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2.0 PROPOSED PROJECT PURPOSE AND NEED

This section of the Proponent's Environmental Assessment (PEA) identifies the objectives, purpose and need for San Diego Gas & Electric Company's (SDG&E) proposed South Orange County Reliability Enhancement Project (Proposed Project), as required by the California Public Utilities Commission's (CPUC) PEA Guidelines (CPUC Information and Criteria List, Appendix B, Section V) and the California Environmental Quality Act (CEQA) Guidelines (Section 15126.6(a)). Additional information regarding the Proposed Project's purpose and need is provided in SDG&E's application to the CPUC, in accordance with CPUC General Order (G.O.) 131-D.

2.1 OVERVIEW

SDG&E is a regulated public utility that provides electric service to approximately 1.4 million electric customers within a 4,100-square-mile service area, covering 25 cities and unincorporated areas within San Diego County and a portion of Orange County. SDG&E requests approval of the Proposed Project to improve reliability, replace aged equipment, and accommodate future customer load growth in the South Orange County service area.

SDG&E's South Orange County service area is located at the northern end of SDG&E's service territory and has more than 129,000 electric customers. This service area represents approximately 10 percent of SDG&E's total customer load of approximately 5000 megawatts (MW). South Orange County's electric load is supplied by seven SDG&E 138/12 kilovolt (kV) distribution substations (Capistrano, Laguna Niguel, Margarita, Pico, San Mateo, Rancho Mission Viejo, and Trabuco).

Currently, there is no significant generation of electric energy in South Orange County service area. Consequently, the only power source for this entire service area is the 230kV transmission network at Talega Substation. Power supplied from the Talega Substation is transmitted to seven distribution substations over a 138kV transmission network. The substation interconnection diagram shown in Figure 2-1, South Orange County 138kV Substation Interconnection Diagram, illustrates how the distribution substations within the South Orange County service area are connected to each other and to the source of power, which is located at the 230/138kV Talega Substation.

The current 138kV transmission network leaves South Orange County vulnerable to bulk power system failures, such as outages of lines, transformers or buses, which may lead to the interruption of power to customers. Power from the 230kV transmission network enters South Orange County at the Talega Substation 230kV bus and flows through the substation's four 230/138kV transformers to the substation's 138kV bus. The Talega Substation 138kV bus supplies power to the 138kV transmission network, which supplies the distribution substations. If a failure occurs, which requires the Talega Substation 230kV or 138kV bus to be removed from service, power flow to South Orange County would be interrupted.

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Figure 2-1: South Orange County 138kV Substation Interconnection Diagram

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BACK OF FIGURE 2-1

Additionally, the existing Talega Substation configuration restricts the conditions under which maintenance can be done and creates 18 different outage scenarios that would cause uncontrolled loss of customer load in South Orange County.

Among the 18 outage scenarios, approximately half could cause uncontrolled loss of the entire customer load in South Orange County.

In addition, the South Orange County area has been experiencing continuing load growth: over 15 percent in the last ten years and an expected 10 percent in the next ten years. In order to keep up with increasing customer load, SDG&E has added two of the existing seven 138/12kV distribution substations over the last ten years. The 138kV transmission network, however, has reached its maximum capacity. To accommodate load growth within the South Orange County service area, the Proposed Project is needed for additional capacity, reliability, and operational flexibility.

The need to upgrade the existing transmission network in South Orange County has been identified in both SDG&E's and the California Independent System Operator's (CAISO) long-term assessments of South Orange County. The Proposed Project is the result of work done independently by both CAISO and SDG&E staff working toward a common goal: service reliability through compliance with mandatory standards. The Proposed Project was included in the CAISO 2010-2011 Transmission Plan and presented to the CAISO Board of Governors for approval. The CAISO Board of Governors approved the CAISO 2010-2011 Transmission Plan, along with the Proposed Project, at its May 18, 2011 meeting.

The Proposed Project meets the ultimate goal of SDG&E and the CAISO that any upgrade to the transmission system provide safe, reliable, and reasonably priced electric power to the local cities and communities of South Orange County. This is consistent with CPUC Section 451¹ and SDG&E's obligation to serve by implementing a comprehensive and long-term electric system strategy. Also, it meets one of the CAISO's primary tasks to benefit customers by operating the grid in a reliable and efficient manner.²

In addition to bringing a second source of power into the South Orange County service area, the Proposed Project will modernize SDG&E's 138/12kV Capistrano Substation, which is nearly 60

¹ Pursuant to Cal. Pub. Util. Code § 451 "Every public utility shall furnish and maintain such adequate, efficient, just, and reasonable service, instrumentalities, equipment, and facilities, including telephone facilities, as defined in Section 54.1 of the Civil Code, as are necessary to promote the safety, health, comfort, and convenience of its patrons, employees, and the public." Further, Cal. Pub. Util. Code § 330 (g) provides that "Reliable electric service is of utmost importance to the safety, health, and welfare of the state's citizenry and economy. It is the intent of the Legislature that electric industry restructuring should enhance the reliability of the interconnected regional transmission systems, and provide strong coordination and enforceable protocols for all users of the power grid." Generally, the CPUC provides the following language in regards to a utility's obligation to serve: "The utilities' obligation to serve their customers is mandated by state law and is part and parcel of the entire regulatory scheme under which the utilities received a franchise and under which the CPUC regulates utilities under the Public Utilities Act. (*See, e.g.*, Pub. Util. Code §§ 451, 761, 762, 768, and 770)" [Footnote omitted] (D.02-12-069 at 7-8).

²CAISO Mission Statement: "For the benefit of our customers, we: (1) operate the grid reliably and efficiently; (2) provide fair and open transmission access; (3) promote environmental stewardship; and (4) facilitate effective markets and promote infrastructure development. All through the provision of timely and accurate information."

years old. To replace the aging substation and accommodate the new 230kV power source, SDG&E is proposing to build a new 230/138/12kV Gas Insulated Substation on SDG&E’s existing Capistrano Substation site. SDG&E proposes to bring the additional source of power to the South Orange County service area by adding two new 230kV transmission lines into the new San Juan Capistrano Substation. The Proposed Project will connect six 138kV transmission lines at the new San Juan Capistrano Substation, two of which currently bypass the substation, and three of which currently connect at the substation.

The Proposed Project will also bring an additional 138kV transmission line into the Talega Substation by rearranging the existing transmission system located near this substation. As a result, the Proposed Project will improve reliability at the Talega Substation by removing undersized and aging equipment.

No new substation land and minimal new transmission right-of-way (ROW) will be required for the Proposed Project. The Proposed Project has an anticipated in-service date of 2017.

2.2 PROPOSED PROJECT OBJECTIVES

As discussed above, SDG&E has identified several areas of concern that must be resolved in order to meet SDG&E’s obligation to serve and to maintain reliable customer service in the South Orange County service area. Resolving those areas of concern is the overall purpose of the Proposed Project, which will achieve the following objectives:

1. Provide transmission system reliability:
 - a. Reduce the risk of an uncontrolled outage of all South Orange County load.
 - b. Reduce the risk of a controlled interruption of a portion of the South Orange County load.
 - c. Comply with mandatory North American Electric Reliability Corporation (NERC), Western Electric Coordinating Council (WECC) and CAISO transmission planning and operations standards.
2. Rebuild Capistrano Substation to replace aging equipment and increase capacity.
3. Improve transmission and distribution operating flexibility.
4. Accommodate customer load growth in the South Orange County area.
5. Locate proposed facilities within existing transmission corridors, SDG&E ROW and utility owned property.

The Proposed Project components are presented in Section 3.0, Project Description. Each of the Proposed Project objectives is more thoroughly described below.

2.2.1 Objective 1: Provide Transmission System Reliability

One of the primary objectives of the Proposed Project is to reduce the risk of a service interruption resulting from a transmission failure. The standards put in place by the Federal Energy Regulatory Commission (FERC) after the August 14, 2003 Northeast blackout set the

foundation for reducing the possibility of power system failures and support the need to construct new transmission infrastructure. Each of the three transmission system reliability objectives (a) – (c) is listed with the related NERC transmission planning standard. NERC, WECC, and CAISO all require SDG&E to meet the NERC Transmission Planning (TPL) standards.

2.2.1.1 Objective 1a: Reduce the Risk of an Uncontrolled Outage of all the South Orange County Load

NERC Standard TPL-004-0 requires that each Transmission Owner assess the risks and consequences of the loss of a substation.³ SDG&E and the CAISO have evaluated the risks and consequences of the loss of the Talega Substation, which are outlined below.

Risks:

- Loss of 230kV switchyard or a combination of the 230/138kV transformers at the Talega Substation would result in the loss of power flow to all customers located in the South Orange County service area.
- Loss of 138kV switchyard at the Talega Substation would result in the loss of power flow to all customers located in the South Orange County service area.

Consequences:

- A momentary outage may cause sensitive electronic equipment to reset.
- An outage lasting an hour or more may cause economic impacts (food spoilage, equipment damage, loss of business for retail establishments, etc.).
- A prolonged outage (days or weeks) would leave all customers without power for an extended period of time and cause extensive and serious economic impacts. Sensitive loads (hospitals, emergency services, data centers, etc.) would be supplied by customer owned emergency backup systems. These systems can operate for a limited duration, but are not designed as a primary source of power.

To reduce the risks associated with the loss of Talega Substation, the Proposed Project would introduce a second 230kV source into South Orange County at the new San Juan Capistrano Substation. Both San Juan Capistrano and Talega Substations would supply the area load during normal operation and in the event that one of the substations is removed from service, the remaining substation would supply power to the area. The Proposed Project meets Objective 1a by substantially reducing the risk of an uncontrolled outage of the entire South Orange County load.

2.2.1.2 Objective 1b: Reduce the Risk of a Controlled Interruption of a Portion of the South Orange County Load

NERC Standard TPL-003-0 requires that, when there is a loss of two or more elements (where an element is defined as a generator, transformer, transmission line, circuit breaker or bus section),

³ NERC Transmission Planning Standard TPL-004-0 – System Performance Following Extreme Events Resulting in the Loss of Two or More Bulk Electric System Elements (Category D). Table I, Category D, Contingency 8.

all remaining elements be within applicable ratings.⁴ If a failure or fault (short-circuit) forces the removal of two or more elements from the system and overloads occur, the standard allows customer load to be interrupted to remove the overloads. Independent reliability assessments prepared by CAISO and SDG&E of the South Orange County service area for the year 2020 found numerous instances where the loss of two elements would require customer load to be interrupted to bring the remaining transmission elements within emergency ratings.

The addition of a second 230kV source at the new San Juan Capistrano Substation redistributes power flow on the 138kV transmission system in the South Orange County service area and removes the majority of the instances which would need to interrupt customer load following the loss of two elements. Therefore, the Proposed Project meets Objective 1b by substantially reducing the risk of a controlled interruption of a portion of the South Orange County load.

2.2.1.3 Objective 1c: Comply with Mandatory NERC, WECC and CAISO Transmission Planning Standards

The Proposed Project is needed to comply with mandatory NERC, WECC and CAISO standards. NERC Standard TPL-002-0⁵ requires all transmission lines and transformers that remain in service following the loss of a single transmission line or transformer to be within applicable ratings. This standard does not allow interruption of customer load to be used to remove overloads caused by the loss of a single transmission line or transformer. The CAISO and SDG&E performed independent reliability assessments of the South Orange County service area, which showed that of the eight 138kV transmission lines that serve the area, four will overload following the outage of a single transmission line. Until the Proposed Project is approved, constructed and in service there are two transmission line taps that temporarily reduce the number of potential overloads from four to two. These temporary transmission line taps do not fully address the system performance requirements of the NERC Standard TPL-002-0 in the South Orange County service area.

Requirement R1.3.12 of NERC Standard TPL-002-0 requires that maintenance outages be included in the reliability assessments. SDG&E and the CAISO have independently identified several maintenance outages combined with a single system element outage that will lead to an interruption of the entire South Orange County load.

NERC Standard TPL-002-0 does not allow for the loss of demand following the loss of a single element with one exception. Footnote b of the standard states that:

Planned or controlled interruption of electric supply to radial customers or some local Network customers connected to or supplied by the Faulted element or by the affected area, may occur in certain areas without impacting the overall reliability of the interconnected transmission systems. To prepare for the next

⁴ NERC Transmission Planning Standard TPL-003-0 – System Performance Following Loss of Two or More Bulk Electric System Elements (Category C), Table I, Category C.

⁵ NERC Transmission Planning Standard TPL-002-0 – System Performance Following Loss of a Single Bulk Electric System Element (Category B), Table I, Category B.

contingency, system adjustments are permitted, including curtailments of contracted Firm (non-recallable reserved) electric power Transfers.

System adjustments will not prevent the interruption of customer load and the loss of load is neither planned nor controlled.

Requirement R1.3.12 of NERC Standard TPL-003-0 requires that maintenance outages be included in the reliability assessment. SDG&E and the CAISO have independently identified numerous maintenance outage scenarios that combined with a bus outage or single breaker failure will lead to an interruption of all South Orange County load.

NERC Standard TPL-003-0 allows for “Planned or Controlled” load interruption to remove overloads caused by the loss of two or more elements, but the loss of South Orange County load described above is neither planned nor controlled.

The addition of a second 230kV source at the new San Juan Capistrano Substation assures continued compliance with the NERC reliability standards. Therefore, the Proposed Project meets Objective 1c by making the system improvements necessary to comply with mandatory NERC reliability standards.

2.2.2 Objective 2: Rebuild Capistrano Substation to Replace Aging Equipment and Increase Capacity

The Capistrano Substation is nearly 60 years old and was not constructed to meet today's customer load growth or today's engineering standards. The substation's aging equipment and infrastructure need to be upgraded and rebuilt.

Replacing aging equipment, upgrading and rebuilding the existing substation will result in the following benefits:

- Modernizes substation infrastructure to meet current standards,
- Improves reliability by adding new 12kV bus ties,
- Increases ultimate 12kV (distribution) capacity,
- Improves operating flexibility,
- Increases available 12kV tie capacity,
- Rebuilds equipment to new seismic standards,
- Improves security,
- Reduces maintenance requirements, and
- Utilizes new substation standards in electrical and structural design.

The Proposed Project meets this objective by completely rebuilding the almost 60 year old Capistrano Substation to current SDG&E standards.

2.2.3 Objective 3: Improve Transmission and Distribution Operating Flexibility

Since the Talega Substation is the only substation feeding power to the South Orange County service area and the South Orange County 138kV transmission network is a loop system which begins and ends at Talega Substation, SDG&E has limited ability to schedule maintenance outages at Talega Substation.

Currently, when SDG&E needs to perform some maintenance activities on the 230kV transformers and busses at Talega Substation or 138kV transmission lines serving South Orange County, it is necessary to take outages that result in radializing customer load. Also, some maintenance activities do not result in radialized customer load, but instead render the remaining system elements insufficient to serve customer load in the event of a subsequent unscheduled outage.

The Proposed Project provides a new 230/138kV source within the South Orange County that will significantly improve the ability of Electric Transmission (Grid) Operations to schedule outages not only at Talega Substation but also for neighboring substations at San Mateo, Rancho Mission Viejo, Pico, and Trabuco. This improved operational flexibility is the result of two 230kV transmission lines serving San Juan Capistrano and Talega Substations, and two 230/138kV sources serving the South Orange County 138kV network.

The modernized 138kV bus at the new San Juan Capistrano Substation will improve operational flexibility with its breaker and a half design and increased positions to allow for the feed of the new 230kV source and three additional 138kV transmission lines. The increased operating flexibility will also allow SDG&E's Grid Operations to utilize the 138kV system more efficiently and reliably in normal operations and in programming routine maintenance.

The 12kV distribution system serving the South Orange County service area is currently limited in its operating flexibility due to the current configuration of the existing Capistrano Substation. The existing Capistrano Substation's capacity is 60 megavolt amperes (MVA), which limits the available tie capacity between the neighboring Laguna Niguel and Trabuco Substations. These substations are currently loaded to over 90 percent of their maximum rating of 120MVA and a loss of one or more of their 12kV transformer banks would result in customer load loss due to lack of available transfer capacity at the Capistrano Substation. This transfer capacity is further decreasing as the loading at Capistrano Substation increases.

To prevent high loading of the existing 60MW capacity at the Capistrano Substation, the new 138/12kV San Juan Capistrano Substation will coincide with the distribution system need for added capacity to increase operational flexibility. This additional capacity at the new San Juan Capistrano Substation will improve reliability by providing tie capacity to the adjacent Laguna Niguel, Trabuco, and Margarita Substations. This improved reliability will come from allowing existing circuits to be more fully utilized and allow for new 12kV circuits to be added at San Juan Capistrano Substation, thereby creating more usable connections between the substations, increased capacity and improved operational flexibility.

The Proposed Project meets this objective of improving transmission and distribution operating flexibility by providing additional bulk power sources, and modernizing and expanding the 138kV and 12kV busses at Capistrano Substation.

The Proposed Project also meets Objective 3 by introducing the second 230kV source into the South Orange County service area, which alleviates the difficulty of obtaining necessary maintenance and construction outages. This will also reduce the loading at Talega Substation and will allow SDG&E to eliminate the need to replace two existing 230/138kV transformers: Banks 60 and 62.

2.2.4 Objective 4: Accommodate Customer Load Growth in the South Orange County Area

South Orange County is an area in SDG&E's service territory experiencing continuing load growth. Customer load is expected to increase 10 percent over the next ten years. To provide efficient and effective electric service in the South Orange County area, SDG&E must locate the proposed facilities (a new 230/138kV substation and associated 230kV transmission lines) within the transmission load center. Notably, serving customer load closer to the transmission load center will reduce transmission line losses.

One of the factors that led to choosing Capistrano Substation for the new 230kV source is its close proximity to South Orange County's transmission load center. Approximately 81 percent of the load served by the South Orange County 138kV transmission network is within four miles of the Capistrano Substation. Figure 2-2, South Orange County 138kV Substation Load Center Diagram, shows the location of the South Orange County transmission load center. This point is approximately one mile east of Capistrano Substation. The transmission load center represents the theoretical geographical point where the substation loads served from the Talega Substation (South Orange County electrical source) converge based on the influence of distance and MW load at those substations.

2.2.5 Objective 5: Locate Proposed Facilities within Existing Transmission Corridors, SDG&E Rights of Way and Utility Owned Property

Another primary objective of the Proposed Project is to locate the proposed facilities within areas that already include electric transmission facilities. SDG&E currently owns 6.4 acres of property at the existing Capistrano Substation site. This property is currently the site of the existing Capistrano Substation (upper yard). The lower portion of this property and the existing structure were previously utilized for utility purposes. SDG&E continues to retain ownership of the entire property for the express purpose of accommodating future load growth and expansion.

SDG&E currently has an easement for a transmission corridor between the Talega and Capistrano Substations. Much of this corridor also includes Southern California Edison (SCE) transmission facilities. This average 150-foot easement was acquired in the 1960s to allow for future load growth and system expansion. Currently, this 150-foot easement is generally occupied by three 138kV transmission lines. The 150-foot easement was originally acquired to accommodate multiple transmission lines.

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Figure 2-2: South Orange County 138kV Substation Load Center Diagram

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The Proposed Project has been designed to meet Objective 5. The construction of the new San Juan Capistrano Substation can be accommodated on SDG&E's utility property. The property is currently occupied by existing electrical substation equipment and has been used for electrical facilities since 1918. Furthermore, all substation work at the Talega Substation can also occur within the existing fenced area resulting in no expansion of the existing facility.

The construction of the 230kV transmission lines utilizes approximately eight miles of existing ROW, thereby requiring minimal additional ROW which is consistent with state law guiding the use of existing transmission corridors, known as the Garamendi Principle.⁶ Only minimal amounts of new ROW will be required to implement the Proposed Project (see Section 3.8, Permanent Land and Right of Way Requirements). Therefore, the Proposed Project will meet Objective 5.

2.3 CONCLUSION

The Proposed Project would construct two new 230kV transmission lines within an existing transmission corridor and a new 230/138/12kV substation at the existing Capistrano Substation site. The Proposed Project would fully meet all five of the Objectives, which represent a long-term electric system strategy for the South Orange County area. The Proposed Project will result in increased transmission and distribution capacity and reliability, improving SDG&E's ability to provide safe, reliable, and reasonably priced electric power for the future.

⁶ Garamendi Principle – Transmission Siting SB 2431 (Garamendi), Chapter 1457, 62, Statutes of 1988: 1. Encourage the use of existing ROW by upgrading existing transmission facilities where technically and economically feasible; 2. When construction of new transmission lines is required, encourage expansion of existing ROW, when technically and economically feasible; and 3. Provide for the creation of new ROW when justified by environmental, technical, or economic reasons defined by the appropriate licensing agency.