1: PURPOSE AND NEED

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1.1 PROJECT OVERVIEW

Southern California Edison Company (SCE) proposes to construct the Devers-Mirage 115 kilovolt (kV) Subtransmission System Split Project (referred to as the Proposed Project as summarized below and fully described in Chapter 3). The Proposed Project is necessary to maintain electric system reliability, enhance operational flexibility, and serve projected electrical demand in the cities of Palm Springs, Rancho Mirage, Cathedral City, Palm Desert, Indian Wells, and unincorporated areas of Riverside County, including the Thousand Palms community (Electrical Needs Area), as shown on Figure 1.1: Regional Map and Electrical Needs Area. Construction is scheduled to begin by the second quarter of 2009, or immediately following receipt of all project approvals. The Proposed Project is scheduled to be operational by mid-2010 to ensure that safe and reliable electric service is available to serve customer electrical demand in the Electrical Needs Area.

1.2 PROJECT PURPOSE

The purpose of the Proposed Project is to relieve existing thermal overload conditions on two 115 kV subtransmission lines and to resolve a forecasted voltage problem on the 220 kV transmission system that would exist by 2009. The Proposed Project is needed to continue to provide safe and reliable electric service to customers in the Electrical Needs Area.

Under the rules, guidelines, and regulations of the Federal Energy Regulatory Commission (FERC), North American Electric Reliability Council (NERC), Western Electricity Coordinating Council (WECC), and California Public Utilities Commission (CPUC), electrical transmission, subtransmission, and distribution systems must have sufficient capacity to maintain safe, reliable, and adequate service to customers. The safety and reliability of the systems must be maintained under normal conditions when all facilities are in service as well as under abnormal conditions. Abnormal conditions result from equipment or line failures, maintenance outages, or emergency outages that cannot be predicted or controlled.

SCE utilizes a multi-step planning process to ensure that any necessary system upgrades are developed in time to meet increased electrical demand and to reliably serve such demand. The planning process begins with the development of a peak demand forecast for each substation. Peak demand forecasts are developed using trends in population data, urbanization data, and meteorological data. Technical engineering analyses are then conducted to determine whether the forecast of peak demand can be accommodated on the existing transmission, subtransmission, and distribution systems. System facilities, such as substations and power lines, have defined operating limits. When projections indicate that these limits would be exceeded within an appropriate planning horizon, a project is proposed to keep the electrical system within specified operating limits.

Accordingly, SCE identified the need to split the Devers 115 kV Subtransmission System in its 2003 California Independent System Operator (CAISO) Expansion Plan. SCE also identified the

need to loop the existing Devers-Coachella Valley 220 kV transmission line into Mirage Substation by 2009 in its 2004 CAISO Expansion Plan. SCE received approval from CAISO in 2004 to proceed with the split of the Devers 115 kV Subtransmission System and in 2006 to proceed with the loop of the Devers-Coachella Valley 220 kV transmission line into Mirage Substation. Between 2003 and the present, SCE has taken CAISO-approved steps to mitigate (through the implementation of operating procedures and system modifications) the overload and the reliability issues associated with the Devers 115 kV Subtransmission System. Existing mitigation measures are not sufficient to provide reliable electric service under certain projected base case and abnormal load conditions.

The Proposed Project has two components, splitting the Devers 115 kV Subtransmission System into two systems and looping the Devers-Coachella Valley 220 kV transmission line into Mirage Substation. The first component of the Proposed Project, the system split, is necessary to relieve thermal overload conditions on the existing Mirage-Concho[3] leg of the Devers-Capwind-Concho-Mirage 115 kV subtransmission line and the Mirage-Tamarisk 115 kV subtransmission line. These two 115 kV subtransmission lines are part of the Devers 115 kV Subtransmission System. In addition, the Proposed Project would improve electric system reliability and operational flexibility, as well as relieve electrical demand on the Devers 115 kV Subtransmission System, by splitting the existing Devers 115 kV Subtransmission System between the Devers and Mirage substations into two separate 115 kV subtransmission systems, forming the proposed Devers 115 kV Subtransmission System and the proposed Mirage 115 kV Subtransmission System (see Figure 1.2: Proposed Subtransmission System Split in the Electrical Needs Area).

The second component of this Proposed Project, the loop-in, is necessary to provide voltage support to the 220 kV transmission system to avoid post transient (post-N-2) voltage drops of 10 percent or more of pre-disturbance values (pre-N-2) when a loss of more than one 220 kV transmission line serving the Mirage Substation occurs[4] (See Figure 2.4: New Mirage Subtransmission Area Proposed Project and Alternatives).

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[3] In 2008, the Devers-Capwind-Concho-Mirage 115 kV subtransmission line would be separated into the Devers-Capwind-Mirage 115 kV subtransmission line and the Mirage-Concho 115 kV subtransmission line (2008 Mirage-Concho 115 kV Subtransmission Line), to improve operational flexibility and reliability at Mirage Substation.

[4] The NERC WECC reliability standards state that transmission system post-transient voltage drops should not exceed 10 percent of their pre-disturbance value under a "normal minus two" (N-2) contingency.

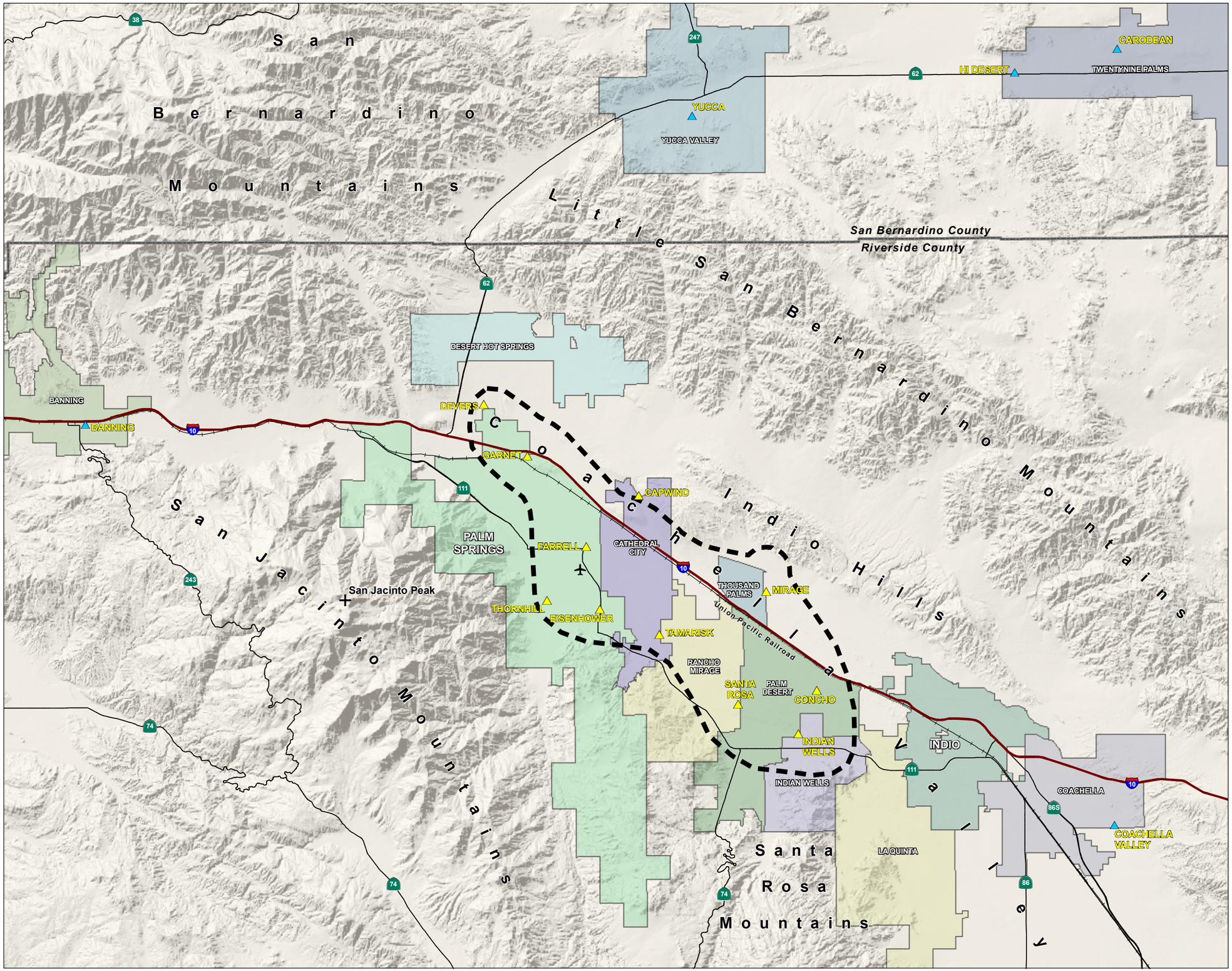

Figure 1.1
Regional Map and
Electrical Needs Area

LEGEND

- Electrical Needs Area
- SCE Substation - Proposed Modifications
- SCE Substation - No Modifications
- County Boundary
- Interstate Highway
- State Highway
- Railroad
- Airport

N

0 2.5 5 10

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.

Project ID: 2006LE7177
Custodian: John Le
Filename: Fig 1.1 Regional Map and Electrical Needs Area_epg.mxd
Date: August 2, 2007

Mapping Prepared by:
Corporate Real Estate Department
Real Estate Operations
Survey and Mapping

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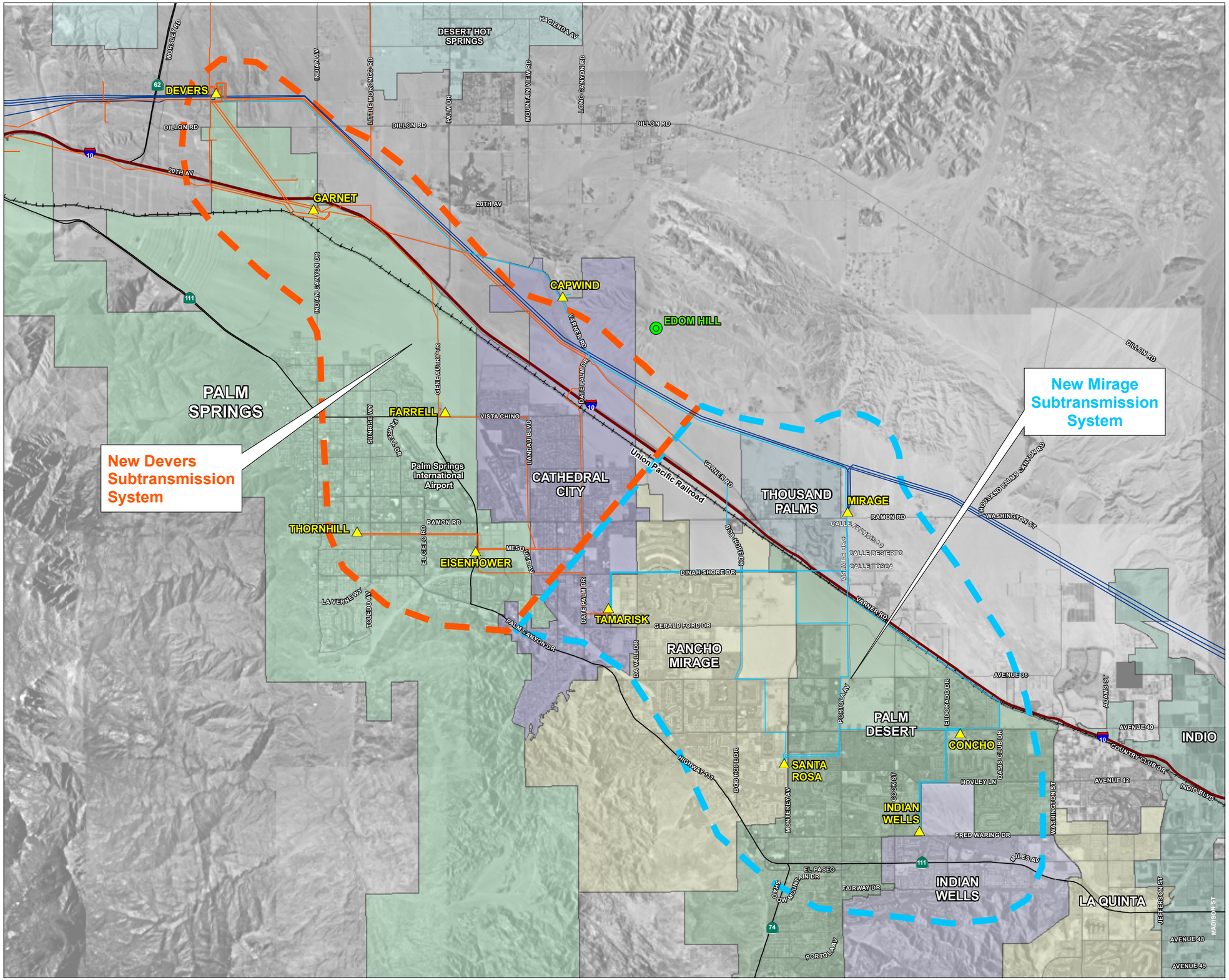

Figure 1.2
Proposed Subtransmission System Split in the Electrical Needs Area

LEGEND

- New Devers Subtransmission System
- New Mirage Subtransmission System
- SCE Substation
- Communication Site
- 115 kV Subtransmission Line - Devers System
- 115 kV Subtransmission Line - Mirage System
- 220 kV Transmission Line
- Interstate Highway
- State Highway
- Major Road
- Railroad

0 1.25 2.5 5
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.© Corporate Real Estate Department, REO-Mapping and GIS.

Project ID: 2006LE7177
Custodian: John Le
Filename: Fig 1.2 Proposed Substransmission System Split in the Electrical Needs Area_epg.mxd
Date: October 9, 2007

Mapping Prepared by:
Corporate Real Estate Department
Real Estate Operations
Survey and Mapping

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1.2.1 Devers 115 kV Subtransmission System Split

The portion of the Proposed Project necessary to accomplish a split of the Devers 115 kV Subtransmission System into the Devers 115 kV Subtransmission System and the Mirage 115 kV Subtransmission System includes the elements described below. Please see Chapter 3: Project Description, for additional detail.

1.2.1.1 Mirage-Santa Rosa, Mirage-Santa Rosa-Tamarisk, Mirage-Capwind-Devers-Tamarisk, and Mirage-Concho 115 kV Subtransmission Lines

Create the Mirage-Santa Rosa, Mirage-Santa Rosa-Tamarisk, Mirage-Capwind-Devers-Tamarisk, and Mirage-Concho 115 kV subtransmission lines in accordance with the following scope-of-work:

- Replace approximately 1,783 feet of the existing Mirage-Tamarisk single-circuit 115 kV subtransmission line with a new, higher capacity double-circuit 115 kV subtransmission line and replace support structures within existing SCE rights-of-way (ROWs) from Mirage Substation to Calle Francisco, in the community of Thousand Palms

- Build a new single-circuit 115 kV subtransmission line on the west side of the existing SCE ROW from Calle Francisco to Calle Desierto (approximately 2,447 feet) on new support structures

- Build a new single-circuit 115 kV subtransmission line on the east side of the existing SCE ROW, from Calle Desierto through the Tri-Palm Country Club golf course (approximately 1,293 feet) on new wood poles

- Replace approximately 2,130 feet of the existing Devers-Capwind-Concho-Mirage 115 kV subtransmission line with a new, higher capacity double-circuit 115 kV subtransmission line and replace support structures within existing SCE ROWs from the Tri-Palm Country Club golf course, to Interstate 10 (I-10)

- Replace an existing single-circuit 115 kV subtransmission wood pole on the northwest corner of Portola Avenue and Gerald Ford Drive, with a new double-circuit tubular steel pole (TSP), located south of I-10, approximately 50 feet north of the existing wood pole at the intersection of Portola Avenue and Gerald Ford Drive in the City of Palm Desert

- Install two new 115 kV subtransmission line positions at Mirage Substation; upgrade two existing 115 kV subtransmission line positions at Santa Rosa Substation; upgrade two existing 115 kV subtransmission line positions at Tamarisk Substation; and upgrade two existing 115 kV subtransmission line positions at Devers Substation

- Replace one 115kV circuit breaker at Tamarisk Substation and replace two 115 kV circuit breakers at Devers Substation

- Transfer existing fiber optic cable to the new support structures from Calle Francisco to Calle Desierto and install fiber optic and digital telecommunications equipment at Concho, Devers, Mirage, Santa Rosa, and Tamarisk substations

- Replace two TSPs, one light-weight steel (LWS) pole, and one wood pole at the intersection of Dinah Shore Drive and Bob Hope Drive with four TSPs, and three LWS poles with three 115 kV pole switches

    - At the northwest corner of Bob Hope Drive and Dinah Shore Drive, replace one TSP with one new LWS pole to obtain the required vertical rise of the existing conductors that would connect to one new TSP.
    - At the southwest corner of Bob Hope Drive and Dinah Shore Drive, replace one wood pole with one new LWS pole to obtain the required vertical rise of the existing conductors that would connect to one new TSP.
    - At the southeast corner of Bob Hope Drive and Dinah Shore Drive, replace one TSP with one new LWS pole to obtain the required vertical rise of the existing conductors that would connect to one new TSP.
    - At the northeast corner of Bob Hope Drive and Dinah Shore Drive, replace one TSP with one new TSP pole to obtain the required vertical rise.
    - Split the existing Garnet-Santa Rosa 115 kV subtransmission line at the intersection of Bob Hope Drive and Dinah Shore Drive by removing the span of wire that connects the southwest and northeast corner poles
    - Split the Santa Rosa-Tamarisk at the same intersection by dead-ending and grounding the Santa Rosa leg at the northwest corner pole
    - Connect the open Tamarisk leg of the former Santa Rosa-Tamarisk 115 kV subtransmission line to the open Garnet leg of the former Garnet-Santa Rosa 115 kV subtransmission line at the northeast corner pole of Bob Hope Drive and Dinah Shore Drive
    - Create the Mirage-Santa Rosa-Tamarisk 115 kV subtransmission line by tapping the former southern segment of the Garnet-Santa Rosa 115 kV subtransmission line to the Mirage-Tamarisk 115 kV subtransmission line at the northwest corner pole
    - Create the reconfigured Mirage-Capwind-Devers-Tamarisk 115 kV subtransmission line by installing a span of conductor between the former north segment of the Garnet-Santa Rosa 115 kV subtransmission line and the former west segment of the Santa Rosa-Tamarisk 115 kV subtransmission line at the northwest corner of Bob Hope Drive and Dinah Shore Drive

- Split the existing Garnet-Santa Rosa 115 kV subtransmission line by dead-ending and grounding the Garnet leg to the new TSP installed east of Date Palm Drive and south of Varner Road
- Connect the existing Devers-Capwind-Mirage 115 kV subtransmission line to the former Santa Rosa leg of the former Garnet-Santa Rosa 115 kV subtransmission line at the new TSP installed east of Date Palm Drive and south of Varner Road to form the reconfigured Mirage-Capwind-Devers-Tamarisk 115 kV subtransmission line

1.2.1.2 Devers-Eisenhower-Thornhill and the Eisenhower-Tamarisk 115 kV Subtransmission Lines

Create the new Devers-Eisenhower-Thornhill and the Eisenhower-Tamarisk 115 kV subtransmission lines by rearranging and modifying the existing Tamarisk-Thornhill and Devers-Eisenhower 115 kV subtransmission line in accordance with the following scope of work:

- Install two TSPs inside Eisenhower Substation.
- Rearrange the existing Tamarisk-Thornhill 115 kV subtransmission line and attach the Tamarisk tap to the switchrack at Eisenhower Substation to create the Eisenhower-Tamarisk 115 kV subtransmission line.
- Attach the Thornhill tap of the existing Tamarisk-Thornhill 115 kV subtransmission line to the existing Devers-Eisenhower 115 kV subtransmission line to create the Devers-Eisenhower-Thornhill 115 kV subtransmission line.
- Upgrade one existing 115 kV subtransmission line position at Devers Substation, upgrade one existing 115 kV subtransmission line at Thornhill Substation, upgrade three existing 115 kV subtransmission lines at Eisenhower Substation, and upgrade one existing 115 kV subtransmission line at Tamarisk substation.
- Replace two 115 kV circuit breakers at Devers Substation and replace three 115kV circuit breakers at Eisenhower Substation.
- Install fiber optic and digital telecommunication equipment at Devers, Eisenhower, Tamarisk, and Thornhill substations.

After the split of the Devers 115 kV Subtransmission System, the following work is necessary to relieve a thermal overload condition that will be created on the newly reconfigured Devers 115 kV Subtransmission System and to maintain transformer emergency loading criteria at Mirage Substation.

1.2.1.3 Farrell-Garnet 115 kV Subtransmission Line

Create the Proposed Farrell-Garnet 115 kV Subtransmission Line (Route 1) in accordance with the following scope-of-work:

- Replace approximately 5.3 miles of the existing Devers-Farrell-Windland[5] single-circuit 115 kV subtransmission line with a new higher capacity double-circuit 115 kV subtransmission line and replace support structures within existing SCE ROWs and

[5] *"Windland" collectively refers to Altwind, Buckwind, Seawest I, Seawest II, Seawest III, and Wintec VI substations.*

franchise locations[6] between the Farrell and Garnet substations in the City of Palm Springs.

- Install a new 115 kV subtransmission line position at Farrell Substation and upgrade an existing 115 kV subtransmission line position at Garnet Substation.

- Install a new circuit breaker at Farrell Substation.

- Transfer existing fiber optic cable to the new double-circuit support structures for approximately 5.3 miles and install fiber optic and digital telecommunications equipment at the Devers, Farrell, and Garnet substations.

1.2.1.4 Mirage 220/115 kV Substation

- Install one new 280 megavolt amperes (MVA) 220/115 kV transformer, two new 220 kV circuit breakers, and five new 115 kV circuit breakers at Mirage Substation.

1.2.2 Devers-Coachella Valley 220 kV Transmission Line Loop-In

The portion of the Proposed Project necessary to resolve a forecasted post-transient voltage problem that would exist by 2009 on the Devers 220 kV Transmission System and interconnected Imperial Irrigation District (IID) and Metropolitan Water District (MWD) facilities includes the following elements:

1.2.2.1 Devers-Coachella Valley 220 kV Loop-In at Mirage Substation

The Proposed Devers-Coachella Valley 220 kV Loop-In at Mirage Substation would include the work described below. Please see Chapter 3: Project Description, for additional detail.

- Loop the existing Devers-Coachella Valley 220 kV transmission line into the Mirage Substation along the existing ROW, for approximately 0.8 mile, on double-circuit lattice steel towers (LSTs), forming the new Devers-Mirage No. 2 and Mirage-Coachella Valley 220 kV transmission lines in accordance with the following scope of work.

    - Install approximately 7,240 feet of single-circuit 220 kV transmission line on eight new, double-circuit LSTs. The new LSTs would be strung with single 1,033 thousand circular mil (kcmil) aluminum-stranded conductors with a steel-stranded reinforced core (ACSR) conductors on new polymer insulators.

    - Remove 4 LSTs and 3,770 feet of existing single-circuit 220 kV transmission line in or near the existing Devers-Coachella Valley 220 kV transmission line ROW north of the Mirage Substation.

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[6] *The term franchise location is used to refer to public street ROWs where SCE has a franchise agreement with the local governmental agency.*

- Install one new TSP and 1,000 feet of single-circuit 220 kV transmission line at Mirage Substation and rearrange the Julian Hinds 220 kV transmission line from the existing LSTs on the west side of the approximately 0.8-mile ROW to existing LSTs on the east side of the approximately 0.8-mile ROW.

- Install 1,540 feet of single-circuit 220 kV transmission line and remove 820 feet of single-circuit 220 kV transmission line between the 220 kV switchrack located inside Mirage Substation and the three LSTs and one TSP adjacent to the north fence of Mirage Substation.

- Install two new 220 kV transmission line positions at Mirage Substation.

- Install three new 220 kV circuit breakers at Mirage Substation.

- Install digital telecommunications equipment within existing SCE building facilities at Edom Hill Communications Site, Mirage Substation, and Devers Substation.

1.3 PROJECT NEED

Currently, the Devers 115 kV Subtransmission System is served by the Devers and Mirage substations' 220/115 kV transformers. The 115 kV subtransmission lines from Devers and Mirage substations serve the distribution substations in the Electrical Needs Area (See Figure 1.2: Proposed Subtransmission System Split in the Electrical Needs Area). As discussed below, the current 115 kV subtransmission line configuration of the Devers 115 kV Subtransmission System cannot reliably accommodate existing and projected peak customer demand because of the thermal overload conditions on the 2008 Mirage-Concho and Mirage-Tamarisk 115 kV subtransmission lines.

Additionally, by 2009, the Devers 220 kV Transmission System would not be able to meet NERC and WECC reliability standards under N-2 conditions.[7] As projected, under an N-2 condition, potential voltage collapse and post transient voltage violations in the Devers 220 kV Transmission System and at interconnected IID and MWD facilities would occur. Therefore, the Proposed Project is needed to provide reliable electric service.

1.3.1 Electrical Demand Growth and Reliability

SCE transmission studies forecast that the subtransmission system facilities in the Electrical Needs Area would experience reliability problems in 2007, without additional facility upgrades. Based on historical growth trends and known residential, commercial, and industrial developments either under construction or planned, SCE projects that the peak demand, adjusted for a 1-in-5 year heat storm, on the Devers 115 kV Subtransmission System would

[7] *The NERC and WECC reliability standards state that transmission system post transient voltage drops should not exceed 10 percent of their pre-disturbance value under an N-2 contingency.*

increase from 1003 MVA in 2007 to 1,151 MVA by 2017 (an average annual compound growth rate of 2.22 percent).[8] This projected electrical demand would not exceed the operating limits of the transformers currently serving the Devers 115 kV Subtransmission System under normal operating conditions. However, as discussed below, loading on two 115 kV subtransmission lines due to customer demand and the higher power flow on the 220 kV system, which migrates onto the 115 kV subtransmission lines (220 kV power flow), creates the need to split the load on the Devers and Mirage substations at the 115 kV subtransmission level.

The existing Devers 115 kV Subtransmission System serves approximately 150,000 metered customers and is bounded to the north by SCE's service territory (Yucca Valley area), to the south by the San Bernardino National Forest (Mt. San Jacinto State Park and Agua Caliente Reservation land), to the west by SCE's service territory, and to the east by the Imperial Irrigation District's utility service territory. The Devers 115 kV Subtransmission System is composed of the Devers and Mirage 220/115 kV substations and connecting subtransmission and distribution facilities. The Devers and Mirage substations are connected to one another through SCE's 220 kV transmission network and are interconnected at the 115 kV subtransmission level by and through 10 existing 115 kV substations, which are Concho, Devers, Eisenhower, Farrell, Garnet, Indian Wells, Mirage, Santa Rosa, Tamarisk, and Thornhill (See Figure 1.2: Proposed Subtransmission Split in the Electrical Needs Area).

Currently, the Mirage-Tamarisk 115 kV subtransmission line does not have adequate capacity to serve the load during customer peak-demand periods under abnormal conditions. The Mirage-Concho leg of the existing Devers-Capwind-Concho-Mirage 115 kV subtransmission line does not have adequate capacity to serve the load during customer peak-demand periods under normal and abnormal conditions. These 115 kV subtransmission line thermal overload conditions are discussed in more detail below.

Additionally, the amount of electrical load required by the Electrical Needs Area that can be served by the 220/115 kV transformers from the Devers and Mirage substations is limited by their designed operating limits (see Table 1.3-1: Projected Line Loadings for 220/115 kv Lines Under Normal Conditions, below, for line capacity ratings of 220/115 kV lines and projected line loadings, in amperes, for all 115 kV subtransmission lines modified by the Proposed Project under normal conditions in a 1-in-10 year heat storm from 2008 to 2017.). Once the Devers 115 kV Subtransmission System is split into two separate subtransmission systems, a need to install an additional 220/115 kV transformer at Mirage Substation would exist to maintain transformer emergency loading criteria in the event one of the existing transformers is unavailable to transform power at Mirage Substation. This required element of the Proposed Project is discussed in more detail below.

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[8] Percent growth rate was adjusted to exclude the transfer of the Banning Substation to the proposed El Casco 220/115kV system in 2010.

TABLE 1.3-1 PROJECTED LINE LOADINGS FOR 220/115 KV LINES UNDER NORMAL CONDITIONS											
Transmission/ Subtransmission Line	**Line Capacity Ratings Normal/ Emergency**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**
Devers-Coachella 220kV	1030/1030	227	231	227	221	217	215	211	209	204	200
Devers-Eisenhower 115kV	885/1190	514	503	548	555	571	581	595	598	606	615
Devers-Mirage 220kV	1296/1745	271	265	294	322	342	356	365	378	387	399
Garnet-Santa Rosa 115kV	920/1200	472	519	550	539	555	563	569	578	587	596
Mirage-Concho 115 kV	920/1200	1105	1116	1176	1089	1127	1167	1184	1214	1237	1259
Mirage-Tamarisk 115kV	1090/1471	1022	986	1038	968	994	1011	1028	1040	1056	1073
Santa Rosa-Tamarisk 115kV	798/1014	308	358	368	332	342	347	348	357	361	366
Tamarisk-Thornhill 115kV	592/758	224	203	206	211	209	207	201	193	179	165

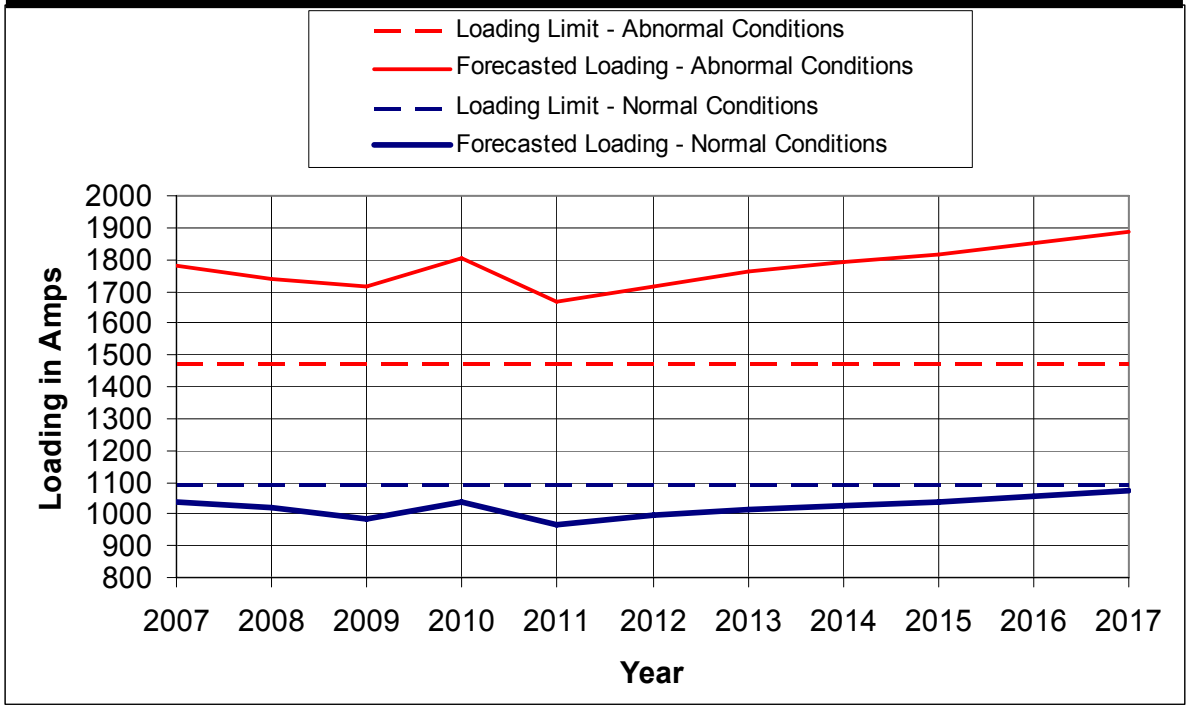
Furthermore, by 2009, the Devers 220 kV Transmission System is projected to experience post transient voltage drops of more than 10 percent of pre-disturbance values under N-2 conditions. This condition would require voltage support in the form of a 220 kV transmission line loop-in to Mirage Substation. This required element of the Proposed Project is discussed in more detail below.

1.3.1.1 Mirage-Tamarisk 115 kV Subtransmission Line Loading

The Mirage-Tamarisk 115 kV subtransmission line is currently rated at 1,090 amps under normal conditions and 1,471 amps under abnormal conditions. Under normal conditions, this projected line loading[9] is 1,039 amps in 2007 and 1,073 amps in 2017, but it is projected to increase to 1,783 amps in 2007 and 1,886 amps in 2017 under abnormal conditions. As shown in Figure 1.3: Forecasted Loading of Existing Mirage-Tamarisk 115 kV Subtransmission Line under Normal and Abnormal Conditions, the thermal overload condition under abnormal conditions is projected to persist through 2017.

[9] The projected line loading represents the customer demand in a 1-in-10 year heat storm. A 1-in-10 year heat storm is defined as a period of extreme heat when the temperature exceeds the 10-year average of peak temperature.

Figure 1.3: Forecasted Loading of Existing Mirage-Tamarisk 115 kV Subtransmission Line Under Normal and Abnormal Conditions



The Tamarisk Substation is one of the four substations in the southeast portion of the Electrical Needs Area that is experiencing much of the load growth activity, along with the Concho, Indian Wells, and Santa Rosa substations. The Mirage-Tamarisk 115 kV subtransmission line is at its maximum conductor size, which is 954 Stranded Aluminum Conductor (SAC), and future load growth is forecasted to impact this subtransmission line under abnormal operating conditions. Thus, SCE would continue to implement operating procedures[10] until the Proposed Project becomes operational, to reduce the risk of load-dropping due to 115 kV subtransmission line thermal overloads during peak customer demand periods, primarily during summer. Accordingly, the Proposed Project is necessary to relieve the thermal overload condition during heavy load conditions on the Mirage-Tamarisk 115 kV subtransmission line and to satisfy SCE's planning guidelines.

[10] *These operating procedures typically include dropping of area load during overload conditions and are not consistent with SCE's planning guidelines. Planning guidelines are established by SCE to provide a basis for designing a safe and reliable transmission system using methodologies and procedures approved by SCE's Grid Planning Committee.*

1.3.1.2 Mirage-Concho 115 kV Subtransmission Line Loading

In 2008, the Mirage-Concho leg of the Devers-Capwind-Concho-Mirage 115 kV subtransmission line (see Figure 1:4: Existing Devers 115 kV Subtransmission System [2007]) peaked at 854 amperes during periods of customer peak demand. This is below the 920 amperes rating for the line under normal conditions. The ratings of the existing Mirage-Concho leg of the Devers-Capwind-Concho-Mirage 115 kV subtransmission line for normal and abnormal conditions are 920 amps and 1,200 amps, respectively. The projected line load of the 2008 Mirage-Concho 115 kV subtransmission line under normal conditions is 1,105 amps in 2008 and 1,259 amps in 2017. For abnormal conditions, the projected line load is 1,619 amps in 2008 and 1,790 amps in 2017 (see Figure 1.5a: Forecasted Loading of the 2008 Mirage-Concho 115 kV Subtransmission Line Under Normal and Abnormal Conditions). Also, the combined loading at Santa Rosa, Indian Wells, and Concho substations further contributes to the thermal overload condition on the 2008 Mirage-Concho 115 kV subtransmission line.

In 2008, the Devers-Capwind-Concho-Mirage 115 kV subtransmission line would be separated into the Devers-Capwind-Mirage and the Mirage-Concho 115 kV subtransmission lines (see Figure 1.5b: Devers 115 kV Subtransmission Line System [2008]). This work would create additional operating flexibility, for 2 years, allowing the use of one of the 220/115 kV Mirage Substation transformers, but would not provide the necessary relief on the subtransmission conductor during peak customer demand. In order to mitigate these thermal overload conditions until the Proposed Project is operational, SCE has operating procedures planned to reduce the risk of load dropping due to 115 kV subtransmission line thermal overloads during heavy load-conditions.

Accordingly, to reduce the existing and projected loading to within the normal and abnormal limits on the 2008 Mirage-Concho 115 kV subtransmission line within SCE's existing planning horizon, a new subtransmission line connecting the Mirage and Santa Rosa substations (Proposed Mirage-Santa Rosa 115 kV Subtransmission Line) and a separation of the Devers 115 kV Subtransmission System into two separate 115 kV subtransmission systems (the reconfigured Devers 115 kV and new Mirage 115 kV subtransmission systems) are necessary (see Figure 1.6: Proposed Devers and Mirage 115 kV Subtransmission Systems [2010]).

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Figure 1.4: Existing Devers 115 kV Subtransmission System (2007)

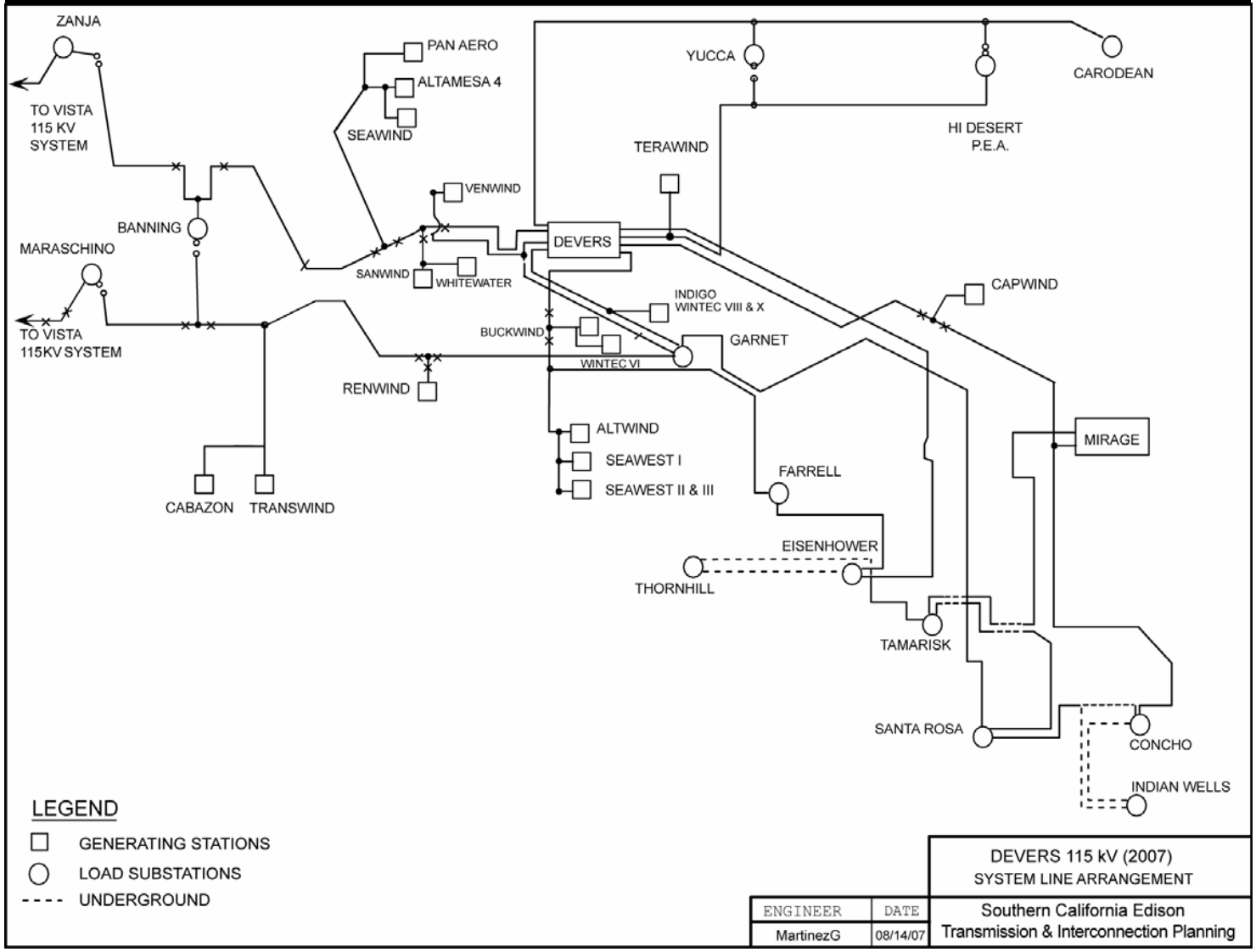

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Figure 1.5a: Forecasted Loading of the 2008 Mirage-Concho 115 kV Subtransmission Line Under Normal and Abnormal Conditions

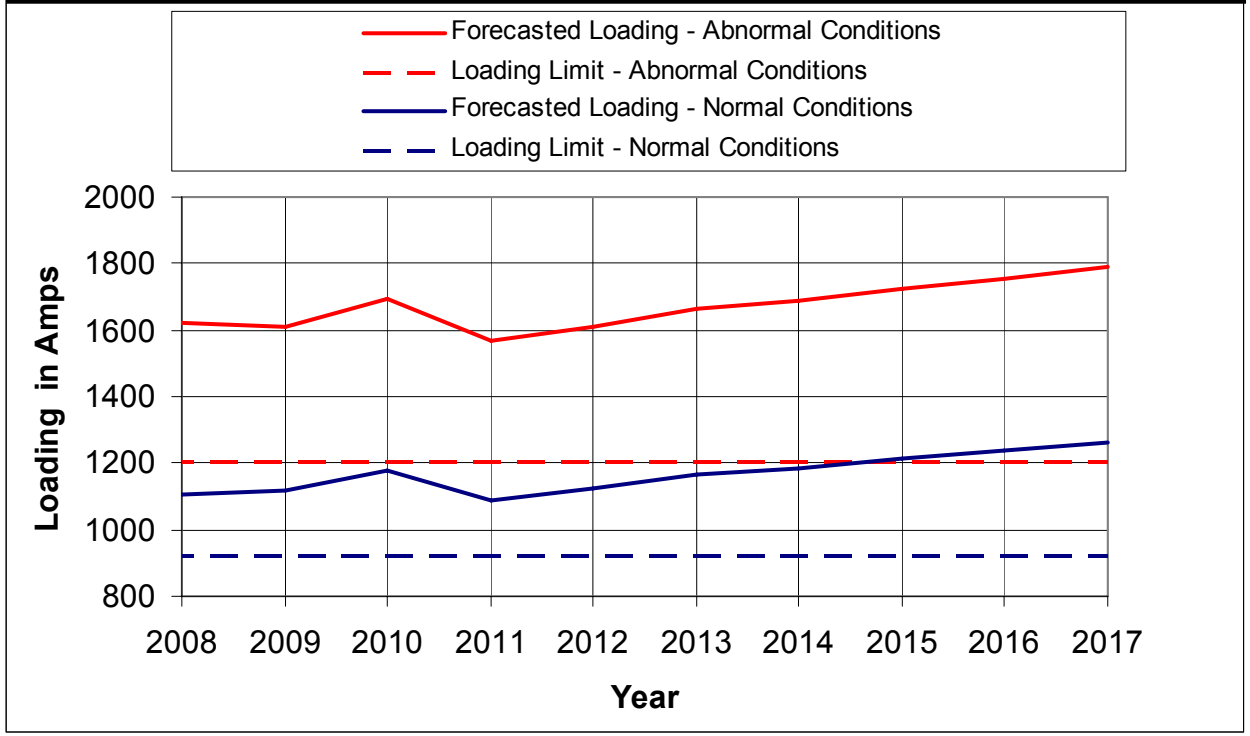

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Figure 1-5b: Devers 115 kV Subtransmission System (2008)

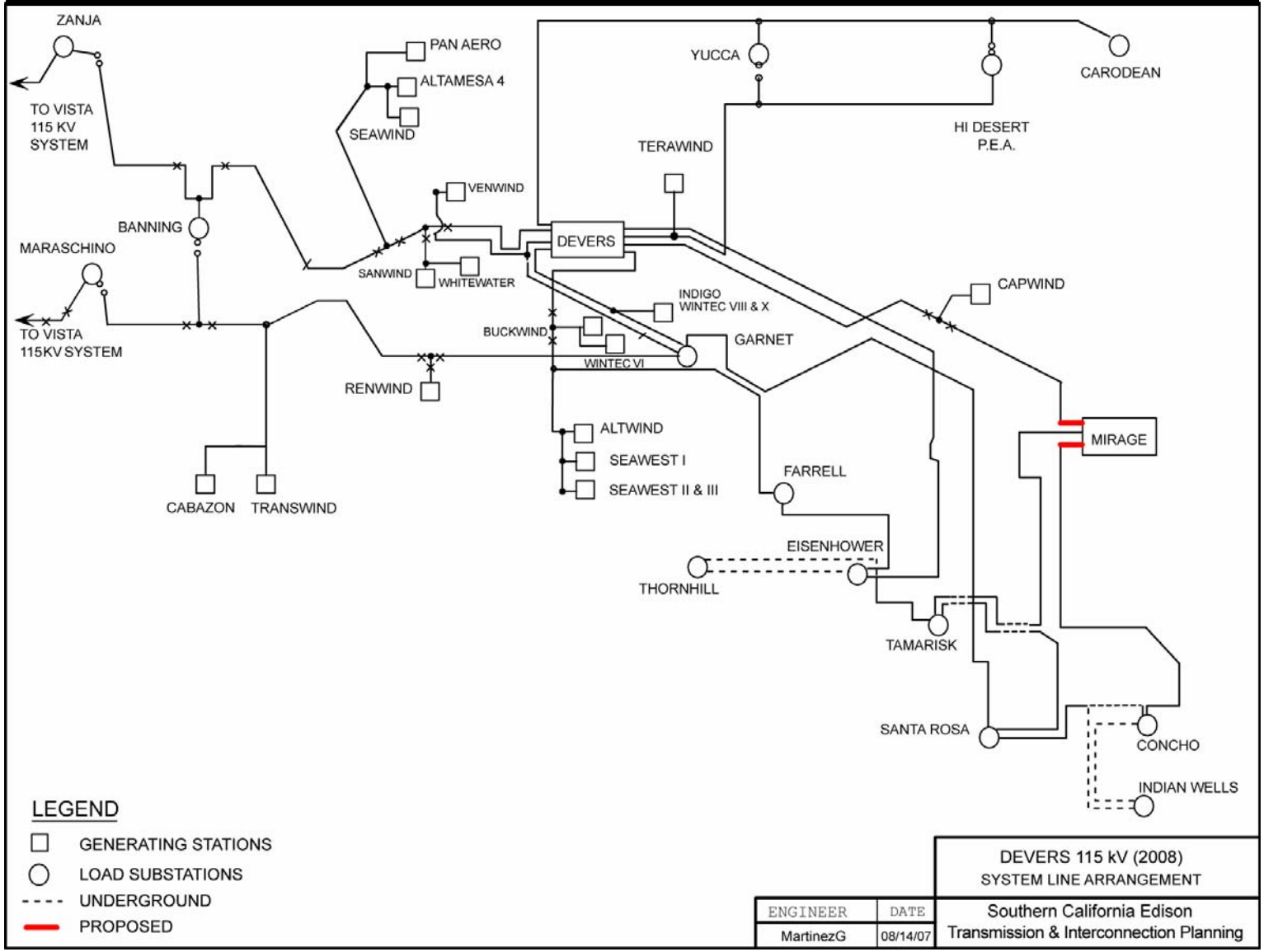

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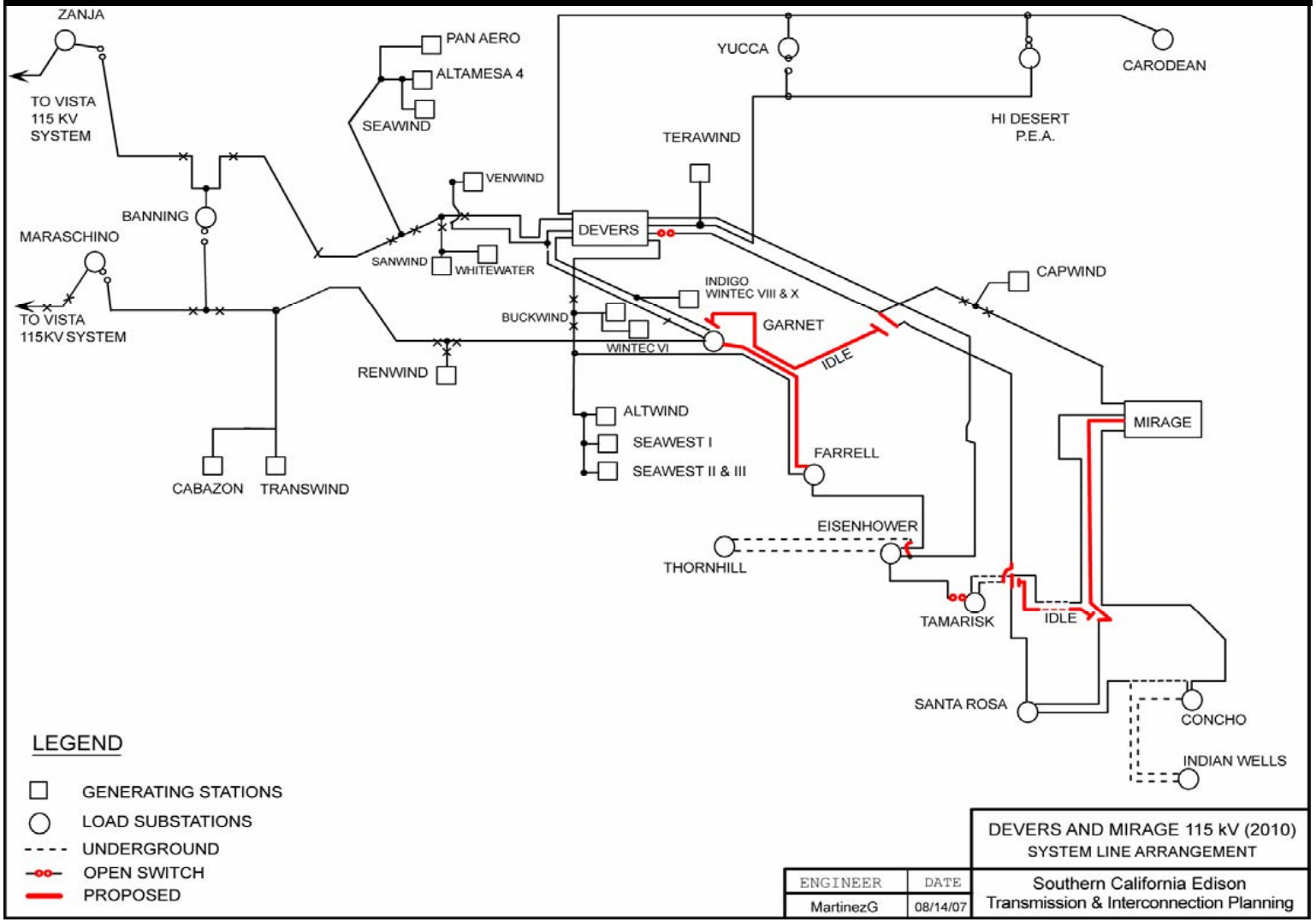
Figure 1.6: Proposed Devers and Mirage 115 kV Subtransmission Systems (2010)



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1.3.2 Devers 115 kV Subtransmission System Split

1.3.2.1 Transmission Power Flow Contribution to Overloads

Beginning in 2007, the Devers 115 kV Subtransmission System reliability is affected by projected line thermal overloads[11] on two 115 kV subtransmission lines: the Mirage-Tamarisk 115 kV subtransmission line and the Mirage-Concho leg of the existing Devers-Capwind-Concho-Mirage 115 kV subtransmission line. The overloads on these lines are caused by the combination of two existing conditions:

- Periods of peak customer demand
- 220 kV power flow on the interconnected 115 kV subtransmission lines

When peak customer demand (during a 1-in-10 year heat storm) under normal and abnormal operating conditions exceeds the maximum operating limits of the two affected subtransmission lines (Mirage-Tamarisk 115 kV subtransmission line and the Mirage-Concho leg of the existing Devers-Capwind-Concho-Mirage 115 kV subtransmission line), SCE is required to implement operating procedures to redistribute load that may result in power outages in the communities that are served by one or more of these subtransmission lines. Accordingly, when this adjusted peak demand exceeds the maximum operating limits of the existing electrical facilities, SCE's planning criteria require that a project be proposed to keep the electrical system within specified loading limits.

In addition to peak customer demand, 220 kV power flow also affects system reliability. Since the Devers 115 kV Subtransmission System is physically connected through the Devers and Mirage substations, power flow from the 220 kV transmission systems also flows between the two substations through the many 115 kV subtransmission lines that interconnect the distribution substations (Concho, Eisenhower, Farrell, Garnet, Indian Wells, Santa Rosa, Tamarisk, and Thornhill substations). The transmission power flow on the 220 kV transmission lines serving the Mirage Substation contribute to the existing and projected thermal overloads on the Mirage-Tamarisk and the 2008 Mirage-Concho 115 kV subtransmission lines. For every 100 amps of increased flow on a particular 220 kV line at the Mirage Substation, the 2008 Mirage-Concho 115 kV subtransmission line loading increases by 9 amps for normal conditions and 13 amps for abnormal conditions. When the power flow on the same 220 kV transmission line increases by 100 amps, the Mirage-Tamarisk 115 kV subtransmission line loading increases by 13 amps for normal conditions and 16 amps for abnormal conditions.

In conjunction with resolving the thermal overload conditions on the Mirage-Tamarisk and the 2008 Mirage-Concho subtransmission lines, the design of two separate subtransmission systems for improved system operations and flexibility creates a thermal overload condition on the Eisenhower-Thornhill 115 kV subtransmission line that must be resolved to reliably serve the customer demand in the Electrical Needs Area. Accordingly, the need to install another line, named the Proposed Farrell-Garnet 115 kV Subtransmission Line, is discussed below.

[11] *Line overloads occur when the power flow on a line exceeds the rated capacity of its conductor size.*

1.3.2.2. Need for Proposed Farrell-Garnet 115 kV Subtransmission Line

Under this split configuration, the Devers section of the Devers-Eisenhower-Thornhill 115 kV subtransmission line is projected to load up to 1,275 amps for abnormal conditions in 2009, which is 85 amps above its emergency limit of 1,190 amps. In order to relieve thermal overload on the Devers-Eisenhower-Thornhill 115 kV subtransmission line, a new Proposed Farrell-Garnet 115 kV Subtransmission Line is needed to provide a direct path that allows power to flow from the source (Devers Substation) to the Farrell, Eisenhower, and Thornhill substations.

The Proposed Project provides a direct path from Garnet Substation to Farrell Substation that eliminates the power flow from Garnet Substation to Santa Rosa Substation, and creates a new path for power flow from Devers to Thornhill Substation. This would create a balanced power flow between Devers Substation and the distribution substations (Eisenhower, Farrell, Garnet and Thornhill substations) (see Figure 1.6: Proposed Devers and Mirage 115 kV Subtransmission Systems [2010]).

1.3.2.3 Need for Third Mirage 220/115 kV Transformer

Both the Devers and Mirage substations reduce voltage from 220 kV to 115 kV using five 280 MVA 220/115 kV transformers. Three transformers are at Devers Substation, and two transformers are at Mirage Substation. The amount of electrical load that can be served in the Electrical Needs Area (see Figure 1.2: Proposed Subtransmission System Split in the Electrical Needs Area) is limited to the maximum amount of electrical power that these five transformers can deliver before exceeding their designed operating limits. Operating limits are established to ensure that SCE maintains the required capacity and operational flexibility to safely and reliably meet the projected peak electrical demands during periods of extreme heat under both normal and abnormal conditions. Based on these factors, the capacity of the existing Devers 115 kV Subtransmission System is limited to approximately 1,247 MVA.[12]

In 2006, the normal-condition peak demand for the Devers and Mirage substations was 919 MVA. For a 220/115 kV substation, SCE adjusts the normal condition peak demand to reflect the forecasted peak demand of a 1-in-5 year heat storm, in accordance with SCE's planning guidelines.[13] The 2006 weather-adjusted peak demand, adjusted for a 1-in-5 year heat storm, was 980 MVA for the Devers and Mirage substations.

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[12] *The operating capacity of a substation is determined through technical analysis taking into account several factors, including the summation of nameplate ratings and the evaluation of thermal capabilities of all equipment. Notwithstanding this analysis, the operating capacity of the substation may not exceed the operating or planning guidelines established by SCE. In this case, Devers Substation has three 280 MVA transformers, resulting in a combined nameplate rating of 840 MVA, but is limited to 811 MVA due to transformer impedance differences. Mirage Substation has two 280 MVA transformers, resulting in a combined nameplate rating of 560 MVA, but is limited to 436 MVA due to subtransmission line rating capability and 1200-ampere rating of the 115 kV circuit breaker at Tamarisk Substation.*

[13] *Planning guidelines are established by SCE to provide a basis for designing a safe and reliable transmission system using methodologies and procedures approved by SCE's Grid* Planning Committee. SCE uses a 1-in-5 year heat storm forecast in determining the need for 220/115 kV transformer additions.

Following the 115 kV subtransmission system split and assuming a 1-in-5 year heat storm, the projected 2009 forecast at Mirage Substation is 495 MVA. The short-term emergency limit of each one of the Mirage Substation 220/115 kV transformer banks is limited to 384 MVA. Following the loss of one of the two Mirage Substation 220/115 kV transformer banks, the remaining Mirage Substation 220/115 kV transformer bank would be loaded up to 507 MVA (including line and transformer losses).

SCE is required to meet emergency 220/115 kV transformer loading criteria, which are the allowed loading of the transformers under abnormal conditions (120 percent of the transformer MVA rating). A third 220/115 kV transformer would be required at Mirage Substation in order to maintain transformer emergency loading to less than 384 MVA, after the split of the Devers 115 kV Subtransmission System.

1.3.3 Need for Devers-Coachella Valley 220 kV Loop-In at Mirage Substation

The existing Devers 115 kV Subtransmission System is served by five 220/115 kV transformers located at Devers and Mirage substations. These two substations are connected by a network of 220 kV transmission lines that are part of the Devers 220 kV Transmission System (See Figure 1.7: Existing 220 kV Lines Connecting the Devers and Mirage Substations) The NERC and WECC reliability standards state that transmission system post-transient voltage drops should not exceed 10 percent of pre-disturbance values under an N-2 contingency. Forecasted studies confirm that potential voltage collapse and post-transient voltage drops to levels below NERC and WECC standards would occur if the existing 220 kV lines serving Mirage Substation are lost. For example, if the existing Devers-Mirage line and the Mirage-Ramon line both were to be out of service at the same time, a load serving deficiency would occur whereby the remaining 220 kV lines would not be able to maintain the required voltage to serve the load in the Devers 220 kV Transmission System, and interconnected IID and MWD facilities. This problem would require load to be dropped from the Devers 115 kV Subtransmission System, causing a major blackout condition. Figure 1.7: Existing 220 kV Lines Connecting the Devers and Mirage Substations shows the Devers 220 kV Transmission System as it exists today, with the blue lines indicating the transmission line outages in the above example.

To correct the problems associated with losing more than one 220 kV transmission line serving Mirage Substation, the Proposed Project would loop the Devers-Coachella Valley 220 kV transmission line into Mirage Substation. This loop-in creates two additional 220 kV source lines that would serve Mirage Substation. The addition of two source lines at Mirage Substation would maintain the required voltage support under an N-2 condition per NERC and WECC standards (see Figure 1.8: Proposed Devers-Coachella Valley 220 kV Loop-In to Mirage Substation).

1.3.4 Summary

In summary, splitting the Devers 115 kV Subtransmission System into two separate 115 kV subtransmission systems and looping the Devers-Coachella Valley 220 kV transmission line into Mirage Substation results in reliability and operational benefits. The Proposed Project:

- Increases reliability by preventing 115 kV subtransmission line thermal overloads during periods of peak customer demand.
- Increases operational flexibility by removing the need to consider 115 kV subtransmission lines for planned outages on the 220 kV transmission system serving the Electrical Needs Area.
- Provides tie lines[14] between the two 115 kV subtransmission systems, which increases operational flexibility by providing alternative sources for distribution substations.
- Eliminates the migration of the 220 kV power flow onto the 115 kV subtransmission network.
- Provides voltage support on the Devers 220 kV Transmission System to avoid N-2 post-transient voltage drops of 10 percent or more of pre-disturbance values.
- Defers the need for upgrades of short-circuit duty equipment on the Devers and Mirage 115 kV subtransmission systems.
- Permits future 115 kV subtransmission line additions to be designed to serve the local load only, without the need to consider 220 kV power flow.

1.4 PROJECT OBJECTIVES

California Environmental Quality Act (CEQA) and the CEQA Guidelines (Section 15126.6[a]) require the consideration of a range of alternatives to a Proposed Project or to the location of a Proposed Project that would feasibly attain most of the basic project objectives but would avoid or substantially lessen any of the significant effects of the Proposed Project. Therefore, SCE has defined the following objectives to address the Proposed Project purpose and need described in this chapter:

- Serve projected electrical demand requirements in the Electrical Needs Area, beginning in 2010.
- Maintain electrical system reliability within the Devers 220 kV Transmission System and Electrical Needs Area.

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[14] Tie lines are energized lines that are normally kept as an open circuit between substations that may be closed during abnormal conditions or planned outages to continue providing electrical service to distribution substations.

Figure 1.7: Existing 220 kV Transmission Lines Connecting the Devers and Mirage Substations

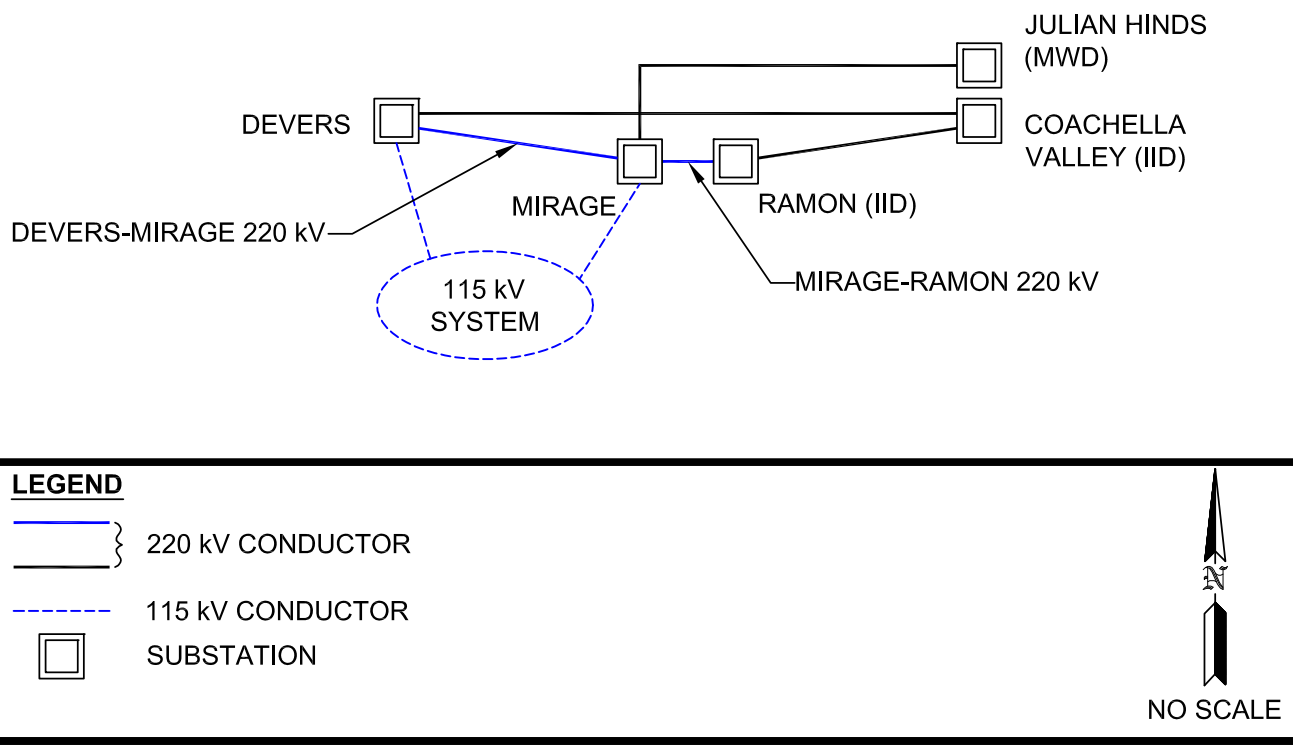
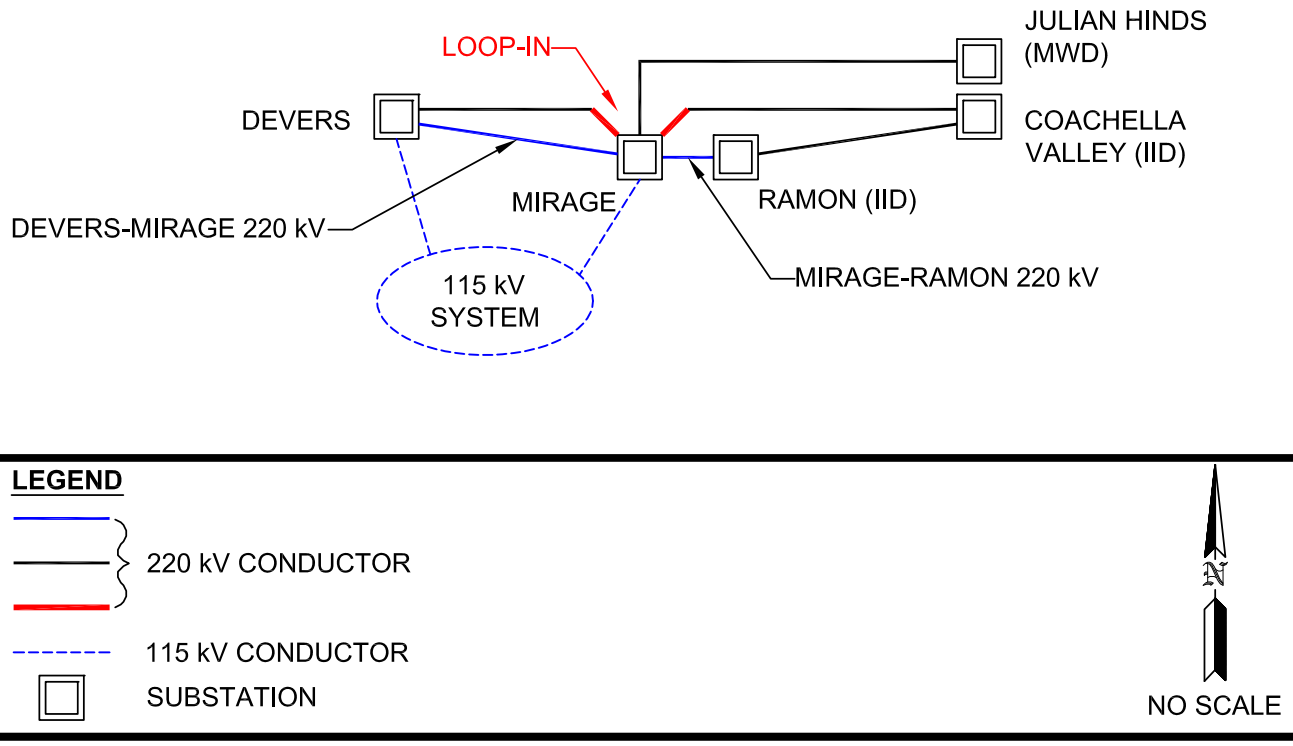


Figure 1.8: Proposed Devers-Coachella Valley 220 kV Loop-In to Mirage Substation



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- Enhance operational flexibility by providing the ability to transfer load between subtransmission lines and substations within the Electrical Needs Area.

- Utilize existing SCE facilities and ROWs, where feasible.

- Meet projected need while minimizing environmental impacts.

- Meet project need in a cost-effective manner.

SCE considered these objectives in developing a reasonable range of alternatives for this Proposed Project or to the location of this Proposed Project. The following chapter describes the alternatives development process and the process for selecting the system and route alternatives for analysis in this Proponent's Environmental Assessment (PEA).

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