B. Project Description

B.1 PROJECT OVERVIEW

The proposed El Casco System Project (Proposed Project) includes the following elements:

- Construct the new El Casco 220/115/12 kV Substation within the Norton Younglove Reserve in the County of Riverside, associated 220 kV and 115 kV interconnections, and new 12 kV line getaways (i.e., distribution line connections out of the substation).
- Replace approximately 13 miles of existing single-circuit 115 kV subtransmission lines with new, higher capacity double-circuit 115 kV subtransmission lines and replace support structures within existing SCE rights-of-way (ROWs) in the Cities of Banning and Beaumont and unincorporated areas of Riverside County.[1]
- Replace approximately 1.9 miles of existing single-circuit 115 kV subtransmission lines with new, higher capacity single-circuit 115 kV subtransmission lines and replace support structures within existing SCE ROWs in the City of Beaumont and unincorporated Riverside County.
- Replace approximately 0.5 mile of existing single-circuit 115 kV subtransmission lines with new, higher capacity single-circuit 115 kV subtransmission lines on existing support structures within existing SCE ROWs in the City of Beaumont and unincorporated Riverside County.
- Rebuild 115 kV switchracks within Zanja and Banning Substations in the Cities of Yucaipa and Banning, respectively.
- Install telecommunications equipment at the proposed El Casco Substation and at SCE's existing Mill Creek Communications Site.
- Install fiber optic cables within public streets and on existing SCE structures between the Cities of Redlands and Banning.

Figure B-1, Regional Overview of the El Casco System Project, shows the locations of the proposed El Casco Substation, subtransmission line upgrade locations, and telecommunication facilities associated with the Proposed Project.

B.2 PROJECT LOCATION

SCE would construct the proposed El Casco Substation in northern Riverside County within the Norton Younglove Reserve in close proximity to San Timoteo Canyon Road and SCE's existing Devers-San Bernardino No. 2 220 kV transmission line ROW. The Devers-San Bernardino No. 2 220 kV transmission line would serve as the electrical source for the El Casco Substation and its 115 kV system.

The 115 kV subtransmission line work would occur between El Casco, Maraschino, and Banning Substations within existing SCE ROWs in unincorporated Riverside County and the Cities of Beaumont and Banning. The Proposed Project would also involve the rebuilding of switchracks at Banning and Zanja Substations in the Cities of Banning and Yucaipa, respectively.

[1] Various segments of the existing 115 kV subtransmission lines also have distribution lines on the same structures. Where there are existing distribution lines on the structures, they would be transferred to the new structures.

As part of the new fiber optic system, microwave towers would be installed at El Casco Substation and the existing Mill Creek Communications Site, located on SCE-owned property within the San Bernardino National Forest. Five new fiber optic circuits would be installed between the Cities of Redlands and Banning within existing SCE ROWs.

Figure B-2 illustrates the location of the proposed El Casco Substation Site and 115 kV Subtransmission Line upgrades.

B.3 PROJECT PHASING

The Proposed Project would be constructed and operational in two phases (Phase 1 and Phase 2) from approximately June 2008 to June 2010.

B.3.1 Phase 1

The 115 kV portion of the proposed El Casco Substation would be constructed as part of Phase 1, and would be operational by June 2009. Phase 1 would include construction of the following elements at El Casco Substation:

- Grade the entire site
- Construct two mechanical and electrical equipment rooms (MEER)
- Construct the 12 kV switchrack with all positions equipped as designed
- Construct the 115 kV switchrack with two line positions equipped and two 115/12 kV bank positions equipped
- Construct two 115/12 kV transformer banks
- Install protective relays and a Substation Automation System for 115/12 kV system
- Install 12 kV distribution line getaways
- Install microwave communication facilities including a microwave tower.

In addition to the substation work described above, Phase 1 would include the following construction elements:

- Install a microwave tower at the Mill Creek Communications Site
- Loop in the existing Vista-San Bernardino-Maraschino 115 kV line to the new 115 kV switchrack

B.3.2 Phase 2

The 220/115 kV portion of the proposed El Casco Substation and remaining components of the Project would be constructed as part of Phase 2, and would be operational by June 2010. Phase 2 would include construction of the following elements at El Casco Substation:

- Construct the 220 kV switchrack with all positions equipped as designed
- Construct two 220/115 kV transformer banks
- Equip two 220/115 kV bank positions and one additional 115 kV line position in the 115 kV switchrack
- Install protective relays and a Substation Automation System for 220/115 kV system

Click here for Figure B-1

Click here for Figure B-2

In addition to the substation work described above, Phase 2 would include the following construction elements:

- Loop in the existing San Bernardino-Devers No. 2 220 kV line to the new 220 kV switchrack
- Rebuild 115 kV switchracks within Banning and Zanja Substations
- Replace approximately 13 miles of existing single-circuit 115 kV subtransmission lines with new, higher capacity double-circuit 115 kV subtransmission lines and replace support structures
- Replace approximately 1.9 miles of existing single-circuit 115 kV subtransmission lines with new, higher capacity single-circuit 115 kV subtransmission lines and replace support structures
- Replace approximately 0.5 mile of existing single-circuit 115 kV subtransmission lines with new, higher capacity single-circuit 115 kV subtransmission lines on existing support structures
- Loop in the existing fiber optic cable from the Devers-Vista No. 1 and No. 2 tower line to the MEER within El Casco Substation
- Install new fiber optic cable within public streets and on existing SCE structures between the Cities of Redlands and Banning.

Upon completion of the 115/12 kV portion of the substation, the substation would serve local distribution loads currently served by Maraschino Substation. Upon completion of the 220/115 kV portion of the substation, the new El Casco 115 kV System would be created. This system would serve five existing distribution substations that are currently served by the Vista and Devers 115 kV Systems.

B.4 SUBSTATION FACILITIES

B.4.1 El Casco Substation

B.4.1.1 Engineering Plan

The proposed El Casco Substation would be an unattended, automated 220/115/12 kV low-profile substation. The approximately 28-acre proposed substation site would consist of approximately 14 acres within the substation perimeter fence. The remaining 14 acres outside the perimeter fence would be disturbed during construction. Sections B.4.1.1.1 through B.4.1.1.7 provide details regarding the overall layout and equipment to be utilized at the substation.

The substation would be served by looping in the existing Devers-San Bernardino No. 2 220 kV transmission line. Five 12 kV distribution lines would be constructed underground from the substation in a northeasterly direction, crossing beneath San Timoteo Creek and the railroad tracks, to San Timoteo Canyon Road to deliver power to local residences and businesses. Beyond this point, the exact location and routing of these proposed lines have yet to be determined but the lines would be installed underground within public streets. The 12 kV lines cannot be designed until the precise locations of the loads are determined.

B.4.1.1.1 Equipment

The substation incorporates low-profile design features, which limit the height of electrical equipment and structures. The substation would be equipped with one 220 kV switchrack, two 280 MVA 220/115 kV transformers, one 115 kV switchrack, one 45 MVAR 115 kV capacitor bank, two 28 MVA 115/12 kV transformers, one 12 kV switchrack, and two 4.8 MVAR 12 kV capacitor banks. The 220 kV and

115 kV switchracks would be designed with a breaker-and-a-half configuration. The 12 kV switchrack would be designed with an operating and transfer bus configuration, and would have provisions for a second operating bus. A bus is an apparatus that can split the distribution power off in multiple directions.

Figures B-3a (El Casco Substation Site Plan) and B-3b (El Casco Substation Site Plan Aerial View) identify the proposed layout for the new substation. Two MEERs would be constructed to house control and relay panels, batteries and battery chargers, and telecommunications equipment. Electrical equipment housed within the substation is summarized in Table B-1, El Casco Substation Facility Summary. The El Casco Substation would also be equipped with a Substation Automation System (SAS), which is a system that provides for remote control and monitoring of all the equipment at the site. The substation would be unattended; therefore, SCE personnel would remotely interface with the SAS as needed. The SAS would include one Human Machine Interface (HMI) cabinet and approximately 42 19-inch equipment racks.

Table B-1 El Casco Substation Facility Summary

Equipment	Description
220 kV Switchrack	The 220 kV, low-profile switchrack would consist of seven bays.[2] Initially, two positions would be equipped as 220 kV line positions, and two positions would be equipped as transformer bank positions. The 220 kV dead-ends would be 49 feet high.
Transformers	Transformation would consist of two 280 MVA, 220/115 kV and two 28 MVA, 115/12 kV transformers. The 280 MVA transformers would be approximately 27 feet high. The 28 MVA transformers would be approximately 15 feet high.
115 kV Switchrack	The 115 kV, low-profile switchrack would consist of six bays. Three positions would be equipped as line positions, two would be equipped as 220/115 kV bank positions, and two would be equipped as 115/12 kV bank positions. The 115 kV switchrack would use high and low dead-end structures with elevations of 39 feet and 29 feet, respectively.
12 kV Switchrack	The 12 kV, low-profile switchrack would consist of eleven bays. Two bays would be equipped as bank positions, one bay would be equipped as a bus-tie position, and five would be equipped as line positions. Three bays would be available for future use. The switchrack would be approximately 15 feet high.
Capacitor Banks	One 45 MVAR, 115 kV capacitor bank with fused disconnects and a circuit breaker would be installed. Two 4.8 MVAR, 12 kV capacitor banks with fused disconnects and a vacuum switch would be installed. Each capacitor bank would be approximately 14 feet high.
MEERs	Two MEERs would contain control and relay panels, battery chargers, communication equipment, and local alarms. The larger MEER would be approximately 55 feet wide, 65 feet long and 12 feet high. The smaller MEER would be approximately 15 feet wide, 20 feet long, and 10 feet high.

B.4.1.1.2 Maintenance Lighting

The proposed El Casco Substation would include maintenance lighting consisting of high pressure sodium lights located in the switchracks, around the transformer banks, and in areas of the yard where operations or maintenance activities may be required during nighttime hours. Maintenance lights would be controlled by a manual switch and would normally be in the off position. These lights would be directed downward and shielded to reduce glare outside the substation.

2 The 220 kV and 115 kV switchracks would each be designed using a breaker-and-a-half configuration, so each "bay" results in two "positions" available for use.

Click here for Figure B-3a

Click here for Figure B-3b

B.4.1.1.3 Substation Access

An approximately 24-foot wide asphalt concrete paved entry road located to the north and west of the substation site would be constructed to provide access to the substation from San Timoteo Canyon Road. The access road would be approximately 0.6 mile long. A gate would be installed near San Timoteo Canyon Road to control entry onto the access road.

B.4.1.1.4 Paving and Surfacing

The access road would be constructed in accordance with the proposed substation site plan, as depicted in Figure B-2, El Casco Substation Site Plan. The access road would be paved with asphalt concrete over a compacted layer of aggregate base material placed on the sub-grade. Three types of surfacing would be utilized on the approximately 14 acres within the substation fence; crushed rock, asphalt pavement, and concrete foundation. The surface areas for each type are estimated as follows:

- Crushed rock surface – 10.5 acres
- Asphalt pavement – 2.5 acres (not including access road to station)
- Concrete foundations – 1.0 acre.

B.4.1.1.5 Restroom

The new substation would accommodate one portable restroom, which would not require water or sewer service. The restroom would be maintained by an outside contractor who would collect and dispose of the waste.

B.4.1.1.6 Substation Security

A combination of masonry block walls and chainlink fences would be constructed around the perimeter of the substation. The block wall would be constructed along the north and east perimeters, and the fence would be installed along the south and west perimeters. Both the wall and the fence would have a minimum height of eight feet. Alternatively, SCE may install a block wall along the entire perimeter of the substation. Access gates would be located along the north and east perimeters. The primary gate would be approximately 30 feet wide and 8 feet high, and the secondary gate would be 24 feet wide and 8 feet high. A band consisting of several strands of barbed wire would be affixed near the top of the wall and fence, as well as on the gates. Gates and MEERs would normally be locked and would only be unlocked when substation personnel are present at the station. All MEER doors would be remotely monitored using the SAS.

B.4.1.1.7 Landscaping

The landscaping plan for the proposed substation would incorporate primarily native vegetation and would be designed to filter views of the substation site. The landscaping plan would be prepared by a certified licensed landscape architect and would be consistent with Riverside County standards to the extent that consistency with these standards would not create unsafe conditions or facilitate unauthorized entry into the substation. Vegetation would be planted on graded side-slopes around the substation. Landscaping would require irrigation during the initial establishment phase. The method of irrigation would depend upon the availability of local water supplies at the site following construction of the substation. If local water supplies are not available, SCE would either construct a well with a holding tank or a cistern.

B.4.1.2 Construction Plan

B.4.1.2.1 Grading and Site Preparation

The substation requires a pad of approximately 14 acres within the fenceline. Due to the existing topography of the site, however, a total of approximately 28 acres would need to be graded in order to create the relatively flat 14-acre pad, and to address potential landslide issues presented by the hillside south of the substation site. Grading depths at the proposed substation site will vary from approximately one foot in the middle of the site to approximately 60 feet along the northern portion of the site (SCE, 2007f). The substation pad is configured in an "L" shape because of constraints placed on the site in the form of easements, buffer zones, and property boundaries. Initial site preparation would require the removal of all vegetation on the 28-acre site. The removed vegetation would be screened to remove loose soil, and would then be disposed of at an approved green waste facility. If trash or other waste materials are found during this process, they would be inspected for contamination and hauled away to an approved disposal site. All utilities would be avoided or relocated prior to site preparation. If existing utilities are unexpectedly encountered during grading activities, the appropriate utility company would be contacted and necessary arrangements would be made.

Geotechnical surveys indicate that the northern portion of the site, currently a relatively flat area, is subject to potential liquefaction and lateral spreading hazards due to shallow groundwater levels and loose to medium dense soil. To address this issue, soil stabilization techniques such as deep soil mixing (DSM), which involves the mechanical blending of slurry with the on-site soils to make them stiffer and contain fewer voids, would be utilized below the locations where foundations for electrical equipment and the two MEERs are placed. DSM makes use of a hollow stem auger and mixing tool arrangement attached to a large drilling rig to inject and mix grout into the soil.

Geotechnical surveys also indicate that the southern portion of the site, currently a relatively hilly area, overlies an existing landslide and presents a potential future landslide hazard due to the presence of thin clay-rich layers (landslide failure planes) underground. To address this issue, soil stabilization techniques such as a compacted-fill earth buttress or soil tie-backs would be utilized at the graded slope behind the substation. Due to the site topography, it is estimated that approximately 350,000 cubic yards of soil would be removed from the hillside, sifted to remove any rocks greater than 3 inches in diameter, and replaced in the cut area to a 95 percent compaction factor. Some fill soil may be required to be imported to the site in order to complete the buttress. If a compacted earth-filled buttress is the slope stabilization method utilized, SCE anticipates (based on preliminary estimates) that approximately 50,000 cubic yards of fill material may be required (SCE, 2007b).

Following completion of slope stabilization, the site would be contoured and the substation pad would be compacted and leveled. Soil cut from various areas of the site would be used as fill material in other areas. Material not suitable as fill would be stockpiled for other possible uses or disposed of at an approved facility. It is estimated that approximately 285,000 cubic yards of soil would be cut and 285,000 cubic yards of fill would be required for site preparation. The site would be graded using best engineering practices for soil content, compaction, and slope stability.

B.4.1.2.2 Drainage

The existing site slopes downward from south to north at an average of 40 percent in hillside areas and at an average of 5 percent in non-hillside areas. The western portion of the site is predominantly located within a 125 acre watershed. In general, the runoff from this watershed sheet drains from south to north. Also, a loosely defined natural swale meanders through the western portion of the site and adjacent property, and ultimately discharges runoff into the San Timoteo Creek. The eastern portion of the site is located on the perimeter of an adjacent watershed area that does not significantly impact drainage on the site.

The constructed substation would result in the slight redirection of the western watershed channel to an area outside of the substation perimeter fence. Stormwater runoff from the graded substation pad would be directed towards the north of the substation site. The hillside south of the substation would be finished at a 50 percent slope (i.e., 2 horizontal to 1 vertical slope) with concrete drainage terraces constructed at every 25-foot vertical elevation drop to prevent stormwater from flowing into the substation pad and to prevent erosion of the graded hillside. Any concentrated stormwater flow from the terraces would be routed to the east and west around the substation and into drainage channels that would flow toward the north of the property.

To prevent the concentrated stormwater flow from eroding the drainage channel, the rerouted channel west of the fenceline would be lined with rip rap or other erosion protection measures to dissipate the water into the ground. The stormwater runoff from the graded substation pad would ultimately flow into San Timoteo Creek in essentially the same manner as it does in the presently ungraded condition of the site. The quantity of runoff would be slightly increased over the existing quantity of runoff. Graded slopes around the substation would be landscaped with native vegetation to further reduce potential stormwater erosion.

B.4.1.2.3 Equipment Installation

After grading and site preparation are completed, the perimeter fences, foundations, and belowground facilities (e.g., ground-grid, conduit, etc.) would be constructed followed by installation of the above-ground structures and the electrical equipment. Equipment would be delivered to the site using the access routes described below in Section B.4.1.2.4. Footings for substation equipment may be installed as deep as 25 feet (SCE, 2007c). During the initial construction period, temporary equipment for fencing, sanitation, and construction power would be utilized. Construction power would likely be provided through small conductors placed on temporary poles installed along the access road from a supply point near San Timoteo Canyon Road. All construction support equipment would be removed upon completion of Phase 1 construction. Construction support services for Phase 2 would utilize those items placed into operation during Phase 1.

B.4.1.2.4 Access Road Improvement

An existing dirt road adjacent to the substation site would be improved from San Timoteo Canyon Road to the east for approximately 0.6 mile to provide access to El Casco Substation. The existing road closely parallels San Timoteo Creek. Because certain portions of the creek bank are eroding very close to the existing road, the location of the improved access road may be moved, up to 20 feet south of the existing road. In locations where the existing dirt road would be abandoned, it would be landscaped with native vegetation. The road would first be graded and compacted. A road base would then be placed. Finally, the road would be paved with asphalt. Existing drainage routes that currently intersect the dirt road would be conveyed across the improved road using culverts or wet crossings and discharged to the creek at their current locations.

B.4.1.2.5 Staging and Access

Material would be staged within the substation wall/fence during construction. All material for the proposed substation, including the transformers, would be delivered by truck. Construction traffic would use San Timoteo Canyon Road and would be scheduled for off-peak traffic hours to the extent possible. Concrete truck deliveries may need to be made during peak hours when footing work is being performed. The transformers would be delivered by heavy transport vehicles and off-loaded on site by large cranes with support trucks. A traffic control service would be used for transformer delivery.

B.4.1.2.6 Labor and Equipment

Construction would be performed by SCE construction crews and/or by contractors under the supervision of SCE personnel. Anticipated construction personnel and equipment are summarized in Table B-2, Construction Personnel and Equipment Summary for Phase 1 (El Casco Substation), and Table B-3, Construction Personnel and Equipment Summary for Phase 2 (El Casco Substation).

Table B-2 Construction Personnel and Equipment Summary for Phase 1 (El Casco Substation)

Construction Element	Number of Personnel	Number of Days	Equipment Requirements	
Site Management	2	Duration of Construction	1 – Office Trailer (Electric)	
Grading (including Soil Stabilization)	15	180	1 – 980 Loader (Diesel) 3 – Graders (Diesel) 2 – Compactor (Gas/Diesel) 1 – 20-ton Drilling Rig (Diesel)	3 – Water Trucks (Gas/Diesel) 4 – Dump Trucks (Diesel) 2 – Crew Trucks (Gas/Diesel) 1 – Survey Truck (Gas/Diesel) 1 – Soils Test Crew Truck (Gas/Diesel)
Civil (foundations, underground conduits, ground grid, etc.)	15	90	2 – Drillers (Diesel) 4 – Crew Trucks (Gas/Diesel) 1 – 14-ton Crane (Diesel) 3 – Dump Trucks (Diesel)	2 – Tractors (Diesel) 1 – 5-ton Truck (Gas/Diesel) 1 – Forklift (Diesel) 1 – Ditch Digger (Diesel)
Electrical (MEER, switchracks, conductors, circuit breakers, etc.)	25	180	4 – Manlifts (Diesel) 4 – Pickup Trucks (Gas/Diesel) 2 – 14-ton Cranes (Diesel) 2 – Crew Trucks (Gas/Diesel)	2 – 150-ton Cranes (Diesel) 1 – 5-ton Truck (Gas/Diesel) 1 – Forklift (Diesel) 4 – Carryall Vehicles (Gas/Diesel) 2 – Support Trucks (Gas/Diesel)
Maintenance (equipment preparation and verification)	5	30	1 – Foreman Truck (Gas/Diesel) 1 – Manlift (Gas/Diesel)	2 – Crew Trucks (Gas/Diesel) 2 – Gas/Processing Trailers (Electric)
Test (relays, energization, SAS, etc.)	4	180	1 – Pickup Truck (Gas/Diesel)	

Table B-3 Construction Personnel and Equipment Summary for Phase 2 (El Casco Substation)

Construction Element	Number of Personnel	Number of Days	Equipment Requirements	
Site Management	2	Duration of Construction	1 – Office Trailer (Electric)	
Civil (foundations, underground conduits, ground grid, etc.)	10	90	2 – Drillers (Diesel) 4 – Crew Trucks (Gas/Diesel) 1 – 14-ton Crane (Diesel) 3 – Dump Trucks (Gas/Diesel)	1 – Water Truck (Diesel) 2 – Tractors (Diesel) 1 – 5-ton Truck (Gas/Diesel) 1 – Forklift (Diesel) 1 – Ditch Digger (Diesel)

Table B-3 Construction Personnel and Equipment Summary for Phase 2 (El Casco Substation)

Construction Element	Number of Personnel	Number of Days	Equipment Requirements	
Electrical (MEER, switchracks, conductors, circuit breakers, etc.)	12	135	4 – Manlifts (Diesel) 4 – Pickup Trucks (Gas/Diesel) 2 – 14-ton Cranes (Diesel) 2 – Crew Trucks (Gas/Diesel)	2 – 150-ton Cranes (Diesel) 1 – 5-ton Truck (Gas/Diesel) 1 – Forklift (Diesel) 4 – Carryall Vehicles (Gas/Diesel) 2 – Support Trucks (Gas/Diesel)
Transformer Assembly (220/115 kV banks)	6	40	2 – Carry-all (Gas/Diesel) 1 – Manlift (Diesel) 1 – Forklift (Diesel)	2 – 50-ton Cranes (Diesel) 2 – Crew Trucks (Gas/Diesel) 1 – Processing Trailer (Electric)
Maintenance (equipment preparation and verification)	5	20	1 – Foreman Truck (Gas/Diesel) 1 – Manlift (Gas/Diesel)	2 – Crew Trucks (Gas/Diesel) 2 – Gas/Processing Trailers (Electric)
Test (relays, energization, SAS, etc.)	4	120	1 – Pickup Truck (Gas/Diesel)	

B.4.1.2.7 Hazardous Material Usage and Waste Generation

Construction of the El Casco Substation would require limited use of hazardous materials, including fuel, lubricants, and cleaning solutions. All hazardous materials would be stored, handled, and used in accordance with applicable regulations, including the Construction Storm Water Pollution Prevention Plan and the Spill Prevention Control and Countermeasure Plan, for the substation components.

Construction of the El Casco Substation would result in the generation of various waste materials, including materials associated with removal activities and construction of the substation. A summary of the waste generation estimates is presented in Table B-4.

Table B-4 Construction Waste Estimates (El Casco Substation)

Waste Item	Pounds Total	Pounds Reusable on Site	Pounds Recyclable or Disposed
Grading Element			
Soil/Vegetation	1,050,000	945,000	105,000
Sanitation Waste	500	0	500
Miscellaneous	500	0	500
Civil Element			
Soil	9,240,000	0	9,240,000
Wood	2,000	0	2,000
Concrete	2,000	0	2,000
Sanitation Waste	700	0	700
Miscellaneous	1,000	0	1,000
Electrical Element			
Wood	5,000	0	5,000
Aluminum	2,000	0	2,000
Copper	600	0	600
Steel	1,000	0	1,000
Sanitation Waste	700	0	700
Miscellaneous	1,000	0	1,000

B.4.1.2.8 Post Construction Clean-Up

All debris associated with construction of the substation would be placed in appropriate on-site containers and periodically disposed of in accordance with all applicable regulations.

B.4.1.2.9 Construction Schedule

Construction of the proposed El Casco Substation would take a total of approximately 24 months (for both Phase 1 and Phase 2 construction), commencing in approximately June 2008 and concluding in June 2010, including testing and energizing the substation. The planned operating date for Phase 1 is June 2009, and the planned operating date for Phase 2 is June 2010.

B.4.2 Zanja Substation

All Project activities proposed at Zanja Substation would occur within the existing fence line of the facility. No substation expansion would be necessary (SCE, 2007c).

B.4.2.1 Engineering Plan

SCE's Zanja 115/33 kV Substation is connected to the Vista 115 kV System through one preferred 115 kV line. During abnormal conditions, Zanja Substation can be transferred to the Devers 115 kV System through an emergency 115 kV line. Figure B-1 notes the location of the Zanja Substation. As a part of the Proposed Project, Zanja Substation would be transferred to the El Casco 115 kV System. To effectuate this transfer, the existing 115 kV switchrack would be replaced with a new switchrack, configured as a four-element 115 kV ring bus to implement necessary protection and switching for self restoring loop (SRL) operation. The switchrack would be built within the existing fenced-in substation area and would not disturb SCE property to the east of the substation. Figure B-4 (Zanja Substation Proposed Plot Plan) illustrates the existing structures at the substation, and the location of the proposed 115 kV switchtrack. Existing poles, disconnects, and some other equipment, previously installed for interconnection of a mobile transformer unit, would be removed.

The new 115 kV switchrack would be a box steel structure approximately 72 feet wide by 72 feet long by 42 feet high. This structure would support bus work and would initially interconnect three circuit breakers and eight gang-operated disconnect switches. Gang-operated disconnect switches are used where more than one phase of a circuit must be opened simultaneously. The switchrack could accommodate the addition of a fourth 115 kV circuit breaker, if needed in the future. Maintenance lighting, similar to that described for El Casco Substation above, would be installed within the new switchrack area.

The existing MEER is too small to accommodate installation of the SAS and the protective relays and telecommunications equipment necessary to remotely monitor and control the substation. Therefore, an additional MEER, approximately 15 feet wide by 20 feet long by 12 feet high, would be installed at the substation inside the perimeter fence. This installation would require construction of a new foundation. The new protective relaying, telecommunications, and automation equipment, including an HMI cabinet, would be installed inside the MEER on approximately seven 19-inch racks.

No modifications to the existing substation maintenance lighting (except for the new lighting installed for the new switchrack area), access, paving, restroom facilities, perimeter security, or landscaping would be necessary at this substation.

Click here for Figure B-4

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B.4.2.2 Construction Plan

B.4.2.2.1 Grading and Site Preparation

The new switchrack requires a pad of approximately 0.2 acre when completed. The pad would be located in the southeast corner of the existing substation property. The existing site is effectively level; however, during construction, an area of approximately 0.4 acre would likely be disturbed to create the pad. Site preparation would require the removal of previously installed substation crushed rock. Materials removed during site preparation would be handled in the same manner as described above for El Casco Substation.

B.4.2.2.2 Drainage

There would be no change to the existing drainage patterns at Zanja Substation as a result of Proposed Project activities.

B.4.2.2.3 Equipment Installation

After grading and site preparation are completed, the foundations and below-ground facilities (e.g., ground-grid, conduit, etc.) would be constructed followed by installation of the above-ground structures and the electrical equipment. Equipment would be delivered to the site using the access routes described in Section B.4.2.2.4.

B.4.2.2.4 Staging and Access

Material would be staged within the substation fence during construction. All construction material would be delivered by truck. Construction traffic would use Bryant Street and/or Mill Creek Road and would be scheduled for off-peak traffic hours to the extent possible. Concrete truck deliveries may need to be made during peak hours when foundation work is being performed. A traffic control service would be used for oversized material delivery.

B.4.2.2.5 Labor and Equipment

Construction would be performed by SCE construction crews and/or by contractors under the supervision of SCE personnel. Anticipated construction personnel and equipment are summarized in Table B-5, Construction Personnel and Equipment Summary (Zanja Substation).

Table B-5 Construction Personnel and Equipment Summary (Zanja Substation)

Construction Element	Number of Personnel	Number of Days	Equipment Requirements	
Site Management	2	Duration of Construction	1 – Office Trailer (Electric)	
Grading	8	10	1 – 980 Loader (Diesel) 1 – Graders (Diesel) 1 – Compactor (Gas/Diesel)	1 – Water Truck (Diesel) 1 – Survey Truck (Gas/Diesel) 1 – Soils Test Crew Truck (Gas/Diesel)
Civil (foundations, underground conduits, ground grid, etc.)	10	30	2 – Drillers (Diesel) 3 – Crew Trucks (Gas/Diesel) 1 – 14-ton Crane (Diesel) 2 – Dump Trucks (Gas/Diesel)	2 – Tractors (Diesel) 1 – 5-ton Truck (Gas/Diesel) 1 – Forklift (Diesel) 1 – Ditch Digger (Diesel)

Table B-5 Construction Personnel and Equipment Summary (Zanja Substation)

Construction Element	Number of Personnel	Number of Days	Equipment Requirements	
Electrical (MEER, switchracks, conductors, circuit breakers, etc.)	20	60	4 – Manlifts (Diesel) 4 – Pickup Trucks (Gas/Diesel) 2 – 14-ton Cranes (Diesel) 2 – Crew Trucks (Gas/Diesel)	2 – 150-ton Cranes (Diesel) 1 – 5-ton Truck (Gas/Diesel) 1 – Forklift (Diesel) 4 – Carryall Vehicles (Gas/Diesel) 2 – Support Trucks (Gas/Diesel)
Maintenance (equipment preparation and verification)	5	20	1 – Foreman Truck (Gas/Diesel) 1 – Manlift (Gas/Diesel)	2 – Crew Trucks (Gas/Diesel) 2 – Gas/Processing Trailers (Electric)
Test (relays, energization, SAS, etc.)	4	30	1 – Pickup Truck (Gas/Diesel)	

B.4.2.2.6 Hazardous Material Usage and Waste Generation

Construction at Zanja Substation would require limited use of hazardous materials, including fuel, lubricants, and cleaning solutions. All hazardous materials would be stored, handled, and used in accordance with applicable regulations, including the Construction Storm Water Pollution Prevention Plan, for the substation modifications.

Construction at Zanja Substation would result in the generation of various waste materials, including materials associated with removal activities and substation modifications. A summary of the waste generation is presented in Table B-6.

Table B-6 Construction Waste Estimates (Zanja Substation)

Waste Item	Pounds Total	Pounds Reusable on Site	Pounds Recyclable or Disposed
Grading Element			
Soil/Vegetation	0	0	0
Sanitation Waste	0	0	0
Miscellaneous	0	0	0
Civil Element			
Soil	315,000	0	315,000
Wood	1,000	0	1,000
Concrete	2,000	0	2,000
Sanitation Waste	500	0	500
Miscellaneous	500	0	500
Electrical Element			
Wood	2,000	0	2,000
Aluminum	1,000	0	1,000
Copper	1,000	0	1,000
Steel	500	0	500
Sanitation Waste	500	0	500
Miscellaneous	500	0	500

B.4.2.2.7 Post Construction Clean-Up

All debris associated with work at Zanja Substation would be placed in appropriate on-site containers and periodically disposed of in accordance with all applicable regulations.

B.4.2.2.8 Construction Schedule

Construction at Zanja Substation would take approximately six months, commencing in late 2009 and concluding in early 2010, including testing and energizing the substation.

B.4.3 Banning Substation

All Project activities proposed at Banning Substation would occur within the existing fence line of the facility. No substation expansion would be necessary (SCE, 2007e).

B.4.3.1 Engineering Plan

SCE's Banning 115/33 kV Substation is connected to the Devers 115 kV System through one preferred 115 kV line. During abnormal conditions, Banning Substation can be transferred to an emergency 115 kV line that is also connected to the Devers 115 kV System. As an additional contingency during abnormal conditions, either the preferred line or the emergency line can be connected to lines fed by the Vista 115 kV System to enable the transfer of Banning Substation to the Vista System. As part of the Proposed Project, Banning Substation would be transferred to the El Casco 115 kV System. To effectuate this transfer, the existing 115 kV switchrack would be replaced with a new switchrack, configured as an operating and transfer bus to implement necessary protection and switching for SRL operation. In order to install the new switchrack at the substation, three existing 115/33 kV transformers and one 33 kV capacitor bank would need to be relocated within the existing substation fence.

A new 27-foot tall 115 kV switchrack designed for eight bays would be installed. Initially, four bays would be equipped as 115 kV line positions, two bays would be equipped as bank positions, and one bay would be equipped as a bus tie position. A bay is a part of a substation containing voltage switching devices and connections of a power line or a power transformer to the substation busbar system(s), as well as protection, control, and measurement devices for the power line and the power transformer. A bay used to connect a power line to the busbar system is referred to as a “line bay,” and a bay used for connecting a power transformer to the busbar system is referred to as a “transformer bay.” The switchrack could accommodate the addition of an eighth 115 kV circuit breaker, if needed in the future.

Two new low-profile transformer racks, approximately 27 feet high, would be constructed for the relocated transformers. Each installation would include foundations for two transformers and two 115 kV gang-operated disconnect switches. The transformers would be connected to the existing 33 kV switchrack through insulated cables installed in two cable trenches.

One of the two existing 33 kV capacitor banks would be replaced with a new capacitor bank located within the substation perimeter fence. The new capacitor bank would require construction of a new foundation and would be enclosed within a 6-foot tall chainlink fence. The capacitor bank would be connected to the existing 33 kV switchrack through an insulated cable installed in underground conduit.

The existing MEER is too small to accommodate installation of the SAS and the protective relays and telecommunications equipment necessary to remotely monitor and control the substation. Therefore, an additional MEER, approximately 15 feet wide by 20 feet long by 12 feet high, would be installed at the substation inside the perimeter fence. This installation would require construction of a new foundation. The new protective relaying, telecommunications, and automation equipment, including an HMI cabinet, would be installed inside the MEER on approximately seven 19-inch racks.

B.4.3.2 Construction Plan

B.4.3.2.1 Grading and Site Preparation

The new switchrack and relocated transformers require a pad of approximately 0.25 acre when completed. The existing site is effectively level; however, during construction an area of approximately 0.5 acre would likely be disturbed in order to create this pad. The pad would be located on the western half of the existing substation property. Initial site preparation would require the removal of any previously installed substation crushed rock. Materials removed during grading would be handled in the same manner as described above for El Casco Substation.

B.4.3.2.2 Drainage

There would be no change to the existing drainage patterns at Banning Substation as a result of this work.

B.4.3.2.3 Equipment Installation

After grading and site preparation is completed, the foundations and below-ground facilities (e.g., ground-grid, conduit, etc.) would be constructed followed by installation of the above-ground structures and the electrical equipment. Equipment would be delivered to the site using the access routes described in Section B.4.3.2.4.

B.4.3.2.4 Staging and Access

Material storage and vehicle parking would be staged within the boundary of the substation during construction. All construction material would be delivered by truck. Construction traffic would use Lincoln Street and/or Hargrave Street and would be scheduled for off-peak traffic hours to the extent possible. Concrete truck deliveries may need to be made during peak hours when footing work is being performed. A traffic control service would be used for oversized material delivery.

B.4.3.2.5 Labor and Equipment

Construction would be performed by SCE construction crews and/or by contractors under the supervision of SCE personnel. Anticipated construction personnel and equipment are summarized in Table B-7, Construction Personnel and Equipment Summary (Banning Substation).

Table B-7 Construction Personnel and Equipment Summary (Banning Substation)

Construction Element	Number of Personnel	Number of Days	Equipment Requirements	
Site Management	2	Duration of Construction	1 – Office Trailer (Electric)	
Grading	8	10	1 – 980 Loader (Diesel) 1 – Graders (Diesel) 1 – Compactor (Gas/Diesel)	1 – Water Truck (Diesel) 1 – Survey Truck (Gas/Diesel) 1 – Soils Test Crew Truck (Gas/Diesel)
Civil (foundations, underground conduits, ground grid, etc.)	10	45	2 – Drillers (Diesel) 4 – Crew Trucks (Gas/Diesel) 1 – 14-ton Crane (Diesel) 3 – Dump Trucks (Gas/Diesel)	2 – Tractors (Diesel) 1 – 5-ton Truck (Gas/Diesel) 1 – Forklift (Diesel) 1 – Ditch Digger (Diesel)

Table B-7 Construction Personnel and Equipment Summary (Banning Substation)

Construction Element	Number of Personnel	Number of Days	Equipment Requirements	
Electrical (MEER, switchracks, conductors, circuit breakers, etc.)	20	75	4 – Manlifts (Diesel) 4 – Pickup Trucks (Gas/Diesel) 2 – 14-ton Cranes (Diesel) 2 – Crew Trucks (Gas/Diesel)	2 – 150-ton Cranes (Diesel) 1 – 5-ton Truck (Gas/Diesel) 1 – Forklift (Diesel) 4 – Carryall Vehicles (Gas/Diesel) 2 – Support Trucks (Gas/Diesel)
Maintenance (equipment preparation and verification)	5	30	1 – Foreman Truck (Gas/Diesel) 1 – Manlift (Gas/Diesel)	2 – Crew Trucks (Gas/Diesel) 2 – Gas/Processing Trailers (Electric)
Test (relays, energization, SAS, etc.)	4	40	1 – Pickup Truck (Gas/Diesel)	

B.4.3.2.6 Hazardous Material Usage and Waste Generation

Construction at Banning Substation would require limited use of hazardous materials, including fuel, lubricants, and cleaning solutions. All hazardous materials would be stored, handled, and used in accordance with applicable regulations, including the Construction Storm Water Pollution Prevention Plan for the substation modifications.

Construction at Banning Substation would result in the generation of various waste materials, including materials associated with removal activities and substation modifications. A summary of the waste generation is presented in Table B-8.

Table B-8 Construction Waste Estimates (Banning Substation)

Waste Item	Pounds Total	Pounds Reusable on Site	Pounds Recyclable or Disposed
Grading Element			
Soil/Vegetation	0	0	0
Sanitation Waste	0	0	0
Miscellaneous	0	0	0
Civil Element			
Soil	1,000,200	0	1,000,200
Wood	2,000	0	2,000
Concrete	1,000	0	1,000
Sanitation Waste	500	0	500
Miscellaneous	300	0	300
Electrical Element			
Wood	2,000	0	2,000
Aluminum	1,000	0	1,000
Copper	1,000	0	1,000
Steel	2,000	0	2,000
Sanitation Waste	500	0	500
Miscellaneous	1,000	0	1,000

B.4.3.2.7 Post Construction Clean-Up

All debris associated with work at Banning Substation would be placed in appropriate on-site containers and periodically disposed of in accordance with all applicable regulations.

B.4.3.2.8 Construction Schedule

Construction at Banning Substation would take approximately eight months, commencing in mid-2009 and concluding in early 2010, including testing and energizing the substation.

B.5 220 KV TRANSMISSION LINE LOOP-IN

B.5.1 Engineering Plan

To connect the proposed El Casco Substation to the 220 kV transmission system, the existing Devers-San Bernardino No. 2 220 kV line would be looped into the new 220 kV switchrack by constructing two new line segments of approximately 500 feet each between the existing ROW and the proposed El Casco 220 kV switchrack (see Figure B-3b, El Casco Substation Site Plan Aerial View). This would create two new lines: the Devers-El Casco 220 kV line and the El Casco-San Bernardino 220 kV line. To support the two new line segments, three new double-circuit lattice steel towers (LSTs) would be constructed. One tower would intercept the existing Devers-San Bernardino No. 2 220 kV transmission line between structures T-72 and T-73 to redirect the line into the substation. Two towers would be constructed between the existing ROW and the new El Casco Substation perimeter wall. Figure B-5 (Typical Structure Designs) illustrates the 220 kV LSTs that would be constructed near the proposed El Casco Substation.

B.5.1.1 Structures and Associated Equipment

The three 220 kV double-circuit LSTs would each be built on four drilled pier concrete footings. The dimensions of each footing are dependent on variables such as topography, tower height, span lengths, and soil properties. On average, a typical footing would have an above-ground projection of about 3 feet. Each LST would range in height from 100 to 130 feet. Final engineering will determine the exact height of each structure. All LSTs would be constructed of dull galvanized lattice steel angle members connected by steel bolts.

The proposed line segments would utilize a single 1033 kcmil (thousand circular mils) aluminum conductor steel reinforced (ACSR) conductors with non-specular (dulled) finish. Each conductor would be attached to an LST by dead-end insulator assemblies, consisting of two polymer insulators each, oriented horizontally in each direction. Overhead ground wire would be strung on the peaks of the LSTs for the line segments between the existing ROW and the El Casco Substation 220 kV switchrack.

B.5.1.2 Spur Roads

Spur roads are roads that lead from the access road and dead-end into one or more tower sites. An approximate 200-foot long by 12-foot wide dirt spur road would be graded from the substation access road to the three new LSTs.

B.5.2 Construction Plan

B.5.2.1 Tower Site Preparation

Each tower site would be graded or cleared to provide a relatively level pad, free of any vegetation that would hinder tower construction. The tower site (approximately 100 feet by 100 feet) would be graded such that no ponding or erosive water flow would occur that would cause damage to the tower footings.

Click here for Figure B-5

The graded pad would be compacted to at least 90 percent relative density and would be capable of supporting heavy vehicles.

B.5.2.2 Staging and Access

Material would be staged within the substation wall/fence during construction. All material for the 220 kV transmission line loop-in work, including concrete, steel, and wire, would be delivered by truck. Construction traffic would use San Timoteo Canyon Road and would be scheduled for off-peak traffic hours to the extent possible. Concrete truck deliveries may need to be made during peak hours when footing work is being performed.

B.5.2.3 Foundations

After a geotechnical investigation and final engineering of the LST have been completed, pier-type foundations would be poured in place using augured excavation techniques. The depth of the underground portion of the footing would be approximately 35 feet (SCE, 2007c). The above-ground portion of the footings would extend approximately three feet high.

B.5.2.4 Tower Assembly

LSTs would be assembled at each individual LST location. Crews would erect the steel onto the footings and would bolt together the panel sections until the entire LST is erected. Assembly and erection of the LSTs would require an erection crane to be set up approximately 60 feet from the centerline of each LST. The crane pad would be located transversely from each LST location.

B.5.2.5 Conductor Pulling

Conductor pulling includes all activities associated with the installation of conductors onto the LSTs. This activity includes the installation of overhead ground wire (OHGW) and primary conductor, vibration dampeners, weights, spacers, and dead-end hardware assemblies. Two cable pulls would be performed, one for each circuit, between the switchrack and the tower intercepting the 220 kV line. An 80-foot by 80-foot temporary staging area would be required at each of two pull locations.

Conductor pulling would be in accordance with SCE specifications and similar to process methods detailed in the Institute for Electrical Engineers Standard 524-1992 (Guide to the Installation of Overhead Transmission Line Conductors). Conductors are pulled using individual reels, with ropes strung along the towers. Conductors are pulled from each pull location using take up reels.

B.5.2.6 Labor and Equipment

Anticipated construction personnel and equipment are summarized in Table B-9, Construction Personnel and Equipment Summary (220 kV Transmission Line Loop-In).

Table B-9 Construction Personnel and Equipment Summary (220 kV Transmission Line Loop-In)

Construction Element	Number of Personnel	Number of Days	Equipment Requirements	
Survey	4	5	2 – Pick-ups (Diesel)	
Receive and Load Out Materials	8	10	1 – 50-ton Hydro Crane (Diesel) 1 – 980 Loader (Diesel)	1 – 5-ton Forklift (Diesel) 1 – Pick-up (Diesel)
Spur Road Work	6	5	1 – D-6 CAT (Diesel) 1 – Motor Grader (Diesel)	1 – Water Truck (Diesel) 1 – Pick-up (Diesel)
Foundations	10	10	1 – Auger Truck (Diesel) 6 – Concrete Trucks (Diesel) 1 – Boom Truck (Diesel) 1 - Backhoe (Diesel)	1 – 10-ton Dump Truck (Diesel) 1 – Water Truck (Diesel) 2 – Pick-up (Diesel)
LST Assembly	16	40	1 – 150-ton Hydro Crane (Diesel) 1 – Pick-up (Diesel) 2 – Ton Trucks (Diesel)	1 - Semi-Tractor (Diesel) 1 – Compressor (Diesel) 1 – Water Truck (Diesel)
Conductor & Ground Wire Installation	10	15	3 – Bucket Trucks (Diesel) 1 – Tensioner (Diesel) 1 – 3 Drum Puller (Diesel) 1 – Single Drum Puller (Diesel) 1 – 50-ton Crane (Diesel) 1 – Semi Truck (Diesel) 1 – Static Tensioning Truck	1 – Sagger (Diesel) 1 – Pick-up (Diesel) 3 – Small Engines/Generators/Pumps (gas) 4 – 1-ton Flatbed Trucks (Diesel) 1 – Water Truck (Diesel)
Clean-Up	8	5	1 – Bucket Truck (Diesel) 1 – Pick-up (Diesel)	

B.5.2.7 Hazardous Material Usage and Waste Generation

Construction of the 220 kV transmission line loop-in would require limited use of hazardous materials, including fuel, lubricants, and cleaning solutions. All hazardous materials would be stored, handled, and used in accordance with applicable regulations, including the Construction Storm Water Pollution Prevention Plan, for the transmission segments. Construction of the 220 kV transmission line loop-in would generate waste in the form of wood, soil and vegetation, and sanitation waste.

B.5.2.8 Post Construction Clean-Up

All debris associated with construction of the 220 kV transmission line loop-in would be placed in appropriate on- site containers and periodically disposed of in accordance with all applicable regulations.

B.5.2.9 Construction Schedule

Construction of the proposed 220 kV transmission line loop-in would take approximately 90 days, and is scheduled to begin in early 2010.

B.6 115 KV SUBTRANSMISSION LINE WORK

B.6.1 Engineering Plan

During Phase 1 construction and operation, the proposed El Casco 115/12 kV Substation would be connected to the Vista 115 kV System. To accomplish this, the existing Vista-Maraschino-San Bernardino 115 kV subtransmission line would be looped into the proposed 115 kV switchrack. This would create the Vista-El Casco-San Bernardino 115 kV and the El Casco-Maraschino 115 kV subtransmission lines.

During Phase 2 of construction, modifications and additions to the existing 115 kV subtransmission lines in the area would be required to create the new El Casco 115 kV System. Two existing 115 kV subtransmission lines would be rebuilt (El Casco-Maraschino and Banning-Garnet-Maraschino-Windfarm) and one new 115 kV subtransmission line would be built (El Casco-Banning). See Figure B-1, El Casco Project Overview.

B.6.1.1 Routing

Figures B-6 through B-10 (115 kV Subtransmission Line Route Maps 1 through 5) show the location of the 115 kV upgrade routing on aerial maps. Construction of the 115 kV subtransmission lines would occur as follows:

1. The existing Vista-Maraschino-San Bernardino 115 kV subtransmission line would be looped into the proposed El Casco 115/12 kV Substation during Phase 1 of construction. This would require constructing two new subtransmission line segments of approximately 900 feet each between the existing 115 kV ROW and the proposed 115 kV switchrack. To support the two new subtransmission line segments, 12 new double-circuit steel poles would be installed: two in the existing ROW, eight between the existing ROW and El Casco Substation, and two within the substation fence. These steel poles would be designed to support two sets of conductors, though only one set would be installed on each steel pole during Phase 1.
2. During Phase 2 of construction, the portion of the El Casco-Maraschino 115 kV subtransmission line between Maraschino Substation and the new line segments installed as part of Item 1 above would be rebuilt. The route begins just south of the proposed substation site and continues southeast within the existing ROW for approximately 5 miles and would require the replacement of existing single-circuit wood pole structures with double-circuit steel poles in this section. Throughout this section, some existing structures also support distribution lines, which would be transferred to the new steel poles. The route then continues east for approximately 1.0 mile into Maraschino Substation (this 1.0-mile segment is referred to as "Maraschino Loop West"). In this section, the first 0.5 mile would require the replacement of single-circuit wood poles with new single-circuit steel poles, while the second 0.5 mile would not require any pole replacements.
3. Portions of the existing Banning-Garnet-Maraschino-Windfarm 115 kV subtransmission line would also be rebuilt during Phase 2. The route begins at Maraschino Substation and heads south for approximately 0.7 mile to the existing ROW and would require the replacement of single-circuit wood poles with new single-circuit steel poles in this section (this 0.7-mile segment is referred to as "Maraschino Loop South"). At this point, the route turns east for approximately 7.0 miles and then north for approximately 0.7 miles into Banning Substation. These sections require the replacement of existing single-circuit wood pole structures with double-circuit steel poles. For approximately 1.2 miles (0.5 mile at the eastern end of the route and the 0.7 mile segment south of Banning Substation), the existing wood pole structures also support distribution lines, which would be transferred to the new steel pole structures. Two new switches would also be installed on the steel poles installed south of Banning Substation to allow this subtransmission line to be split, forming the Banning-Maraschino 115 kV and the Garnet-Windfarm 115kV subtransmission lines. The existing 115 kV subtransmission line between Maraschino and Banning substations is energized at 115 kV. However, because this line is currently used as the emergency line to Maraschino Substation, electric current only flows through the subtransmission line when it is needed to serve loads (SCE, 2007f).
4. The El Casco-Banning 115 kV subtransmission line would be newly created during Phase 2. The route would begin at El Casco Substation, parallel to the El Casco-Maraschino 115 kV subtransmission line, and would be installed on the new double-circuit steel poles described above in Item 2 to the point where the El Casco-Maraschino 115 kV subtransmission line turns east towards Maraschino Substation. At that point, the El Casco-Banning 115 kV subtransmission line would continue southeast for approximately 0.8 mile, and would require the replacement of single-circuit wood poles with new single-circuit steel poles in this section. The route would then connect with the portion of the rebuilt Banning-Maraschino 115 kV subtransmission line heading towards Banning Substation and would be installed on the new double-circuit steel poles described above in Item 3.

Click here for Figure B-6

Click here for Figure B-7

Click here for Figure B-8

Click here for Figure B-9

Click here for Figure B-10

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B.6.1.2 Structures and Associated Equipment

To accomplish all of the subtransmission line construction identified in both Phases 1 and 2, approximately 225 new steel poles, ranging from 65 to 85 feet tall, would be installed. Approximately 25 percent of these steel poles would be bolted-base tubular steel poles (TSP), and the remaining 75 percent would be direct-buried lightweight steel (LWS) poles. Except for the steel poles installed within the substation site, these structures would be placed within existing 115 kV ROWs or along public street ROWs. For segments of the 115 kV subtransmission line where existing distribution lines are also attached to the existing wood poles, the distribution lines would be transferred to the new steel poles. Figure B-5 (Typical Structure Designs) above illustrates the 115 kV TSP and LWS poles that would be constructed as part of the subtransmission line upgrades.

All of the proposed subtransmission line work, both rebuild and new, would use single 954 kcmil solid aluminum conductor (SAC). Each conductor would be attached to a steel pole by either dead-end insulator assemblies consisting of dual polymer insulators attached to each crossarm in a horizontal configuration or suspension assemblies consisting of single polymer insulators attached to each crossarm in a vertical configuration. Overhead ground wires would be installed on the peaks of the steel poles. Distribution lines transferred to the new steel poles would typically be installed on standard wood crossarms with polymer insulators.

B.6.1.3 Access Roads and Spur Roads

Because the subtransmission portion of the Proposed Project occurs within existing ROWs, access roads are already in existence and are maintained on a regular basis. Therefore, no new access roads, improvements, or additional maintenance would be required for the 115 kV subtransmission line.

One new spur road would be constructed from the existing access road south of the substation site heading north approximately 600 feet along the new line route of the 115 kV loop-in to El Casco Substation. The new spur road would be approximately 12 feet wide with a maximum grade of approximately 15 percent.

B.6.2 Construction Plan

B.6.2.1 Steel Pole Site Preparation

Construction activities would begin with the survey of the 115 kV subtransmission line routes. Survey crews would stake the steel pole locations, including reference points and centerline hubs. They would also survey limits of grading for steel pole excavations, the new stub road, and any necessary crane pads or lay-down areas.

Any steel poles that are replacing existing wood pole structures in existing ROW areas would be primarily installed at the same locations (i.e., within approximately 10 feet of the existing structures) (SCE, 2007c). Therefore, minimal new surface disturbance would be required at these locations as a result of this aspect of the 115 kV subtransmission line work. However, excavation would be required at these locations for the installation of the steel poles. Depending on their location, the assembly and erection of some of the new TSPs may require that a new crane pad, approximately 50 feet by 50 feet (approximately 0.06 acres) each, be prepared to allow an erection crane to set up 60 feet from the centerline of each TSP. The crane pad would be located transversely from each applicable TSP location.

B.6.2.2 Staging and Access

Primary material staging areas would be established at El Casco Substation, as well as at Maraschino and Banning Substations, due to their proximity to certain portions of the work. Materials and equipment to be staged in these yards would include: wire reels, insulators and hardware, heavy equipment, light trucks, construction trailers, and portable sanitation facilities. All material for the 115 kV subtransmission line work would be delivered by truck. Construction traffic would primarily use San Timoteo Canyon Road near El Casco Substation, California Avenue near Maraschino Substation, and San Gorgonio Avenue near Banning Substation, and would be scheduled for off-peak traffic hours to the extent possible.

B.6.2.3 Steel Pole Installation

LWS poles would be installed in holes bored approximately 24 to 30 inches in diameter and approximately 10 to 12 feet deep (SCE, 2007c). LWS poles are normally installed using a line truck. Once the LWS poles are set in place, bore spoils (material from the bored holes) would be used to backfill the hole. If the bore spoils are not suitable for backfill, imported material, such as clean fill dirt and/or pea gravel, would be used. Excess bore spoils would be distributed at each pole site or used as backfill for the holes left after removal of nearby wooden poles.

TSPs would be installed on top of cylindrical concrete footings approximately 6 to 8 feet in diameter and approximately 20 to 25 feet deep. Footings for the 115 kV TSP require an excavation depth of approximately 30 feet (SCE, 2007c). After holes for the footings are bored, a steel (rebar) cage would be inserted into the hole, and then concrete would be poured into the hole to a level 1 to 2 feet above the natural surface. After the concrete has cured, the TSP would be bolted onto the footing. Excess bore spoils would be distributed at each pole site or used as backfill for the holes left after removal of nearby wooden poles.

Both LWS poles and TSPs consist of separate base and top sections for ease of construction. Steel pole installation would begin with initially laying the individual sections on the ground at each location. While on the ground, the top sections would be pre-configured with the necessary insulators and wire stringing hardware. The installation is completed by using a line truck (for LWS poles) or a crane (for TSPs) to position each pole base section in previously augured holes or on top of previously prepared foundations. When the base section is secured, the top section would then be placed above the base section. The two sections may be spot welded together for additional stability.

B.6.2.4 Removal of Existing Wood Poles

Following installation of the new steel poles, the existing wood poles would be completely removed (including the portion below ground surface) and the hole would be backfilled using imported fill in combination with fill that may be available as a result of excavation for the installation of the new steel poles. The existing wood H-frame poles that are proposed to be replaced with TSPs are direct-buried, so there are no footings to remove during removal of the wood poles. Depending on their condition and chemical treatment method, the wood poles to be replaced would be reused by SCE, returned to the manufacturer, disposed of in a Class I hazardous waste landfill, or disposed of in the lined portion of a Regional Water Quality Control Board (RWQCB)-certified municipal landfill.

B.6.2.5 Conductor Pulling

Conductor pulling includes all activities associated with the installation of conductors onto the steel poles. This activity includes the installation of primary conductor and ground wire, vibration dampeners, weights, and suspension and dead-end hardware assemblies.

A standard wire stringing plan includes a sequenced program of events starting with determination of the most effective wire pulls and wire pull equipment set-up positions. Depending on the concerns of various stakeholders along the line route, the stringing plan may require altered hours of operation, implementation of special dust control measures, or use of guard structures in particular areas to prevent inadvertent stoppages of traveled roadways.

Typically, wire pulls and splices occur every 6,000 feet. Wire pulls are the length of any given continuous wire installation process between two selected points along the line. Wire pulls are selected, where possible, based on availability of dead end structures at the ends of each pull, geometry of the line as affected by points of inflection, terrain, and suitability of stringing and splicing equipment set ups. The dimensions of the area needed for conductor pulling set ups can vary depending upon the terrain; however, a typical set up for single-circuit conductor pulling is approximately 100 feet by 200 feet. Where necessary due to space limitations, however, crews can work from within a somewhat smaller area.

Special equipment is positioned at each end of the conductor pull. At one end, a puller is positioned and on the other end a tensioner and wire reel stand truck is positioned. Once positioned, a lightweight sock line is installed through stringing sheaves on each steel pole for the particular set of spans selected for the conductor pull. The sock line is then used to pull in the conductor pulling cable. The conductor pulling cable is then attached to the conductor using a special swivel joint to prevent the wire from “basketing” and allowing it to rotate freely, thus preventing complications from twisting as the conductor unwinds off of the reel. Pulling, sagging, and clipping-in the conductors are then completed. Stringing equipment from one end of the pull is then rotated 180 degrees to face the new pull direction and the equipment from the other end of the pull is then "leapfrogged" to its new pulling position and the process is repeated. A similar process is employed for the ground wire. Conductor pulling would be in accordance with SCE specifications and similar to process methods detailed in IEEE Std. 524-1992 (Guide to the Installation of Overhead Transmission Line Conductors).

B.6.2.6 Labor and Equipment

Anticipated construction personnel and equipment are summarized in Table B-10, Construction Personnel and Equipment Summary (115 kV Subtransmission Lines).

Table B-10 Construction Personnel and Equipment Summary (115 kV Subtransmission Lines)

Construction Element	Number of Personnel	Number of Days	Equipment Requirements	
Survey	4	5 (Ph. 1) 20 (Ph. 2)	2 – Picks-ups (Diesel)	
Receive and Load Out Materials	6	5 (Ph. 1) 25 (Ph. 2)	1 – 50-ton Hydro Crane (Diesel) 1 - 980 Loader (Diesel)	1 – 5-ton Forklift (Diesel) 1 – Pick-up (Diesel)
Spur Road Work	4	5 (Ph. 1) 25 (Ph. 2)	1 – Motor Grader (Diesel) 1 – Water Truck (Diesel)	1 – Pick-up (Diesel)

Table B-10 Construction Personnel and Equipment Summary (115 kV Subtransmission Lines)

Construction Element	Number of Personnel	Number of Days	Equipment Requirements	
Steel Pole Construction and Conductor Installation	16	10 (Ph. 1) 95 (Ph. 2)	1 – 150-ton Hydro Crane (Diesel) 1 – Pickup (Diesel) 1 – Line Truck (Diesel) 1 – Wire Pulling Machine (Diesel) 1 – Wire Tension Machine (Gas) 2 – 30-ton Crane (Diesel) 2 – Truck Mounted Crane (Diesel)	1 – Water Truck (Diesel) 2 – Ton Trucks (Diesel) 1 – Semi-Tractor (Diesel)
Clean-up	4	5 (Ph. 1) 15 (Ph. 2)	1 – 10-ton Dump Truck (Diesel) 1 – Pick-up (Diesel)	

B.6.2.7 Hazardous Material Usage and Waste Generation

Construction of the 115 kV subtransmission lines would require limited use of hazardous materials, including fuel, lubricants, and cleaning solutions. All hazardous materials would be stored, handled, and used in accordance with applicable regulations, including the Construction Storm Water Pollution Prevention Plan, for the subtransmission line segments. Construction of the 115 kV subtransmission lines would result in the generation of various waste materials, including wood, soil and vegetation, and sanitation waste.

B.6.2.8 Post Construction Clean-Up

All construction debris associated with construction of the 115 kV subtransmission lines would be placed in appropriate onsite containers and periodically disposed of in accordance with all applicable regulations.

B.6.2.9 Construction Schedule

Construction of the 115 kV subtransmission line work for Phase 1 would require approximately 30 days to complete and is scheduled to begin in early 2009. Construction of the 115 kV subtransmission line work for Phase 2 would require approximately 180 days to complete and is scheduled to begin in late 2009.

B.7 12 KV DISTRIBUTION LINE GETAWAYS

B.7.1 Engineering Plan

Two underground duct banks, spaced six feet apart, and each consisting of six 5-inch conduits, would start at the southwest end of the 12 kV switchrack and would be routed towards the northeast corner of the El Casco Substation. Two additional 5-inch conduits, for telecommunications purposes, would join each of those duct banks near the northeast corner of the substation. At the northeast substation corner, the duct banks would enter separate 26 inch (internal dimension) bore casings, spaced six feet apart, which would be installed underground for about 300 feet, beneath both the San Timoteo Creek and the adjacent railroad tracks, and then terminate in separate vaults on the south side of San Timoteo Canyon Road (see Figure B-3b, El Casco Substation Site Plan Aerial View). The installation of the bore casings would be accomplished using horizontal directional drilling (HDD) techniques and would be designed so that the top of the casings would be approximately eight feet below the flow line of the creek. The depth of HDD under the Union Pacific Railroad ROW is unknown at this time. For use of HDD under the Union Pacific Railroad ROW, SCE would contact the railroad to secure permission for HDD activities, and to install and maintain the duct bank beneath the railroad tracks (SCE, 2007c).

B.7.2 Construction Plan

B.7.2.1 Conduit Installation

The installation of the conduit banks from the 12 kV switchrack to the casing entrances at the northeast corner would be completed shortly after the overall rough grading work is done on the site, and prior to the installation of the ground grid. This work would be completed during Phase 1 of construction as part of the substation construction work described above in Section B.4.1. The staging area for HDD equipment and activities would be located within the proposed El Casco Substation site, near the northeast corner of the site (SCE, 2007c).

B.7.2.2 Horizontal Directional Drilling

The HDD work would occur at approximately the same time as the remainder of the conduit bank installations inside the substation fenceline. One access hole for each casing, each approximately three feet wide by three feet long by three feet deep (approximately 27 cubic feet), would be dug near the northeast corner of the substation to aid in verifying the proper depth and angle of the drilling head. These entry holes would be located approximately 140 feet south of the southerly bank of San Timoteo Creek. Another pair of holes, of approximately the same dimensions, would be dug at the end of the drilling limits to provide access to the drilling head in order to change out the drilling tools. The exit holes would be located approximately 10 feet north of the northerly edge of San Timoteo Canyon Road (SCE, 2007c). These exit holes would also serve as the locations where connections to future conduits to be installed east and west along San Timoteo Canyon Road would be made to extend the 12 kV lines to serve local loads. When the HDD work is completed, the entrance and exit holes are subsequently filled up, typically with the native soils that were previously removed, and compacted to the appropriate value. The HDD work would be performed by a subcontractor experienced in this type of application, and only after applicable construction permits have been acquired. Standard practice for drilling an HDD crossing includes three phases to complete:

1) A small pilot hole is drilled initially to establish the crossing;
2) The pilot hole is then reamed to the approximate diameter of the casing to be installed and the hole is conditioned to minimize any potential cave-ins; and
3) Finally, the casing(s) are pulled back into place.

Once the casings are installed, the eight conduits would be placed inside, with spacers to maintain their configuration, and then a sand/cement slurry is used to fill any internal voids of the casing and provide additional structural support.

The initial bore hole would be supported by a water-based drilling fluid, such as bentonite, which has several functions including transport of cuttings, cooling off the drill bit, sealing and supporting the drilled hole, and providing lubrication to reduce friction during the pullback phase. Precautions would be taken to ensure that the drilling fluid does not enter roadways, streams, municipal storm or sanitary sewer lines, and/or any other drainage system or body of water.

B.7.2.3 Labor and Equipment

Anticipated construction personnel and equipment for the HDD work are summarized in Table B-11, Construction Personnel and Equipment Summary (12 kV Distribution Line Getaways).

Table B-11 Construction Personnel and Equipment Summary (12 kV Distribution Line Getaways)

Construction Element	Number of Personnel	Number of Days	Equipment Requirements	
HDD	8	15	2 – Crew Trucks (Gas/Diesel) 1 – Horizontal Directional Drill (Gas/Diesel) 2 – Dump Trucks (Gas/Diesel)	1 - Backhoe (Diesel) 1 – 5-ton Truck (Gas/Diesel)

B.7.2.4 Construction Schedule

Installation of the HDD work would require 15 days to complete. This work is scheduled for early 2009. To the extent possible, HDD work would not be performed during periods of heavy rainfall (typically November through March) (SCE, 2007c).

B.8 TELECOMMUNICATIONS IMPROVEMENTS

The Proposed Project would require new telecommunication infrastructure to be installed to protect the transmission and subtransmission lines and provide protective relaying, Supervisory Control and Data Acquisition (SCADA), data, and telephone services to the substations served by the El Casco System.

Two telecommunications paths would be constructed to provide for redundancy and enhanced reliability of the protection systems for the 220 kV transmission lines. The primary communication path would be a new microwave system installed between the proposed El Casco Substation and SCE's existing Mill Creek Communications Site. The secondary communication path would use a series of new fiber optic circuits installed between the Cities of Redlands and Banning.

The new microwave system would require construction of new microwave towers at both El Casco Substation and at the Mill Creek Communications Site. The new fiber optic system would consist of approximately 55 miles of fiber optic cable to be installed both overhead on existing poles or towers and underground primarily in existing conduits and substructures from El Casco Substation to Maraschino, Banning, Zanja, Mentone, Crafton Hills, and San Bernardino Substations.

Completion of the El Casco System Project telecommunications improvements would be staged to match the schedule of the substation work. Construction of the majority of the microwave system would be completed in 2009 to support the initial substation operations and protection of the associated 115 kV lines. Construction of the fiber optic cables and minor additions to the microwave system would be completed in 2010 to support the protection and operation of the new 220 kV lines and the additional 115 kV lines.

B.8.1 Microwave System

B.8.1.1 Engineering Plan

A new microwave path would be constructed between the proposed El Casco Substation and SCE's existing Mill Creek Communications Site to provide a communications circuit for control and protection of the newly formed El Casco System. The proposed microwave path length is approximately 9.2 miles. Based on preliminary microwave path engineering, using GIS data as well as computer modeling software, line-of-sight between the proposed El Casco Substation and Mill Creek Communications Site can be achieved using an 85-foot tall antenna tower at El Casco Substation and a 110-foot tall antenna tower at Mill Creek Communications Site. A field survey would be required to verify path clearance prior to construction of the proposed microwave system.

B.8.1.2 Construction Plan

B.8.1.2.1 El Casco Substation Antenna Tower

A new 85-foot tall, three-legged, self-supporting steel microwave antenna tower would be constructed adjacent to the larger MEER within the El Casco Substation. Tower footings would be installed and the antenna tower would be assembled and erected on site. One 10-foot diameter microwave antenna would be installed on the antenna tower.

B.8.1.2.2 El Casco Substation Communications Room

A dedicated communications room, measuring approximately 15 feet wide by 25 feet long, would be included within the larger El Casco Substation MEER to house communications equipment. The communications room would be equipped with AC power, batteries and a battery charger, an overhead cable tray, redundant air conditioners, and conduits for connection to fiber optic cables.

During Phase 1 of construction, one digital microwave terminal, two digital multiplexers, one communications alarm, two routers, one switch, and one DC power system would be installed in the communications room.

During Phase 2 of construction, two SONET terminals and an additional digital multiplexer would be installed in the communications room to facilitate connections between relays to support the protection of the new 220 kV transmission lines and 115 kV subtransmission lines.

B.8.1.2.3 Mill Creek Communications Site Antenna Tower

SCE's existing Mill Creek Communications Site is located on 160 acres of SCE-owned property (i.e., private in-holding owned in fee since 1909) within the San Bernardino National Forest approximately two miles northeast of SCE's existing Zanja Substation (see Figure B-11) (SCE, 2007c). The existing antenna structure, mounted on the rooftop of the communications building at Mill Creek Communications Site, is not adequate to support the additional microwave antenna needed for the El Casco System Project, nor is it tall enough to provide adequate line-of-sight to El Casco Substation. Therefore, a new 110-foot tall, three-legged, self-supporting steel lattice antenna tower would be constructed adjacent to the existing communications building. The specific location of the new antenna tower would be determined during final engineering. Existing site grounding would also need to be upgraded. Tower footings would be installed and the antenna tower would be assembled and erected on site. One 10-foot diameter microwave antenna would be installed on the new antenna tower and the two existing microwave antennas would be relocated from the rooftop structure to the new antenna tower. The existing rooftop structure would subsequently be removed.

According to SCE (2007g), construction of the microwave system at the Mill Creek Communications Site would be accomplished through the use of "gin pole" techniques or with the aid of helicopters.

Gin Pole Technique Construction. If the Mill Creek Communications Site microwave tower is to be constructed on site using the gin pole technique, activities would consist of the following:

- Site preparation work would proceed as described above. Medium-duty pickup trucks would transport personnel to the site and a small backhoe would create the necessary level pad and dig four foundation holes each approximately 15 to 20 feet deep;
- Medium-duty stakeside pickup trucks would transport tower materials to a laydown yard adjacent to the existing communications building at the Mill Creek Communications Site;
- Except for the bottom section, crews would assemble the tower members into sections each about 20 feet tall, using portable tools;
- The bottom 20-foot section would be erected one leg at a time using cables, pulleys, and a winch on the pickup truck; and
- The remaining sections would be assembled in the laydown area. The gin pole is used to raise successive sections of steel into position. This temporary lifting device uses cables and pulleys to allow enough head room to accommodate the length of the next tower section being installed.

Helicopter Construction. If the construction of the new microwave tower at the Mill Creek Communications Site is performed with the aid of a helicopter, the activities would consist of the following:

- Site preparation work would proceed as described above. Medium-duty pickup trucks would transport personnel to the site and a small backhoe would create the necessary level pad and dig four foundation holes each approximately 15 to 20 feet deep;
- Medium-duty stakeside pickup trucks would transport tower materials to a laydown yard located behind SCE's existing Mill Creek 2 and 3 Hydroelectric Power Plant;
- A helicopter would only be used to transport preassembled tower sections (approximately 6 sections, each about 20 feet tall) from the construction staging area behind the Mill Creek 2&3 Hydroelectric Power Plant up to the Mill Creek Communications Site;
- Crews would assemble the tower materials into sections each about 20 to 25 feet tall, using portable tools;
- One medium-duty helicopter, similar to a Bell B-204 or Sikorsky S-58T would be used. When all sections are constructed at the laydown area, the helicopter would pick them up sequentially and transport them up to the site for connection to previously installed sections. Personnel at the site would position themselves at the top of the previous section and guide the newest section into place, secure it, then climb to the top of that section and await the aerial delivery of the subsequent section;
- No landing zone would be necessary at the Mill Creek Communications Site. While waiting for the construction crews to secure a previously installed section, or while crews are fabricating a subsequent section, the helicopter may land at an appropriate location near the staging area behind SCE's existing Mill Creek 2&3 Hydroelectric Power plant;
- While carrying the individual tower sections, the helicopter would be limited to a path directly between the Mill Creek 2 and 3 Hydroelectric Plant and the Mill Creek Communications Site. Travel from a base location to the hydroelectric plant would not be along a defined flight path;
- . No access restrictions or road closures would be necessary along Mill Creek Road if helicopter assistance is used for the tower construction; and
- Helicopter refueling, if needed, would most likely occur at Redlands Municipal Airport, which is located approximately 6 miles west of the Mill Creek 2&3 Hydroelectric Power Plant.

Click here for Figure B-11

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B.8.1.2.4 Mill Creek Communications Site Communications Building

One digital microwave terminal and one digital multiplexer would be installed in the existing communications building during Phase 1 of construction. No additional equipment would need to be installed at this location during Phase 2 of construction.

B.8.1.2.5 Staging Areas

Temporary construction lay down areas, each approximately 60 feet by 60 feet, would be established for vehicle parking and material storage at each site prior to construction. All tower material would be delivered by truck and would be staged within these lay down areas. The construction crews would be responsible for cleaning up these areas prior to permanently vacating the job sites.

If helicopter construction is used for the Mill Creek Communications Site, the primary helicopter construction staging area would be located in a previously cleared area behind SCE's Mill Creek 2&3 Hydroelectric Power Plant, approximately 6,000 feet southwest of the Mill Creek Communications Site. An additional minor construction staging area (i.e., 60 feet by 60 feet as described above) would still be required adjacent to the proposed communication tower location (SCE, 2007g).

B.8.1.2.6 Labor and Equipment

Tower construction and installation of the antennas and associated equipment would be performed by SCE personnel and/or by contractors under the supervision of SCE personnel. Anticipated construction personnel and equipment are summarized in Table B-12, Construction Personnel and Equipment Summary (Microwave System). Each tower section at El Casco Substation would be erected using a 100-foot crane and a 100-foot lift (bucket) truck.

Table B-12 Construction Personnel And Equipment Summary (Microwave System)

Construction Element	Number of Personnel	Number of Days (per site)	Equipment Requirements
Antenna Tower Construction Crew	4	30 (Ph. 1) 0 (Ph. 2)	2 - Crew Trucks (Gas/Diesel) 1 – 100’ Crane (Diesel) – El Casco 1 – 150’ Crane (Diesel) – Mill Creek[1] 1 - 100' Lift Truck (Diesel) – El Casco 1 - 150' Lift Truck (Diesel) – Mill Creek[1]
Telecommunications Installation Crew	4	15 (Ph. 1) 10 (Ph. 2)	1 - 2-ton Truck (Gas/Diesel) 1 - Crew Truck (Gas)

[1] Would only be required with the use of the gin pole technique (SCE, 2007g)

B.8.1.2.7 Construction Schedule

During Phase 1 of construction, each antenna tower would require 30 days to assemble, and an additional 15 days would be necessary at each site to attach the microwave antennas and install the other required equipment inside the communication buildings. This work is scheduled for early 2009. The additional work necessary during Phase 2 of construction would require 10 days to complete and is scheduled for early 2010.

If helicopter construction is used at the Mill Creek Communications Site, assembly of all 4 to 6 sections at the final location would be accomplished in one working day (8 to 10 hours) with the helicopter only in flight for a maximum of approximately 4 to 5 hours (SCE, 2007g).

B.8.2 Fiber Optic System

B.8.2.1 Engineering Plan

B.8.2.1.1 Routing

Construction of five new fiber optic circuits would be required to provide the necessary communication paths for control and protection of the 220 kV transmission lines and 115 kV subtransmission lines, as well as the various substations in the area. Paths are designed to be diversely routed in order to provide adequate redundancy to mitigate for abnormal events.

The five circuits are described below:

1. **El Casco-San Bernardino** - would be installed between El Casco and San Bernardino Substations, and would include taps into and out of Yucaipa, Zanja, Crafton Hills, and Mentone Substations. The total length of this circuit is approximately 180,000 feet, of which approximately 25,000 feet would be underground. See Figure B-12, El Casco-San Bernardino Fiber Optic Cable Route.

2. **El Casco-Banning** - would be installed between El Casco and Banning Substations, and would include a tap into and out of Maraschino Substation. The total length of this circuit is approximately 91,000 feet, of which approximately 7,000 feet would be underground. See Figure B-13, El Casco-Banning Fiber Optic Cable Route.

3. **El Casco-M29 T2** - would be installed between El Casco Substation and the existing transmission tower numbered "M29-T2" on the Devers-Vista 220 kV transmission line ROW, located directly south of the proposed El Casco Substation site. The total length of this circuit is approximately 3,000 feet, of which the entire length would be underground. See Figure B-14, Fiber Optic Cable Routes near the El Casco Substation.

4. **El Casco-M30 T3** - would be installed between El Casco Substation and the existing transmission tower numbered "M30-T3" on the Devers-Vista 220 kV transmission line ROW, located approximately 1 mile west of the substation site, outside of the Norton Younglove Reserve Boundary. The fiber optic cable will come from this tower along an existing transmission access road, supported on approximately six new 35-foot tall wood poles, would connect to an existing 12 kV distribution pole line at the south terminus of Entranz Boulevard (which serves as the main entrance drive into the Fisherman's Retreat recreational community), and then continue north on the existing poles to San Timoteo Canyon Road. The circuit would then turn east on the 12 kV distribution pole line along San Timoteo Canyon Road until it connects to the underground duct bank turning into the proposed El Casco Substation. The total length of this circuit is approximately 8,000 feet, of which approximately 3,000 feet would be underground. In order to connect the fiber optic circuit to M30-T3, a new splice in the existing fiber optic line would be created. To accomplish this splice, the use of one light-duty helicopter would be required (SCE, 2007f). See Figure B-14, Fiber Optic Cable Routes near the El Casco Substation

5. **Banning-M17 T1** - would be installed between Banning Substation and the existing transmission tower numbered "M17-T1" on the Devers-Vista 220 kV transmission line ROW, located approximately 0.5 mile north of the intersection of Repplier Road and Florida Street in the City of Banning. The total length of this circuit is approximately 12,000 feet, of which approximately 2,000 feet would be underground. See Figure B-15, Banning- M17 T1 Fiber Optic Cable Route.

Click here for Figure B-12

Click here for Figure B-13

Click here for Figure B-14

Click here for Figure B-15

B.8.2.1.2 Structures

The majority of the proposed fiber optic cables would be constructed overhead on existing subtransmission and distribution wood and steel pole structures. Portions of the El Casco-San Bernardino circuit would be installed underground in existing underground conduit systems. No new trenching would occur within public roads as a result of the Proposed Project (SCE, 2007c). Underground fiber optic cables would also be installed in the new distribution and telecommunication conduit system coming out of the El Casco Substation. Approximately six new wood poles, each approximately 35 feet tall, would be installed to carry a portion of the El Casco-M30 T3 circuit.

B.8.2.1.3 Fiber Optic Cable

The proposed fiber optic circuits would use an all-dielectric self-supporting (ADSS) 48-strand single mode fiber optic cable, which is used for both overhead and underground installations. A total of approximately 294,000 feet of new fiber optic cable would be installed.

B.8.2.1.4 Fiber Optic Cable Attachments To Overhead Structures

For overhead attachments to wood or lightweight steel poles, the fiber optic cable would be supported by a high-strength engineered dielectric suspension support block. This suspension support block is oriented vertically and one per overhead structure would be required.

B.8.2.1.5 Fiber Optic Cable Installation In Underground Systems

Where fiber optic circuits are installed in underground conduit and structures, the ADSS cable would be installed within a high density polyethylene smoothwall innerduct, which provides protection and identification for the cable.

B.8.2.1.6 Access and Spur Roads

The construction of the fiber optic circuits would use facilities that are either located in franchise areas or along existing access and spur roads. Therefore, no new roads would be required for the installation and maintenance of this equipment.

B.8.2.2 Construction Plan

B.8.2.2.1 Staging Areas

Construction crews would establish a lay-down area for all material for the proposed fiber optic cable, which would be delivered by truck. Material would be placed inside the perimeter of a fenced material and staging yard during construction. The majority of the truck traffic would use major streets and would be scheduled for off-peak traffic hours. All construction debris would be placed in appropriate on-site containers and periodically disposed of in accordance with all applicable regulations.

The primary staging area would be established inside El Casco Substation, or, if room is not available, a suitable existing SCE facility near the substation would be utilized. This alternate staging area location would be selected based on its central location and proximity to the construction activities. Materials and equipment to be staged include: fiber optic cable reels and hardware, heavy equipment, light trucks, and portable sanitation facilities. In addition to the materials and equipment already described for new construction, the following may be temporarily stored in the primary staging yard:

empty fiber optic cable and innerduct reels and other debris associated with the installation of the fiber optic cable process.

B.8.2.2.2 Conductor Pulling and Splicing

Fiber optic cable stringing includes all activities associated with the installation of cables onto the existing overhead wood and steel pole structures. Typically, fiber optic cable pulls occur every 6,000 to 10,000 feet, depending on terrain. Fiber optic cable splices are required at the end and beginning of each cable pull. "Fiber optic cable pulls" are the length of any given continuous cable installation process between two selected points along the overhead or underground structure line. Fiber optic cable pulls are selected, where possible, based on availability of pulling equipment and designated dead-end structures at the ends of each pull, geometry of the line as affected by points of inflection, terrain, and suitability of fiber optic cable stringing and splicing equipment set ups. The dimensions of the area needed for stringing locations varies depending upon the terrain; however, a typical stringing set up is 40 feet by 60 feet.

Conductors are pulled using individual reels, with ropes strung along the poles. Conductors are pulled from each pull location using take up reels.

B.8.2.2.3 Labor and Equipment

Construction would be performed by SCE construction crews and/or by contractors under the supervision of SCE personnel. Anticipated construction personnel and equipment are summarized in Table B-13, Construction Personnel and Equipment Summary (Fiber Optic System).

Table B-13 Construction Personnel And Equipment Summary (Fiber Optic System)

Construction Element	Number of Personnel	Number of Days	Equipment Requirements	
Cable Construction	8	100	3 – Bucket Trucks (Diesel) 1 – Pick-up (Diesel) 2 – Cable Dollies	1 – Single Drum Puller (Diesel) 1 – 2 Axle Trailer
Receive and Load Out Materials	4	15	1 – 5-Ton Forklift (Diesel) 1 – Pick-up (Diesel)	
Clean-Up	4	15	2 – Bucket Trucks (Diesel) 1 – Pick-up (Diesel)	

B.8.2.2.4 Hazardous Material Usage and Waste Generation

Installation of the fiber optic cables would require limited use of hazardous materials, including fuel, lubricants, and cleaning solutions. All hazardous materials would be stored, handled, and used in accordance with applicable regulations.

B.8.2.2.5 Post Construction Clean-Up

All debris associated with installation of the fiber optic circuits would be placed in appropriate on-site containers and periodically disposed of in accordance with all applicable regulations.

B.8.2.2.6 Construction Schedule

Construction of the proposed fiber optic system would take approximately 130 days and is scheduled to begin in late 2009. In order to connect the fiber optic circuit to M30-T3, the use of one light-duty helicopter will be required for one day.

B.9 Applicant-Proposed Measures

The following table lists the Applicant-Proposed Measures (APMs) for the different issue areas analyzed in this document. These measures come from the following sources:

- Measures that SCE included in its PEA Chapter 2.0, Project Description
- APMs that SCE included in PEA Chapter 3.0, Impact Assessment
- Measures described by SCE in response to data requests by the CPUC

SCE committed to implementing the measures presented in Table B-14 in order to reduce the direct and indirect impacts that would result from Proposed Project activities.

Table B-14: Applicant-Proposed Measures (APMs)[3]

	Air Quality
APM AQ-1: Earth-moving	• Cease all active operations; OR • Apply water to soil not more than 15 minutes prior to moving such soil (SCAQMD Rule 403 Table 3, additional requirements for large operations when performance standards cannot be met through the use of Table 2 actions) .
APM AQ-2: Disturbed surface areas	• On the last day of active operations prior to a weekend, holiday, or any other period when active operations will not occur for not more than four consecutive days: apply water with a mixture of chemical stabilizer diluted to not less than 1/20 of the concentration required to maintain a stabilized surface for a period of six months; OR • Apply chemical stabilizers prior to wind event; OR • Apply water to all unstabilized disturbed areas 3 times per day. If there is any evidence of wind-driven fugitive dust, watering frequency is increased to a minimum of four times per day; OR • Utilize any combination of control actions presented above such that, in total, these actions apply to all disturbed surface areas. (SCAQMD Rule 403 Table 3, additional requirements for large operations when performance standards cannot be met through the use of Table 2 actions)
APM AQ-3: Unpaved roads	• Apply chemical stabilizers prior to wind event; OR • Apply water twice per hour during active operation; OR • Stop all vehicular traffic. (SCAQMD Rule 403 Table 3, additional requirements for large operations when performance standards cannot be met through the use of Table 2 actions)
APM AQ-4: Open storage piles	• Apply water twice per hour; OR • Install temporary coverings. (SCAQMD Rule 403 Table 3, additional requirements for large operations when performance standards cannot be met through the use of Table 2 actions)

3 Applicant-Proposed Measures (APMs) are numbered based on the section and sequence in which they appear in the PEA.

Table B-14: Applicant-Proposed Measures (APMs)[3]

APM AQ-5: Paved road track-out	• Cover all haul vehicles; OR • Comply with the vehicle freeboard requirements of Section 23114 of the California Vehicle Code for both public and private roads. (SCAQMD Rule 403 Table 3, additional requirements for large operations when performance standards cannot be met through the use of Table 2 actions)
APM AQ-6: All categories	Any other control measures approved by the SCAQMD Executive Officer and the U.S. EPA as equivalent to the methods specified in Table 3 of SCAQMD Rule 403 may be used..
APM AQ-7: Earth-moving (except construction cutting and filling areas, and mining operations)	• Maintain soil moisture content at a minimum of 12 percent, as determined by ASTM method D2216, or other equivalent method approved by the Executive Officer, the California Air Resources Board, and the U.S. EPA. Two soil moisture evaluations must be conducted during the first three hours of active operation during a calendar day, and two such evaluations each subsequent four-hour period of active operations; OR For any earth-moving, which is more than 100 feet from all property lines, conduct watering as necessary to prevent visible dust emissions from exceeding 100 feet in length in any direction. (SCAQMD Rule 403 Table 2)
APM AQ-8: Earth-moving: Construction fill areas	Maintain soil moisture content at a minimum of 12 percent, as determined by ASTM method D2216, or other equivalent method approved by the Executive Officer, the California Air Resources Board, and the U.S. EPA. For areas which have an optimum moisture content for compaction of less than 12 percent, as determined by ASTM Method 1557 or other equivalent method approved by the Executive Officer, the California Air Resources Board, and the U.S. EPA, complete the compaction process as expeditiously as possible after achieving at least 70 percent of the optimum soil moisture content. Two soil moisture evaluations must be conducted during the first three hours of active operations during a calendar day, and two such evaluations during each subsequent four hour period of active operations. (SCAQMD Rule 403 Table 2).
APM AQ-9: Construction cut areas and mining operations	Conduct watering as necessary to prevent visible emissions from extending more than 100 feet beyond the active cut or mining area unless the area is inaccessible to watering vehicles due to slope conditions or other safety factors. (SCAQMD Rule 403 Table 2)
APM AQ-10: Disturbed surface areas (except completed grading areas)	Apply dust suppression in sufficient quantity and frequency to maintain a stabilized surface. Any areas which cannot be stabilized, as evidenced by wind driven fugitive dust must have an application of water at least twice per day to at least 80 percent of the unstabilized area. (SCAQMD Rule 403 Table 2)
APM AQ-11: Disturbed surface areas: Completed grading areas	Apply chemical stabilizers within five working days of grading completion.
APM AQ-12: Inactive disturbed surface areas	• Apply water to at least 80 [70] percent of all inactive disturbed surface areas on a daily basis when there is evidence of wind driven fugitive dust, excluding any areas which are inaccessible to watering vehicles due to excessive slope or other safety conditions. • Apply dust suppressants in sufficient quantity and frequency to maintain a stabilized surface. • Establish a vegetative ground cover within 21 [30] days after active operations have ceased. Ground cover must be of sufficient density to expose less than 30 percent of unstabilized ground within 90 days of planting, and at all times thereafter. Utilize any combination of control actions presented above such that, in total, these actions apply to all inactive disturbed surface areas.
APM AQ-13: Unpaved Roads	• Water all roads used for any vehicular traffic at least once per every two hours of active operations (3 times per normal 8 hour work day). • Water all roads for any vehicular traffic once daily and restrict vehicle speeds to 15 miles per hour. Apply a chemical stabilizer to all unpaved road surfaces in sufficient quantity and frequency to maintain a stabilized surface.
APM AQ-14: Open storage piles	• Apply chemical stabilizers. • Apply water to at least 80 [70] percent of the surface area of all open storage piles on a daily basis when there is evidence of wind driven fugitive dust. • Install temporary coverings.

Table B-14: Applicant-Proposed Measures (APMs)[3]

	Install a three-sided enclosure with walls with no more than 50 percent porosity, which extend, at a minimum, to the top of the pile.
APM AQ-15: All Categories	Any other control measures approved by the Executive Officer and the U.S. EPA as equivalent to the methods specified in Rule 403 Table 2 may be used.
APM AQ-16: Track Control Options	• Pave or apply chemical stabilization at sufficient concentration and frequency to maintain a stabilized surface starting from the point of intersection with the public paved surface, and extending for a centerline distance of at least 100 feet and a width of at least 20 feet. • Pave from the point of intersection with the public paved road surface, and extending for a centerline distance of at least 25 feet and a width of at least 20 feet, and install a track-out control device immediately adjacent to the paved surface such that exiting vehicles do not travel on any unpaved road surface after passing through the track-out control device. Any other control measures approved by the Executive Officer and the U.S. EPA.
Biological Resources	
APM BIO-1: Environmentally Sensitive Areas	SCE would reduce impacts to sensitive habitat by avoiding grading or other ground disturbing activities near sensitive habitats to the greatest extent possible. However, where this is not feasible, environmentally sensitive areas such as rare plant populations or specific breeding habitat would be identified in the field to minimize the possibility of inadvertent encroachment using the following avoidance and mitigation measures: • Flagging or otherwise marking sensitive plant species so construction crews would avoid direct or indirect impacts to these areas. Construction personnel shall be instructed to avoid intrusion beyond these marked areas. • Monitor the known locations of special-status plant populations that might be found prior to or during the construction period, using a trained professional botanist. Monitor while construction is taking place in the vicinity of the special-status plant populations and for one year following construction to assess the effectiveness of protection measures. • Fencing construction limits that are adjacent to sensitive biological resources. Temporary fencing would consist of t-posts with orange barrier fence. Silt fences would also be included when construction occurs adjacent to streams.
APM BIO-2: Pre-Construction Nesting Surveys	Causing the abandonment or removing active nests (with eggs or young) of any special status or non-special-status migratory birds and raptors violates the State Fish and Game Code and the federal MBTA. To avoid this impact, SCE would implement one of the following: • Conduct all construction activity (including vegetation pruning or removal) during the non-breeding season (generally between September 1 and January 31) for most special-status and non-special-status migratory birds; or • If construction activities are scheduled to occur during the breeding season (generally between February 1 and August 31), retain a qualified wildlife biologist to conduct pre-construction focused nesting surveys prior to vegetation trimming or removal activities. The biologist would monitor all work activities within these zones daily and assess their effect on the nesting birds. If the biologist determines that particular activities pose a high risk of disturbing an active nest, the biologist would recommend additional, feasible measures to minimize the risk of nest disturbance. If work activities are found to result in harm to nesting birds, destruction of an active nest, or nest abandonment prior to fledging, the SCE biologist would be notified and report the incident to the CDFG and USFWS.
APM BIO-3: Noise Control	SCE would minimize noise through careful work scheduling and having properly functioning mufflers on construction vehicles. In addition, to the extent practicable, no Project vehicles, chain saws, or heavy equipment would be operated within the exclusion zone until the nesting season is over or the biologist has determined that nesting is finished and the young have fledged. If it is not practicable to avoid work within an exclusion zone around an active nest, work activities modified to minimize disturbance of nesting birds may proceed within these zones. The biologist would monitor all work activities within these zones daily and assess their effect on the nesting birds. If the biologist determines that particular activities pose a high risk of disturbing an active nest, the biologist would recommend additional, feasible measures to minimize the risk of nest disturbance. If work activities are found to result in harm to nesting birds, destruction of an active nest, or nest abandonment prior to fledging, the biologist would report this to the CDFG and USFWS.

Table B-14: Applicant-Proposed Measures (APMs)[3]

APM BIO-4: Western Riverside County MSHCP Compliance	SCE would comply with all regulations and policies outlined in the MSHCP. This would include: • The payment of Local Development Mitigation Fees and other relevant fees as set forth in Section 8.5 of the MSHCP or the purchase of conservation land. • Compliance with the HANS process or equivalent process to ensure application of the Criteria. • Compliance with the policies for the Protection of Species Associated with Riparian/Riverine Areas and Vernal Pools, set forth in Section 6.1.2 of the MSHCP. This includes avoidance and minimization measures implemented in accordance with the species-specific objectives for those species. In the case of the least Bell's vireo, 90 percent of the occupied portions of the property that provide for long-term Conservation value for the vireo shall be conserved in a manner consistent with Conservation of the vireo. This would involve including 100 meters of undeveloped landscape adjacent to the Habitat conserved. • Compliance with the policies for the Protection of Narrow Endemic Plant Species set forth in Section 6.1.3 of the MSHCP. • Compliance with survey requirements as set forth in Section 6.3.2 of the MSHCP. • Compliance with the Urban/Wildlife Interface Guidelines as set forth in Section 6.1.4 of the MSHCP. • Compliance with the Best Management Practices and the siting and design criteria as set forth in Section 7.0 and Appendix C of the MSHCP. • The alignment for the proposed subtransmission line route currently passes through MSHCP Criteria Cells 936, 1032, and 1024 of The Pass Area Plan. The conservation goals for these cells are provided in the Biology Technical Report as a guideline for design criteria.
APM BIO-5: Dust Control	Adequate dust control measures and best management practices (BMPs) would be instituted during earthwork to reduce harmful "edge effects" to sensitive resources in the Project area.
APM BIO-6: Substation Landscaping	The cut slopes and constructed berms associated with the substation building pad would be revegetated with the appropriate native species subject to an approved revegetation plan.
APM BIO-7: Nocturnal Lighting	Nocturnal lighting during construction and normal operation would be minimized on the approximate 14-acre substation site by using directional lighting to minimize any indirect impacts on the surrounding habitat, especially the riparian habitat associated with San Timoteo Creek shall be avoided.
APM BIO-8: Horizontal Directional Drilling	Appropriate measures should be enacted to avoid accidental discharge of the water-based drilling fluid (i.e., a "frac-out") into San Timoteo Creek during the HDD under the creek for the two duct banks. Geotechnical investigations would be conducted to ensure that the boring would be situated at a depth such that there is no danger of the creek bed scouring down to the casings. HDD should be conducted during a period of low flow in the creek to reduce the potential impact of a frac-out. The HDD contractor would prepare and implement a frac-out plan to minimize the possibility of its occurrence and respond should one occur. Some possible measures that may be utilized in this plan would include, but not be limited, to the following: • Require a full-time biological monitor to attend the HDD. • Require boring crews to strictly monitor drilling fluid preserves. • Provide containment equipment on site during construction activities associated with the HDD plan. Containment equipment shall include staked and floating silt barriers to isolate frac-out locations from flowing water. • Monitor waters downstream of the crossing site to quickly identify any seeps and immediately stop work if a seep is detected. • Prepare a contingency plan in the event that seeps are monitored in the stream. In addition to the above mitigation measures, the HDD would adhere to the following in order to avoid additional permitting requirements: • The directional bore would be at least eight feet below the channel to avoid impacts to the base flow of the stream. • All impacts to riparian vegetation would be avoided by placing bore pit outside of riparian habitat. • No resulting spoils or sediment would enter the waterway. • HDD would occur outside of the least Bell's vireo breeding season.

Table B-14: Applicant-Proposed Measures (APMs)[3]

APM BIO-9	Standard BMPs would be imposed to avoid siltation or other potential construction-related impacts on the drainage adjacent the Zanja Substation.
APM BIO-10	Specific mitigation measures for impacts from the construction of the proposed southerly 115 kV transmission line route would be provided as the Project footprint is finalized. Efforts would be made to minimize impacts from subtransmission line road improvement in sensitive habitat area to the maximum extent practicable. All construction activity and equipment would be limited to the access roads and spurs during the installation of the 115 kV line.
APM BIO-11	Pre-construction surveys would be conducted along the subtransmission line access roads, proposed spur areas, and location of the four new fiber optic poles between transmission tower M30-T3 and the existing distribution poles. Surveys are intended to avoid disturbance to sensitive species with the potential to occur in the area, including special management plant species, Los Angeles pocket mouse, Stephens' kangaroo rat, and western burrowing owl. Impacts on suitable habitat for these species would be avoided to the extent practicable. If suitable habitat for these species is detected within impact areas, then surveys for these species are required under the MSHCP. Fees paid pursuant to the Riverside County Stephens' Kangaroo Rat Habitat Conservation Plan or MSHCP may be required if impacts on suitable Stephens' kangaroo rat habitat are unavoidable.
APM BIO-12: Mill Creek Communications Site	It is recommended that the proposed tower and construction staging area at the Mill Creek Communications Site are located in an area of disturbed or non-native grassland habitat to minimize impacts on special status biological resources. Construction-related disturbance should be limited to existing dirt roads, developed lands, and areas of disturbed habitat. Impacts on undisturbed habitat, such as chaparral, shall be avoided to the extent feasible. If impacts on undisturbed habitat or existing trees are unavoidable, then rare plant surveys shall be conducted prior to vegetation clearing. Furthermore, vegetation clearing shall take place outside of the bird breeding season.
APM BIO-13: Tree Removal Permitting	Obtain a Tree Removal Permit from the County of Riverside. The County of Riverside, Roadside Tree Ordinance 12.08 requires permits for tree removal within county highway ROWs (County of Riverside 2004). In addition, the County of Riverside requires that any future development in an identified sensitive vegetation area (including oak woodlands) must be evaluated individually and cumulatively for potential impact on vegetation (County of Riverside 1993). Mitigation would be coordinated, as required, with the appropriate public and resource agencies once tree removal permits or approvals for lost significant trees are obtained. Mitigation for lost trees may not be implemented within the ROW due to fire safety concerns, and instead may be implemented in an alternative, agency-approved location.
APM BIO-14	All subtransmission poles would be designed to be raptor-safe in accordance with the Suggested Practices for Raptors on Power Lines: State of the Art in 1996 (Avian Power Line Interaction Committee 1996).
Cultural Resources	
APM CUL-1	New poles would be erected at a sufficient distance from site 33-8344 to prevent damage to the building, its foundations, or supporting structures.
APM CUL-2	There is a high potential for buried cultural resources at the proposed El Casco Substation site, including possible structures and features from the historic Weaver Ranch. Prior to construction, a subsurface exploration program such as ground-penetrating radar, would be conducted to search for buried resources. Should resources be found by this means, they would be evaluated for CRHR-eligibility. Appropriate mitigation measures would be devised for eligible resources. Additionally, ground disturbing activity would be monitored by a qualified archaeologist.
APM CUL-3	In the event that unexpected cultural resources are encountered during the course of Project construction, work is to be halted in that location until a qualified archaeologist is able to evaluate the resource.
APM CUL-4	Cultural resource surveys would be conducted in areas that have not been previously surveyed and surveys would be conducted to relocate previously recorded cultural resources once construction and staging areas are called out in final engineering. Any identified resources would be recorded and evaluated. If a cultural resource is identified within a construction/staging area then the construction/staging area would be shifted to avoid cultural resources. If construction/staging areas cannot avoid a significant resource, then appropriate mitigation measures would be developed to reduce any impacts to less than significant and all ground disturbing activities would be monitored by a qualified archaeologist.
APM PALEO-1	Conduct a paleontological field assessment of the finalized right of way for the substation location.

Table B-14: Applicant-Proposed Measures (APMs)[3]

APM PALEO-2	Prior to construction a paleontologist would salvage known exposed paleontological resources. This would consist of collected standard samples of fossiliferous sediments.
APM PALEO-3	A paleontological monitor would be present during ground disturbing activities within the Project area. The monitor would be empowered to temporarily halt or redirect construction activities to ensure avoidance of adverse impacts.
APM PALEO-4	Upon encountering a large deposit of bone, salvage of all bone in the area would be conducted in accordance with modern paleontological techniques.
APM PALEO-5	All fossils collected would be prepared to a reasonable point of identification. Itemized catalogs of all material collected and identified would be provided to the museum repository along with the specimens. A specimen repository would be arranged in writing with a museum prior to initiation of construction excavation.
APM PALEO-6	A report documenting the results of the monitoring and salvage activities and the significance of the fossils would be prepared.
Geology	
APM GEO-1	A geotechnical investigation of slope stability and geologic conditions, coupled with engineering design, would delineate the extent of potential landslide hazards and develop recommendations to support appropriate design measures to mitigate these hazards. Landslide mitigation may include one or more of the measures listed below. • Over-excavation of adverse bedding and landslide failure surfaces, and placement of a large stabilizing buttress fill. • Over-excavation of adverse bedding and landslide failure surfaces to remove potential slope stability hazards. • Other appropriate design measures, or combinations of design measures.
APM GEO-2	A geotechnical investigation of site soils and geologic conditions, coupled with engineering design, would identify the hazards and develop recommendations to support appropriate seismic designs to mitigate the effects of ground shaking. Specific requirements for seismic design would be based on the IEEE 693 "Recommended Practices for Seismic Design of Substations", and/or CBC Seismic Design criteria for sites within seismic Zone IV.
APM GEO-3	Where appropriate, subsurface trenching along active fault traces would be required to ensure tower foundations are not placed on, or immediately adjacent to, these features. In addition, tower locations would be selected to accommodate anticipated fault offset, and minimize excessive tension in lines should a fault movement occur.
Hazards and Hazardous Materials	
APM HAZ-1	SCE would develop a fire management plan for the construction and operation phases for both the substation and the sections of the subtransmission line routes classified with a high risk for wildfires.
Hydrology and Water Quality	
APM HYDRO-1	Grading activities at the El Casco Substation site and improved access road would not commence if heavy rain is forecast for the period of time of major earthmoving activities through compaction and stabilization of the site.
APM HYDRO-2A	An engineering erosion control and drainage plan would be developed as part of the site grading plan. The plan would developed in accordance with the County of Riverside Hydrology Manual and would address all activities at the El Casco Substation site (including the areas of 220 kV transmission line and 115 kV Subtransmission line tie-ins and the duct banks). The location of the discharge of site runoff for construction would be defined in final engineering and in consultation with Riverside County, the RWQCB, and the CDFG. The plan would include measures for stormwater energy dissipation in areas subject to concentrated flow. Energy dissipation measures would include rip rap, weirs, natural vegetation, gabions, or other measures. Infiltration pits, sediment filter fabrics, fabric rolls, vegetated swales, or other measures would be used to protect water quality. The energy dissipation plan would be designed to prevent impacts to the riparian channel from high energy discharges and the discharge of fluids with high levels of sediment or other detrimental contaminants. These energy dissipation and erosion control measures could require the use of land on the El Casco Substation site parcel or between the parcel and creek.

Table B-14: Applicant-Proposed Measures (APMs)[3]

APM HYDRO-2B	If any Project construction requires that a watercourse be altered or relocated, the flood carrying capacity of the altered or relocated portion of the watercourse shall be maintained. Adjacent communities, the California Department of Water Resources, California Department of Fish and Game (Section 1600 Streambed Alteration Agreement), and FEMA shall be notified of any such alteration or relocation. Plans to meet the above requirements shall be prepared and certified by a civil engineer registered in the State of California.
APM HYDRO-2C	SCE shall develop an erosion control plan incorporating construction-phase measures to limit and control erosion and siltation. The erosion control plan shall include components such as: phasing of grading, limiting areas of disturbance, diversion of runoff away from disturbed areas, protective measures for sensitive areas, outlet protection, and provision for revegetation or mulching. The plan shall also prescribe treatment measures to trap sediment once it has been mobilized, at a scale and density appropriate to the size and slope of the catchment. These measures typically include: inlet protection, straw bale barriers, straw mulching, straw wattles, silt fencing, check dams, terracing, and siltation or sediment ponds.
APM HYDRO-2D	An environmental training program would be established to communicate environmental concerns and appropriate work practices, including spill prevention and response measures, to all field personnel involved in the construction of the Proposed Project elements. A monitoring program would be implemented to ensure that the plans are followed throughout the period of construction.
APM HYDRO-3	In the event that excess water and liquid concrete escapes from pole foundations during pouring, it would be directed to bermed areas adjacent to the borings where the water would infiltrate or evaporate and the concrete would remain and begin to set. Once the excess concrete has been allowed to set, but before it is dry, it would be removed and transported to an approved landfill for disposal.
APM HYDRO-4	If groundwater is encountered while excavating or constructing the Subtransmission Line, it would be tested for contaminants. If contaminants are identified, they would be contained and disposed of in accordance with all federal, state, and local regulations.
APM HYDRO-5	Dewatering would involve pumping water out of excavations to allow construction of the pier footings. Water produced during dewatering activities would include sediment from the excavation, and could include lubricants used in the pumping process. During dewatering, SCE would, as applicable, use measures to avoid adverse effects related to discharging the water. Measures may include sediment traps and sediment basins in accordance with BMP BS-2 (Dewatering Operations) from the California Storm Water Quality Association's (CASQA) California Stormwater BMP Handbook. Measures may also include using above-ground holding tanks and pumping the water in the excavated area into the tank for sediment filtration. Sediment would then be filtered or decanted prior to discharge into the prescribed drainage location.
APM HYDRO-6	The HDD contractor shall be provided with copies of all applicable mitigation measures and permit conditions so that construction activities associated with the installation of the 12 kV and fiber optic conduit duct banks would be conducted in accordance with NPDES requirements. Measures to mitigate potential water quality impacts may also include, but not be limited to, the following measures: • Use mulch, seed, or gravel to disturbed areas for the purpose of providing temporary erosion protection. • Cover spoils piles with a tarp or contain within a sediment barrier. • Use sediment barriers such as silt fences, sand bags, straw bales, rock checks and/or sediment traps to contain sediment on site.
APM HYDRO-7	Prior to final engineering of the proposed access road to the El Casco Substation site, SCE would consult with Riverside County, CDFG, and the Santa Ana RWQCB regarding the location of the access road. The proposed access road should be located approximately 25 feet from the existing top of the creek bank. The existing access road should be reclaimed and revegetated with native vegetation determined by a qualified biologist in consultation with CDFG.
APM HYDRO-8	SCE would prepare a Hazardous Substance Control and Emergency Response Plan, which would include preparations for quick and safe cleanup of accidental spills. This plan would be submitted to agencies with the grading permit application. It would prescribe hazardous materials handling procedures for reducing the potential for a spill during construction, and would include an emergency response program to ensure quick and safe cleanup of accidental spills. The plan would identify areas where refueling and vehicle maintenance activities and storage of hazardous materials, if any, would be permitted. Oil-absorbent materials, tarps, and storage drums would be

Table B-14: Applicant-Proposed Measures (APMs)[3]

	used to contain and control any minor releases of mineral oil that may occur at the El Casco Substation site
	Noise
APM NOISE-1	All construction activities occurring in association with the Proposed Project would operate within the allowable construction hours as determined by the applicable local agency and presented earlier in this document.
APM NOISE-2	A noise control plan would be prepared for all work sites associated with the Proposed Project. The noise control plan would include, but not be limited to, the following: • Stockpiling and vehicle staging areas would be located as far away from occupied residences as possible, and screened from these uses by a solid noise attenuation barrier. • Temporary solid noise attenuation barriers constructed with ½-inch plywood (sound transmission coefficient rating of 20) would be used to break the line of sight between noise generating activities and the closest residential land uses. A noise attenuation barrier constructed in this fashion would attenuate noise by 8 to 12 db(A) depending on the distance of the barrier from the noise source and noise receptor. • All stationary construction equipment would be operated as far away from residential uses as possible. If this is not possible, the equipment shall be shielded with temporary sound barriers, sound aprons, or sound skins. • To the extent feasible, haul routes for removing excavated materials or delivery of materials from the site would be designed to avoid residential areas and areas occupied by noise sensitive receptors (e.g., hospitals, schools, convalescent homes, etc.). • Idling equipment would be turned off when not in use for periods longer than 20 minutes.
APM NOISE-3	SCE would notify all sensitive receptors within 500 feet of construction of the potential to experience significant noise levels during construction.

Source: SCE, 2007.