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SOUTHERN CALIFORNIA EDISON
LOCKHART SUBSTATION
PROJECT DESCRIPTION
FOR ABENGOA SOLAR INC.

Dated: March 15, 2010

LOCKHART SUBSTATION PROJECT DESCRIPTION
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LOCKHART PROJECT DESCRIPTION

Abengoa Solar Inc. (Abengoa) applied to the California Independent System Operator (CAISO) for interconnection of a new 250 MW solar generation project currently referred to as the *Abengoa Mojave Solar Project* (AMSP). Abengoa requested and paid for Interconnection Studies in accordance with the CAISO Large Generation Interconnect Procedures (LGIP) Tariff. The CAISO assigned Queue Position 125 to the AMSP. All applicable interconnection studies have been completed for the AMSP, and Abengoa is currently negotiating the execution of the Large Generator Interconnection Agreement (LGIA) under an "Energy Only" service arrangement with the implementation of special protection system (SPS). Such service arrangement could result in the need to implement congestion management protocols which could result in the curtailment of generation resources in the area during times when total generation production in the area exceeds the total area transmission capability.

1.0 Project Overview

Southern California Edison (SCE) proposes to construct the Lockhart Substation and associated facilities to interconnect the 250 MW Abengoa Mojave Solar Project (AMSP) to SCE's existing Cool Water-Kramer No.1 220 kV transmission line (Project). This project description is prepared for Abengoa for use in their California Energy Commission (CEC) Application for Certification (AFC) (docket 09-AFC-05) and Bureau of Land Management (BLM) Environmental Impact Statement (EIS). Major components of the Project are summarized below:

- *Lockhart Substation*: Construct a new 220 kV Substation to loop-in the existing Cool Water-Kramer No. 1 220 kV transmission line and provide two 220 kV line positions to terminate two new 220 kV generation tie lines (gen-ties) owned by AMSP.

- *Transmission Lines*: Loop the existing Cool Water-Kramer No. 1 220 kV transmission line into the new Lockhart Substation. The transmission loop will require construction of approximately 3,000 feet of new transmission line segments (comprised of two line segments of approximately 1,500 feet each) creating the new Lockhart-Kramer and Cool Water-Lockhart 220 kV transmission lines.

- *Generation Tie Line Connections*: Connect the two AMSP-built gen-ties into the SCE-owned Lockhart Substation. This work involves construction of two single spans of conductors between the Lockhart switchrack and the last AMSP-owned tower(s).

- *Distribution Line for Station Light and Power*: Connect the existing Hutt 12 kV distribution circuit out of the Hutt Poletop Substation replacing one and removing one existing pole approximately 40 feet north of the Lockhart Substation. A range of approximately 200-400 feet of underground conduit would be installed from the replaced pole to the substation to provide a path for one of the two required sources of station light and power.

- *Telecommunications Facilities*: Install fiber optic communication cables, associated poles, conduits, and other telecommunication facilities to provide diverse path routing of communications required for the AMSP interconnection, and to provide communications redundancy at the two AMSP power blocks. This work would include installing communication paths between the Victor, Roadway, Tortilla, Kramer, Lockhart, and Cool Water Substations.

This project description is based on planning level assumptions. Further details will be made available upon completion of preliminary and final engineering, identification of field conditions, verification of availability of materials and equipment, and compliance with applicable environmental and permitting requirements.

2.0 Project Location

The Lockhart Substation would be located on private land within the boundaries of the new AMSP solar generation facility and located approximately 5.5 miles north-east of the intersection of California State Highway 58 and Harper Lake Road in the County of San Bernardino (see Figure 1). At this time, the extent of the SCE portion of the overall facility property would be approximately 8 to 10 acres including the Lockhart Substation, safety buffers, access for new loop-in line segments, and two gen-ties. To accommodate the proposed Lockhart Substation location within Abengoa's identified property and allow for future access to the substation, a corridor (transmission right-of-way (ROW)) would also be provided to SCE along the southern boundary of the AMSP paralleling the AMSP water drainage channel.

The electrical distribution system to provide station light and power would tap into the existing Hutt 12 kV distribution circuit that is in immediate proximity to the Lockhart Substation site.

The telecommunication facilities needed to provide adequate line protection would require the installation of new fiber optic cable from (1) SCE's Kramer Substation to Lockhart Substation on an existing distribution pole line (see Figure 3-1), (2) SCE's proposed Lockhart Substation to SCE's Tortilla Substation on existing distribution pole lines and approximately 1,500 feet of new underground and approximately 11,000 feet of new overhead pole line (see Figure 3-2), (3) SCE's Tortilla Substation to SCE's Cool Water Substation on existing distribution pole lines (see Figure 3-2), and (4) SCE's Lockhart to the AMSP Alpha and Beta plant sites (two routes are required to each plant site as shown in Figure 3-4). In addition, a new telecommunication facility would be required within SCE's Tortilla Substation (see Figure 3-6).

Abengoa elected to interconnect to SCE's transmission system with the implementation of a Special Protection System (SPS). Implementation of the SPS would enable the AMSP to operate under an "Energy Only" service arrangement. The telecommunication facilities needed for the SPS would require the installation of new fiber optic cable from SCE's Victor Substation to SCE's Kramer Substation on the existing Kramer-Victor 115 kV line (see Figure 3-5), and installation of an optical repeater site would be required at SCE's Roadway Substation.

3.0 Lockhart Substation

The Lockhart Substation would be a 220 kV switching station measuring approximately 450 feet by 542 feet. Lockhart Substation would be an unattended collector station (no power transformation) surrounded by a wall or chain-link fence with two gates (see Figure 2).

3.1 Substation Design and Equipment

The Lockhart Substation would be constructed with a six-bay 220 kV switchrack. One bay position would be utilized to loop the SCE Cool Water-Kramer No. 1 220 kV transmission line. Two of the bays would be used to terminate the two AMSP gen-ties. The three remaining positions would be available for future use.

Lockhart Substation would be initially equipped with:

- Two (2) overhead 220 kV buses
- Seven (7) 220 kV circuit breakers
- 220 kV disconnect switches
- One (1) Mechanical Electrical Equipment Room (MEER)
- Light and power transformers
- Station lighting
- Back-up generator

3.2 Substation Construction

3.2.1 Grading and Ground Disturbance

Because the Lockhart Substation would be located within the boundaries of the new solar facility, the grading of the substation site would be included within the solar developer's overall grading design. Therefore, SCE would not prepare a grading and drainage plan, nor would SCE apply for grading permits from the County of San Bernardino. Prior to Abengoa's submittal of the site grading application to the County, SCE would review and approve that portion of the grading design pertaining to the substation location. Abengoa would carry out site grading in accordance with the developer's county approved grading plans.

Land disturbance areas and earth moving quantities at the substation location are included within the AMSP facilities application.

Upon completion of the site preparation by the developer, SCE would assume responsibility for the remainder of the Lockhart Substation construction including the installation of a temporary chain-link fence surrounding the construction site.

Access to the substation site for both construction and operation would be gained through the solar facilities internal road network from its main access on Harper Lake Road. This internal road network would be paved as identified in the AMSP facility application.

Table 1 below provides the approximate area of land disturbance at the Lockhart Substation site within the substation fences and the approximate volume and type of earth materials that would be used or disposed by SCE during Substation construction.

Table 1: Substation Materials and Estimated Volumes

Element	Material	Approximate Volume (yd^3)
Substation Equipment Foundations	Concrete	1,300
Equipment and cable trench excavations *	Soil	1,500
Cable Trenches**	Concrete	25
Internal Driveway	Asphalt concrete Class II aggregate base	360 550
Substation Rock Surfacing	Rock, nominal 1 to 1-1/2 inch per SCE Standard	2,400

Notes to Table 1

* Excavation "spoils" would be placed on site during the below-ground construction phase to the extent possible.
** Standard cable trench elements are factory fabricated, delivered to the site and installed by crane. Intersections are cast in place concrete.

3.2.2 Construction Yard/Staging Areas

Abengoa would provide a temporary staging yard necessary to construct the Lockhart Substation and appropriate transmission facilities.

3.2.3 Geotechnical Studies

Prior to the start of construction Abengoa would conduct a geotechnical study of the substation site and the transmission line routes that would include an evaluation of the depth to the water table, evidence of faulting, liquefaction potential, physical properties of subsurface soils, soil resistivity, slope stability, and the presence of hazardous materials.

3.2.4 Below Grade Construction

After the substation site is graded, below grade facilities would be installed. Below grade facilities include a ground grid, underground conduit, trenches, and all required foundations. The design of the ground grid would be based on soil resistivity measurements collected during a geotechnical investigation that would be conducted prior to construction.

3.2.5 Equipment Installation

Above grade installation of substation facilities (i.e., buses, circuit breakers, steel structures, and the MEER) would commence after the below grade structures are in place.

3.2.6 Hazards and Hazardous Materials

Construction and operation of the Lockhart Substation would require the limited use of hazardous materials such as fuels, lubricants, and cleaning solvents. SCE would comply with all applicable laws relating to hazardous materials use, storage, and disposal. A Stormwater Pollution Prevention Plan (SWPPP) would also be prepared for the Lockhart Project.

3.2.7 Waste Management

Construction of the Lockhart Substation would result in the generation of various waste materials including soil, vegetation, and sanitation waste (portable toilets). Soil excavated for the Lockhart Substation would either be used as fill or disposed of off-site at an appropriately licensed waste facility. Sanitation waste (i.e., human generated waste) would be disposed of according to sanitation waste management practices.

3.2.8 Post-Construction Cleanup

Any damage to existing roads as a result of construction would be repaired once construction is complete in accordance with local agency requirements. Following completion of construction activities, SCE would also restore all areas that were temporarily disturbed by construction of the Lockhart Substation to as close to preconstruction conditions as possible or where applicable to the conditions agreed upon between the landowner and SCE. In addition, all construction materials and debris would be removed from the area and recycled or properly disposed of off-site. SCE would conduct a final inspection to ensure that cleanup activities were successfully completed.

3.2.9 Construction Equipment Personnel and Temporary Facilities

The estimated elements, materials, number of personnel and equipment required for construction of the Lockhart Substation are summarized below in Table 2- Construction Equipment and Personnel Use Estimations. In addition to the information provided in Table 2, a temporary contractor office trailer and equipment trailer would be placed within the proposed substation construction area during the construction phase of the Project.

Construction would be performed by either SCE construction crews or contractors. Contractor construction personnel would be managed by SCE construction management personnel. SCE anticipates a total of approximately 14 construction personnel working on any given day. SCE anticipates that crews would work concurrently whenever possible however the estimated deployment and number of crew members would be dependent upon County permitting, material availability and construction scheduling. For example, electrical equipment (such as substation MEER, wiring, and circuit breaker) installation may occur while transmission line construction proceeds.

Table 2: Construction Equipment and Personnel Use Estimations

Activity and number of Personnel	Number of Work Days	Equipment and Quantity	Duration of Use (Hours/Day)
Survey (2 people)	10	2-Survey Trucks (Gasoline)	8
Grading (8 people)	30	1-Dozer (Diesel) 2-Loader (Diesel) 1-Scraper (Diesel) 1-Grader (Diesel) 1-Water Truck (Diesel) 2-4X4 Backhoe (Diesel) 1-4X4 Tamper (Diesel) 1-Tool Truck (Gasoline) 1-Pickup 4X4 (Gasoline)	4 4 3 3 2 2 2 2 2
Fencing (4 people)	25	1-Bobcat (Diesel) 1-Flatbed Truck (Gasoline) 1-Crewcab Truck (Gasoline)	8 2 4
Civil (8 people)	60	1-Excavator (Diesel) 1-Foundationauger (Diesel) 2-Backhoes (Diesel) 1-Dump truck (Diesel) 1-Cement truck (Diesel) 1-Skip Loader (Diesel) 1-Water Truck (Diesel) 2-Bobcat Skid Steer (Diesel) 1-Forklift (Propane) 1-17TonCrane (Diesel) 1-Tool Truck (Gasoline)	4 5 3 2 2 3 3 3 4 2 hours/day for 45 days 3
MEER (4 people)	20	1-Carry-all Truck (Gasoline) 1-Stake Truck (Gasoline)	3 2
Electrical (8 people)	70	2-Scissor Lifts (Propane) 2-Manlifts (Propane) 1-Reach Manlift (Propane) 1-15 ton Crane (Diesel) 1-Tool Trailer 2-Crew Trucks (Gasoline)	3 3 4 3 3 2
Wiring (2 people)	25	1-Manlift (Propane) 1-Tool Trailer	4 3

Activity and number of Personnel	Number of Work Days	Equipment and Quantity	Duration of Use (Hours/Day)
Maintenance Crew Equipment Check (2 people)	30	2-MaintenanceTrucks (Gasoline)	4
Testing (2 people)	80	1-Crew Truck (Gasoline)	3
Asphalting (6 people)	40	2-Paving Roller (Diesel) 1-Asphalt Paver (Diesel) 1-Stake Truck (Gasoline) 1-Tractor (Diesel) 1-Dump Truck (Diesel) 2-Crew Trucks (Gasoline) 1-Asphalt Curb Machine (Diesel)	4 4 4 3 3 2 3

4.0 Transmission Lines and Related Structures

SCE's transmission line requirements for the Lockhart Substation interconnection to the Cool Water-Kramer No. 1 220 kV transmission line would consist of the following components: (1) 220 kV transmission line loop-in, (2) existing 220 kV transmission line structure modification/replacement, and (3) 220 kV gen-tie extension. Each of these components is described below.

4.1 Transmission Line and Related Structures Design and Equipment

4.1.1 220 kV Transmission Line Loop-In

The proposed Lockhart Substation would be connected to the Cool Water-Kramer No. 1 220 kV transmission line via loop-in transmission segments. The two loop-in line segments would create two new separate transmission lines: the Cool Water-Lockhart 220 kV transmission line and the Kramer-Lockhart 220 kV transmission line. Each transmission line segment into the Lockhart Substation would be approximately 1,500 feet long (see Figure 2).

The proposed loop-in of the existing Cool Water-Kramer No. 1 220 kV transmission line would require approximately four double circuit transmission structures to enter the Lockhart Substation. The exact combination of new tubular steel poles (TSP) and/or lattice steel towers (LST) needed for the loop-in would be determined during detailed engineering (see Figures 4-1 and 4-2).

Two of the 220 kV double circuit structures would be utilized just outside of the substation fence or wall. The other two structures would be used to re-route the Cool Water-Kramer No. 1 220 kV transmission line into Lockhart Substation. The conductor utilized would be 1-1590 kcmil "Lapwing" ACSR conductor.

The section of line connecting the existing Cool Water-Kramer No. 1 220 kV transmission line to the first structure outside of Lockhart Substation would require a new right of way as shown in Figure 2 between SCE's existing ROW and the new Lockhart Substation facilities.

4.1.2 Existing 220 kV Transmission Line Structure Modification/Replacement Design

To support the loop-in, one existing double circuit transmission structure may need to be removed. However, the exact number of towers to be removed would be determined during detailed engineering.

4.1.3 220 kV Generation Tie Line Extension Design

The proposed Lockhart Substation design would involve bringing two 220 kV gen-tie segments into a 220 kV position. SCE understands that there would be one customer-owned double circuit structure outside the SCE-owned Lockhart Substation facilities to support connection of the two customer gen-ties.

SCE's scope of work would be to connect the gen-ties from the customer owned dead end structures to the appropriate 220 kV position inside Lockhart Substation. The span needed for this connection is estimated to be up to 300 feet depending on the location of the transmission line tower relative to Lockhart Substation. The conductor utilized would be 1590 kcmil "Lapwing" ACSR conductor.

4.2 Transmission Line and Related Structures Construction

Construction activities would consist of the receiving and handling of construction materials, rehabilitation of existing and creation of new access roads for construction activities, site preparation, assembly and erection of structures, removal of existing structure(s), stringing of conductors, and site cleanup.

4.2.1 Transmission Line Access and Spur Roads

This portion of the Project would involve construction within existing and new ROW. Existing public roads as well as existing transmission line roads would be used as much as possible during construction of this Project. However, this Project would require new transmission line roads to access the new transmission line segments and structure locations. Transmission line roads are classified into two groups; access roads and spur roads. Access roads are through roads that run between tower sites along a ROW and serve as the main transportation route along line ROWs. Spur roads are roads that lead from access roads and terminate at one or more structure sites.

Rehabilitation work may be necessary in some locations along the existing transmission line roads to accommodate construction activities. This work may include the re-grading and repair of existing access, spur roads and associated drainage hardware. These roads would be cleared of vegetation, blade-graded to remove potholes, ruts, and other surface irregularities, and re-compacted to provide a smooth and dense riding surface capable of supporting heavy construction equipment. The graded road would have a minimum drivable width of 14 feet with 2 feet of shoulder on each side (depending upon field conditions).

Similar to rehabilitation of existing roads, all new road alignments would first be cleared and grubbed of vegetation. Roads would be blade-graded to remove potholes, ruts, and other surface irregularities, fill material would be deposited where necessary, and roads would be re-compacted to provide a smooth and dense riding surface capable of supporting heavy construction equipment. The graded road would have a minimum drivable width of 14 feet with 2 feet of shoulder on each side but may be wider depending on final engineering requirements and field conditions. New road gradients would be leveled so that any sustained grade would not exceed 12 percent. Drainage hardware would be installed where necessary to ensure adequate drainage of the road to reduce erosion and rutting. All curves would have a radius of curvature of not less than 50 feet measured at the center line of the usable road surface. The new roads would typically have turnaround areas near the structure locations.

4.2.2 Marshalling Yard/Staging Areas

A marshalling yard would be required for the construction of the transmission line loop-in segments and the gen-tie connection to SCE's proposed Lockhart Substation. A temporary equipment and material staging area would also be established for short-term utilization within the Lockhart Substation or within AMSP property as needed.

Equipment and materials to be stored at the temporary equipment and material staging area may include:

- Construction trailer
- Construction equipment
- Conductor/wire reels
- Transmission structure components
- Overhead ground wire/Optical ground wire cable
- Hardware
- Insulators
- Consumables, such as fuel and joint compound
- Portable sanitation facilities
- Waste materials for salvaging, recycling, and/or disposal

The size of the temporary equipment and material staging area would be dependent upon a detailed site inspection and would take into account, where practical, suggestions by the SCE crew foreman or the SCE contractor selected to do the work. An area of approximately 0.5 to 1.5 acres would be required. Additional temporary areas may be required for crew "show up" yards and would be used for temporary parking. Land disturbed at the temporary equipment and material staging area would be restored, to the extent possible, to preconstruction conditions following the completion of construction.

4.2.3 Temporary Shoo-Fly

SCE may temporarily transfer the existing Cool Water-Kramer No 2 220 kV conductor to temporary structures during the removal and replacement of the existing Cool Water-Kramer No. 1 220 kV structures. Upon completion of the construction of the 220 kV replacement structures and dismantling of the existing 220 kV structure to a level below the conductor attachment height, the existing conductor would be transferred over from the temporary structures and attached to the new 220 kV structures. The exact number of temporary transmission structures and the related ground disturbance would not be known until additional engineering is performed.

4.2.4 Construction of New 220 kV Transmission Structures

The new structure locations would first be graded and/or cleared of vegetation as required to provide a reasonably level and vegetation-free surface for footing and structure construction. The temporary laydown area, approximately 200 feet by 200 feet (0.92), required for the assembly of the structures would also be cleared of vegetation and graded as required to provide a reasonably level and vegetation-free surface for the laydown, assembly, and erection of the structures. Erection of the structure would require an erection crane to be set up adjacent to and 60 feet from the centerline of the structure. A crane pad would be located within the laydown area used for structure assembly. If the existing terrain is not suitable to support crane activities, a temporary 50 feet by 50 feet (0.06 acre) crane pad would be constructed.

The structures would require drilled, poured-in-place, concrete footings that would form the structure foundation. Actual footing diameters and depths for each of the structure foundations would depend on the soil conditions and topography at the site and would be determined during final engineering.

The foundation process starts with the excavation of the hole for the structure. The hole would be excavated using truck or track-mounted auger with various diameter augers to match the diameter requirements of the structure. The excavated material would be distributed at the structure site, used as fill for the new roads or substation site, or used in the rehabilitation of existing access roads. Alternatively, the excavated soil may be disposed of at an off-site disposal facility in accordance with all applicable laws.

Following excavation of the foundation footing for each structure, steel reinforced rebar cage(s) would be set in the excavated footing holes, anchor bolts and/or stub angles would be set in place, precision would be verified by a surveyor, and concrete would then be placed. The steel reinforced rebar cage(s) would be assembled off site and delivered to the structure location by flatbed truck. A typical transmission structure would require approximately 50 to 80 cubic yards of concrete delivered to the structure location depending upon the type of structure being constructed, soil conditions, and topography at each site. The transmission structure footings would project approximately 1-4 feet above the ground level.

During construction, existing commercial ready-mix concrete supply facilities would be used where feasible. If commercial ready-mix concrete supply facilities do not exist within the general area of need, a temporary concrete batch plant would be set up. If necessary, approximately two acres of property would be sub-partitioned from the temporary equipment and material staging area within the Lockhart Substation site/property for a temporary concrete batch plant. Equipment would include a central mixer unit (drum type); three silos for injecting concrete additives, fly ash, aggregate, and cement; a water tank; portable pumps; a pneumatic injector; and a loader for handling concrete additives not in the silos. Dust emissions would be controlled by watering the area and by sealing the silos and transferring the fine particulates pneumatically between the silos and the mixers.

The assembly would consist of hauling the structure components from the staging yard to their designated structure location using semi-trucks with 40-foot trailers and off loaded at site. Crews would then assemble portions of each structure on the ground at the structure location, while on the ground, the top section may be pre-configured with the necessary insulators and wire-stringing hardware before being set in place. An 80-ton all-terrain or rough terrain crane would be used to position the base section on top of previously prepared foundation. When the base section is secured, the remaining portions of the structure would then be placed upon the base section and bolted together.

After construction is completed, the transmission structure site would be graded such that water would run toward the direction of the natural drainage. In addition, drainage would be designed to prevent ponding and erosive water flows that could cause damage to the structure footing. The graded area would be compacted and would be capable of supporting heavy vehicular traffic.

4.2.5 Removal of Existing 220 kV Transmission Structure

Transmission line facilities planned to be removed would include an existing 220 kV transmission structure, and associated hardware (i.e., insulators, vibration dampeners, suspension clamps, ground wire clamps, shackles, links, nuts, bolts, washers, cotters pins, insulator weights, and bond wires). The existing access routes would be used to reach the structure site, but some rehabilitation work on these routes may be necessary before removal activities begin. In addition, grading may be necessary to establish a temporary laydown area approximately 150 feet by 150 feet (0.52 acre) adjacent to the existing structure for equipment and material staging during the structure removal. A crane truck or rough terrain crane would be used to support the structure during dismantle and removal. A crane pad would be located within the laydown area used for structure assembly. If the existing terrain is not suitable to support crane activities, a temporary 50 feet by 50 feet (0.06 acre) crane pad would be constructed. The existing structure footings would be removed to a depth of approximately 2 feet below ground level. Holes would be filled, compacted, and the area would be smoothed to match surrounding grade.

SCE may temporarily transfer the existing 220 kV conductor to temporary structures during the removal and replacement of the existing 220 kV structure. Upon completion of the construction of the 220 kV replacement structures and dismantling of the existing 220 kV structure to a level below the conductor attachment height, the existing conductor would be transferred over from the temporary structures and attached to the new 220 kV structures.

4.2.6 Wire-Stringing of 220 kV Conductor

Wire-stringing would include all activities associated with the installation of conductors, including the installation of primary conductor and overhead ground wire (OHGW), vibration dampeners, weights, spacers, and suspension and dead-end hardware assemblies. Insulators and stringing sheaves (rollers or travelers) would be typically attached during the steel erection process.

A standard wire-stringing plan would include a sequence of events starting with determination of wire pulls and wire pull equipment set-up positions. Advanced planning by supervision determines circuit outages, pulling times, and safety protocols to ensure that safe and effective installation of wire is accomplished.

Wire-stringing activities would be conducted in accordance with SCE specifications that are similar to process methods detailed in Institute of Electrical and Electronics Engineers Standard 524-2003, Guide to the Installation of Overhead Transmission Line Conductors.

Wire pulls would include the length of any given continuous wire installation process between two selected points along the line. Wire pulls would be 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 setups. In some cases, it may be preferable to select an equipment setup position between two suspension structures. Anchor rods would then be installed to provide dead-ending capability for wire sagging purposes, and also to provide a convenient splicing area.

To ensure the safety of workers and the public, safety devices such as traveling grounds, guard structures, and radio-equipped public safety roving vehicles and linemen would be in place prior to the initiation of wire-stringing activities.

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

- Step 1: Sock Line, Threading: Typically, a lightweight sock line would be passed from structure to structure, which would be threaded through the wire rollers in order to engage a camlock device that would secure the pulling sock in the roller. This threading process would continue between all structures through the rollers of a particular set of spans selected for a conductor pull.

- Step 2: Pulling: The sock line would be used to pull-in the conductor pulling cable. The conductor pulling cable would be attached to the conductor using a special swivel joint to prevent damage to the wire and to allow the wire to rotate freely to prevent complications from twisting as the conductor unwinds off the reel. A piece of hardware known as a running board would be installed to properly feed the conductor into the roller. This device keeps the bundle conductor from wrapping during installation.

- Step 3: Splicing, Sagging, and Dead-ending: After the conductor is pulled-in, the conductor would be sagged to proper tension and dead-ended to structures.

- Step 4: Clipping-in, Spacers: After the conductor is dead-ended, the conductors would be secured to all tangent structures; a process called clipping in. Once this is complete, spacers, if applicable, would be attached between the bundled conductors of each phase to keep uniform separation between each conductor.

The dimensions of the area needed for the stringing setups associated with wire installation are variable and depend upon terrain. The preferred minimum area needed for tensioning equipment set-up sites would require approximately 150 feet by 500 feet (1.72 acres). The preferred minimum area needed for pulling equipment set-up sites would require approximately 150 feet by 300 feet (1.03 acres). Crews though can work from within slightly smaller areas when space is limited. Each stringing operation would include one puller positioned at one end and one tensioner and wire reel stand truck positioned at the other end.

Stringing equipment that cannot be positioned at either side of a dead-end transmission structure would require installation of temporary field snubs (i.e., anchoring and dead-end hardware) to sag conductor wire to the correct tension.

The puller and tensioner set-up locations would require level areas to allow for maneuvering of the equipment. When possible, these locations would be located on existing level areas and existing roads to minimize the need for grading and cleanup. The final number and locations of the puller and tensioner sites would be determined during detailed engineering for the Project based on the construction methods chosen by SCE or its contractor.

An overhead ground wire (OHGW) or optical ground wire (OPGW) for shielding would be installed on the transmission line and would be installed in the same manner as the conductor. The OHGW or OPGW would typically be installed in conjunction with the conductor, depending upon various factors including line direction, inclination, and accessibility.

4.2.7 Housekeeping and Construction Site Cleanup

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

SCE would restore, to the extent possible, all areas that are temporarily disturbed by project activities (including equipment and material staging yard, pull and tension sites, and structure laydown and assembly sites) to preconstruction conditions following the completion of construction. Restoration may include grading and restoration of sites to original contours and reseeding where appropriate. In addition, all construction materials and debris would be removed from the area and recycled or properly disposed of at an off-site disposal facility in accordance with all applicable laws. SCE would conduct a final inspection to ensure that cleanup activities are successfully completed.

Table 3 below provides information on temporary and permanent land disturbance areas related to construction of the transmission lines.

Table 3: Ground Disturbance Table – Transmission Line Construction

Project Feature	Site Quantity	Disturbed Acreage Calculation (L x W)	Acres Disturbed During Construction	Acres to be restored	Acres Permanently Disturbed
Modify Existing 220 kV Lattice Steel Tower (1)	0	150' x 150'	0	0	0.000
Remove Existing 220 kV Lattice Steel Tower (1)	1	150' x 150'	0.517	0.517	0.000
Temporary Conductor Field Snub/Transfer Area (2)	6	200' x 150'	4.132	4.132	0.000
Construct New 220 kV Lattice Steel Tower (3)	4	200' x 200'	1.837	1.200	0.637
Construct New 220 kV Gen-Tie Structure (5)	0	200' x 200'	0	0	0.000
Conductor & OHGW Stringing Setup Area - Puller (6)	3	300' x 150'	3.099	3.099	0.000
Conductor & OHGW Stringing Setup Area - Tensioner (7)	3	500' x 150'	5.165	5.165	0.000
New Access/Spur Roads (8)	0.6	linear miles x 14' wide	1.018	0.000	1.018
Lockhart Sub - Material & Equipment Staging Area	1	approx. 1.5 acres	1.500	1.500	0.000
Total Estimated (6)			17.268	15.613	1.6552

Notes to Table 3:
1. Includes the removal of existing conductor, teardown of existing structure, and removal of foundation 2' below ground surface.
2. Includes area needed for temporary conductor transfer towers and/or conductor removal, field snubs, and splicing new conductor; area to be restored after construction.
3. Includes foundation installation, structure assembly & erection, and conductor & OHGW attachment; a majority of the area to be restored after construction; a portion of ROW beneath and within 35' of the LST to remain permanently cleared of vegetation and access area of 25' around structure; area to be permanently disturbed for each 220 kV LST equals 0.3183 acres.
4. Includes foundation installation, structure assembly & erection, and conductor & OHGW attachment; a majority of the area to be restored after construction; a portion of ROW beneath and within 25' of the LST to remain permanently cleared of vegetation and access area of 25' around structure; area to be permanently disturbed for each LST equals 0.2173 acres.
5. Includes foundation installation, structure assembly & erection, and conductor & OHGW attachment; a majority of the area to be restored after construction; a portion of area within 25' of the structure to remain permanently cleared of vegetation; approximately 0.057 acre would be permanently disturbed for the structure.
6. Based on 9,000' conductor reel lengths, number of circuits, and route design.
7. Based on length of road in miles x road width of 14'.
8. The disturbed acreage calculations are estimates based upon SCE's preferred area of use for the described project feature, the width of the existing right-of-way, or the width of the proposed right-of-way and, they do not include any new access/spur road information; they are subject to revision based upon final engineering and review of the project by SCE's Construction Manager and/or Contractor awarded project.
Note: All data provided in this table is based on planning level assumptions and may change following completion of more detailed engineering, identification of field conditions, availability of material, and equipment, and any environmental and/or permitting requirements.

4.2.8 Operation and Maintenance

Following the completion of project construction, operation and maintenance of the new lines would commence. Operation, inspection, and maintenance activities would occur at least once per year, and be in compliance with CPUC General Order No. 165. The frequency of inspection and maintenance activities would depend upon weather effects and any unique problems that may arise due to such variables as substantial storm damage or vandalism.

4.2.9 Labor and Equipment

Construction of the Project would be performed by SCE crews or contract personnel and supervised by SCE's project administration and inspection. The estimated number of persons and types of equipment required for each phase of transmission line construction for the Lockhart Substation Project is shown in Tables 4, 5, and 6 below.

TABLE 4

CONSTRUCTION EQUIPMENT AND WORKFORCE ESTIMATES BY ACTIVITY TO CONSTRUCT NEW 220 KV LOOP-IN LINES

LOCKHART SUBSTATION PROJECT

Work Activity				Activity Production			
Primary Equipment Description	Estimated Horse-Power	Probable Fuel Type	Primary Equipment Quantity	Estimated Workforce	Estimated Schedule (Days)	Duration of Use (Hrs/Day)	Estimated Production Per Day
Survey (1)				**4**	**6**		**0.5 Miles**
3/4-Ton Pick-up Truck, 4x4	200	Gas	2		6	8	1 Mile/Day and Construction Support
Temporary Equipment & Material Staging Area (2)				**4**			
1-Ton Crew Cab, 4x4	300	Diesel	1		Duration of Project	2	
30-Ton Crane Truck	300	Diesel	1			2	
Water Truck	350	Diesel	1				
10,000 lb Rough Terrain Fork Lift	200	Diesel	1			5	
Truck, Semi, Tractor	350	Diesel	1			1	
Roads & Landing Work (4)				**5**	**4**		**0.5 Miles & 4 Pads**
1-Ton Crew Cab, 4x4	300	Diesel	2		4	2	0.5 Miles/Day & 0.66 Structure Pads/Day
Road Grader	350	Diesel	1		4	4	
Backhoe/Front Loader	350	Diesel	1		4	6	
10-cu. yd. Dump Truck	350	Diesel	2		4	8	

TABLE 4

CONSTRUCTION EQUIPMENT AND WORKFORCE ESTIMATES BY ACTIVITY TO CONSTRUCT NEW 220 KV LOOP-IN LINES

LOCKHART SUBSTATION PROJECT

Work Activity				Activity Production			
Primary Equipment Description	Estimated Horse-Power	Probable Fuel Type	Primary Equipment Quantity	Estimated Workforce	Estimated Schedule (Days)	Duration of Use (Hrs/Day)	Estimated Production Per Day
Drum Type Compactor	250	Diesel	1		4	4	
Track Type Dozer	350	Diesel	1		4	6	
Lowboy Truck/Trailer	500	Diesel	2		2	2	
Install LST Foundations (5)				**9**	**6**		**4 LSTs**
1-Ton Crew Cab Flat Bed, 4x4	300	Diesel	2		6	2	0.50 LST/Day
30-Ton Crane Truck	300	Diesel	1		6	5	
Backhoe/Front Loader	200	Diesel	1		6	8	
Auger Truck	500	Diesel	1		6	8	
10-cu. yd. Dump Truck	350	Diesel	2		6	8	
10-cu. yd. Concrete Mixer Truck	425	Diesel	4		4	5	
LST Steel Haul (6)				**6**	**4**		**4 LSTs**
1-Ton Crew Cab Flat Bed, 4x4	300	Diesel	2		4	2	1 LST/Day
10,000 lb Rough Terrain Fork Lift	200	Diesel	1		4	6	
40' Flat Bed Truck/ Trailer	350	Diesel	1		4	8	
LST Steel Assembly (7)				**14**	**11**		**4 LSTs**
3/4-Ton Pick-up Truck, 4x4	300	Diesel	3		11	4	0.25 LST/Day
1-Ton Crew Cab Flat Bed, 4x4	300	Diesel	2		11	4	
10,000 lb Rough Terrain Fork Lift	200	Diesel	1		11	6	
30-Ton Crane Truck	300	Diesel	2		11	8	
Compressor Trailer	350	Diesel	2		11	6	
LST Erection (8)				**8**	**16**		**4 LSTs**
3/4-Ton Pick-up Truck, 4x4	300	Diesel	2		16	5	0.13 LST/Day
1-Ton Crew Cab Flat Bed, 4x4	300	Diesel	2		16	5	

TABLE 4

CONSTRUCTION EQUIPMENT AND WORKFORCE ESTIMATES BY ACTIVITY TO CONSTRUCT NEW 220 KV LOOP-IN LINES

LOCKHART SUBSTATION PROJECT

Work Activity				Activity Production			
Primary Equipment Description	Estimated Horse-Power	Probable Fuel Type	Primary Equipment Quantity	Estimated Workforce	Estimated Schedule (Days)	Duration of Use (Hrs/Day)	Estimated Production Per Day
Compressor Trailer	120	Diesel	1		16	6	
80-Ton Rough Terrain Crane	350	Diesel	1		16	6	
Install Conductor & OHGW (9)				**16**	**6**		**0.6 Circuit Miles**
3/4-Ton Pick-up Truck, 4x4	300	Diesel	2		6	8	
1-Ton Crew Cab Flat Bed, 4x4	300	Diesel	2		6	8	
Wire Truck/Trailer	350	Diesel	2		6	2	
Dump Truck (Trash)	350	Diesel	1		5	2	
20,000 lb. Rough Terrain Fork Lift	350	Diesel	1		6	2	
22-Ton Manitex	350	Diesel	1		6	8	
30-Ton Manitex	350	Diesel	2		6	6	
Splicing Rig	350	Diesel	1		6	2	
Splicing Lab	300	Diesel	1		4	2	0.25 miles/day
Spacing Cart	10	Diesel	1		4	8	
Static Truck/ Tensioner	350	Diesel	1		6	2	
3 Drum Straw line Puller	300	Diesel	1		6	4	
60lk Puller	525	Diesel	1		6	3	
Sag Cat w/ 2 winches	350	Diesel	1		6	2	
580 Case Backhoe	120	Diesel	1		6	2	
D8 Cat	300	Diesel	1		6	3	
Lowboy Truck/Trailer	500	Diesel	1		6	2	
Restoration (10)				**7**	**3**		**0.5 Miles**
1-Ton Crew Cab, 4x4	300	Diesel	2		3	2	
Road Grader	350	Diesel	1		3	6	
Backhoe/Front Loader	350	Diesel	1		3	6	
Drum Type Compactor	250	Diesel	1		3	6	0.5 Mile/Day
Track Type Dozer	350	Diesel	1		3	6	
Lowboy Truck/Trailer	300	Diesel	1		3	3	

TABLE 5

CONSTRUCTION EQUIPMENT AND WORKFORCE ESTIMATES BY ACTIVITY TO CONSTRUCT NEW 220 KV GEN-TIE CONNECTION ON SCE PROPERTY

LOCKHART SUBSTATION PROJECT

Work Activity				Activity Production			
Primary Equipment Description	Estimated Horse-Power	Probable Fuel Type	Primary Equipment Quantity	Estimated Workforce	Estimated Schedule (Days)	Duration of Use (Hrs/Day)	Estimated Production Per Day
Survey (1)				**4**	**2**		**500 feet**
3/4-Ton Pick-up Truck, 4x4	200	Gas	2		2	8	1 Mile/Day
Temporary Equipment & Material Staging Area (2)				**4**			
1-Ton Crew Cab, 4x4	300	Diesel	1		Duration of Project	2	
Water Truck	350	Diesel	1			8	
30-Ton Crane Truck	300	Diesel	1			2	
10,000 lb Rough Terrain Fork Lift	200	Diesel	1			5	
Truck, Semi, Tractor	350	Diesel	1			1	
Roads & Landing Work (3)				**5**	**2**		**0.1 Miles & 1 Pad**
1-Ton Crew Cab, 4x4	300	Diesel	2		2	2	0.5 Miles/Day & 2 Structure Pads/Day
Road Grader	350	Diesel	1		1	4	
10-cu. yd. Dump Truck	350	Diesel	2		2		
Backhoe/Front Loader	350	Diesel	1		2	6	
Drum Type Compactor	250	Diesel	1		2	4	
Track Type Dozer	350	Diesel	1		2	6	
Lowboy Truck/Trailer	500	Diesel	2		2	2	
Install TSP Foundation (4)				**7**	**2**		**1 TSP**
1-Ton Crew Cab Flat Bed, 4x4	300	Diesel	3		2	2	2 TSPs/Day
30-Ton Crane Truck	300	Diesel	1		2	5	
Backhoe/Front Loader	200	Diesel	1		1	8	
Auger Truck	500	Diesel	1		2	8	
10-cu. yd. Dump Truck	350	Diesel	2		2	8	
10-cu. yd. Concrete Mixer Truck	425	Diesel	3		1	3	
TSP Haul (5)				**3**	**1**		**1 TSP**
3/4-Ton Pick-up Truck, 4x4	300	Diesel	1		1	5	4 TSPs/Day

TABLE 5

CONSTRUCTION EQUIPMENT AND WORKFORCE ESTIMATES BY ACTIVITY TO CONSTRUCT NEW 220 KV GEN-TIE CONNECTION ON SCE PROPERTY

LOCKHART SUBSTATION PROJECT

Work Activity				Activity Production			
Primary Equipment Description	Estimated Horse-Power	Probable Fuel Type	Primary Equipment Quantity	Estimated Workforce	Estimated Schedule (Days)	Duration of Use (Hrs/Day)	Estimated Production Per Day
Flat Bed Truck/Trailer	350	Diesel	1		1	8	
80-Ton Rough Terrain Crane	350	Diesel	1		1	6	
TSP Assembly (6)				**8**	**1**		**1 TSP**
3/4-Ton Pick-up Truck, 4x4	300	Diesel	2		1	5	2 TSPs/Day
1-Ton Crew Cab Flat Bed, 4x4	300	Diesel	2		1	5	
Compressor Trailer	120	Diesel	1		1	5	
80-Ton Rough Terrain Crane	350	Diesel	1		1	6	
TSP Erection (7)				**8**	**1**		**1 TSP**
3/4-Ton Pick-up Truck, 4x4	300	Diesel	2		1	5	2 TSPs/Day
1-Ton Crew Cab Flat Bed, 4x4	300	Diesel	2		1	5	
Compressor Trailer	120	Diesel	1		1	5	
80-Ton Rough Terrain Crane	350	Diesel	1		1	6	
Install Conductor & OPGW (8)				**16**	**4**		**0.1 Circuit Miles**
3/4-Ton Pick-up Truck, 4x4	300	Diesel	4		4	8	0.2 miles/day
1-Ton Crew Cab Flat Bed, 4x4	300	Diesel	4		4	8	
Wire Truck/Trailer	350	Diesel	4		2	2	
Dump Truck (Trash)	350	Diesel	1		4	2	
20,000 lb. Rough Terrain Fork Lift	350	Diesel	1		4	2	
22-Ton Manitex	350	Diesel	1		4	8	
30-Ton Manitex	350	Diesel	4		4	6	
Splicing Rig	350	Diesel	2		4	2	
Splicing Lab	300	Diesel	2		2	2	
Spacing Cart	10	Diesel	2		2	8	
Static Truck/ Tensioner	350	Diesel	1		2	2	
3 Drum Straw line Puller	300	Diesel	2		2	4	

TABLE 5

CONSTRUCTION EQUIPMENT AND WORKFORCE ESTIMATES BY ACTIVITY TO CONSTRUCT NEW 220 KV GEN-TIE CONNECTION ON SCE PROPERTY

LOCKHART SUBSTATION PROJECT

Work Activity				Activity Production			
Primary Equipment Description	Estimated Horse-Power	Probable Fuel Type	Primary Equipment Quantity	Estimated Workforce	Estimated Schedule (Days)	Duration of Use (Hrs/Day)	Estimated Production Per Day
60lk Puller	525	Diesel	1		2	3	
Sag Cat w/ 2 winches	350	Diesel	2		2	2	
580 Case Backhoe	120	Diesel	1		4	2	
D8 Cat	300	Diesel	2		2	3	
Lowboy Truck/Trailer	500	Diesel	1		4	2	
Restoration (9)				**7**	**3**		**0.5 Miles**
1-Ton Crew Cab, 4x4	300	Diesel	2		3	2	
Road Grader	350	Diesel	1		1	6	
Backhoe/Front Loader	350	Diesel	1		1	6	
Drum Type Compactor	250	Diesel	1		1	6	0.5 Mile/Day
Track Type Dozer	350	Diesel	1		1	6	
Lowboy Truck/Trailer	300	Diesel	1		3	3	

TABLE 6

CONSTRUCTION EQUIPMENT AND WORKFORCE ESTIMATES BY ACTIVITY TRANSMISSION LINE STRUCTURE REMOVAL

Work Activity				**Activity Production**			
Primary Equipment Description	Estimated Horse-Power	Probable Fuel Type	Primary Equipment Quantity	Estimated Workforce	Estimated Schedule (Days)	Duration of Use (Hrs/Day)	Estimated Production Per Day
Temporary Equipment & Material Staging Area(2)				**4**			
1-Ton Crew Cab, 4x4	300	Diesel	1		Duration of Project	2	
30-Ton Crane Truck	300	Diesel	1			2	
Water Truck	350	Diesel	1			8	
10,000 lb Rough Terrain Fork Lift	200	Diesel	1			5	
Truck, Semi, Tractor	350	Diesel	1			1	
Roads & Landing Work (3)				**5**	**2**		**.5 Miles & 3 Pads**
1-Ton Crew Cab, 4x4	300	Diesel	2		2	2	0.5 Miles/Day & 2 Structure Pads/Day
Road Grader	350	Diesel	1		2	4	
Backhoe/Front Loader	350	Diesel	1		2	6	
Drum Type Compactor	250	Diesel	1		2	4	
Track Type Dozer	350	Diesel	1		2	6	
Excavator	300	Diesel	1		2	6	
Lowboy Truck/Trailer	500	Diesel	1		2	2	
LST Removal (4)				**8**	**2**		**1 LSTs**
3/4-Ton Pick-up Truck, 4x4	300	Diesel	2		2	6	0.75 LST/Day
1-Ton Crew Cab Flat Bed, 4x4	300	Diesel	2		2	6	
Compressor Trailer	120	Diesel	1		2	6	
80-Ton Rough Terrain Crane	350	Diesel	1		2	6	
Remove Foundations (5)				**9**	**1**		**3 LSTs**
1-Ton Crew Cab Flat Bed, 4x4	300	Diesel	2		1	2	0.50 LST/Day
Backhoe/Front Loader	200	Diesel	1		6	8	
Auger Truck	500	Diesel	1		8	8	
10-cu. yd. Dump Truck	350	Diesel	2		8	8	

TABLE 6

CONSTRUCTION EQUIPMENT AND WORKFORCE ESTIMATES BY ACTIVITY TRANSMISSION LINE STRUCTURE REMOVAL

Work Activity				Activity Production			
Primary Equipment Description	Estimated Horse-Power	Probable Fuel Type	Primary Equipment Quantity	Estimated Workforce	Estimated Schedule (Days)	Duration of Use (Hrs/Day)	Estimated Production Per Day
Compressor Trailer	120	Diesel	1		2	6	
LST Steel Haul (6)				**4**	**1**		**3 LSTs**
1-Ton Crew Cab Flat Bed, 4x4	300	Diesel	1		1	2	
10,000 lb Rough Terrain Fork Lift	200	Diesel	1		1	6	1 LST/Day
40' Flat Bed Truck/ Trailer	350	Diesel	1		1	8	
Transfer Conductor (9)				**16**	**3**		**.5 Circuit Miles**
3/4-Ton Pick-up Truck, 4x4	300	Diesel	2		3	8	
1-Ton Crew Cab Flat Bed, 4x4	300	Diesel	2		3	8	
Wire Truck/Trailer	350	Diesel	2		3	2	
Dump Truck (Trash)	350	Diesel	1		5	2	
20,000 lb. Rough Terrain Fork Lift	350	Diesel	1		3	2	
22-Ton Manitex	350	Diesel	1		3	8	
30-Ton Manitex	350	Diesel	2		3	6	
Splicing Rig	350	Diesel	1		3	2	
Splicing Lab	300	Diesel	1		3	2	1 tower/day
Spacing Cart	10	Diesel	1		3	8	
Static Truck/ Tensioner	350	Diesel	1		3	2	
3 Drum Straw line Puller	300	Diesel	1		3	4	
60lk Puller	525	Diesel	1		3	3	
Sag Cat w/ 2 winches	350	Diesel	1		3	2	
580 Case Backhoe	120	Diesel	1		3	2	
D8 Cat	300	Diesel	1		3	3	
Lowboy Truck/Trailer	500	Diesel	1		3	2	
Restoration (11)				**7**	**3**		**.5 Miles**
1-Ton Crew Cab, 4x4	300	Diesel	2		3	2	0.5 Mile/Day
Road Grader	350	Diesel	1		1	6	
Backhoe/Front Loader	350	Diesel	1		1	6	

TABLE 6

CONSTRUCTION EQUIPMENT AND WORKFORCE ESTIMATES BY ACTIVITY TRANSMISSION LINE STRUCTURE REMOVAL

Work Activity				**Activity Production**			
Primary Equipment Description	Estimated Horse-Power	Probable Fuel Type	Primary Equipment Quantity	Estimated Workforce	Estimated Schedule (Days)	Duration of Use (Hrs/Day)	Estimated Production Per Day
Drum Type Compactor	250	Diesel	1		1	6	
Track Type Dozer	350	Diesel	1		3	6	
Lowboy Truck/Trailer	300	Diesel	1		2	3	

5.0 Distribution System for Station Light and Power

The following elements describe the distribution requirements for one of the two required sources of Lockhart Substation station light and power.

5.1 Distribution System Design and Equipment

The Hutt 12 kV distribution circuit out of Hutt Poletop Substation would be the source to provide station light and power to the Lockhart Substation. The Project calls for rearranging the existing Hutt 12 kV overhead distribution circuit where it terminates at the central site for the proposed Lockhart Substation at approximately the location of an existing distribution pole located near Roy Street and a private dirt road. This distribution pole would need to be removed as well as the pole to the north in order to make room for the new Lockhart Substation.

A new distribution riser pole would be installed approximately 40 feet north of the Lockhart Substation northern fence with down guys and an anchor located in between (see Figure 5 and Figure 6). The existing 12 kV tap line would be dead-ended on this new pole and an Omni-rupter switch would be installed. From this last dead-end pole, a distribution 12 kV riser would be installed and approximately 200 feet of two five inch conduits would be installed to a new 12 kV station light and power rack location within Lockhart Substation adjacent to the MEER. Portions of these facilities could also be utilized for installation of the required telecommunication fiber optic cables into Lockhart Substation (described below in Section 6.0, Telecommunication System).

The 12 kV Hutt distribution circuit would extend through one of the new five inch conduits with 1/0 aluminum jacketed concentric neutral (JCN), cross-linked polyethylene (CLP) cable to connect the existing overhead tap line to three new 25 kVA, 120/240 three phase, four wire, back-up station light and power transformers mounted on the 12 kV rack.

TABLE 7
LOCKHART SUBSTATION

CONSTRUCTION EQUIPMENT AND WORKFORCE ESTIMATES BY ACTIVITY
12KV HUTT STATION LIGHT & POWER

Work Activity				**Estimated Workforce**	**Estimated Schedule (Days)**		**Activity Production**
Primary Equipment Description	Estimated Horse-Power	Probable Fuel Type	Primary Equipment Quantity			Duration of Use (Hrs/Day)	Estimated Production Per Day
Trenching, Structure Excavation(1)				**4**	**1**		
1-Ton Crew Cab	300	Diesel	1		1	2	
Backhoe Front Loader	300	Diesel	1		1	8	
Dump Truck	300	Diesel	1		1	4	
Overhead Line Work(2)				**4**	**3**		
1-Ton Crew Cab, 4x4	300	Diesel	1		3	2	
55’ Double Bucket Truck	350	Diesel	1		2	8	
Auger Truck	350	Diesel	1		1	8	
Underground Cable Pulling and Makeup (3)				**4**	**1**		
55’ Double Bucket Truck	350	Diesel	1		1	8	
1-Ton Crew Cab, 4x4	300	Diesel	1		1	2	
Hydraulic Rewind Puller	300	Diesel	1		1	6	

Crew size assumptions:

1. Trenching and Conduit Installation = one 4-man crew
2. Overhead Line Work = one 4-man crew
3. Underground Cable Pulling and Makeup = one 4-man crew

5.2 Distribution System Construction

A lay down area within the SCE-owned Lockhart Substation property or within AMSP property as needed would be required to store any materials needed during construction. Distribution line crews would work Monday through Friday in one 8 to 10 hour shift each day. One line truck and a companion vehicle with four man crew would be utilized to perform the work each day.

6.0 Telecommunication System

The following elements describe the requirements for Lockhart Substation telecommunication facilities.

6.1 Telecommunication System Design and Equipment

A telecommunication system would be required in order to provide transmission line protection, SPS, monitoring and remote operation capabilities of the electrical equipment at Lockhart Substation.

To provide line protection, the telecommunications system would extend diverse communication paths utilizing fiber-optic cables to connect Lockhart Substation to the SCE telecommunication network via SCE's Kramer Substation, SCE's Tortilla Substation, and also to the AMSP Alpha and Beta power facilities. In addition, a telecommunication path between SCE's Tortilla Substation and SCE's Cool Water Substation is currently undergoing permitting as part of a separate project and would also be used for the required line protection. This path between SCE's Tortilla Substation and SCE's Cool Water Substation is not described within this document but is represented in the figure provided (see Figure 3-1, Figure 3-2, Figure 3-3 and Figure 3-4). In addition, a new telecommunication facility would be required at SCE's Tortilla Substation (see Figure 3-6). This telecommunications facility is needed to support the additional telecommunication equipment to be installed at Tortilla Substation.

To provide for the required SPS, SCE telecommunications would install a fiber optic cable between SCE's existing Kramer Substation and SCE's existing Victor Substation. SCE is currently evaluating the possibility of installing a telecommunication ADSS fiber optic cable on the existing Kramer-Victor 115 kV pole line. However, a determination of feasibility has not been made so the document provides for the installation on a new pole line. If completion of the evaluation identifies that SCE's Kramer-Victor 115 kV pole line is adequate to support the ADSS fiber optic cable, SCE would install the cable on this facility; otherwise, a new telecommunication pole line would be required (see Figure 3-5).

It is anticipated that the total distance of the combined telecommunication routes would be approximately 85 miles.

As described in detail below, certain portions of the fiber optic cable would be constructed on existing overhead distribution and transmission wood and light duty steel poles, while other portions of the cable would be constructed on new overhead structures and newly constructed underground conduit system(s). For a breakdown of new versus existing components refer to the Table 8 below.

Telecommunications Equipment:

- New overhead/underground 48-strand fiber optic cables to connect the Lockhart Substation Site/Property to SCE's Kramer and Tortilla Substations, and AMSP's Alpha and Beta Substations.
- New overhead/underground 96-strand fiber optic cables to connect SCE's Kramer Substation to SCE's Victor Substation.
- New fiber optic multiplex equipment and channel equipment in the Lockhart Substation MEER.
- New telecommunications room within SCE's existing Tortilla Substation.
- New fiber optic multiplex equipment and channel equipment at SCE's Kramer, Tortilla, Cool Water, Roadway, Lugo Substations and any other location necessary to support the communication requirements for the Lockhart Project.
- Replacement of existing poles if required, to be determined by final engineering.

Cable Route, SCE's Kramer Substation to Lockhart Substation:

From SCE's Kramer substation, proceed north from the MEER building approximately 800' feet installing underground cable in an existing underground trench. Continue west approximately 525 feet installing underground cable in existing underground conduit. Continue north approximately 725 feet installing underground cable in existing underground conduit to pole 1793491E rise up.

Continue north approximately 2,000 feet installing ADSS overhead cable on existing overhead structures, continue east on ROW approximately 63,500 feet installing overhead cable on existing overhead structures. Continue north on Harper Lake Rd. approximately 5,700 feet installing overhead cable on existing overhead structures, continue east on Lockhart Rd. approximately 11,000 feet installing overhead cable on existing overhead structures to pole 4488408E where path would continue south approximately 5,700 feet installing overhead cable on new overhead structures to be installed for station light and power for Lockhart Substation. Install riser and continue west for approximately 1,000 feet installing underground cable in new underground conduit structures to Lockhart Substation MEER.

Cable Route, SCE's Lockhart Substation to SCE's Tortilla Substation:

From Lockhart Substation, proceed south from the MEER for approximately 1,000 feet installing underground cable in new underground conduit to a new pole with riser. From this point continue west on new overhead poles along the edge of the existing SCE's Cool Water-Kramer 220 kV ROW for approximately 11,000 feet. This would require approximately 54 new poles. A riser would be installed on the last pole at the intersection with Harper Lake Road. Continue south on Harper Lake Road for approximately 400 feet installing new underground cable and conduit to pole 4349976E where a new riser would be installed. Continue south on Harper Lake Road to HWY 58 for approximately 26,000 feet installing ADSS overhead cable on existing overhead structures.

From HWY 58 continue east for approximately 52,600 feet installing overhead cable on existing overhead structures. Continue south on Summerset Road for approximately 5,300 feet installing overhead cable on existing overhead structures. Continue east on Community Boulevard for approximately 10,600 feet installing overhead cable on existing overhead structures to Lenwood Road. Continue south for approximately 13,500 feet installing overhead cable on existing overhead structures. Continue south on Sun Valley Drive for approximately 2,000 feet installing overhead cable on existing overhead structures. Continue northeast on the existing SCE Poco 33 kV pole line for approximately 25,000 to Avenue I installing overhead cable on existing overhead structures. Continue south approximately 1,850 feet installing overhead cable on existing overhead structures. Continue south over the Interstate 15 for approximately 425 feet to pole 1847916E on I Street continue south approximately 4,500 feet to Siderite Road installing overhead cable on the existing overhead structures.

From Siderite Road continue east for approximately 1,400feet installing overhead cable on existing overhead structures. Continue northwest on SCE’s existing Kramer-Tortilla 115 kV ROW for approximately 6,100feet installing overhead cable on existing overhead structures to pole 2263364E drop down existing riser, continue east for approximately 500 feet installing underground cable in existing underground conduit to SCE’s Tortilla Substation MEER.

Cable Route, SCE’s Lockhart Substation to AMSP’s Alpha and Beta Power Facilities:

Routing of second diverse path routed fiber-optic cable from Lockhart Substation to AMSP’s Alpha and Beta Power facilities would be dependent on easements and paths provided by Abengoa.

Cable Route, SCE’s Victor Substation to Kramer Substation:

From SCE’s Victor Substation, proceed west from the MEER for approximately 1,200 feet installing underground cable in existing underground conduit rising up on the existing riser pole. Continue west on Palmdale Road for approximately 2,750 feet installing overhead cable on existing overhead structures. Continue north on Hwy 395 for approximately 27,000 feet installing overhead cable on existing overhead structures to Bartlett Avenue. Continue west on Bartlett Avenue for approximately 1800 feet installing overhead cable on existing overhead structures. Continue north on Bellflower Street for approximately 1,000 feet installing overhead cable on existing overhead structures, installing riser on existing pole drop down. Continuing north approximately 1000 feet installing underground cable in new underground conduit, installing riser on existing pole rise up. Continue north on Bellflower Street approximately 4,300 feet installing overhead cable on existing overhead structures. Continue north on Hwy 395 approximately 46,000 feet installing overhead cable on existing overhead structures on SCE ROW. Continue north approximately 100,600 feet installing overhead cable on new overhead structures within SCE ROW on approximately 525 poles to new riser pole at SCE’s Kramer Substation, installing riser drop down. Continue north on SCE ROW installing underground cable in new underground conduit to trench at Kramer substation. Continue approximately 1000 feet installing underground cable in existing underground conduit into MEER building.

Table 8 – Summary of Proposed Telecommunications Fiber Optic Cables Estimates

	Kramer to Lockhart	**Lockhart to Tortilla**	**Victor to Kramer**
Fiber-Optic Cable Length (Proposed)	92,000 ft (18Miles)	164,000 ft (31 miles)	189,000 ft. (36 miles)
Total Length Underground (U.G.)	3,100 ft	1,900 ft.	3,200 ft.
-Existing U.G. Conduits	2,000 ft.	500 ft.	1,200 ft.
-New U.G. Conduits Needed	1,100 ft.	1,400 ft.	2,000 ft.
Total Length Overhead (O.H.)	88,000 ft.	162,000 ft.	185,000 ft.
-Existing O.H.	82,000 ft.	150,000 ft	82,600 ft.
-New O.H.	6,000 ft.	12,000 ft	102,400 ft.
-Existing Poles	250	600	250
-New Poles Required	30	55	525
Time and Resources to Construct (4 men per crew)	38 Crew Days	64 Crew Days	83 Crew Days
Total Man Days Required	152 Man Days	256 Man Days	332 Man Days

Note: These figures may change based upon final engineering.

6.2 Telecommunication System Construction

Construction Activities

SCE would utilize SCE's existing Victor, Roadway, Kramer, Tortilla, and Cool Water Substations as well as SCE's Barstow Service Center and the proposed Lockhart Substation as marshalling yards to support the installation of the telecommunications facilities required for this Project. SCE or contractor crews would use standard construction methods to construct the required fiber optic cables. The crews would comply with all rules, regulations and standards with interdepartments and other agencies while in their performance of the construction phase.

Portions of the fiber optic cable would be constructed on existing overhead distribution and transmission wood and light duty steel poles. In addition, portions of the cable would be constructed on new overhead structures and newly constructed underground conduit system(s), subject to determination through final engineering. This project description is based on planning level assumptions. Exact details would be determined following completion of preliminary and final engineering, identification of field conditions, availability of labor, material, and equipment, and compliance with applicable environmental and permitting requirements.

Generally no hazardous material would be used in installing underground conduit, new wood communication poles, and the stringing of fiber-optic cables. There is generally no need for local services or utilities (such as water). Waste generated (empty cable reels, cut-off pieces of fiber cable) would be disposed of at existing SCE facilities.

Table 9 - Telecommunications Labor Force and Construction Equipment Estimates

Construction Element	Number of Personnel	Equipment Requirements
Cable Construction	4	2 – 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	1 – 5-Ton Forklift (Diesel) 1 – Pick-up (Diesel)
Cleanup	4	2 – Bucket Trucks (Diesel) 1 – Pick-up (Diesel)

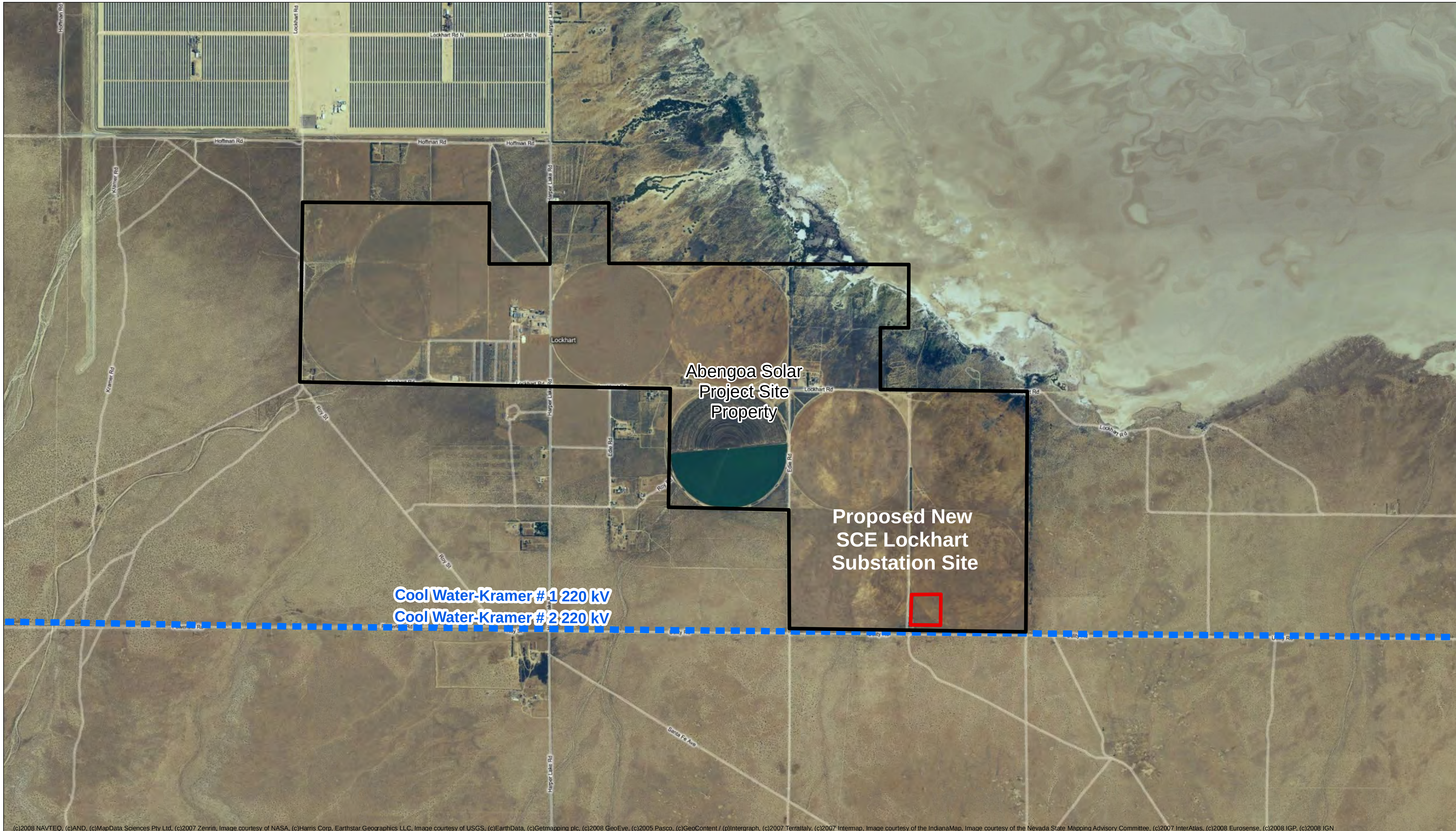

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FIGURE 1
PROPOSED NEW SCE LOCKHART SUBSTATION SITE

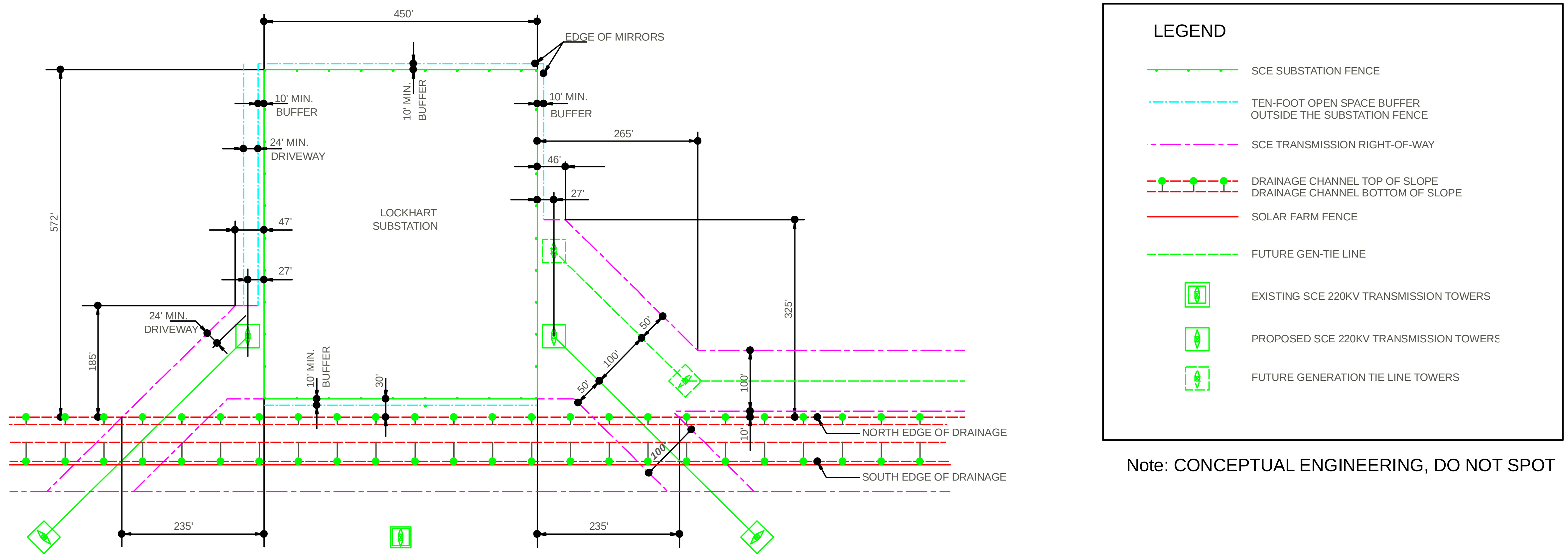
0 0.25 0.5 1 Miles

Features depicted herein are planning level accuracy, and intended for informational purposes only. Distances and locations may be distorted at this scale. Always consult with the proper legal documents or agencies regarding such features.

LEGEND -
- Proposed New SCE Lockhart Substation Site
- Mohave Solar (Abengoa Solar Inc.) Plant Site
- Existing 220kV Transmission Lines (SCE, 2009)

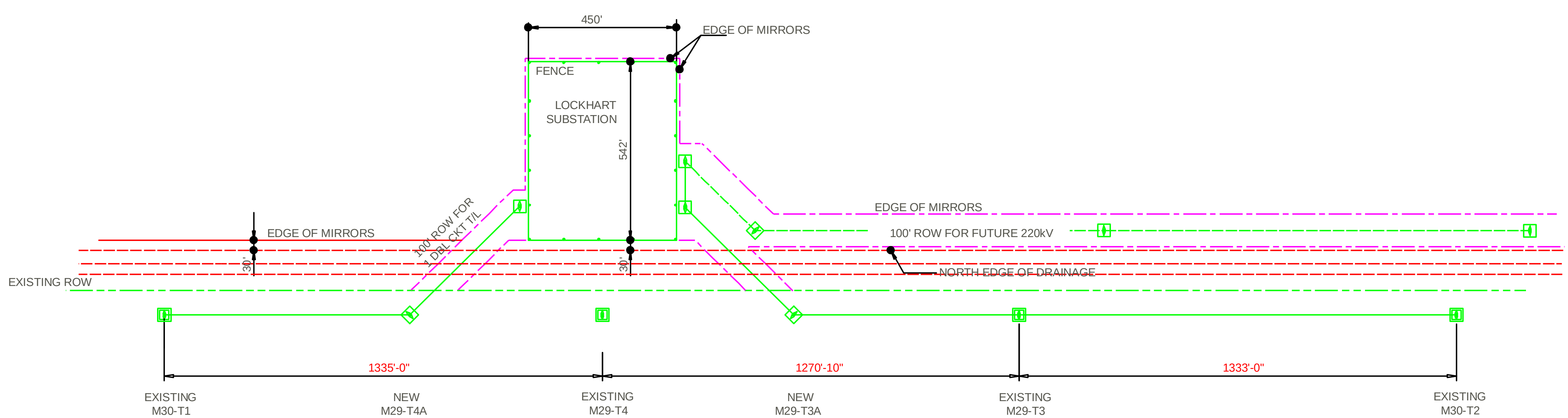
N W E S

P:\GIS\Data\Projects\MasterData\Major Transmission Projects\LockhartProject\2010\OT20081 9625_Interconnection_Maps\Figure 1 - Preferred Substation Site-Property and Alternate Substation Site-Property.mxd 3/12/2010



Note: CONCEPTUAL ENGINEERING, DO NOT SPOT

SUBSTATION DETAILS



SITE PLAN

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FIGURE 2
PROPOSED NEW SCE LOCKHART SUBSTATION AND ASSOCIATED ELECTRICAL LINES

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P:\GISData\Projects\MasterData\Major Transmission Projects\Millennium_Project\2010\OT200819591_Interconnection_Maps\Figure 2 - Substation Site.mxd 3/10/2010

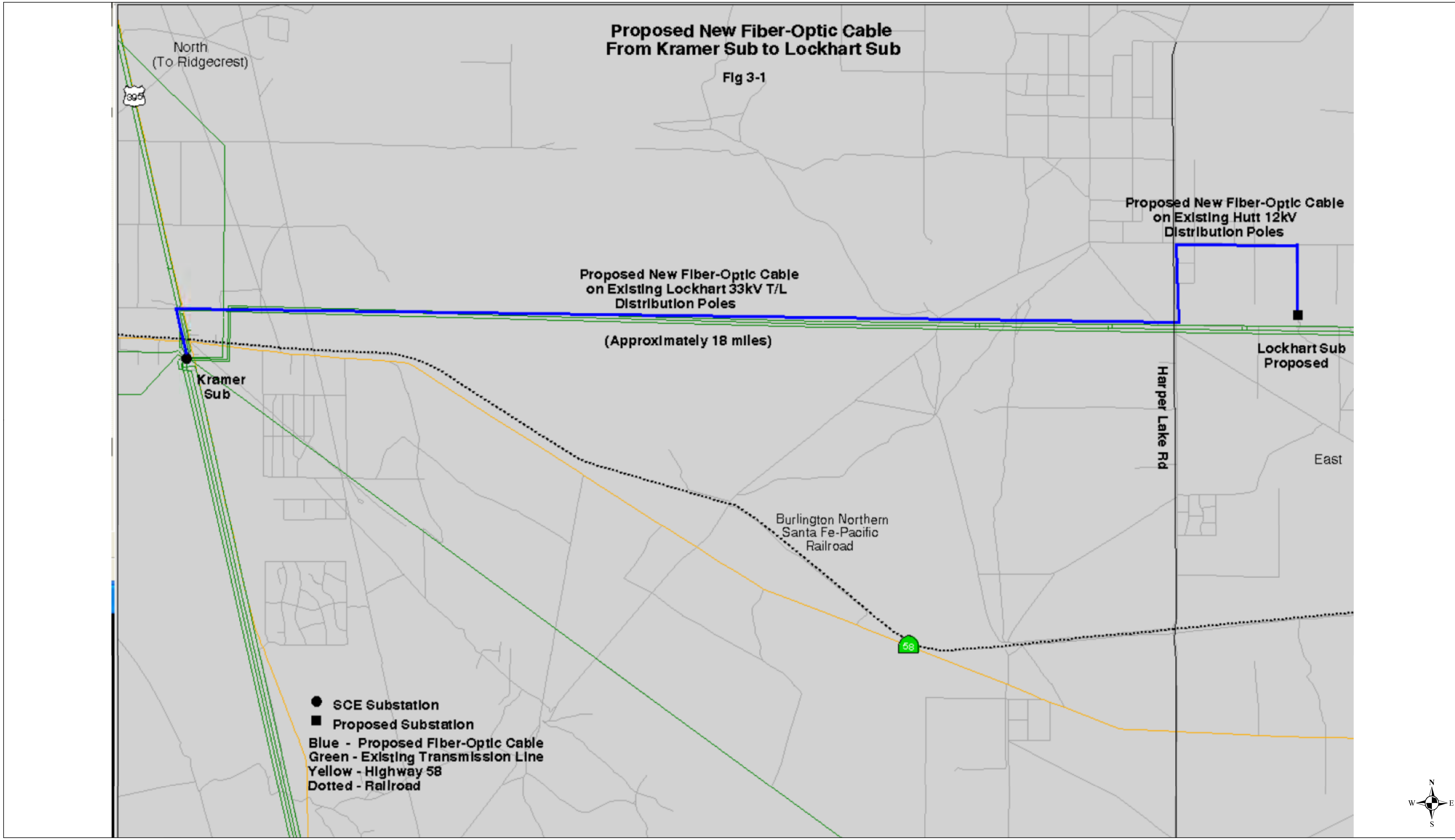

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FIGURE 3-1
PROPOSED NEW TELECOMMUNICATION LINES
CONNECTING KRAMER SUBSTATION
TO NEW LOCKHART SUBSTATION

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LEGEND

- PROPOSED KRAMER SUB TO NEW LOCKHART SUB FIBER OPTIC CABLE
- EXISTING TRANSMISSION LINES
- LOCKHART PROPOSED SITE
- EXISTING SUBSTATION

P:\GISData\Projects\MasterData\Major Transmission Projects\Millennium_Project\2010\NOT200819591_Interconnection_Maps\Figure 3-1 Proposed Telecomm Kramer_Lockhart.mxd 3/11/2010

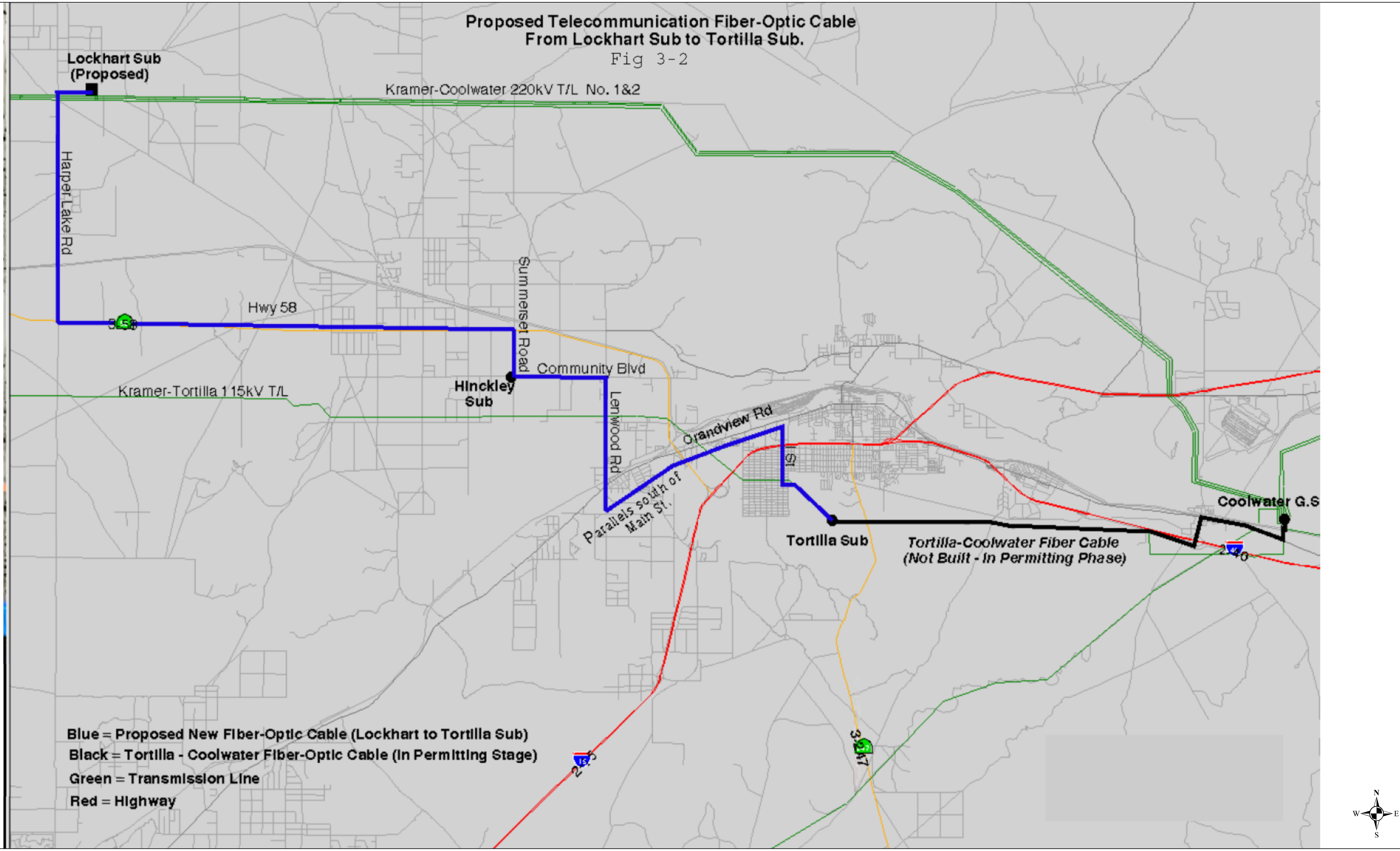

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FIGURE 3-2
PROPOSED NEW TELECOMMUNICATION LINES CONNECTING NEW LOCKHART SUBSTATION TO TORTILLA SUBSTATION

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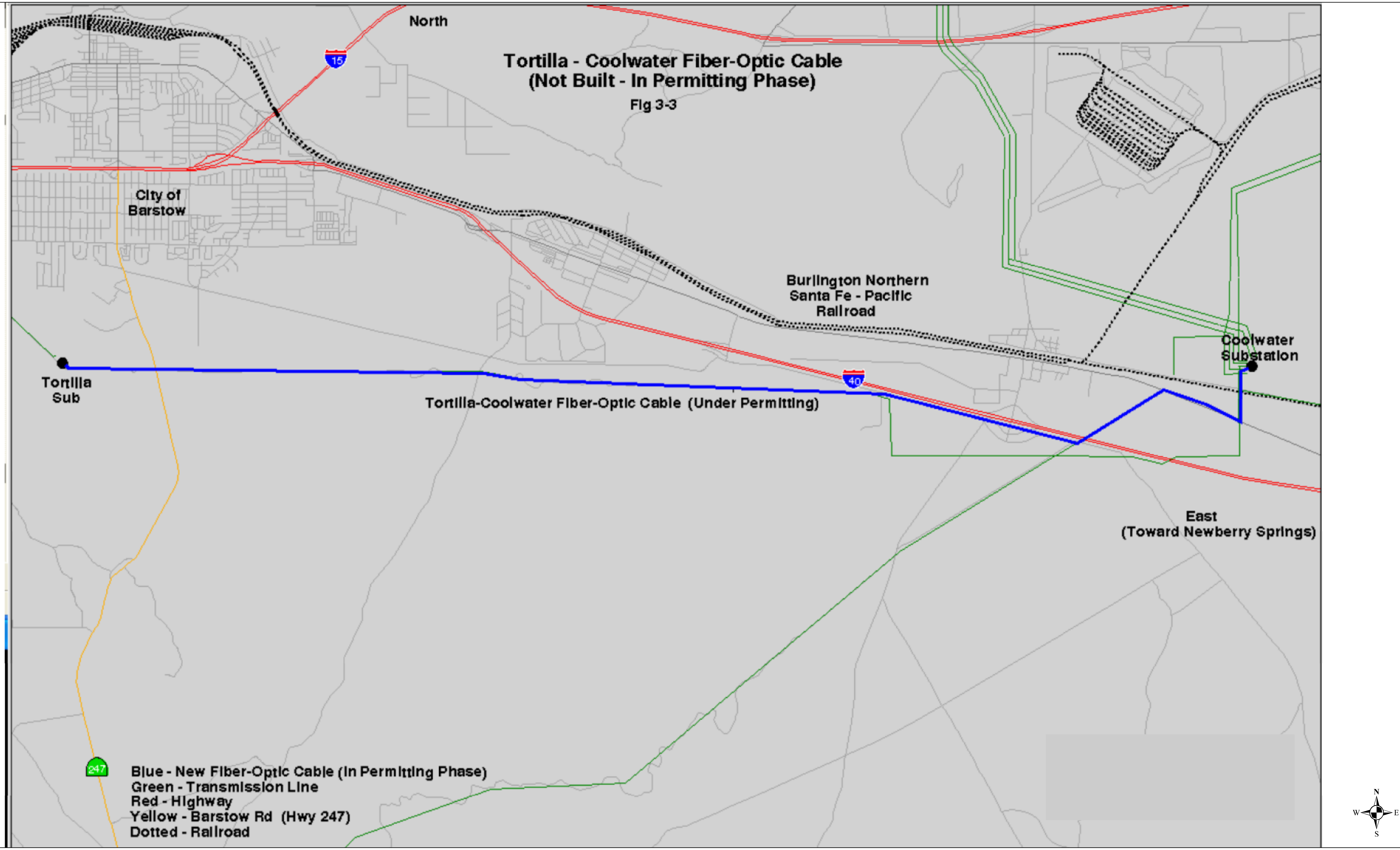
LEGEND
- PROPOSED NEW LOCKHART SUB TO TORTILLA SUB FIBER OPTIC CABLE
- TORTILLA SUB TO COOLWATER SUB FIBER OPTIC CABLE (IN PERMITTING STAGE)
- EXISTING TRANSMISSION LINES
- LOCKHART PROPOSED SITE
- EXISTING SUBSTATION

P:\GIS\Data\Projects\MasterData\Major Transmission Projects\Millennium_Project\2010\NOT200819591_Interconnection_Maps\Figure 3-2 Proposed Telecomm Lockhart_Tortilla.mxd 3/11/2010



P:\GIS\Data\Projects\MasterData\Major Transmission Projects\Millennium_Project\2010\OT200819591_Interconnection_Maps\Figure 3-3 Proposed Tortilla_Coolwater.mxd 3/11/2010

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FIGURE 3-3
TELECOMMUNICATION LINES CONNECTING TORTILLA SUBSTATION TO COOLWATER SUBSTATION (NOT BUILT- IN PERMITTING PHASE)

Features depicted herein are planning level accuracy, and intended for informational purposes only. Distances and locations may be distorted at this scale. Always consult with the proper legal documents or agencies regarding such features.

LEGEND
- TORTILLA SUB TO COOLWATER SUB FIBER OPTIC CABLE (IN PERMITTING STAGE)
- EXISTING TRANSMISSION LINES
- EXISTING SUBSTATION

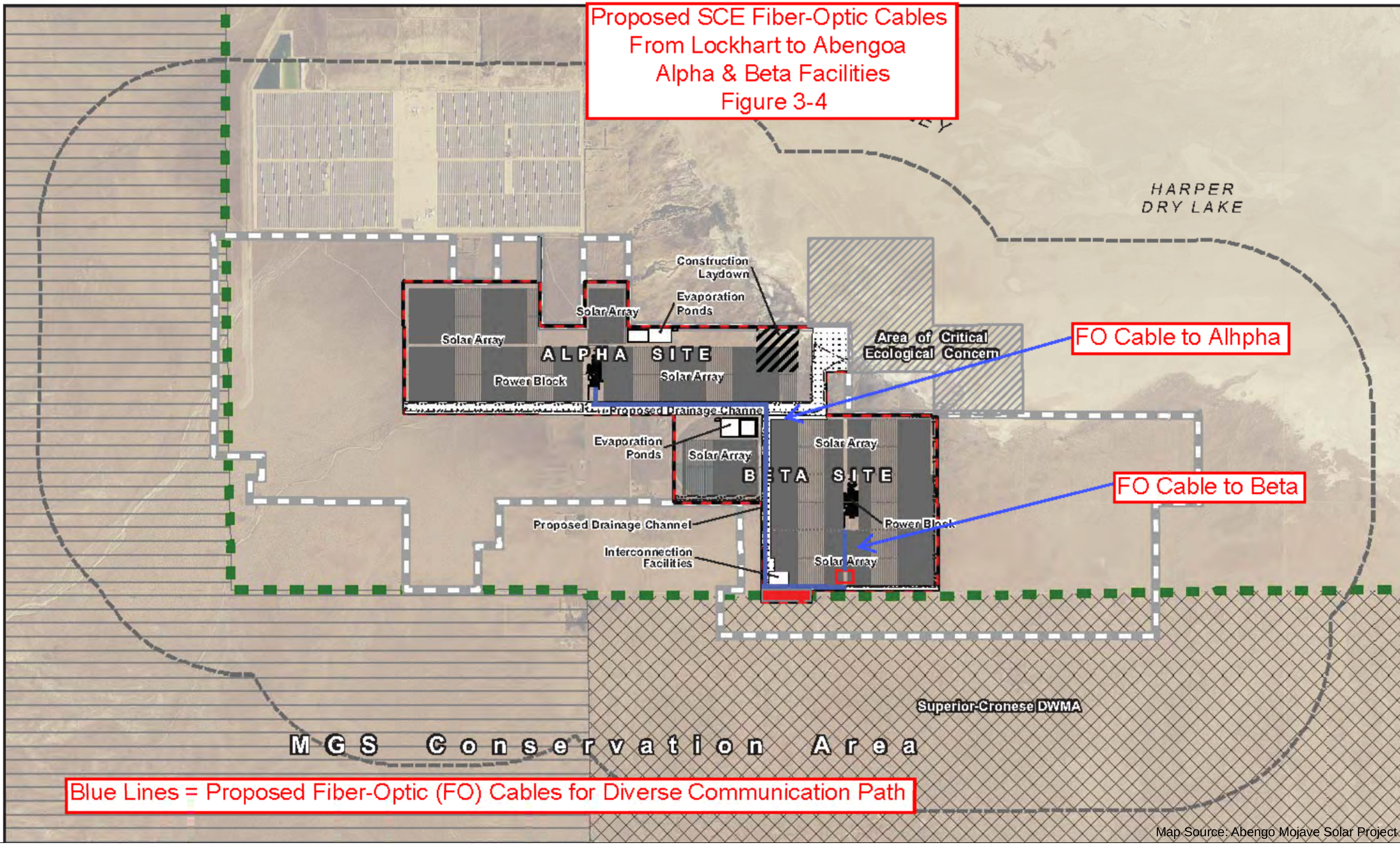

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FIGURE 3-4
PROPOSED NEW TELECOMMUNICATION LINES CONNECTING NEW SCE LOCKHART SUBSTATION TO ABENGOA ALPHA AND BETA FACILITIES

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LEGEND
PROPOSED NEW LOCKHART SUB TO ABENGOA FACILITIES FIBER OPTIC CABLE
LOCKHART PROPOSED SITE

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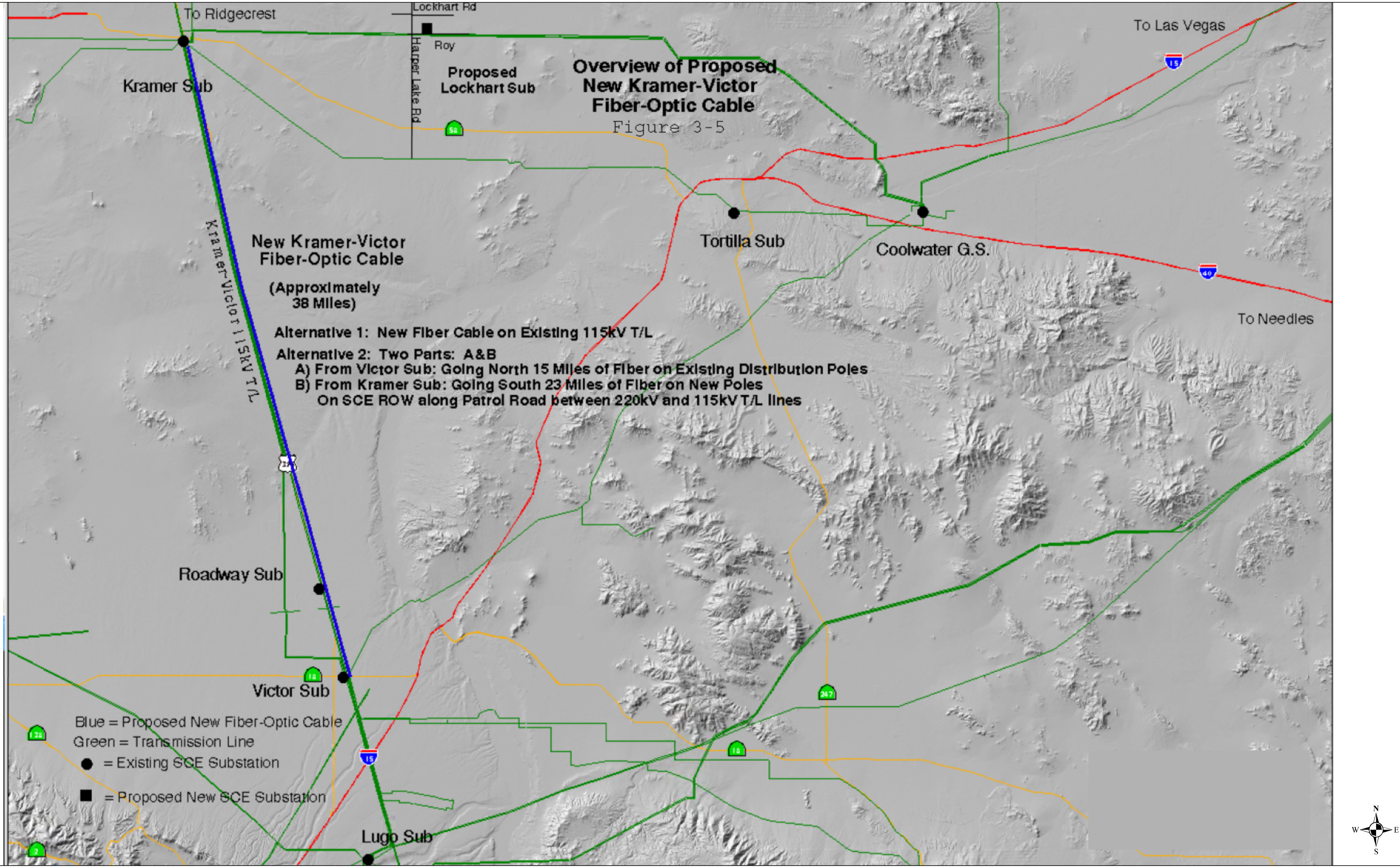

FIGURE 3-5
PROPOSED NEW TELECOMMUNICATION LINES CONNECTING NEW KRAMER SUBSTATION TO VICTOR SUBSTATION

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LEGEND
- PROPOSED NEW KRAMER SUB TO VICTOR SUB FIBER OPTIC CABLE
- EXISTING TRANSMISSION LINES
- ■ LOCKHART PROPOSED SITE
- ● EXISTING SUBSTATION

P:\GISData\Projects\MasterData\Major Transmission Projects\Millennium_Project\2010\NOT200819591_Interconnection_Maps\Figure 3-5 Proposed Telecomm New Kramer_Victor.mxd 3/11/2010

DOUBLE 220KV

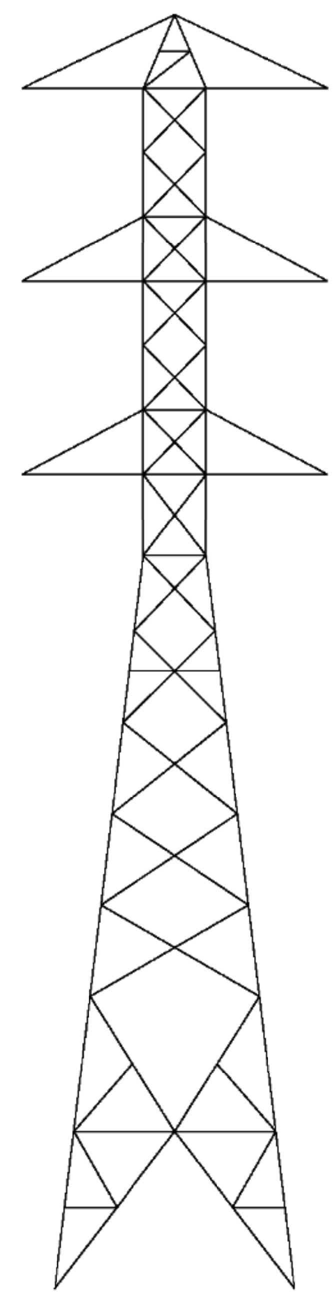

FIGURE 4-1
220KV LATTICE STEEL
TOWER CONFIGURATION

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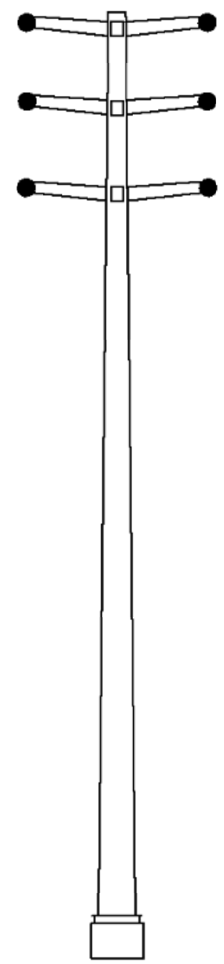
P:\GISData\Projects\MasterData\Major Transmission Projects\LockhartProject\2010NOT200819625_Interconnection_Maps\Figure 4 - 220 kV Lattice Steel Tower Configuration.mxd 3/12/2010

DOUBLE CIRCUIT
220KV TSP



SINGLE CIRCUIT
220KV TSP

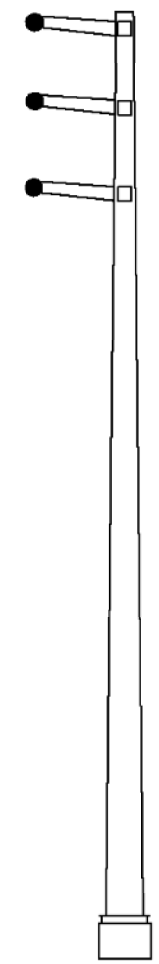


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FIGURE 4-2
220KV TUBULAR STEEL
POLE CONFIGURATION

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P:\GISData\Projects\MasterData\Major Transmission Projects\LockhartProject\2010NOT200819625_Interconnection_Maps\Figure 4-2 220 kV TSP Pole Configuration.mxd 3/12/2010

Typical Pole Heads/Clearance

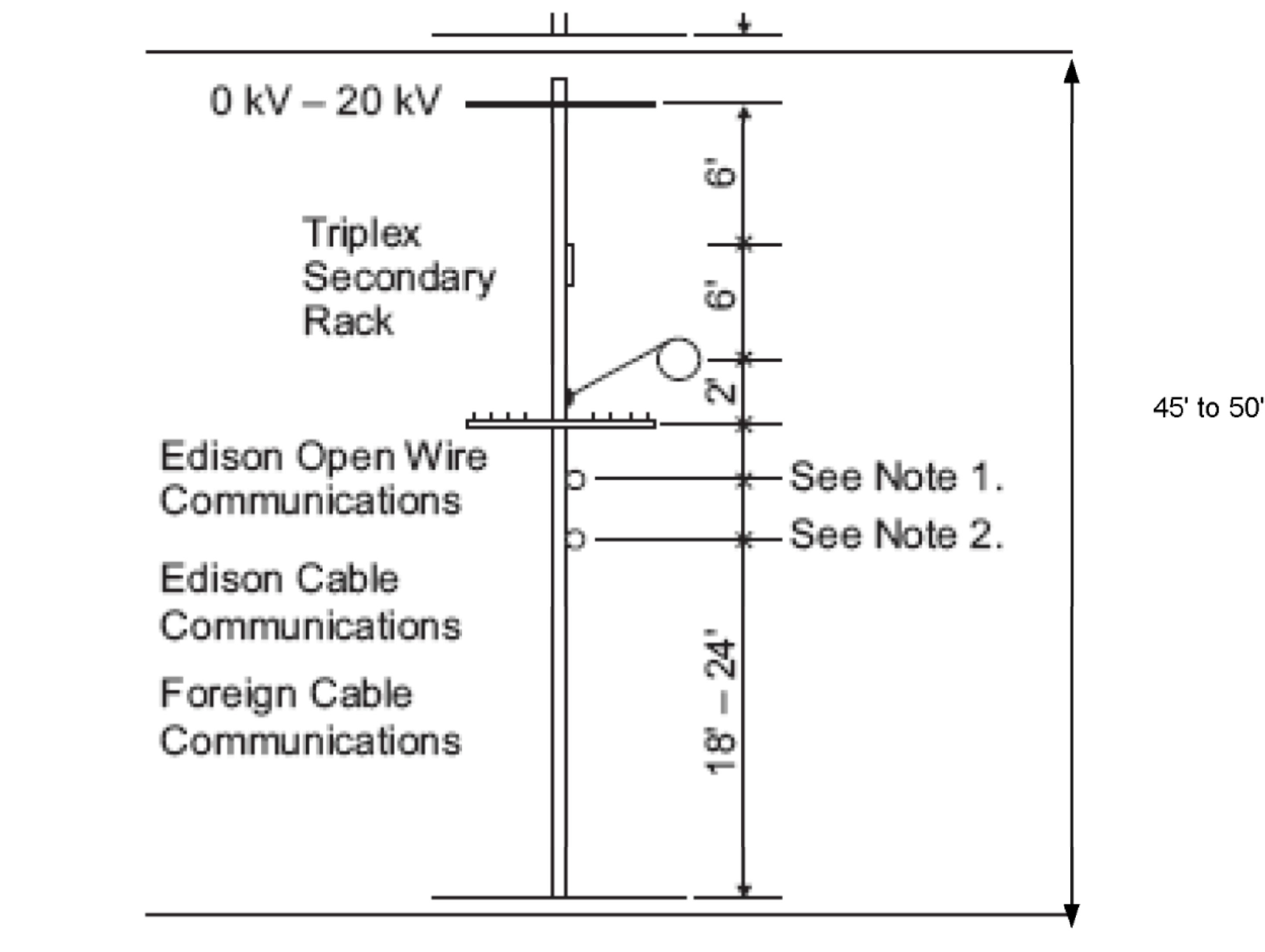

FIGURE 5
POLE CONFIGURATION

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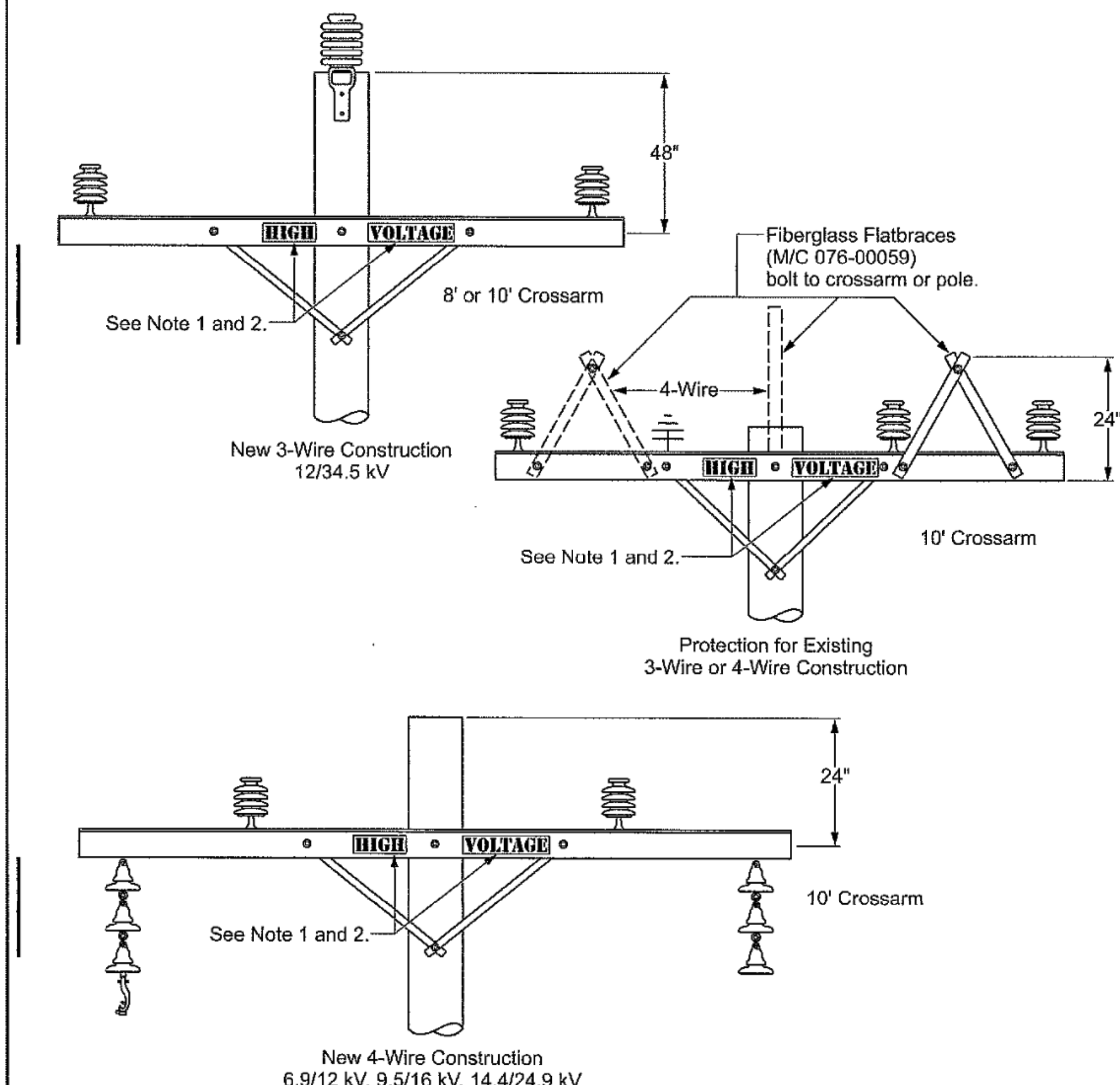
P:\GISData\Projects\MasterData\Major Transmission Projects\LockhartProject\2010NOT200819625_Interconnection_Maps\Figure 5 - Pole Configuration.mxd 3/5/2010

DC 535 Raptor Construction

Scope DC 535.1 Construction for Protection of Bald or Golden Eagles and Other Large, Rare, Predatory Birds

Figure DC 535–1: Raptor Construction



Note(s):

1. HIGH VOLTAGE signs mounted on crossarm are for existing installations only. For new or replacement of deteriorated sign installations, encircle the pole with HIGH VOLTAGE sign per PO 120.

NOTE: If the project is located within a designated raptor area, any new 12 kV distribution line work will be constructed in accordance with SCE's raptor construction standards.

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FIGURE 6
POLE AND CROSSARM CONFIGURATION
WITH RAPTOR GUARD

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P:\GISData\Projects\MasterData\Major Transmission Projects\LockhartProject\2010NOT200819625_Interconnection_Maps\Figure 6 - Pole and crossarm Configuration.mxd 3/10/2010