximately 91 acres of disturbance would be on NFS lands, with restoration of approximately 58 acres. Permanent land disturbance would occur on approximately 76 acres, approximately 33 acres of which would be on NFS lands. An estimate of land disturbance resulting from Alternative 1 is listed in Table B.4-5, including estimates of temporary disturbance, the acreage to be restored, and estimates of potential permanent disturbance.

Table B.4-5. Estimates of Land Disturbance for Alternative 1

Project Feature	Quantity	Disturbed Acreage Calculation	Acres Disturbed During Construction	Acres to be Restored	Acres Permanently Disturbed
Guard Pole (1) Hole and (2) Truck Damage (qty street crossings on quad maps)	8 (NFS) 16	(1) P/4 (28"/12)^2 x 4 locs *1.5 (2) 2 tracks x 10' x 2' x 4 locs	0.034 0.069	0.034 0.069	0 0
Steel Pole Hole (qty steel poles)	3	P/4 (96"/12)^2	0.004	0	0.004
Steel Pole (1) Truck Damage, (2) Laydown Area, (3) Crane Pad (qty steel poles)	3	(1) 2 tracks x 10' x 2' (2) 175' x 8' (3) 50' x 50'	0.269	0.269	0
Lattice Steel Tower Footings Holes (qty tower structures)	40 (NFS) 46	P/4(2)^2 x 4 locs	0.0104 0.0120	0 0	0.0104 0.0120

Table B.4-5. Estimates of Land Disturbance for Alternative 1

Project Feature	Quantity	Disturbed Acreage Calculation	Acres Disturbed During Construction	Acres to be Restored	Acres Permanently Disturbed
Lattice Steel Tower (1) Truck Damage, (2) Laydown and Assembly Area, (3) Crane Pad (qty tower structures)	39 (NFS) 46	(1) 2 tracks x 10' x 2' x 4 locs (2) 175' x 60' (3) 50' x 50'	11.78 13.89	11.78 13.89	0 0
Lattice Steel Tower Site Grading (0.05 acres each)	7	12' x 50' x 40'	0.35	0	0.35
Pulling Set-ups (qty set-ups)	7 (NFS) 12	100' x 100'	1.61 2.76	1.61 2.76	0 0
Splicing Set-ups (qty set-ups)	7 (NFS) 4	20' x 50'	0.16 0.09	0.16 0.09	0 0
New Spur Roads (qty miles)	3.14 (NFS) 0.6	x 16' wide	6.09 1.16	0 0	6.09 1.16
New and/or Improved Access Roads (impacted areas only) (qty miles)	10.24 (NFS) 0.45	x 16' wide	19.87 0.87	0 0	19.87 0.87
Radius from access road to spur road	---	50-foot radius requires 1,464 sq. ft.	1.32 0.84	0 0	1.32 0.84
Spur road related temporary disturbed areas	---	566 sq. ft. per spur road	0.52 0.34	0.52 0.34	0 0
Additional Spur Road Radius for Steel Pole Trucks	3	2,285 sq. ft. per spur road	0.16	0	0.16
Underground Trenching (qty miles)	4.0 (NFS) 3.5	10.3 acres per mile (Temp LD)	41.2 36.1	41.12 36.03	0.08 0.07
Primary Marshalling Yard	1	5 acres per yard	5.0	5.0	0
Staging Areas Material and Equipment (Secondary Marshalling Yards)	6	3 to 5 acres per yard	30	30	0
Antelope-Pole Switch 74 66-kV Line Removal Specific Truck and Ped Damage	41 (NFS) 17	100 sq. ft. per tower site	0.09 0.04	0.09 0.04	0 0
Antelope-Pole Switch 74 66-kV Line Removal Crane Pads	41 (NFS) 17	50' x 50'	2.36 0.98	2.36 0.98	0 0
Antelope Substation Expansion (220-kV)	1	2 acres expansion established	2.00	0	2.00
Antelope Substation Expansion (500-kV)	1	31 acres expansion established	31.00	0	31.00
Transition Stations	2 (NFS) 2	3 acres/station	6.0 6.0	0 0	6.0 6.0
Total Estimated	---	---	218.0	142.1	75.9
Total on NFS lands	---	---	91.0	57.6	33.4

Note: These are approximate numbers based on estimates derived from preliminary design concepts for Alternative 1. Numbers are subject to change as the design is finalized.

Construction Waste. Construction of Alternative 1 would result in the generation of various waste materials and the limited use of hazardous materials that include fuel, lubricants, and cleaning solvents. All waste materials would be disposed of in off-site landfills. Table B.4-6 provides an estimate of exported construction

waste of those elements of Alternative 1 that would differ from the proposed Project, which is described in Table B.2-8.

Table B.4-6. Estimates of Construction Waste for Alternative 1

Waste Item	Recyclable/ Disposable Pounds
Transmission Line	
500-kV Construction Waste Estimate	
Wood from Cribbing, etc.	116,000
Soil/Veg: Footings, Spurs, and Crane Pads	1,140,000
Soil/Veg: trenching (underground)	343,696,000
Removal of single-circuit 500-kV towers from Pardee-Vincent Corridor	0
Miscellaneous	30,000
Sanitation Waste	42,000
Concrete	412,000

Note: These are approximate numbers based on estimates derived from preliminary design concepts for Alternative 1. Numbers are subject to change as the design is finalized.

Facility Operations and Maintenance. Operation and maintenance activities for the overhead portions of Alternative 1 would involve a periodic inspection (e.g., once per year) via helicopter and truck. Maintenance of the transmission lines would be performed on an as-needed basis, and would include maintenance of access roads and erosion/drainage control structures.

To accommodate operation and maintenance activities for underground transmission lines, the land above the underground cables must remain free from secondary surface development, including overhead transmission lines. The area must also remain clear of lengthy-rooted trees, which could disturb the buried cables. The type of vegetation allowed to grow on land above the buried infrastructure would be permanently restricted and would be compatible with the vegetation maintenance needs of the existing fuelbreak on the ridge top.

The maintenance of underground transmission lines is more difficult than overhead lines because when a problem occurs underground, it can be very difficult to identify the exact location of the problem. Once the problem is located, the segment (length between two splicing vaults) of cable on which the problem occurred must be removed and replaced. This process involves additional excavation and construction. This process, assuming a spare cable duct is available (best case scenario), would take approximately 12-14 days; however, if no spare duct is available, a new trench would need to be dug adjacent to the existing concrete ductbank and new cable installed, which would take approximately 21-23 days (assumes a 1,000 to 1,200-foot segment). As such, circuit restoration for underground replacement/restoration of conductors would take longer than with overhead lines, which take approximately 2-5 days to restore. It should be noted that underground transmission lines are more at risk for damage from earthquakes than overhead lines. The occurrence of one of these events after construction could increase the required emergency maintenance activities. Although there are no 500-kV lines to compare, it can be assumed that underground lines also have a shorter overall lifespan than overhead lines due to the degradation of the insulation surrounding the cable.

Maintenance activities associated with transition stations would typically occur on an annual basis and consist of visual inspection and testing of relays, breakers, reactors, battery system and miscellaneous equipment. These maintenance activities are expected to take approximately two to three days to complete.

B.4.2 Alternative 2: Antelope-Pardee East Mid-Slope

B.4.2.1 Alternative 2 Description

This alternative would follow the same route (and use similar proposed improvements and remove the existing 66-kV line) as the proposed Project, except the proposed line would relocate most of the towers off the top of Del Sur Ridge in the ANF, roughly from proposed Project Mile 5.7 to Mile 17.5 (Alternative 2 Mile 18.6), as shown in Figure B.4-9. To reduce the visibility of the towers to distant viewers, as well as conflicts with Forest Management activities (e.g., wildland fire suppression), and the potential for avian collision and electrocution, the new alignment would place the towers on the eastern face of Del Sur Ridge, facing Bouquet Canyon, mid-slope between the ridge top and the canyon bottom. As such, the new towers would fall outside of the boundaries of the existing 1,000-foot-wide Saugus-Del Sur utility corridor (approximately 12.4 miles would be re-routed outside of the existing 1,000-foot utility corridor through a Forest Plan amendment).

The total length of Alternative 2 would be approximately 26.7 miles. This alternative would traverse NFS lands for 13.2 miles (14.0 miles through the ANF, where approximately 0.8 miles cross private land near Bouquet Reservoir), which is an additional 0.6 miles in comparison with the proposed Project. On NFS lands, 12.2 miles of this alternative route would deviate from the existing 66-kV line (considered new ROW).

For Alternative 2, the Forest Service would issue a 50-year-term Special Use Easement authorizing the construction, use, and maintenance of the long-term transmission line and infrastructure, 13.2 miles long, within a 160-foot-wide ROW, on NFS lands. Any ground disturbing activities during construction on NFS lands and outside the proposed 160-foot-wide ROW easement would be authorized by one or more temporary Special Use Permits. Additional resource studies would be necessary to authorize the temporary Special Use Permit for work outside the proposed 160-foot-wide ROW (e.g., secondary marshalling yards, pulling and splicing set up sites, helicopter staging areas). In addition, this alternative would require several amendments to the ANF Land Management Plan, including changing the Scenic Integrity Objectives along the proposed utility corridor (see Table A.5-3); relocating approximately 12.4 miles of the 1,000-foot-wide Saugus-Del Sur utility corridor to follow the Alternative 2 route on NFS lands (the towers would be placed at the upslope boundary of the relocated utility corridor); and modifying the Forest Standard related to the Pacific Crest Trail (S1) specifically regarding this Project.

B.4.2.2 Alternative 2 Facilities

The infrastructure and facilities for Alternative 2 would be nearly identical to those for the proposed Project, which is described in Section B.2.1. As with the proposed Project, three double-circuit 220-kV tubular steel pole structures would be installed between Mile 0.0 and Mile 0.1 to carry the new line for the first 0.1 miles from the Antelope Substation. Then, from Mile 0.1 to Mile 22.6, approximately 101 single-circuit 500-kV lattice steel towers would be installed, of which approximately 66 towers (56 mid-slope) would be installed on NFS lands. From Mile 22.6 to Mile 26.7, 21 new double-circuit 500-kV lattice steel towers would be installed (this segment is identical to the proposed Project segment from Mile 20.3 to Mile 25.6) to carry the transmission line to its termination at Pardee Substation. As with the proposed Project, one existing double-circuit 500-kV tower (Mile 23.4) would be used to allow the 500-kV transmission lines to cross over the existing 220-kV transmission lines.

Due to the increased length of Alternative 2, which would be 1.1 miles longer than the proposed Project, approximately eight additional transmission towers would be required between proposed Project Mile 5.7 and Mile 18.6 for this alternative.

Figure B.4-9. Alternative 2 Alignment
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Alternative 2 would require the same modifications to Antelope Substation and Pardee Substation as are required for the proposed Project (described in Section B.2.1.2). As such, relocation of the subtransmission facilities at Antelope Substation, which would be affected by the substation expansion, would also be required for Alternative 2. Furthermore, the same information technology facilities that are described for the proposed Project in Section B.2.1.3 would be required for Alternative 2.

B.4.2.3 Alternative 2 Construction and Operation

Construction and operational activities for Alternative 2 would generally be the same as the proposed Project, as described in Section B.2.2 and B.2.3, respectively. However, additional construction measures would be required for those transmission towers located on steep hillsides. Permanent spur roads would be established for towers located mid-slope, which are not installed by helicopter, so that tower sites would be accessible from the existing access road, located along Del Sur Ridge. Spur roads on steep slopes would need to be cut in a switchback pattern to accommodate the safety requirements of trucks and other construction vehicles. In steep areas, where it would be too dangerous or difficult for construction crews and/or equipment to drive to a hillside tower site, or where extensive cut/fill on spur roads and pads and/or multiple switchbacks for spur roads would create visual scars, helicopters would be used to erect towers. Based on preliminary estimates of tower locations, it is proposed that of the approximately 56 towers proposed mid-slope through the ANF (12.4 miles), approximately 37 towers would be installed using helicopters. As shown in Table B.4-10, new spur road construction for this alternative would be approximately 0.7 miles off NFS lands and 0.3 miles on NFS lands. Maintenance to existing roads would occur on 0.5 miles off NFS lands and 10.4 miles on NFS lands.

Alternative 2 would require expansion of Antelope and Pardee Substations, consistent with the proposed Project, as described in Section B.2.2.2. In addition, Alternative 2 would require the construction and operation of the same information technology facilities that would be required by the proposed Project and are described in Section B.2.2.3. As with the proposed Project (Section B.2.1), construction of Alternative 2 would also involve the removal of 17.5 miles of existing 66-kV transmission line and associated infrastructure, including 119 existing 66-kV towers between proposed Project Mile 1.1 and Mile 18.6 in the Saugus-Del Sur utility corridor.

Construction Schedule. Alternative 2 would require a slightly longer construction duration than the proposed Project (14 months verses 13 months), due to the complications of building transmission towers on hillsides. The in-service date for Alternative 2 would be May 2009. Table B.4-7 describes the estimated construction schedule for Alternative 2.

Table B.4-7. Alternative 2 Construction Schedule

	Duration (months)
Engineering	20
ROW and Substation Site Acquisition	21
Procurement	12
Construction and Testing:	14
• Removal of Antelope-Pole Switch 74 66-kV Line; 12-kV Relocation	3
• 500-kV Transmission Line Construction	14
• Subtransmission Work	2
• Antelope Substation	10
• Pardee Substation	5
Antelope-Pardee 500-kV Transmission Project In-Service Date [1]	May 2009

[1] Assumes a construction start date of March 2008 (same as proposed Project).

Construction Equipment. The construction equipment required for Alternative 2 is the same as for the proposed Project, and is described in Table B.2-3 (transmission line removal and installation equipment) and in Table B.2-4 (Antelope Substation expansion equipment).

Workforce. Table B.4-8 provides a summary of the labor force requirements for Alternative 2. Due to the need for approximately 8.8 miles of new and/or improved access roads to remote locations, two road work crews would be required for Alternative 2, as opposed to the proposed Project, which only requires one road work crew for approximately 1.7 miles of new and/or improved access roads. The overall workforce requirements are anticipated to be similar to the proposed Project.

Table B.4-8. Alternative 2 Labor Force Requirements

Construction Element	No. of Crews	No. Persons per Crew
500-kV Transmission Line Construction and Demolition		
Survey	1	3
Marshalling Yards	1	6
Road Work	2	8
Foundations	4	20
Steel (Shake-out, Hauling, Light Assembly, Heavy Assembly, Erection)	8	48
Conductor (Sheaves, Insulators, Stringing, Deadening, Clipping and Spacing, Anchors)	8	39
Cleanup and Guard Poles	2	6
Wreck-Out (Remove Conductors, Structures, Foundations)	4	30
Bypass Transmission Line (Install Structures and Conductors)	2	12
Bypass Transmission Line (Removal of Conductors and Structures)	2	12
Antelope Substation		
66-kV Relocation at Antelope Substation	2	8
Grading 205 ft by 300 ft at Antelope Substation	1	8
Civil at Antelope Substation	1	50
Electrical at Antelope Substation	1	75
Pardee Substation		
Civil at Pardee Substation	1	8
Electrical at Pardee Substation	1	30

Note: These are approximate numbers based on estimates derived from preliminary design concepts for Alternative 2. Numbers are subject to change as the design is finalized.

Vehicle Trips. The total vehicle miles traveled on paved and unpaved road surfaces was estimated for the Alternative 2, as shown in Table B.4-9. Refer to Appendix 3, Air Quality Calculations, for detailed assumptions.

Land Disturbance. During construction of Alternative 2, a total of approximately 117 acres of land would be disturbed, of which approximately 59 acres would be restored; approximately 38 acres of disturbance would be on NFS lands, with restoration of approximately 17 acres. Permanent land disturbance would occur on a total of approximately 58 acres, approximately 21 acres of which would be on NFS lands. An estimate of land disturbance resulting from Alternative 2 is listed in Table B.4-10, including estimates of temporary disturbance, the acreage to be restored, and estimates of potential permanent disturbance.

Table B.4-9. Estimated Vehicle Miles Traveled for Alternative 2

	Trips		Miles/Round Trip		Miles		
	Paved	Unpaved	Paved	Unpaved	Paved	Unpaved	Total
Passenger Vehicles							
Construction Workers	8,401	0	30	0	252,030	0	252,030
Professionals	1,476	1,476	30	1.8 - 4.7	44,280	6,037	50,317
Mid-Size Vehicles - "Delivery Trucks"							
Road Construction	739	739	10	1.8 - 4.7	7,390	2,827	10,217
Foundation Construction	1,587	1,587	10	1.8 - 4.7	15,870	6,070	21,940
Steel Construction	3,352	3,352	10	1.8 - 4.7	33,520	12,821	46,341
Heavy-Heavy Duty Vehicles							
Equipment Delivery	151	151	0 - 30	0 - 0.5	4,530	76	4,606
Equipment Shuttling	812	812	5	1.8 - 4.7	4,060	3,106	7,166
Waste Disposal	144	144	30 - 54.5	1.8 - 5.18	7,054	636	7,691
Materials Delivery (yards)	278	0	110	0	30,580	0	30,580
Materials Delivery (sites)	694	694	30	2.17 -4.7	20,820	2,732	23,552
TOTAL	17,634	---	---	---	420,134	34,307	454,441

Note: These are approximate numbers based on estimates derived from preliminary design concepts for Alternative 2. Numbers are subject to change as the design is finalized.

Table B.4-10. Estimates of Land Disturbance for Alternative 2

Project Feature	Quantity	Disturbed Acreage Calculation	Acres Disturbed During Construction	Acres to be Restored	Acres Permanently Disturbed
Guard Pole (1) Hole and (2) Truck Damage (qty street crossings on quad maps)	8 (NFS) 26	(1) P/4 (28"/12)^2 x 4 locs *1.5 (2) 2 tracks x 10' x 2' x 4 locs	0.034 0.112	0.034 0.112	0 0
Steel Pole Hole (qty steel poles)	3	P/4 (96"/12)^2	0.004	0	0.004
Steel Pole (1) Truck Damage, (2) Laydown Area, (3) Crane Pad (qty steel poles)	3	(1) 2 tracks x 10' x 2' (2) 175' x 8' (3) 50' x 50'	0.269	0.269	0
Lattice Steel Tower Footings Holes (qty tower structures)	66 (NFS) 56	P/4(2)^2 x 4 locs	0.0172 0.0146	0 0	0.0172 0.0146
Lattice Steel Tower (1) Truck Damage, (2) Laydown and Assembly Area, (3) Crane Pad (qty tower structures)	29 (NFS) 56	(1) 2 tracks x 10' x 2' x 4 locs (2) 175' x 60' (3) 50' x 50'	8.76 16.91	8.76 16.91	0 0
Lattice Steel Tower Site Grading (0.05 acres each)	12	12' x 50' x 40'	0.60	0	0.60
Pulling Set-ups (qty set-ups)	11 (NFS) 14	100' x 100'	2.53 3.22	2.53 3.22	0 0
Splicing Set-ups (qty set-ups)	12 (NFS) 4	20' x 50'	0.28 0.09	0.28 0.09	0 0
New Spur Roads (qty miles)	0.32 (NFS) 0.66	x 16' wide	0.62 1.28	0 0	0.62 1.28
New and/or Improved Access Roads (impacted areas only) (qty miles)	10.39 (NFS) 0.51	x 16' wide	20.16 0.99	0 0	20.16 0.99
Radius from access road to spur road	---	50-foot radius requires 1,464 sq. ft.	0.39 0.79	0 0	0.39 0.79
Spur road related temporary disturbed areas	---	566 sq. ft. per spur road	0.15 0.31	0.15 0.31	0 0
Additional Spur Road Radius for Steel Pole Trucks	3	2,285 sq. ft. per spur road	0.16	0	0.16
Primary Marshalling Yard	1	5 acres per yard	5.0	5.0	0

Table B.4-10. Estimates of Land Disturbance for Alternative 2

Project Feature	Quantity	Disturbed Acreage Calculation	Acres Disturbed During Construction	Acres to be Restored	Acres Permanently Disturbed
Staging Areas Material and Equipment (Secondary Marshalling Yards)	4	3 to 5 acres per yard	20.0	20.0	0
Antelope-Pole Switch 74 66-kV Line Removal Specific Truck and Ped Damage	83 (NFS) 17	100 sq. ft. per tower site	0.18 0.04	0.18 0.04	0 0
Antelope-Pole Switch 74 66-kV Line Removal Crane Pads	83 (NFS) 17	50' x 50'	4.77 0.98	4.77 0.98	0 0
Antelope Substation Expansion (220-kV)	1	2 acres expansion established	2.00	0	2.00
Antelope Substation Expansion (500-kV)	1	31 acres expansion established	31.00	0	31.00
Total Estimated	---	---	116.7	58.6	58.0
Total on NFS lands	---	---	37.9	16.7	21.2

Note: These are approximate numbers based on estimates derived from preliminary design concepts for Alternative 2. Numbers are subject to change as the design is finalized.

Construction Waste. Construction of Alternative 2 would result in the generation of various waste materials and the limited use of hazardous materials that include fuel, lubricants, and cleaning solvents. All waste materials would be disposed of in off-site landfills. Table B.4-11 provides an estimate of exported construction waste of those elements of Alternative 2 that would differ from the proposed Project, which is described in Table B.2-8.

Facility Operations and Maintenance. Inspections of the transmission line and associated infrastructure would be conducted on a periodic (e.g., once per year) basis via helicopter and/or truck. Maintenance would be performed on an as-needed basis. For the towers located downhill from Del Sur Ridge, maintenance activities would be complicated due to the difficulty of conducting maintenance on hillsides. For the 37 towers proposed for construction by helicopter, maintenance work would potentially require helicopter use and access by foot (walk-in) only. Extra precautions may be required when transporting construction equipment and materials from the ridge-top to the hillside tower locations.

Table B.4-11. Estimates of Construction Waste for Alternative 2

Waste Item	Recyclable/ Disposable Pounds
Transmission Line	
500-kV Construction Waste Estimate	
Wood from Cribbing, etc.	116,000
Soil/Veg: Footings, Spurs, and Crane Pads	1,626,000
Removal of single-circuit 500-kV towers from Pardee-Vincent Corridor	1,256,000
Miscellaneous	42,000
Sanitation Waste	60,000
Concrete	590,000

Note: These are approximate numbers based on estimates derived from preliminary design concepts for Alternative 2. Numbers are subject to change as the design is finalized.

B.4.3 Alternative 3: Antelope-Pardee Single-Circuit 500-kV Towers between Haskell Canyon and Pardee Substation

B.4.3.1 Alternative 3 Description

Alternative 3 is a minor variation of the proposed Project; between Mile 0.0 and Mile 20.3, Alternative 3 is identical to the proposed Project. From Mile 20.3 to Mile 25.6 (entirely on non-NFS lands), between Haskell Canyon and Pardee Substation, Alternative 3 includes the construction of 21 single-circuit 500-kV transmission towers, rather than removing the existing single-circuit 500-kV towers and replacing them with double-circuit 500-kV towers. The single-circuit towers would be built in the vacant position of the Pardee-Vincent 500-kV ROW, which is situated near the north edge of the ROW between Mile 20.3 and 22.3 (Figure B.4-10), and near the center of the ROW between Mile 22.3 and 25.6 (Figure B.4-11). Similar to the proposed Project, the transmission line for Alternative 3 would traverse NFS lands for 12.6 miles, between Mile 5.7 and Mile 18.6 (this does not include the 0.3 miles of private in-holdings crossed at Bouquet Reservoir) . This alternative would also include the removal of approximately 119 existing 66-kV towers (cut flush with the surface) from the Saugus-Del Sur utility corridor.

For Alternative 3, the Forest Service would issue a 50-year-term Special Use Easement authorizing the construction, use, and maintenance of the long-term transmission line and infrastructure, 12.6 miles long, within a 160-foot-wide ROW, on NFS lands. Any ground disturbing activities during construction on NFS lands and outside the proposed 160-foot-wide ROW easement would be authorized by one or more temporary Special Use Permits. Additional resource studies would be necessary to authorize the temporary Special Use Permit for work outside the proposed 160-foot-wide ROW (e.g., secondary marshalling yards, pulling and splicing set up sites, helicopter staging areas). In addition, this alternative would require several amendments to the ANF Land Management Plan, including changing the Scenic Integrity Objectives along the proposed utility corridor (see Table A.5-3); and modifying the Forest Standard related to the Pacific Crest Trail (S1) specifically regarding this Project.

B.4.3.2 Alternative 3 Facilities

The infrastructure and facilities required for Alternative 3 would be the same as the proposed Project, Section B.2.1 (Proposed Facilities and Modifications), except for the 5.3-mile segment between Haskell Canyon and Pardee Substation. In this segment, Alternative 3 would use single-circuit towers instead of double-circuit towers. For the entire Alternative 3 route, approximately 114 single-circuit 500-kV transmission towers would be constructed, of which 58 towers would be located on NFS lands (same as proposed Project). As with the proposed Project, one existing double-circuit 500-kV tower located at Mile 22.3 would be used to allow the 500-kV transmission lines to cross over the existing 220-kV transmission lines. Single-circuit 500-kV towers vary in height from 113 to 178 feet, whereas double-circuit towers range from 175 to 230 feet tall.

B.4.3.3 Alternative 3 Construction and Operation

The construction and operational activities for Alternative 3 would be the same as the proposed Project (Section B.2.2 Project Construction and Section B.2.3 Facility Operation and Maintenance), except for the 5.3-mile segment between Haskell Canyon and Pardee Substation. In this segment, Alternative 3 would not include removal of the 21 existing single-circuit 500-kV transmission towers, which would reduce the construction waste and associated vehicle trips/miles traveled for Alternative 3 compared to the proposed Project (see

Figure B.4-10. Alternative 3 Proposed ROW Configuration for Mile 20.3 and Mile 22.3

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Figure B.4-11. Alternative 3 Proposed ROW Configuration for Mile 22.3 and Mile 25.6
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discussion below). The overall construction schedule for this alternative, however, is expected to be the same as the proposed Project (see Table B.2-1). Alternative 3 would also have the same workforce requirements as the proposed Project (see Table B.2-2), construction equipment requirements (see Table B.2-3), and land disturbance (see Table B.2-7). The procedures for installing, operating, and maintaining these towers would be the same as for other single-circuit 500-kV towers proposed for the Project, as described in Section B.2.

Vehicle Trips. Alternative 3 would not include the removal of the 21 existing single-circuit 500-kV transmission towers between Haskell Canyon and Pardee Substation, and would therefore result in fewer vehicle trips/miles traveled then the proposed Project, as shown in Table B.4-12. Refer to Appendix 3, Air Quality Calculations, for detailed assumptions.

Table B.4-12. Estimated Vehicle Miles Traveled for Alternative 3

	Trips		Miles/Round Trip		Miles		
	Paved	Unpaved	Paved	Unpaved	Paved	Unpaved	Total
Passenger Vehicles							
Construction Workers	7,825	0	30	0	234,750	0	234,750
Professionals	1,353	1,353	30	1 - 4.7	40,590	5,559	46,149
Mid-Size Vehicles - "Delivery Trucks"							
Road Construction	990	990	10	1 - 4.7	9,900	4,007	13,907
Foundation Construction	2,128	2,128	10	1 - 4.7	21,280	8,613	29,893
Steel Construction	4,351	4,351	10	1 - 4.7	43,510	18,050	61,560
Heavy-Heavy Duty Vehicles							
Equipment Delivery	151	151	0 - 30	0 - 0.5	4,530	76	4,606
Equipment Shuttling	1,000	1,000	5	1 - 4.7	5,000	4,316	9,316
Waste Disposal	113	113	30 - 54.5	1 - 5.18	5,365	605	5,970
Materials Delivery (yards)	265	0	110	0	29,150	0	29,150
Materials Delivery (sites)	935	935	30	1 - 4.7	28,050	3,847	31,897
TOTAL	19,111	---	---	---	422,125	45,071	467,196

Note: These are approximate numbers based on estimates derived from preliminary design concepts for Alternative 3. Numbers are subject to change as the design is finalized.

Construction Waste. Construction of Alternative 3 would not require the removal of the existing single-circuit 500-kV towers between Haskell Canyon and Pardee Substation. As such, this alternative would result in less construction waste for installation of the 500-kV line, as shown in Table B.4-13. All other elements of construction waste would be the same as the proposed Project, which is described in Table B.2-8.

Table B.4-13. Estimates of Construction Waste for Alternative 3

Waste Item	Recyclable/ Disposable Pounds
Transmission Line	
500-kV Construction Waste Estimate	
Wood from Cribbing, etc.	160,000
Soil/Veg: Footings, Spurs, and Crane Pads	1,559,200
Removal of single-circuit 500-kV towers from Pardee-Vincent Corridor	1,256,000
Miscellaneous	40,000
Sanitation Waste	58,360
Concrete	560,000

Note: These are approximate numbers based on estimates derived from preliminary design concepts for Alternative 3. Numbers are subject to change as the design is finalized.

B.4.4 Alternative 4: Antelope-Pardee Re-Routing of New Right-of-Way along Haskell Canyon

B.4.4.1 Alternative 4 Description

During the public scoping meeting held on July 14, 2005, it was requested that SCE find a new route for the proposed Project that would avoid traversing through the Veluzat Motion Picture Ranch (Veluzat Ranch or ranch) and planned development in the Santa Clarita area. Specifically, the owners of Veluzat Ranch, which use the ranch for shooting television shows and motion pictures, expressed concerns regarding the proposed Project's effects on the ranch's operations. The development of Alternative 4 took into consideration the need to avoid possible conflicts with ranch operations, which could include interference of the transmission line with aerial filming and/or ground filming, as well as the possibility of disrupting filming due to maintenance activities, which would result in traffic and noise impacts to the ranch. Other concerns voiced by the owners of the Veluzat Ranch are that the transmission line may generate EMF and electronic interference that would disturb the electronic equipment used during filming. Therefore, Alternative 4 circumvents Veluzat Ranch in order to address the concerns discussed above, thereby avoiding detrimental impacts to the economic viability of the ranch as a result of compromised operations.

As shown in Figure B.4-12, Alternative 4 follows the same route as the proposed Project except for a 3.1-mile segment between Mile 17.5 and Mile 20.3 of the proposed Project. At Mile 17.5, north of Haskell Canyon Road, the transmission line for Alternative 4 would divert from the proposed Project route and proceed in a southerly direction as the proposed Project route shifts to the west-southwest. Traveling in a new ROW on NFS lands within the ANF, the transmission line would continue southwest for about 0.5 miles, then south for another 0.8 miles, crossing approximately 0.3 miles of private land in-holdings (non-NFS), before leaving the ANF. Once leaving the Forest, the transmission line would continue south another 0.7 miles before turning east for roughly 0.3 miles along the base of a hill. Just north of the City of Santa Clarita, the transmission line would make an abrupt turn to the south-southwest (about 90 degrees) and continue for about 0.2 miles before entering the existing Pardee-Vincent 500-kV ROW, where it would head west for approximately 0.6 miles and rejoin the proposed Project route at approximately Mile 20.6 (proposed Project Mile 20.3). This alternative would require 2.5 miles of new ROW (in addition to the 1.1 miles of new ROW at the Antelope Substation), of which one mile is on NFS lands in the ANF. The transmission line would terminate at the Pardee Substation. The total length of this alternative would be 25.9 miles.

For Alternative 4, the Forest Service would issue a 50-year-term Special Use Easement authorizing the construction, use, and maintenance of the long-term transmission line infrastructure, 12.5 miles long, within a 160-foot-wide ROW, on NFS lands. Any ground disturbing activities during construction on NFS lands and outside the proposed 160-foot-wide ROW, would be authorized by one or more temporary Special Use Permits. Additional resource studies would be necessary to authorize the temporary Special Use Permit for work outside the proposed 160-foot-wide ROW (e.g., secondary marshalling yards, pulling and splicing set up sites, helicopter staging areas). In addition, this alternative would require several amendments to the ANF Land Management Plan, including changing the Scenic Integrity Objectives along the proposed utility corridor (see Table A.5-3); relocating approximately one mile of the 1,000-foot-wide Saugus-Del Sur utility corridor to follow the Alternative 4 route on NFS lands (the towers would be placed centerline of the relocated utility corridor); as well as modifying the Forest Standard related to the Pacific Crest Trail (S1) specifically regarding this Project.

B.4.4.2 Alternative 4 Facilities

The infrastructure and facilities required for Alternative 4 would be the same as the proposed Project, as described in Section B.2.1 (Proposed Facilities and Modifications), with the exception that Alternative 4 would require approximately 94 single-circuit 500-kV transmission towers, whereas the proposed Project would require 93 towers. Similar to the proposed Project, Alternative 4 would require that 58 towers be located on NFS lands.

B.4.4.3 Alternative 4 Construction and Operation

Construction activities for Alternative 4 would be similar to those for the proposed Project, as described in Section B.2.2 (Project Construction). Slightly more construction activities, however, are expected for Alternative 4 as a result of the increase in length (0.3 miles longer than the proposed Project), which results in the need for one additional single-circuit 500-kV tower, and the establishment of a new 2.5-mile ROW, of which one mile would be on NFS lands, between proposed Project Mile 17.5 and Mile 20.3 (This does not include the 0.3 miles of private land in-holdings crossed within the ANF along the new ROW). As shown in Table B.4-16, new spur road construction for this alternative would be approximately 1.7 miles on non-NFS lands and 1.5 miles on NFS lands. Maintenance to existing roads would occur on 0.3 miles on non-NFS lands and 9.6 miles on NFS lands.

Construction Schedule. Alternative 4 would require the same construction duration as the proposed Project; however, additional time would be necessary for ROW acquisition due to the need for a new 2.5-mile ROW extending from proposed Project Mile 17.5 to Mile 20.3. Table B.4-14 describes the estimated construction schedule for Alternative 4.

Table B.4-14. Alternative 4 Construction Schedule

Activity	Duration (months)
Engineering	19
ROW and Substation Site Acquisition	27-30
Procurement	12
Construction and Testing:	13
• Removal of Antelope-Pole Switch 74 66-kV Line; 12-kV Relocation	3
• 500-kV Transmission Line Construction	13
• Subtransmission Work	2
• Antelope Substation	10
• Pardee Substation	5
Antelope-Pardee 500-kV Transmission Project In-Service Date [1]	April 2009

[1] Assumes a construction start date of March 2008 (same as proposed Project).

Construction Equipment. The construction equipment required for Alternative 4 is the same as for the proposed Project, and is described in Table B.2-3 (transmission line removal and installation equipment) and in Table B.2-4 (Antelope Substation expansion equipment).

Workforce. Labor requirements for Alternative 4 would be the same as the proposed Project and are provided in Table B.2-2. The overall workforce requirements are anticipated to be similar to the proposed Project.

Figure B.4-12. Alternative 4: Haskell Canyon Re-Route
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Vehicle Trips. The total vehicle miles traveled on paved and unpaved road surfaces was estimated for the Alternative 4, as shown in Table B.4-15. Refer to Appendix 3, Air Quality Calculations, for detailed assumptions.

Table B.4-15. Estimated Vehicle Miles Traveled for Alternative 4

	Trips		Miles/Round Trip		Miles		
	Paved	Unpaved	Paved	Unpaved	Paved	Unpaved	Total
Passenger Vehicles							
Construction Workers	8,120	0	30	0	243,600	0	243,600
Professionals	1,392	1,392	30	1.8 - 4.7	41,760	5,610	47,370
Mid-Size Vehicles - "Delivery Trucks"							
Road Construction	1,062	1,062	10	1.8 - 4.7	10,620	4,151	14,771
Foundation Construction	2,146	2,146	10	1.8 - 4.7	21,460	8,649	30,109
Steel Construction	4,534	4,534	10	1.8 - 4.7	45,340	18,272	63,612
Heavy-Heavy Duty Vehicles							
Equipment Delivery	151	151	0 - 30	0 - 0.5	4,530	76	4,606
Equipment Shuttling	1,097	1,097	5	1.8 - 4.7	5,485	4,422	9,907
Waste Disposal	144	144	30 - 54.5	1.8 - 5.18	7,054	636	7,691
Materials Delivery (yards)	262	0	110	0	28,820	0	28,820
Materials Delivery (sites)	938	938	30	2 - 4.7	28,140	3,858	31,998
TOTAL	19,846	---	---	---	436,809	45,672	482,482

Note: These are approximate numbers based on estimates derived from preliminary design concepts for Alternative 4. Numbers are subject to change as the design is finalized.

Land Disturbance. During construction of Alternative 4, a total of approximately 126 acres of land would be disturbed, of which approximately 64 acres would be restored; where approximately 45 acres of disturbance would be on NFS lands, with restoration of approximately 22 acres. Permanent land disturbance would occur on a total of approximately 61 acres, approximately 23 acres of which would be on NFS lands. An estimate of land disturbance resulting from Alternative 4 is listed in Table B.4-16, including estimates of temporary disturbance, the acreage to be restored, and estimates of potential permanent disturbance.

Table B.4-16. Estimates of Land Disturbance for Alternative 4

Project Feature	Quantity	Disturbed Acreage Calculation	Acres Disturbed During Construction	Acres to be Restored	Acres Permanently Disturbed
Guard Pole (1) Hole and (2) Truck Damage (qty street crossings on quad maps)	9 (NFS) 24	(1) P/4 (28"/12)^2 x 4 locs *1.5 (2) 2 tracks x 10' x 2' x 4 locs	0.039 0.103	0.039 0.103	0 0
Steel Pole Hole (qty steel poles)	3	P/4 (96"/12)^2	0.004	0	0.004
Steel Pole (1) Truck Damage, (2) Laydown Area, (3) Crane Pad (qty steel poles)	3	(1) 2 tracks x 10' x 2' (2) 175' x 8' (3) 50' x 50'	0.269	0.269	0
Lattice Steel Tower Footings Holes (qty tower structures)	58 (NFS) 57	P/4(2)^2 x 4 locs	0.0151 0.0148	0	0.0151 0.0148
Lattice Steel Tower (1) Truck Damage, (2) Laydown and Assembly Area, (3) Crane Pad (qty tower structures)	57 (NFS) 57	(1) 2 tracks x 10' x 2' x 4 locs (2) 175' x 60' (3) 50' x 50'	17.21 17.21	17.21 17.21	0
Lattice Steel Tower Site Grading (0.05 acres each)	12	12' x 50' x 40'	0.60	0	0.60
Pulling Set-ups (qty set-ups)	10 (NFS) 16	100' x 100'	2.30 3.68	2.30 3.68	0

Table B.4-16. Estimates of Land Disturbance for Alternative 4

Project Feature	Quantity	Disturbed Acreage Calculation	Acres Disturbed During Construction	Acres to be Restored	Acres Permanently Disturbed
Splicing Set-ups (qty set-ups)	11 (NFS) 4	20' x 50'	0.25 0.09	0.25 0.09	0
New Spur Roads (qty miles)	1.52 (NFS) 1.66	x 16' wide	2.95 3.22	0	2.95 3.22
New and/or Improved Access Roads (impacted areas only) (qty miles)	9.6 (NFS) 0.3	x 16' wide	18.66 0.6	0	18.66 0.6
Radius from access road to spur road	---	50-foot radius requires 1,464 sq. ft.	1.24 0.77	0	1.24 0.77
Spur road related temporary disturbed areas	---	566 sq. ft. per spur road	0.49 0.31	0.49 0.31	0
Additional Spur Road Radius for Steel Pole Trucks	3	2,285 sq. ft. per spur road	0.16	0	0.16
Primary Marshalling Yard	1	5 acres per yard	5.0	5.0	0
Staging Areas Material and Equipment (Secondary Marshalling Yards)	4	3 to 5 acres per yard	20.0	20.0	0
Antelope-Pole Switch 74 66-kV Line Removal Specific Truck and Ped Damage	22 (NFS) 17	100 sq. ft. per tower site	0.05 0.04	0.05 0.04	0
Antelope-Pole Switch 74 66-kV Line Removal Crane Pads	22 (NFS) 17	50' x 50'	1.27 0.98	1.27 0.98	0
Antelope Substation Expansion (220-kV)	1	2 acres expansion established	2.00	0	2.00
Antelope Substation Expansion (500-kV)	1	31 acres expansion established	31.00	0	31.00
Total Estimated	---	---	125.5	64.3	61.2
Total on NFS lands	---	---	44.5	21.6	22.9

Note: These are approximate numbers based on estimates derived from preliminary design concepts for Alternative 4. Numbers are subject to change as the design is finalized.

Construction Waste. Construction of Alternative 4 would result in the generation of various waste materials and the limited use of hazardous materials that include fuel, lubricants, and cleaning solvents. All waste materials would be disposed of in off-site landfills. Table B.4-17 provides an estimate of exported construction waste of those elements of Alternative 4 that would differ from the proposed Project, which is described in Table B.2-8.

Facility Operations and Maintenance. The operation and maintenance of Alternative 4 would be very similar to the proposed Project. Some additional effort would be required for operation and maintenance of the additional 0.3 miles of this alignment (in comparison with the proposed Project), but due to the short increase in distance those additional efforts would be minimal. Inspection of the transmission line and associated infrastructure would be conducted on a periodic (e.g., once per year) basis via helicopter and/or truck. Maintenance of the transmission lines would be performed on an as-needed basis and would include maintenance of access roads and erosion/drainage control structures.

Table B.4-17. Estimates of Construction Waste for Alternative 4	
Waste Item	Recyclable/ Disposable Pounds
Transmission Line	
500-kV Construction Waste Estimate	
Wood from Cribbing, etc.	162,000
Soil/Veg: Footings, Spurs, and Crane Pads	1,578,000
Removal of single-circuit 500-kV towers from Pardee-Vincent Corridor	1,256,000
Miscellaneous	40,000
Sanitation Waste	58,000
Concrete	570,000

Note: These are approximate numbers based on estimates derived from preliminary design concepts for Alternative 4. Numbers are subject to change as the design is finalized.

B.4.5 Alternative 5: Antelope-Pardee Sierra Pelona Re-Route

B.4.5.1 Alternative 5 Description

Alternative 5 was initially developed to completely circumvent the ANF and NFS lands between Antelope Substation and Pardee Substation. This alternative was developed to respond to Forest Service policy and Forest Plan direction of denying a special use application if a reasonable alternative can be developed off NFS lands. A goal in selecting an alignment for Alternative 5 was to substantially avoid the Forest, as well as minimize disruptions to existing land uses by routing the corridor across open land to the extent feasible. Four major development projects (Ritter Ranch, City Ranch, Joshua Ranch, and Palmdale 1000), which are currently planned and/or are under construction, severely limit the ability to establish a new overhead line between the Antelope and Pardee Substations. Because of this goal, approximately 0.5 miles of line was routed onto NFS lands in the ANF to avoid affecting residential homes in Leona Valley. Two additional NFS land properties located outside the Forest congressional boundary would also be crossed (1.0 miles) in Soledad Canyon (Mile 17.1 to Mile 17.4 and Mile 17.7 to Mile 18.4).

As shown in Figure B.4-13, this alternative would provide for a completely overhead 500-kV transmission line, routed south from Antelope Substation to the Pardee Substation via the existing Pardee-Vincent corridor. The overhead 500-kV transmission line would head south from the Antelope Substation for approximately 3.4 miles, over the California Aqueduct and the Portal Ridge mountain range. The transmission line would then veer southwest for 1.6 miles, and then south again for 0.6 miles. At this point, Alternative 5 would enter the ANF (on NFS lands) and continue south for approximately 0.5 miles, exiting the ANF. The route would continue southeast for approximately 2.3 miles, and then head in a southerly direction for the next 8.2 miles, traversing the western-most portion of the Ritter Ranch Specific Plan area, the Agua Dulce area, and crossing the Sierra Highway. At approximately Mile 16.6, the transmission line would head southeast for 1.4 miles, and then travel south for another 0.8 miles. This portion of the alignment would cross the Antelope Valley Freeway as well as two properties owned and managed by the Forest (1.0 mile on NFS lands – Mile 17.1 to 17.4 and Mile 17.7 to 18.4). At this point (Alternative 5 Mile 18.8), south of the Antelope Valley Freeway, the transmission line would enter the existing Pardee-Vincent corridor and head west for 13.1 miles, replacing the existing northernmost single-circuit 500-kV towers within the corridor with new double-circuit 500-kV towers. The transmission line would join the proposed Project route at Alternative 5 Mile 31.9 (proposed Project Mile 20.3). The new double-circuit 500-kV towers would continue to replace the existing Pardee-Vincent single-circuit 500-kV towers between Mile 31.9 and Mile 33.9 (Same as proposed Project Mile 20.3 to Mile 22.3 as shown in Figure B.2-11). Between Mile 33.9 and Mile 37.2 the new double-circuit 500-kV

towers would be placed in the vacant position within the existing Pardee-Vincent corridor and the existing single-circuit 500-kV towers would be removed (Same as proposed Project Mile 22.3 to Mile 25.6 as shown in Figure B.2-12). A total of approximately 73 single-circuit 500-kV towers would be removed from the Pardee-Vincent corridor. The total length of Alternative 5 is approximately 37.2 miles, of which 18.8 miles would be in new ROW, where 1.5 miles would traverse NFS lands. This alternative is 11.6 miles (45 percent) longer than the proposed Project.

Improvements and/or expansion of Antelope and Pardee Substations would be required to connect the transmission line to these substations. These improvements would be similar to the proposed Project.

For Alternative 5, the Forest Service would authorize the construction, use, and maintenance of long-term transmission line infrastructure totaling 1.5 miles long (includes both the crossing of the ANF and NFS lands in the Soledad Canyon area), with a 160-foot-wide ROW, on NFS lands through a 50-year-term Special Use easement. Any ground disturbing activities during construction on NFS lands and outside the proposed 160-foot-wide ROW would be authorized by one or more temporary Special Use Permits. Additional resource studies would be necessary to authorize the temporary Special Use Permit for work outside the proposed 160-foot-wide ROW (e.g., secondary marshalling yards, pulling and splicing set up sites, helicopter staging areas). In addition, this alternative would require several amendments to the 2005 ANF Land Management Plan, including changing the Scenic Integrity Objectives along the proposed utility corridor (see Table A.5-3); and designating a 1,000-foot-wide utility corridor to follow the new Alternative 5 route on 1.5 miles of NFS lands (the towers would be placed on the edge of the relocated utility corridor). The existing Saugus-Del Sur utility corridor would be removed (12.9 miles) as a designated utility corridor in the Forest Plan.

B.4.5.2 Alternative 5 Facilities

Alternative 5 is 11.6 miles (45 percent) longer than the proposed Project and would therefore require a comparably greater amount of infrastructure. Alternative 5 would require approximately three double-circuit 220-kV tubular steel poles, 94 single-circuit 500-kV lattice steel towers, and 76 double-circuit 500-kV lattice steel towers. As with the proposed Project, one existing double-circuit 500-kV tower at Alternative 5 Mile 33.9 (proposed Project Mile 22.3) would be used to allow the 500-kV transmission lines to cross over the existing 220-kV transmission lines. Approximately 18.8 miles of new ROW would be established between the Antelope Substation and the existing Pardee-Vincent corridor.

Approximately 18.4 miles of existing ROW within the Pardee-Vincent corridor would be utilized as part of Alternative 5, where no widening of the existing ROW would be required. The existing Pardee-Vincent corridor contains two sets of single-circuit 220-kV transmsission towers and one set of single-circuit 500-kV towers engergized at 220 kV. Alternative 5 would replace the existing single-circuit 500-kV transmission towers with new double-circuit 500-kV towers, which would be taller than the existing towers in the corridor. For the 18.4 miles that Alternative 5 would travel within the Pardee-Vincent corridor, approximately 76 new 500-kV double-circuit towers would be constructed.

Alternative 5 would utilize the same type of single-circuit 500-kV transmission towers as the proposed Project, as described in Section B.2.1. In addition, Alternative 5 would require the same modifications to the Antelope and Pardee Substations as are required for the proposed Project and described in Section B.2.1.2. Relocation of the subtransmission facilities at Antelope Substation that would be affected by the substation expansion would also be required for Alternative 5. Finally, the same information technology facilities which are described for

Figure B.4-13. Alternative 5 Alignment
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the proposed Project in Section B.2.1.3 would be required for Alternative 5. This alternative would also include the removal of 119 existing 66-kV towers from the Saugus-Del Sur utility corridor in the ANF, as would be done for the proposed Project. These towers are not located along this proposed route and would result in construction activities occurring in multiple areas.

B.4.5.3 Alternative 5 Construction and Operation

Due to the extended length of Alternative 5 and the fact that activities associated with the removal of the existing 66-kV towers from the Saugus-Del Sur utility corridor would not occur along the proposed route, the construction activities for this alternative would be spread over a greater geographic area and require a longer schedule for completion than the proposed Project. Besides these differences in location and schedule, the construction activities for Alternative 5 would be similar to those for the proposed Project, as described in Section B.2.2. Best management practices for hillside construction would be employed for any areas where the transmission line would traverse hillside areas, such as crossing the Sierra Pelona mountain range. For the hillside-installation of transmission towers, grading and construction of tower pads for the permanent installation of transmission towers and the temporary use of construction equipment would be required. Land disturbance associated with construction (temporary) and operation (permanent) of Alternative 5 is shown in Table B.4-21, below.

Construction Schedule. In comparison with the proposed Project, the construction schedule for Alternative 5 would be slightly longer (16 months verses 13 months for the proposed Project) due to the longer route. Additional time would be necessary for ROW acquisition due to the need for a new 18.8-mile ROW extending from Antelope Substation to the Pardee-Vincent corridor. Table B.4-18 shows an estimated construction schedule for Alternative 5.

Table B.4-18. Alternative 5 Construction Schedule

Activity	Duration (months)
Engineering	27
ROW and Substation Site Acquisition	36
Procurement	18
Construction and Testing:	16
• Removal of Antelope-Pole Switch 74 66-kV Line; 12-kV Relocation	3
• 500-kV Transmission Line Construction	16
• Subtransmission Work	2
• Antelope Substation	10
• Pardee Substation	5
Antelope-Pardee 500-kV Transmission Project In-Service Date [1]	July 2009

[1] Assumes a construction start date of March 2008 (same as proposed Project).

Construction Equipment. The construction equipment required for Alternative 5 is the same as for the proposed Project, and is described in Table B.2-3 (transmission line removal and installation equipment) and in Table B.2-4 (Antelope Substation expansion equipment).

Workforce. Table B.4-19 provides a summary of the labor force requirements for Alternative 5. Due to the substantially longer route required for this alternative, additional crews beyond what is proposed for the

proposed Project would be required. The overall workforce requirements are anticipated to be similar to the proposed Project.

Table B.4-19. Alternative 5 Labor Force Requirements

Construction Element	No. of Crews	No. Persons per Crew
500-kV Transmission Line Construction and Demolition		
Survey	2	3
Marshalling Yards	1	6
Road Work	3	8
Foundations	6	20
Steel (Shake-out, Hauling, Light Assembly, Heavy Assembly, Erection)	12	48
Conductor (Sheaves, Insulators, Stringing, Deadening, Clipping and Spacing, Anchors)	12	39
Cleanup and Guard Poles	3	6
Wreck-Out (Remove Conductors, Structures, Foundations)	4	30
Bypass Transmission Line (Install Structures and Conductors)	2	12
Bypass Transmission Line (Removal of Conductors and Structures)	2	12
Antelope Substation		
66-kV Relocation at Antelope Substation	2	8
Grading 205 ft by 300 ft at Antelope Substation	1	8
Civil at Antelope Substation	1	50
Electrical at Antelope Substation	1	75
Pardee Substation		
Civil at Pardee Substation	1	8
Electrical at Pardee Substation	1	30

Note: These are approximate numbers based on estimates derived from preliminary design concepts for Alternative 5. Numbers are subject to change as the design is finalized.

Vehicle Trips. The total vehicle miles traveled on paved and unpaved road surfaces was estimated for the Alternative 5, as shown in Table B.4-20. Due to the extended length of Alternative 5 and the additional new ROW compared to the proposed Project (18.8 miles verses 2.8 miles), many more vehicle miles are required during construction for Alternative 5 compared to the proposed Project. Refer to Appendix 3, Air Quality Calculations, for detailed assumptions.

Table B.4-20. Estimated Vehicle Miles Traveled for Alternative 5

	Trips		Miles/Round Trip		Miles		
	Paved	Unpaved	Paved	Unpaved	Paved	Unpaved	Total
Passenger Vehicles							
Construction Workers	11,862	0	30	0	355,860	0	355,860
Professionals	2,033	2,033	30	1.8 - 4.7	60,990	7,881	68,871
Mid-Size Vehicles - "Delivery Trucks"							
Road Construction	1,255	1,255	10	1.8 - 4.7	12,550	5,253	17,803
Foundation Construction	3,135	3,135	10	1.8 - 4.7	31,350	12,152	43,502
Steel Construction	6,623	6,623	10	1.8 - 4.7	66,230	25,673	91,903

Table B.4-20. Estimated Vehicle Miles Traveled for Alternative 5

	Trips		Miles/Round Trip		Miles		
	Paved	Unpaved	Paved	Unpaved	Paved	Unpaved	Total
Heavy-Heavy Duty Vehicles							
Equipment Delivery	151	151	0 - 30	0 - 0.5	4,530	76	4,606
Equipment Shuttling	1,602	1,602	5	1.8 - 4.7	8,010	6,209	14,219
Waste Disposal	211	211	30 - 54.5	1.8 - 5.18	9,726	884	10,610
Materials Delivery (yards)	382	0	110	0	42,020	0	42,020
Materials Delivery (sites)	1,370	1,370	30	2.17 -4.7	41,100	5,532	46,632
TOTAL	28,624	---	---	---	632,366	63,660	696,026

Note: These are approximate numbers based on estimates derived from preliminary design concepts for Alternative 5. Numbers are subject to change as the design is finalized.

Land Disturbance. During construction of Alternative 5, a total of approximately 146 acres of land would be disturbed, of which approximately 87 acres would be restored; where approximately 9.9 acres of disturbance would be on NFS lands, with restoration of approximately 7.3 acres. Permanent land disturbance would occur on a total of approximately 59 acres, approximately 2.6 acres of which would be on NFS lands. An estimate of land disturbance resulting from Alternative 5 is listed in Table B.4-21, including estimates of temporary disturbance, the acreage to be restored, and estimates of potential permanent disturbance.

Table B.4-21. Estimates of Land Disturbance for Alternative 5

Project Feature	Quantity	Disturbed Acreage Calculation	Acres Disturbed During Construction	Acres to be Restored	Acres Permanently Disturbed
Guard Pole (1) Hole and (2) Truck Damage (qty street crossings on quad maps)	0 (NFS) 45	(1) P/4 (28"/12)^2 x 4 locations *1.5 (2) 2 tracks x 10' x 2' x 4 locations	0 0.19	0 0.19	0 0
Steel Pole Hole (qty steel poles)	3	P/4 (96"/12)^2	0.004	0	0.004
Steel Pole (1) Truck Damage, (2) Laydown Area, (3) Crane Pad (qty steel poles)	3	(1) 2 tracks x 10' x 2' (2) 175' x 8' (3) 50' x 50'	0.269	0.269	0
Lattice Steel Tower Footings Holes (qty tower structures)	7 (NFS) 163	P/4(2)^2 x 4 locations	0.0018 0.0424	0	0.0018 0.0424
Lattice Steel Tower (1) Truck Damage, (2) Laydown and Assembly Area, (3) Crane Pad (qty tower structures)	7 (NFS) 163	(1) 2 tracks x 10' x 2' x 4 locations (2) 175' x 60' (3) 50' x 50'	2.11 49.23	2.11 49.23	0
Lattice Steel Tower Site Grading (0.05 acres each)	12	12' x 50' x 40'	0.6	0	0.6
Pulling Set-ups (qty set-ups)	0 (NFS) 28	100' x 100'	0 6.44	0 6.44	0
Splicing Set-ups (qty set-ups)	0 (NFS) 22	20' x 50'	0 0.5	0 0.5	0
New Spur Roads (qty miles)	0.12 (NFS) 2.39	x 16' wide	0.23 4.64	0	0.23 4.64
New and/or Improved Access Roads (impacted areas only) (qty miles)	1.15 (NFS) 8.33	x 16' wide	2.23 16.16	0	2.23 16.16
Radius from access road to spur road (no. total spur roads)	---	50-foot radius requires 1,464 sq. ft.	0.15 1.77	0	0.15 1.77

Table B.4-21. Estimates of Land Disturbance for Alternative 5

Project Feature	Quantity	Disturbed Acreage Calculation	Acres Disturbed During Construction	Acres to be Restored	Acres Permanently Disturbed
Spur road related temporary disturbed areas	---	566 sq. ft. per spur road	0.06 0.70	0.06 0.70	0
Additional Spur Road Radius for Steel Pole Trucks	3	2,285 sq. ft. per spur road	0.16	0	0.16
Primary Marshalling Yard	1	5 acres per yard	5.0	5.0	0
Staging Areas Material and Equipment (Secondary Marshalling Yards)	4	3 to 5 acres per yard	20.0	20.0	0
Antelope-Pole Switch 74 66-kV Line Removal Specific Truck and Ped Damage	86 (NFS) 33	100 sq. ft. per tower site	0.19 0.07	0.19 0.07	0
Antelope-Pole Switch 74 66-kV Line Removal Crane Pads	86 (NFS) 33	50' x 50'	4.95 1.90	4.95 1.90	0
Antelope Substation Expansion (220-kV)	1	2 acres expansion established	2.00	0	2.00
Antelope Substation Expansion (500-kV)	1	31 acres expansion established	31.00	0	31.00
Total Estimated	---	---	145.6	86.6	59.0
Total on NFS lands	---	---	9.9	7.3	2.6

Note: These are approximate numbers based on estimates derived from preliminary design concepts for Alternative 5. Numbers are subject to change as the design is finalized.

Construction Waste. Construction of Alternative 5 would result in the generation of various waste materials and the limited use of hazardous materials that include fuel, lubricants, and cleaning solvents. All waste materials would be disposed of in off-site landfills. Table B.4-22 provides an estimate of exported construction waste of those elements of Alternative 5 that would differ from the proposed Project, which is described in Table B.2-8.

Table B.4-22. Estimates of Construction Waste for Alternative 5

Waste Item	Recyclable/ Disposable Pounds
Transmission Line	
500-kV Construction Waste Estimate	
Wood from Cribbing, etc.	234,000
Soil/Veg: Footings, Spurs, and Crane Pads	2,278,000
Removal of single-circuit 500-kV towers from Pardee-Vincent Corridor	4,365,600
Miscellaneous	58,000
Sanitation Waste	84,000
Concrete	826,000

Note: These are approximate numbers based on estimates derived from preliminary design concepts for Alternative 5. Numbers are subject to change as the design is finalized.

Facility Operations and Maintenance. The operation and maintenance of Alternative 5 would be very similar to the proposed Project, with the same differences in location and schedule mentioned above. Increased effort would be required for operation and maintenance of the additional infrastructure for the 37.4-mile route. Inspections of the transmission line and associated infrastructure would be conducted on a periodic (e.g., once per year) basis via helicopter and/or truck. Maintenance of the transmission lines would be performed on an as-needed basis and would include maintenance of access roads and erosion/drainage control structures. For the

towers located on hillside areas, maintenance activities could be complicated due to the difficulty of conducting maintenance on hillsides, which could increase the time and workforce required to maintain these towers and spur roads.

B.4.6 No Project/Action Alternative

B.4.6.1 Background

CEQA requires an evaluation of the No Project Alternative in order that decision makers can compare the impacts of approving the Project with the impacts of not approving the Project (State CEQA Guidelines §15126.6(e)(1)). According to the State CEQA Guidelines §15126.6(e)(2), "The 'no project' analysis shall discuss the existing conditions at the time the Notice of Preparation is published [(i.e., baseline environmental conditions)], or if no Notice of Preparation is published, at the time environmental analysis is commenced, as well as what would be reasonably expected to occur in the foreseeable future if the project were not approved, based on current plans and consistent with available infrastructure and community services." As required by CEQA, existing conditions that formulate the basis for the No Project Alternative analysis are described in Section C for each environmental discipline under "Environmental Setting."

NEPA requires an evaluation of the No Action Alternative (40 CFR Section 1502.14(d)) as a part of the alternatives screening process. Per NEPA regulations, the No Action Alternative must be considered even if the lead agencies are under a court order or legislative command to act. In this way, the analysis provides a benchmark for decision makers to compare the environmental effects of the action alternatives. NEPA describes two interpretations of "no action": one where the present course of action continues until that action changes (such as ownership or management); and one where the proposed activity would not take place. Regardless of the interpretation applied to the proposed Project, the environmental effects of the No Action Alternative are compared to the environmental effects of allowing the Project to be implemented in each of the action alternatives.

B.4.6.2 No Project/Action Alternative Scenarios

Selection of the No Project/Action Alternative would mean that the Antelope-Pardee 500-kV Transmission Project, as proposed, would not be implemented and the Forest Service would deny the special use application. No Forest Plan amendments would occur through this Project. As such, none of the associated Project activities would occur and the environmental impacts associated with the Project would not occur. For example, SCE's existing Antelope-Pole Switch 74 66-kV line along the Saugus-Del Sur utility corridor would remain in place, as removal of the 66-kV line is specifically linked to the construction of the Project (It should be noted that the USDA Forest Service's Special Use Permit for the 66-kV line has expired). As such, the environmental impacts associated with the Project, as described in Section C, would not occur. SCE's and CPUC's objectives for the Project would remain unfulfilled under the No Project/Action Alternative. For example, the 350 MW of initial transmission capability when energized to 220 kV would not be added between the Antelope and Pardee Substations, and the improved system reliability and operating flexibility associated with the Project would not occur.

As discussed in Section A.3.1 (SCE: Purpose and Need), in the absence of the Project, SCE still would be required to interconnect and integrate power generation facilities into its electric system, as required 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. According to SCE, several wind generation projects either have applications pending before

Kern County or are in the advanced planning stage and expected to submit applications in the near future. Due to their locations, these upcoming wind generation projects will need to interconnect to the SCE transmission system via Antelope Substation or some other new substation located in the vicinity to allow power to be delivered to load in the Los Angeles area. However, these wind generation projects cannot be interconnected to the SCE transmission system without an increase in transmission capacity south of Antelope Substation. Transmission of wind power from the Tehachapi and Antelope Valley areas is currently constrained by the existing Antelope-Mesa 220-kV transmission line, which would be overloaded by the addition of new wind generation. Therefore, without upgrades to the existing system, as new facilities are added to meet the power needs of southern California, SCE's system would experience system-wide power flow and reliability problems due to overloading of the existing system, such as curtailed generation, thermal overload, and blackouts. It should be noted that connection to the transmission systems of other power utilities (such as PG&E or LADWP) is possible but would not meet SCE's objectives for the Project and would not fulfill the goals of the Tehachapi Collaborative Study Group (see Sections A.3.1 and A.3.2).

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

- Initial wind projects in the Antelope Valley and Tehachapi areas would be postponed or cancelled, as additional transmission capacity would not be available, or these proposed wind projects would have to find alternate means to connect to SCE's transmission system without compromising system reliability.
- The requirement of the Renewables Portfolio Standard (RPS), which requires retail sellers of electricity such as SCE and PG&E to increase their sale of electricity produced by renewable energy sources to 20 percent by 2010 (updated from 2017 to 2010 per the Energy Action Plan), may not be achieved as access to renewable energy from the Antelope Valley-Tehachapi region would either not be provided or would be delayed.
- 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, which would likely further limit achievement of the RPS goal by the 2010 deadline.
- The conceptual plan recommended by the TCSG would not be fully implemented. This plan is intended to collect power from Tehachapi area wind projects, interconnect facilities into the state's backbone grid, and upgrade the network to reliably deliver that power to load centers. The conceptual plan, which would allow for the transmission of over 4,000 MW of wind power, would be not be fully achieved because the initial capacity that would have been provided by the proposed Project for transmitting 350 MW of power would not be achieved.
- Transmission providers such as SCE, PG&E, or LADWP would need to accommodate the power load by upgrading existing transmission infrastructure or building new transmission facilities along a different alignment and/or developers of wind generation facilities would need to build their own transmission facilities to connect to the transmission grid.

B.4.7 Project and Alternatives Components Summary

Table B.4-23 provides a summary of the components of the proposed Project presented in Section B.2 with the alternatives presented in Sections B.4.1 through B.4.6. Components located on NFS lands are explicitly identified.

Table B.4-23. Summary of Components of the Proposed Project and Alternatives

Component	Proposed Project	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Total linear distance (miles)	25.6	26.2	26.7	25.6	25.9	37.2
Distance overhead T/L (miles)	25.6	18.7	26.7	25.6	25.9	37.2
Distance underground T/L (miles)	0.0	7.5	0.0	0.0	0.0	0.0
Distance existing ROW (miles)	5.3	2.4	5.3	5.3	5.9	18.4
Distance expanded ROW (miles)	17.5	17.5	5.7	17.5	16.4	0.0
Distance new ROW (miles)	2.8	6.3	15.7	2.8	3.6	18.8
Distance on NFS lands (miles) Overhead Underground	 12.6 0	 8.6 4.0	 13.2 (12.2 new) 0	 12.6 0	 12.5 (1.0 new) 0	 1.5 (1.5 new) 0
Existing 66-kV line removed	Mile 1.1 to 18.6	Mile 1.1 to 18.6	Mile 1.1 to 18.6	Mile 1.1 to 18.6	Mile 1.1 to 18.6	Mile 1.1 to 18.6
No. towers removed: NFS lands	86 (19 non-overlap)	86 (41 non-overlap)	86 (83 non-overlap)	86 (19 non-overlap)	86 (22 non-overlap)	86 (all non-overlap)
non-NFS lands	33 (17 non-overlap)	33 (17 non-overlap)	33 (17 non overlap)	33 (17 non-overlap)	33 (17 non-overlap)	33 (all non-overlap)
Total towers removed	119	119	119	119	119	119
2-3 acre transition station	None	4 total	None	None	None	None
No. of double-circuit 220-kV TSPs	3	3	3	3	3	3
No. of single-circuit 500-kV LSTs	93	86	101	114	94	94
No. of double-circuit 500-kV LSTs	21 + 1 existing	1 existing	21 + 1 existing	1 existing	21 + 1 existing	76 + 1 existing
Total No. of NEW towers	117	89	125	117	118	173
No. of towers on NFS lands (s-c 500-kV 113-178' tall)	58	40	66 (56 mid-slope)	58	58	7
No. of towers off NFS lands	59	49	59	59	60	166
No. of towers constructed by helicopter (all on NFS lands) (without Mitigation Measure V-4a)	1	1	37	1	1	0
No. towers constructed by helicopter (with Mitigation Measure V-4a)	41 (on NFS lands) 0 (off NFS lands)	23 (on NFS lands) 0 (off NFS lands)	37 (on NFS lands) 0 (off NFS lands)	41 (on NFS lands) 0 (off NFS lands)	41 (on NFS lands) 0 (off NFS lands)	9 (on NFS lands) 33 (off NFS lands)
No. of private parcels traversed	58	58	59	58	60	103
No. in ANF	6	6	7	6	1	0
No. outside ANF	52	52	52	52	59	103
Total miles of new spur roads (without Mitigation Measure V-4a)	1.70	3.74	0.98	1.70	3.18	2.51
Miles on NFS lands	1.05	3.14	0.32	1.05	1.52	0.12
Miles off NFS lands	0.65	0.60	0.66	0.65	1.66	2.39
Total miles of new/improved access	10.0	10.7	10.9	10.0	9.9	9.5
Miles of roads on NFS lands	9.7	10.2	10.4	9.7	9.6	1.2
Miles of roads off NFS lands	0.3	0.5	0.5	0.3	0.3	8.3

Table B.4-23. Summary of Components of the Proposed Project and Alternatives

Component	Proposed Project	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Total acres land disturbance (without Mitigation Measure V-4a)	121.8	218.0	166.6	121.8	125.5	145.6
Acres on NFS lands	43.5	91.0	37.9	43.5	44.5	9.9
Acres off NFS lands	78.3	126.9	78.7	78.3	81.0	135.7
Total acres perm. land disturbance	58.5	75.9	58.0	58.5	61.2	59.0
Acres on NFS lands	22.1	33.4	21.2	22.1	22.9	2.6
Acres off NFS lands	36.4	42.5	36.8	36.4	38.3	56.4
Total vehicle trips	19,616	88,792	17,634	19,111	19,846	28,624
Miles traveled on paved roads	432,554	2,650,431	420,134	422,125	436,809	632,366
Miles traveled on unpaved roads (generally on NFS lands)	45,356	184,202	34,307	45,071	45,672	63,660
Total vehicle miles traveled	477,911	2,834,633	454,441	467,196	482,482	696,026
Duration of Construction (months)	13	10 (overhead) 29 (underground)	14	13	13	16
Forest Plan Amendment to change Scenic Integrity Objectives (SIOs) (Within entire 1,000-foot wide utility corridor)	• High SIO changes to Very Low SIO from Mile 5.7 to 15.9 and 16.0 to 17.6 • High SIO changes to Very Low SIO from Mile 15.9 to 16.0	• High SIO changes to Very Low SIO from Mile 5.7 to 11.0, 15.0 to 15.9, and 16.0 to 17.6 • High SIO changes to Unacceptably Low SIO from Mile 11.0 to 15.0 • Moderate SIO changes to Very Low SIO from Mile 15.9 to 16.0	• High SIO changes to Low SIO from Mile 5.7 to 5.8, 6.15 to 6.4, 7.7 to 8.1, 8.6 to 10.4, 10.7 to 12.7, and 12.8 to 13.5 • Moderate SIO changes to Low SIO from Mile 5.8 to 6.15 • High SIO changes to Very Low SIO from Mile 6.4 to 7.7 and 13.5 to 14.0	• High SIO changes to Very Low SIO from Mile 5.7 to 15.9 and 16.0 to 17.6 • Moderate SIO changes to Very Low SIO from Mile 15.9 to 16.0	• High SIO changes to Very Low SIO from Mile 5.7 to 15.9, 16.0 to 17.6, and 18.3 to 18.8 • Moderate SIO changes to Very Low SIO from Mile 17.6 to 18.0	• High SIO changes to Low SIO from Mile 5.6 to 5.85 • High SIO changes to Very Low SIO from Mile 17.1 to 17.4 and 17.7 to 18.4
Forest Plan Amendment to relocate 1,000-foot utility corridor	None	Relocate 1.9 miles (Underground cables located centerline)	Relocate 12.4 miles (Towers located at upslope boundary)	None	Relocate 1.0 miles (Towers located centerline)	Relocate 1.5 miles (Towers located on edge of utility corridor); Remove Saugus-Del Sur Utility Corridor (12.9 miles)
Forest Plan Amendment to modify standard(s) to specifically address this Project	ANF S1 – Pacific Crest Trail	ANF S1 – Pacific Crest Trail	ANF S1 – Pacific Crest Trail	ANF S1 – Pacific Crest Trail	ANF S1 – Pacific Crest Trail	None

Note: Numbers provided are approximate based on estimates derived from preliminary design concepts. Numbers are subject to change as the design is finalized.

B.5 Cumulative Impacts Scenario

B.5.1 Introduction

In accordance with CEQA (State CEQA Guidelines Section 15130 et seq.) and NEPA (CEQ, 1997), this EIR/EIS includes an analysis of cumulative impacts. CEQA and NEPA have very similar definitions of "cumulative impact." Per CEQA, "cumulative impacts" refers to two or more individual effects, which are considerable when considered together, or which compound or increase other environmental impacts (State CEQA Guidelines Section 15355). Per NEPA, a "cumulative impact" is 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 (40 CFR Section 1508.7). In order to comply with both CEQA and NEPA, a cumulative scenario has been developed as a part of this EIR/EIS in order to identify projects that are reasonably foreseeable and that would be constructed or commence operation during the timeframe of activity associated with the proposed Project.

The projects considered to be part of the cumulative scenario include projects that are: (a) completed past projects; (b) projects approved and under construction, (c) projects approved but not yet under construction, or (d) proposed but not approved. These include a range of project types, such as land development projects, infrastructure and energy projects, and maintenance and restoration projects. Cumulative impacts of the proposed Project are analyzed for each environmental resource issue area in Section C of this EIR/EIS.

For each issue area discussed in Section C, the appropriate geographic boundaries for cumulative analysis were first defined. Then, existing conditions within the geographic analysis area were identified in order to characterize the cumulative baseline condition. It was then determined which impacts of the Project and alternatives could potentially be "cumulatively considerable" or might be able to combine with similar impacts of other identified projects in a substantial way. For impacts that cumulatively considerable, a discussion is provided describing the potential significance of the combined effects of the proposed Project (and alternatives) and other projects. When applicable, mitigation measures are described to reduce significant cumulative effects.

A discussion of potential population growth resulting from the Project is provided in Section E.1.4 (Growth-Inducing Impacts).

B.5.2 Energy and Transmission Projects

Proposed Wind Generation Facilities

SCE is obligated to integrate power generation facilities, including wind farms, into its electrical system, per Section 210 and 212 of the Federal Power Act (16 U.S.C. § 824 (i) and (k)) and Section 3.2 and 5.7 of the California Independent System Operator's (CAISO) Tariff. There are a series of wind generation facilities planned for the Tehachapi area, which are currently in the ISO Interconnection Queue (CAISO, 2005). Most of these Tehachapi-area wind facilities are currently in the planning phase and, for the most part, applications have not yet been submitted to the local agencies with approval authority over these projects. Because these projects are still in the early planning phases and information is not available for projects that have not yet submitted applications, these wind generation facility projects are too speculative to be analyzed at this time. One wind generation project, the PdV Wind Energy Project, was actively under review by Kern County Planning when

preparation of this EIR/EIS was initiated. A complete description of the PdV Wind Energy Project is provided in Section E.3.

Additional proposed wind farm development is concentrated approximately 25 miles north of SCE's Antelope Substation, in the Tehachapi Wind Farm area. A comprehensive transmission development plan for phased expansion of transmission capability in the Tehachapi area is currently in progress, due to a collaborative study effort ordered by the CPUC (Ordering Paragraph No. 4 of Decision 04-06-010). Construction of the Antelope Transmission Project (as described below) would provide the infrastructure necessary to service growing power generation in the Antelope Valley for delivery to southern California, and also facilitate construction of other wind generation sites throughout northern Los Angeles and Kern Counties (SCE, 2005).

Antelope Transmission Project: Segments 2 and 3

SCE proposes to construct the Antelope Transmission Project in three individual segments. As discussed, Segment 1 is the Antelope-Pardee 500-kV Transmission Line, which is being analyzed in this EIR/EIS. As proposed, Segment 2 is called the Antelope-Vincent 500-kV Transmission Line and Segment 3 is called the Antelope-Tehachapi Transmission Line. Segment 1 is being analyzed in this EIR/EIS, separately from Segments 2 and 3 because of its independent necessity and utility, which is described in Section A.4 (Independent Utility of the Proposed Project). Segments 2 and 3 will be analyzed in a separate environmental document.

Segment 2, the Antelope-Vincent 500-kV Transmission Line, would consist of a new 17.8-mile 500-kV transmission line connecting SCE's existing Antelope Substation with the Vincent Substation, located near Acton, California. This line would be constructed to deliver electricity from new wind farms in the Antelope Valley and Tehachapi regions to southern California. As with Segment 1 of the Antelope Transmission Project (this Project), Segment 2 would initially be energized at 220 kV to serve the existing transmission needs determined by SCE. Construction of Segment 2 would require the acquisition of new land adjacent to existing transmission ROW.

Segment 3, the Antelope-Tehachapi Transmission Line, would consist of two phases. The first phase includes construction of a new 26.1-mile, 500-kV transmission line connecting SCE's existing Antelope Substation to a new substation (Substation 1) in the Mojave Area. This transmission line would initially be energized at 220 kV. The second phase would consist of a new 9.4-mile, 220-kV transmission line from Substation 1 to a new substation in the Monolith Area (Substation 2). Similar to Segments 1 and 2, Segment 3 and the associated substations would be constructed to transmit electricity from new wind farms in the Antelope Valley and Tehachapi regions to southern California. The construction of Segment 3 would also require acquisition of land for new ROW and substation properties.

B.5.3 Cumulative Projects List

In addition to the energy generation and transmission projects discussed in Section B.5.2, Table B.5-1 lists the projects that were included in the cumulative impact analysis, organized by jurisdiction. Figures B.5-1a and B.5-1b, at the end of this section, portray the location of each of the projects listed in Table B.5-1. The list of cumulative projects was developed in consultation with the following agencies:

- Los Angeles County Regional Planning (Los Angeles County, 2005)
- City of Lancaster (City of Lancaster, 2005)
- City of Palmdale (City of Palmdale, 2005)
- City of Santa Clarita (City of Santa Clarita, 2005)

These agencies were requested to provide information on all projects that are either approved or under construction within their jurisdictions. Any current or future project identified by one of these four agencies that is expected to occur within approximately five miles of the proposed Project alignment is included in this cumulative scenario and is listed in Table B.5-1.

Table B.5-1. Cumulative Projects List: Approved and Pending Projects Within Five Miles of the Proposed Project Route*

Map ID	Tract No.	Project Name	Project Description and Location	Status
Unincorporated Los Angeles County				
1	N/A	Segment 2: Antelope-Vincent 500-kV Transmission Line	This project includes a new 17.8-mile 500-kV transmission line that will connect SCE's existing Antelope Substation with the Vincent Substation. This line would deliver electricity from new wind farms to communities in southern California. Segment 2 would initially be energized at 220 kV.	Application under review by the CPUC
2	N/A	Segment 3: Antelope-Tehachapi Transmission Line	Two phases: (1) construction of a new 26.1-mile, 500-kV transmission line connecting SCE's existing Antelope Substation to a new substation (Substation 1) in the Mojave Area, and (2) construction of a new 9.4-mile, 220-kV transmission line from Substation 1 to a new substation (Substation 2) in the Monolith Area of Kern County.	Application under review by the CPUC
3	TR 47760	Meadow Peak Project	This project involves the subdivision of a 452.81-acre site into 479 single-family residential lots, an elementary school lot on approximately 13.90 acres, an active public park site on approximately 8.60 acres, four mini private park sites on a total of approximately 2.20 acres, one water tank lot, street lots, and seven open space lots totaling approximately 268.10 acres. Residential lots would occupy approximately 118.60 acres of the site. Public streets would occupy approximately 36.10 acres of the site. The water tank lot would occupy approximately 5.31 acres to accommodate two one-million gallon water tanks.	Draft EIR is being prepared
4	TR 35783	Residential Development	Proposed residential development on 149 acres, including 419 family housing units, 1 open space lot, and 2 public facilities.	Recorded by the County in 2002; currently under construction
5	TR 43589	Copper Hill Project	Single-family subdivision located on 75.53 acres along the north boundary of the City of Santa Clarita.	Conditional use permit for the development within a hillside management area and a zone change from A-1-1 and A-1-1 DP to R-1-7,000
6	TR 46183	Residential Development	213 single-family units proposed to be developed on 74.6 acres.	The project has been recorded by the County
7	TR 46389	North Park	The project would include 701 single-family units, 11 multi-family units, 29 lots of open space, 2 recreation areas, 4 public facilities, 1 designated park, and 1 arts and crafts facility.	The project has been approved by the Los Angeles Co. Planning Dept., but the parcel map has not yet been recorded
8	TR 46908	Residential Development	The project consists of 604 lots, which include 594 single-family units, 4 public facilities, and 6 open space lots. The project would be constructed on 381 acres.	In process; not yet approved or recorded by County
9	TR 47657	Residential Development	The proposed development would include 421 single family units, 13 multi-family units, and 1 open space lot on 163 acres.	Recorded in 2000 by the County; currently under construction.
10	TR 50586	Residential Development	The proposed project would include 26 single-family lots on 10 acres.	Recorded with the County in 2000; currently under construction.

Table B.5-1. Cumulative Projects List: Approved and Pending Projects Within Five Miles of the Proposed Project Route*

Map ID	Tract No.	Project Name	Project Description and Location	Status
11	TR 51644	Tesoro del Valley	The project would include 1,601 single-family units, 901 condo units, and 180,000 square feet of commercial area, located on 1,738 acres.	Project has been recorded by the County and is under construction.
12	TR 51789	Residential Development	The project would include 194 single-family lots on 79 acres.	In process; not yet approved or recorded by the County.
13	TR 52829	Somerset Ridge	The project would include 95 single-family lots, 1 open space lot, 1 park, and 2 landscaped lots.	Project has been approved by the County, but not recorded.
14	TR 53822	Residential Development	The project would include 335 single-family lots on 934 acres.	Pending County Approval.
15	TR 53189	Burnam Property	The project would include 60 single-family and 3 open space lots, on 185.8 acres.	Pending – public hearing scheduled for October 2005.
16	TR 54073	Residential Development	The project would include 6 single-family residential lots on 2.67 acres.	Pending County Approval.
City of Lancaster				
17	TR 53445	Residential Development	Residential planned development of 129 single family lots, located on the northeast corner of Ave. M-8 and 45th St. West.; 65.79 ± acres.	Project construction is 90% completed; CUP approved.
18	N/A	Bank of America	4,700 square foot bank building, located in the Quartz Hill Town Center, on the NW corner of 40th St. and Ave. L.	Project construction is 25% complete.
19	TTM 060819, TTM 060916	Fox Field Industrial Park	Construction of 221,488 square feet of industrial buildings, located on the northwest corner of Ave. G and 45th St. West; 17.9 ± acres.	Site plans (Tentative Tract Map) approved by the County, expires 9/2006.
20	37538 Rec	Royal Equestrian Estates	60 single-family custom lots and 1 public lot, located on 117 ± acres on Ave. N between 40th and 42nd St. West	Project construction is 37% Complete.
21	TM 39910	Residential Development	112 single-family lots, located on southwest corner of Ave. L and 55th St. West.	Project construction is 81% complete.
22	44012 Rec	Country Colony Estates	144 single-family custom homes, located on the northeast corner of 40th St. West and Ave. K; 41.25± acres.	Project construction is 90% complete.
23	TTM 44439	Residential Development	23 single-family lots, located on the southwest corner of Ave. L-12 and 70th St. West	Construction to begin in 2006.
24	TTM 44613	Residential Development	40 single-family lots, located on the southeast corner of Ave.L-12 and 57th St. West; 10.13± acres.	Project construction is 93% complete.
25	TTM 45474	Residential Development	176 single-family lots, located on the northwest corner of 65th St. West and Ave. L-8; 60.6± acres	Construction to begin in 2006.
26	TTM 46192	Residential Development	631 single-family lots and 1 acre for a drainage basin, located south of Ave. H, between 80th and 90th St. West; 180± acres	Tentative tract map approved by the City of Lancaster, expires 10/2008.
27	TTM 46250	Community Development: Residential, Schools, Park, Commercial	2,469 single family lots, 1 park, 1 commercial lot, 2 lots for schools, located between 90th and 105th St. West, and Ave. G and Ave. H-8; 880± graded acres	Tentative tract map approved by the City of Lancaster, expires 10/2012.
28	TTM 47583	Residential Development and Open Space	136 single-family lots and 3 open space lots, located on the southeast corner of 90th St. West and Ave. I; 40± acres	Tentative tract map approved by the City of Lancaster, expires 5/2006.
29	TR 47609	Residential Development	88 single-family lots and 1 detention basin, located on Ave. K, 945± feet from 50th St. West; 20± graded acres	Construction to begin in 2006.
30	TTM 47771	Residential Development and Open Space	289 single-family lots and 3 open space lots located on the northeast corner of 90th St. West and Ave. I; 80± acres	Tentative tract map approved by the City of Lancaster, expires 5/2006.

Table B.5-1. Cumulative Projects List: Approved and Pending Projects Within Five Miles of the Proposed Project Route*

Map ID	Tract No.	Project Name	Project Description and Location	Status
31	47775 Rev	Residential Development	61 single-family lots and 1 detention basin, located between 40th and 42nd St. West on Ave. J-8; 15± graded acres	Project construction is 93% complete.
32	TTM 49146	Residential Development	61 single-family lots located on the west side of 40th St. West on the south side of Ave. J-4; 15± acres	Project construction is 98% complete.
33	N/A	Residential Development	80 single-family lots, located on the northeast corner of Ave. K and 50th St. West; 20± acres	Tentative tract map approved by the City of Lancaster, expires 3/2007.
34	N/A	Residential Development	77 single-family lots, located on the Ave. K, 1,320 feet west of 60th St. West; 18± acres	Tentative tract map approved by the City of Lancaster, but expired.
35	TTM 52917	Residential Development	32 single-family lots, located on the southwest corner of Ave. J and 42nd St. West; 7.89± acres	Tentative tract map approved by the City of Lancaster, but expired.
36	TTM 53172	Community Park and Residential Development	22.52 acres for a park with the remainder (40± acres) for a 65-lot subdivision, located on the northeast and southeast corners of 80th St. West and Ave. G-8	Tentative tract map approved by the City of Lancaster, but expired.
37	TTM53190	Residential Development	73 single-family lots, located on the southeast corner of Ave. J and 60th St. West; 18± acres	Tentative tract map approved by the City of Lancaster, expires 9/2005.
38	TTM 53641	Residential Development	61 single-family lots, located on the southwest corner of 75th St. West and Ave. L-8, 20.17± acres	Project construction is 16% complete.
39	TTM 53642	Residential Development	156 single-family lots, located on the northeast corner of Ave. K-8 and 60th St. West, 40± acres	Tentative tract map approved by the City of Lancaster, expires 4/2006.
40	TTM 53907	Residential Development	65 single-family lots, located on the south side of Ave. K, 300± feet west of 45th St. West	Project construction is 25% complete.
41	TTM 54197	Residential Developments	307 single-family lots (104 – Hearthside Homes, 100 – Capital Pacific Homes, 103 – Stratham Properties), located on the SE corner of Ave. J and 50th St. West; 80± acres	Project construction is 3% complete.
42	TTM 54203	Residential Development	48 single-family lots, located on the southeast corner of 40th St. West and Ave. M-8; 30± acres	Tentative tract map approved by the City of Lancaster, expires 8/2006.
43	TTM 54224	Residential Development	42 single-family lots, located on the southwest corner of Ave. L-12 and 55th St. West, 10± acres	Project construction is 90% complete.
44	TTM 54261	Residential Development	34 single-family lots, located on the southwest corner of Ave. J and 45th St. West, 10± acres	Project construction is 41% complete.
45	TTM 54275 or 49830	Residential Development	156 single-family lots, located on the southeast corner of Ave. J-8 and 65th St. West, 40± acres	Project construction is 3% complete.
46	TTM 54276 or 49831	Residential Development	63 single-family lots, located on the northeast corner of Ave. K and future 62nd St. West; 15± acres	Construction to begin in 2006.
47	TTM 54369	Residential Development	31 single-family lots, located on the southwest corner of Ave. L and 70th St. West; 10± acres	Tentative tract map approved by the City of Lancaster, expires 10/2005.
48	TTM 54370 or 27135	Residential Development	207 single-family lots, located on the northwest corner of Ave. L-8 and 70th St. West; 70± acres	Tentative tract map approved by the City of Lancaster, expires 10/2005.
49	TTM 54401	Residential Development	261 single-family lots, located on the northeast corner of Ave. K and 60th St. West; 63± acres	Project construction is 33% complete.
50	TTM 060003	Residential Development	36 single-family lots, located on the southwest corner or Ave. J-8 and 60th St. West; 10± graded acres	Tentative tract map approved by the City of Lancaster, expires 9/2005.

Table B.5-1. Cumulative Projects List: Approved and Pending Projects Within Five Miles of the Proposed Project Route*

Map ID	Tract No.	Project Name	Project Description and Location	Status
51	TTM 060034	Residential Development	106 single-family lots, located on the southeast corner of Ave. J and 60th St. West; 27± acres	Tentative tract map approved by the City of Lancaster, expires 7/2006.
52	TTM 060057	Residential Development	300 single-family lots, located on the southeast corner of Ave. L-8 and 80th St. West; 120± acres	Tentative tract map approved by the City of Lancaster, expires 6/2006.
53	TTM 060126	Residential Development	20 single-family lots, located between 46th St. West and 47th St. West, 660± feet north of Ave. J; 4.99± graded acres	Tentative tract map approved by the City of Lancaster, expires 12/2005.
54	TTM 060149	Residential Development	46 single-family lots, located on Ave. J-12, 660± feet west of 60th St. West; 10± acres	Tentative tract map approved by the City of Lancaster, expires 6/2006.
55	TTM 060198, CUP 04-04	Residential Development	RPD for 72 single-family lots, located on the southeast corner of Ave. M-8 and 45th St. West; 40.5± acres	Tentative tract map approved by the City of Lancaster, expires 9/2007.
56	TTM 060294, GPA 03-03, ZC 03-03	Residential Development	97 single-family lots, located on the northeast corner of 65th St. West and Ave. J; 30± graded acres	Tentative tract map approved by the City of Lancaster, expires 12/2005.
57	TTM 060427	Residential Development	77 single-family lots, located on the northeast corner of 40th St. West and Ave. J-12; 21± acres	Tentative tract map approved by the City of Lancaster, expires 1/2007.
58	TTM 060428	Residential Development	94 single-family lots, located on the southwest corner of 40th St. West and Ave. J-6; 25± acres	Tentative tract map approved by the City of Lancaster, expires 6/2006.
59	TTM 060450 or 060557	Residential Development	323 single-family lots, located on the west side of 60th St. West, 660± feet south of Ave. K; 80.5± graded acres	Tentative tract map approved by the City of Lancaster, expires 1/2006.
60	TTM 060502	Residential Development	76 single-family lots, located on the northwest corner of Ave. K and 62nd St. West; 18.2± acres	Tentative tract map approved by the City of Lancaster, expires 2/2006.
61	TTM 060524	Residential Development	41 single-family lots, located on 60th St. West, 300± feet south of future Ave. K-8; 10± acres	Tentative tract map approved by the City of Lancaster, expires 4/2006.
62	TTM 060782	Residential Development	19 single-family lots, located on the southeast corner or Ave. J-4 and future 42nd St. West; 5± acres	Construction to begin in 2006.
63	TTM 060811	Residential Development	39 single-family lots, located on the northeast corner of 60th St. West and future Ave. K-12; 9.4± acres	Tentative tract map approved by the City of Lancaster, expires 4/2006.
64	TTM 060889	Residential Development	85 single-family lots, located on the northeast corner of Ave. L and 60th St. West; 25± acres	Tentative tract map approved by the City of Lancaster, expires 4/2006.
65	TTM 061342	Residential Development	15 single-family lots, located on the southeast corner of 45th St. West and Ave. M-12; 4.72± acres	Tentative tract map approved by the City of Lancaster, expires 12/2006.
66	N/A	Industrial	10 lot industrial subdivision, located on the northeast corner of 50th St. West and Ave. G; 18.7 graded acres	Tentative tract map approved by the City of Lancaster, expires 10/2006.
67	TTM060916	Industrial	24 lot industrial subdivision, located on the north side of Ave. G between 45th St. West and 47th St. West; 18.5± acres	Tentative parcel map approved by the City of Lancaster, expires 3/2006.

Table B.5-1. Cumulative Projects List: Approved and Pending Projects Within Five Miles of the Proposed Project Route*

Map ID	Tract No.	Project Name	Project Description and Location	Status
68	TTM 060938	Residential Development	2 single-family lots, located north of Ave. L and 650± feet east of 85th St. West; 4.79± acres	Tentative parcel map approved by the City of Lancaster, expires 10/2006.
City of Palmdale				
69	Pre-Ap 7-04-2	Residential Development	Proposal to subdivide 9.69 acres into 18 single-family lots, located at the southeast corner of Ave. M-8 and 65th St. W.	Preliminary Review – Pre-application
70	TTM 061794	Residential Development	Request to subdivide 10 acres into 16 lots, located on the SE side of Ave. M-8, approx. 650 feet west of 70th St. W.	Project currently under review.
71	TTM 54301	Residential Development	A request to subdivide 78.23 acres into 180 single-family lots, located on the northeast corner of Ave. M-8 and 70th St. W.	Tentative tract maps approved by the City of Palmdale.
72	TTM 060431	Residential Development	A request to subdivide 75 acres into 158 single-family lots, located on the northwest corner of Ave. M-8 and 70th St. W.	Tentative tract maps approved by the City of Palmdale.
73	TTM 060209	Residential Development	A request to subdivide the site into 41 single-family lots, located on the southwest corner of Ave. M and 70th St. W.	Tentative tract maps approved by the City of Palmdale.
74	TR 54339	Residential Development	A subdivision of 30.71 acres for 83 single-family lots, located on the southeast corner of Ave. M and 70th St. W.	Final maps approved by the City of Palmdale.
City of Santa Clarita				
75	N/A	Santa Clarita Cross Valley Connector	The Cross Valley Connector is a proposed 8.5-mile road that would extend from Valencia (I-5/SR-126 Interchange) on the west side of the City of Santa Clarita, to the State Route 14/ Golden Valley Interchange on the east side of the City.	Status Uncertain.
76	N/A	Cross Valley Connector Gap Closure	The Cross Valley Connector Gap Closure is a 2.2-mile roadway extension from Rye Canyon to State Route 126.	Approved and under construction.
77	N/A	Gateway Village	152,000 square foot commercial center located on the southwest corner of Rye Canyon Road and Newhall Ranch Road	Approved and under construction.
78	N/A	Rye Canyon Self Storage	201,300 square foot storage facility located in Rye Canyon Business Park at Newhall Ranch Road and Copper Hill Dr.	Pending City Approval.
79	N/A	Highridge Crossing	70,000 square foot commercial center located adjacent to the Valencia Industrial Center, at the intersection of Rye Canyon Road and Newhall Ranch Road	Approved and under construction.
80	N/A	Northpark	121,500 square foot school and church facility	Approved and under construction.
81	N/A	Re/Max Building	22,000 square foot office building located at 25101 The Old Road	Approved and under construction.
82	N/A	Boston Scientific	180,000 square foot research and development facility located at 25129 Rye Canyon Loop Road	Approved and under construction.
83	N/A	North Valencia II	Various residential building types	Approved and under construction (322 units remain to be constructed.
N/A	TR 259166	Baywood Lane Apartments	201 residential apartments	Approved and under construction.
N/A	TR 54349	Sonrisa Residential	35 single-family detached condos	Approved and under construction.
84	TR 53425	Riverpark Project	432 single-family residential units, 657 multi-family residential units, 10,000 commercial acres located east of Bouquet Canyon Road and south of Newhall Ranch Road	Approved by the City of Santa Clarita.

Table B.5-1. Cumulative Projects List: Approved and Pending Projects Within Five Miles of the Proposed Project Route*

Map ID	Tract No.	Project Name	Project Description and Location	Status
85	N/A	Town Center Mall Expansion	Additional department store and inline shops, an office building, and additional retail pads for a total of 700,000 additional square feet of floor space	Status Unknown.
86	TR 60258	Synergy "The Keystone" Project	96 single-family residential units, 883 multi-family residential units, 20-acre school	Pending City Approval.
87	TR 51599	Porta Bella (Whittaker-Bermite Reuse Project)	1244 single-family residential units, 1657 multi-family residential units, 200,000 commercial acres, 500,000 industrial acres located at 22116 W. Soledad Canyon Rd.	Approved by the City of Santa Clarita.
88	N/A	Center Pointe Residential Project (Residential)	280 multi-family residential units located at Ruether Avenue and Golden Valley Road	Pending City Approval.
89	TR 42670	Center Pointe Business Park Implementation (Industrial)	4 million square feet mixed use of commercial and industrial	Under construction.
N/A	MC 03-402	Newhall Land Residential Project	409 multi-family residential units, 800,000 commercial acres	Pending City Approval.
N/A	N/A	Jules Swimmer Residential Project	92 duplexes	Pending City Approval.
90	N/A	Henry Mayo Hospital Master Plan	644,000 square foot addition to hospital located at 23845 McBean Parkway, Valencia	Pending City Approval.
91	MC 04-358	Golden Triangle Apartment Project	188 residential rental apartments on the southeast corner of Golden Triangle and Isabella Parkway.	On hold.
N/A	MC 04-443	Penlon Residential Project	Single-family condos on the corner of Penlon and Soledad Canyon	Approved by the City of Santa Clarita.
92	TR 61811	Centex Golden Valley Road Residential Project	166 single-family homes, located just East of Golden Valley Road and Robert Sealy Parkway	Approved by the City of Santa Clarita.
N/A	N/A	Casden Project	Northeast corner of Sealy and 13th St.	On hold; no development proposal.
93	N/A	Master's College Master Plan	Located between Placerita Canyon Road and Doc Weiler Road	Early stages of the EIR.

* The cumulative projects scenario presented in Table B.5-1 was last updated in October 2005. The status and/or description of projects listed may have changed since that time. TTM: Tentative Tract Map; VTTM: Vesting Tentative Tract Map

In addition to those projects listed in Table B.5-1, there are other current or future projects that occur beyond five miles of the proposed Project, but are notable to this cumulative scenario. Some of these projects were discussed earlier in Section B.3. A complete list of these additional projects is found in Table B.5-2.

Table B.5-2. Cumulative Projects List: Notable Approved and Pending Projects Greater Than Five Miles from the Proposed Project

Project Name	Project Description and Location	Status
PdV Wind Energy Project (formerly "Manzana")	The PdV Wind Energy Project is proposed to be developed on portions of a 6,275.1-acre area in the South Tehachapi Mountains, in an unincorporated area of Kern County. The project is bounded on all four sides by vacant land, with Tejon Ranch to the west. The project would be located about 40 miles southeast of Bakersfield and 20 miles northwest of Edwards Air Force Base. The project would generate up to 300 MW, consisting of 107 to 300 wind turbines. The total disturbance of the project would not exceed more than 5% of the total Project area (i.e., 313.75 acres).	Application is under review by the Kern County Planning Department.
Aero Energy Wind Project	This is a 120-acre wind project located in unincorporated Kern County. Location has yet to be specified.	Application is under review by the Kern County Planning Department.
Ritter Ranch Community Plan*	A community development of approximately 7,200 homes, including a golf course, equestrian center, two lakes, 100 acres of improved parkland, six schools, and an amphitheater. Ritter Ranch Community encompasses 10,625 acres, and is located west of State Route 14, south of Elizabeth Lake Road, west of 30th Street West, and east of Bouquet Canyon Road and ANF.	Project has been approved and is under construction.
City Ranch Specific Plan (Anaverde Master-Planned Community)	Encompassing approximately 2,000 acres, Anaverde includes a total of 5,200 homes, as well as retail stores, schools, a golf course, riding and hiking trails, parks, and an Olympic-sized swimming pool. Located on Avenue S, immediately west of State Route 14.	Project has been approved and is being developed by several contractors.
Anaverde/ Remington Project	The project would include the subdivision of 295.7 acres of vacant land into 157 single-family residential lot, 8 open space lots, and a CUP for developing hillside management area.	L.A. County Planning Department reviewed the 1st draft EIR in June 2005.
Joshua Ranch Residential Development	Encompassing 793 acres, this equestrian-themed residential community includes 539 single-family residential lots ranging in size from 10,000 square feet to 2.25 acres. Joshua Ranch also includes a community park, a system of hiking and equestrian trails, and 500 acres of open space. Located north and adjacent to Elizabeth Lake Road, and south of (partially adjacent to) the California Aqueduct (between 35th St. West and 50th St. West).	Tract map has been submitted to L.A. County and is pending approval.
Pine Tree Wind Project	Proposed energy generation facility consisting of 80 wind turbine generators, rated at 1.5 MW each, a 10-mile transmission line, and an electrical substation. This project would be located in the southern Sierra Nevada Mountains, approximately 12 miles north of Mojave, California and six miles west of State Route 14. The project would provide up to 120 MWs to the City of Los Angeles (enough energy to power approximately 56,000 homes per year).	EIR Certified on August 4, 2005 by LADWP Board of Commissioners. Project is scheduled to be on-line in May 2006.
Agua Dulce Residential Project (TR 50385)**	Proposed 251 single family-residential lots, four open space lots, two park lots, one water reclamation lot and facility, and equestrian trails. A Sewer Maintenance District will be formed to operate and maintain the proposed on-site water reclamation plant. Project site is 820 acres. Project applicant is B & C Land and Water, LLC. The current undeveloped project site is located within the unincorporated community of Agua Dulce and within the Agua Dulce Community Standards District area. SR 14 is to the south/southeast and Sierra Hwy is ¼-mile north. Site ingress and egress will be taken from Valley Sage Road and from Sierra Highway via H Street.	L.A. County is preparing an SEIR, following a 1994 EIR. NOP submitted May 12, 2006. The SEIR will address revised TTM 50385 which alters the previously approved but unrecorded portion of the project.
PM22153**	Two single family residential lots	Parcel maps have been submitted to L.A. County.
PM24912**	Three single family residential lots	Parcel maps have been submitted to L.A. County.

* The western-most portions of Ritter Ranch Community may be within five miles of the proposed Project alignment, but the vast majority of this 10,625-acre development is not within five miles of the proposed Project alignment.

** These projects would be crossed by Alternative 5.

B.5.4 Cumulative Projects on NFS Lands

This section discusses the past projects that have occurred within the ANF, in addition to ongoing and future projects that have been proposed on NFS lands. Previous development within the ANF includes recreational, industrial, and residential uses. The following is a list of the past and existing projects that are located in the Santa Clara/ Mojave Rivers Ranger District north of Highway 14.

Past and Existing Projects: Non-Recreational

- Communication Sites
  - Burnt Peak
  - Portal Ridge
  - Whitaker Ridge
  - Emigrant Landing
  - Castaic Communications
- Utility Corridors
  - Interstate 5 (Tejon Pass): (2) 500 kV, (3) 220 kV, (7) oil and gas pipelines, (4) fiber optic line, Interstate 5, Aqueduct
  - Old Ridge Route: (2) 500 kV, (4) oil pipelines, (2) gas pipelines, fiber optic line, Aqueduct
  - Saugus/Del Sur: 500 kV, 66 kV
  - Gorge Ranaldi: 500 kV
  - Midway Vincent: 500 kV
- Transportation Corridors
  - Bouquet Canyon Road
  - Interstate 5 (Golden State Freeway)
  - Pine Canyon Road
  - San Francisquito Road
  - Sierra Highway
  - Spunky Canyon Road
- Powerhouses
  - Powerhouse No. 1
  - San Francisquito Powerhouse No. 2
- Reservoirs
  - Bouquet Reservoir
  - Castaic Lake
  - Pyramid Lake
- Other
  - Mining operations: Includes Bouquet Canyon Stone Company
  - Los Angeles Aqueduct

Past and Existing Projects: Forest Management and Recreational

- Forest Service Facilities: Over 350 buildings throughout the ANF (e.g., administrative offices, fire stations, restrooms facilities)
- Campgrounds: 13 campgrounds and 2 group campgrounds
  - Bear
  - Cienaga
  - Cottonwood
  - Green Valley Trail Camp
  - Horse Trail Camp
  - Los Alamos
  - Los Cantiles
  - Maxwell Trail Camp
  - Oak Flat
  - Sawmill
  - Spunky
  - Streamside
  - Upper Shake
  - Zuni
- Trails: 557 miles of hiking and equestrian trails throughout the ANF, including 73 miles of National Recreation Trails and 176 miles of the Pacific Crest National Scenic Trail
- OHV Roads: 364 miles of designated off-highway vehicle routes throughout the ANF
- Designated Shooting Areas: Includes A Place to Shoot

- Recreation Residences: Includes those located along Bouquet Canyon, Lake Hughes, and San Francisquito
- Fuelbreak and Fuel Reduction Maintenance Projects

Future Projects

A number of future projects have been proposed on NFS lands within the vicinity of the proposed Project. Table B.5-3 lists the actions that are ongoing or proposed within the Santa Clara/Mojave Rivers Ranger District, north of Highway 14.

Table B.5-3. Recent and Future Projects on NFS Lands

Map ID	Project Name	Project Description and Location	Status
94	Bouquet Canyon US Post Office mail box installation	Installation of a set of "gang box" mailboxes. Approximately 150 individual boxes for the recreation residence cabins and private home owners north of the recreation residence tract.	Developing proposal
95	CAPPS Electronic Site	Renewal of electronic site for cable television.	In progress
96	Dry Gulch Road Realignment and Paving	Los Angeles County Road Department proposal to realign and pave approximately 2 miles of Forest Road (5N30).	In progress
97	Lake Hughes Road at M.M. 16.30 Borrow/Fill Site	L.A. County Department of Public Works proposal to use area for a borrow/fill site for excess water borne and other inorganic debris resulting from erosion, landslides, etc. on Lake Hughes Road. Site capacity is about 20,000 cubic yards.	In progress
N/A	Liebre Mountain Black Oak Recovery	Protection of Black Oak trees damaged in the Pine Fire from deer depredation. Plant new Black Oak within Pine Fire burned area, protect from deer depredation.	In progress
N/A	Los Angeles County Sheriff's Department/ Pyramid Lake Permit Issuance	Issuance of a Special Use Permit to the Los Angeles County Sheriff's Department for the occupancy and use of an office and dock space at Pyramid Lake.	In progress
98	Los Angeles Department of Water and Power Fence Construction	Proposal to erect a chain link fence along the eastside of Bouquet Reservoir to restrict unauthorized access to the reservoir. Total length of the fence is 1.3 miles, of which 0.2 miles is on NFS land.	In progress
N/A	Pacific Pipeline Storm Relocation Project and Access Road Repairs	Pacific Pipeline proposing to relocate several miles of crude oil lines to stable ground locations. Winter storms in 2005 had caused unstable ground.	In progress
N/A	Pastoria to Pardee Transmission Line Reconductoring Project	Project work would consist of the reconductoring by SCE of an existing 230 kV transmission system between Gorman and Valencia to safely accommodate an anticipated increased line loading.	In progress
99	Rehabilitate San Francisquito Canyon Debris Placement Site	Rehabilitation of debris placement site used after the Copper Fire with wood chips and Coulter Pines.	In progress
100	Santa Clara/ Mojave River Ranger District Administrative Site Defensible Space Project	Enhancement of strategic and tactical opportunities in case of a wildfire by reducing fuel loading around administrative sites.	In progress
101	Santa Clara/ Mojave River Ranger District Fuelbreak Reestablishment Project	Re-establishment of the following district fuelbreaks: Castaic, 176 acres; Cordova, 388 acres; Elderberry, 182 acres; Leona East, 277 acres; & Necktie, 260 acres. Various methods such as chainsaw, prescribed fire, discing, and masticating would be used.	In progress
N/A	Santa Clara/ Mojave River Districtwide Trail Rehabilitation	Reconstruction and repair of 36 miles of system trails. Trails include: Devils Punchbowl, Manzanita, Jackson Lake, South Fork, Blue Ridge, Fish Canyon, Lower Shake and Atmore Meadows.	In progress
102	Uppershake Campground Improvements	Installation of a horse corral and replacement of existing site furniture and restroom.	In progress
N/A	Vista Del Lago Monument Installation	Department of Water Resources proposal to install a monument at the Vista Del Lago Visitor Center commemorating the building of the Old Ridge Route.	In progress

Source: USDA Forest Service, 2006.

B.5.5 Forecast Population Growth

In addition to the list of cumulative projects presented in Table B.5-1, general growth trends forecasted by the Southern California Association of Governments (SCAG) were utilized to characterize anticipated population and employment growth in northern Los Angeles County. This information provides a general understanding of the types of physical changes expected in the area and the potential for impacts that could combine with the impacts of the proposed Project. As a regional planning agency, SCAG forecasts growth projections up to 25 years into the future by incorporating recently available information from international, federal, and State statistical agencies, along with subregions and local jurisdictions (SCAG, 2004a). In providing growth projections for Los Angeles County, SCAG has divided the county into eight subregions. The proposed Project would be located entirely within the North Los Angeles County Subregion. The North Los Angeles County Subregion includes the Cities of Lancaster, Palmdale, and Santa Clarita, and the unincorporated Los Angeles County areas north of the City of Los Angeles.

Table B.5-4. Regional Growth Projections for North Los Angeles County Subregion

Year	Area Population	Area Employment
1990	394,111	133,166
1997	503,687	151,342
2000	512,391	178,899
2005	614,502	182,284
2010	735,262	215,955
2015	852,964	235,070
2020	967,387	253,417
2025	1,076,013	270,409
2030	1,179,228	286,286
Change from 1990-2005	220,391	49,118
Percent Change from 1990-2005	56%	37%
Change from 1990 – 2030:	785,117	153,120
Percent Change from 1990 – 2030:	199%	115%

Sources: SCAG, 2004b; SCAG, 2006.

Table B.5-4 displays the forecasted growth for the North Los Angeles County Subregion. Historically, from the year 1990 through the most current year evaluated (2005), the region has experienced substantial growth with a 56 percent increase in population and a 37 percent increase in total employment. It is anticipated that the region will continue to be characterized by rapid growth. From 1990 through 2030, a forecasted 199 percent population increase and 115 percent employment increase are anticipated for the North Los Angeles County Subregion.

The increase in regional growth in the North Los Angeles County Subregion may indirectly contribute to potential cumulative impacts in the proposed Project area. An increase in population growth directly affects the demand for jobs and housing, which may increase the number of planned development and improvement projects, such as public service facilities or transportation system expansions, in northern Los Angeles County. Substantial population or employment increases near the area of the proposed Project also substantially increase the population potentially exposed to an accident or other hazard.

Figure B.5-1a. Cumulative Projects (Northern Section)
CLICK HERE TO VIEW

Figure B.5-1b. Cumulative Projects (Southern Section)

CLICK HERE TO VIEW (2nd page)