January 12, 2018

CITY OF RIVERSIDE

SOUTHERN CALIFORNIA EDISON

Riverside Transmission Reliability Project (A.15-04-013)

Lower Voltage and Other Design Alternatives Report

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ACRONYMS AND ABBREVIATIONS

°F	degrees Fahrenheit
ALJ	Administrative Law Judge
ATRA	Annual Transmission Reliability Assessment
BES	Battery Energy Storage
CAISO	California Independent System Operator
CalEnviroScreen 3.0	California Communities Environmental Health Screening Tool
CalEPA	California Environmental Protection Agency
CDFW	California Department of Fish and Wildlife
CEQA	California Environmental Quality Act
CPCN	Certificate of Public Convenience and Necessity
CPUC	California Public Utilities Commission
CWA	Clean Water Act
DBESP	Determination of Biologically Equivalent or Superior Preservation
DEIR	Draft Environmental Impact Report
DG	distributed generation
EIR	Environmental Impact Report
EPC	Engineering, Procurement and Construction
ESS	energy storage system
FEIR	Final Environmental Impact Report
FERC	Federal Energy Regulatory Commission
GIS	Geographical Information System
GO	General Order
HCP	Habitat Conservation Plan
HVAC	High Voltage Access Charge
I-15	Interstate 15
kV	kilovolt
LWCF	Land and Water Conservation Fund
LVAC	Low Voltage Access Charge
MSHCP	Multiple Species Habitat Conservation Plan
MW	megawatt
MWh	megawatt hour
NEPA	National Environmental Policy Act
NOP	Notice of Preparation
OEHHA	Office of Environmental Health Hazard Assessment
PEA	Proponent's Environmental Assessment
PSLF	Positive Sequence Load Flow
PTO	Participating Transmission Owner
PUC	California Public Utilities Code
PV	photovoltaic
Report	Lower Voltage and Other Design Alternatives Report
RERC	Riverside Energy Resource Center
Riverside	City of Riverside, California and Riverside Public Utilities
ROW(s)	Right(s)-of-way
RTRP	Riverside Transmission Reliability Project
Ruling	ALJ's Ruling Directing Report to Energy Division on Potentially Feasible Low-Voltage Project Alternatives

ACRONYMS AND ABBREVIATIONS – CONTINUED

SAIDI	System Average Interruption Duration Index
SAIFI	System Average Interruption Frequency Index
SCADA	Supervisory Control and Data Acquisition
SCAQMD	South Coast Air Quality Management District
SCE	Southern California Edison
SEIR	Subsequent Environmental Impact Report
SONET	Synchronous optical network
TAC	Transmission Access Charge
TO	Transmission Owner
USFWS	U.S. Fish and Wildlife Service
WDAT	Wholesale Distribution Access Tariff

1. Executive Summary

1.1 ALJ Ruling

On August 15, 2017, Administrative Law Judge (ALJ) of the State of California Public Utilities Commission (CPUC) Hallie Yacknin issued the *Administrative Law Judge's Ruling Directing Report to Energy Division on Potentially Feasible Low-Voltage Project Alternatives* (Ruling). In relevant part, the Ruling directed Southern California Edison Company (SCE), Riverside Public Utilities (RPU) and the California Independent System Operator Corporation (CAISO) to meet, confer and prepare a joint report to the CPUC Energy Division identifying:

1. "lower voltage design alternative(s) to meet the [Riverside Transmission Reliability Project (RTRP or Project)] Project Objectives, either in full or in part;" and
2. "any other interim solutions available to RPU that would mitigate the electrical system impacts until technological advancements in battery storage and distributed solar are feasible at the project scale."

See Section 2.2 for a more detailed discussion of the Ruling.

In response to the ALJ's Ruling, Riverside[1] and SCE, with the help of Riverside's consultant POWER Engineers Inc. (POWER), developed this joint RTRP *Lower Voltage and Other Design Alternatives Report* (Report) with advice and guidance from CAISO. POWER is an engineering and environmental consulting firm with more than 40 years of experience in the electrical transmission and distribution industry. Qualifications for POWER, including a sample list of projects, have been included in Appendix C. POWER assisted the City of Riverside in the development of the Draft Environmental Impact Report (DEIR) and the 2013 Final Environmental Impact Report (2013 FEIR) for the RTRP and continues to provide support in the CPUC licensing process.

1.2 Description and Project Objectives of the RTRP Hybrid Proposal and Principles and Methodology for Consideration of Alternatives

1.2.1 Description of the RTRP Hybrid Proposal2

The RTRP Hybrid Proposal includes many components that would be required for the completion of the entire project in order to meet the Project Objectives as listed in the 2013 FEIR and Section 2.2 (Volume 2). At a macro level, these include the SCE 230 kilovolt (kV) components and the Riverside 69 kV components.

The SCE 230 kV components of the RTRP Hybrid Proposal include the following CAISO-controlled facilities:

- New double-circuit 230 kV transmission line 9.7 miles in length, which includes both overhead and underground design elements.
- New Wildlife Substation.

[1] RPU is a department of the City of Riverside. This Report generally uses the term "Riverside" except where specific reference to RPU is more appropriate.

[2] This Report refers to the design proposal currently supported by SCE and Riverside as the "RTRP Hybrid Proposal." The use of the term "Hybrid" refers to the combination of both overhead and underground transmission facilities included in the design. The RTRP design as originally proposed and evaluated in the 2013 FEIR consisted entirely of overhead facilities.

- Mira Loma and Vista Substation upgrades.
- Telecommunications.

In response to the Ruling, this Report develops for comparison purposes potential lower voltage Alternatives to the components of the RTRP Hybrid Proposal listed above. The cost comparisons included within this Report are specific to the 230 kV components of the RTRP Hybrid Proposal, comparing only those CAISO-controlled facilities to the lower voltage Alternatives that have been developed and are discussed in detail within this Report. *See* Sections 2.1 and 3.4.2.2 for discussion of the history and a more detailed description of the RTRP Hybrid Proposal.

1.2.2 Objectives of the RTRP Hybrid Proposal

The 2013 FEIR, prepared by the City of Riverside acting as the California Environmental Quality Act (CEQA) Lead Agency, stated that a "new interconnection to SCE's transmission system is urgently needed to provide capacity for existing as well as new electrical load and an additional point of interconnect for reliability purposes." The February 2017 CPUC Initial Study for the Subsequent Environmental Impact Report (SEIR) reinforces these stated Objectives, asserting that the "SCE project objectives are to provide Riverside and its customers with adequate transmission capacity to serve existing and projected load, to provide for long-term system capacity for load growth and to provide needed system reliability." The RTRP Hybrid Proposal will add a second point of delivery that would provide an additional 560 megawatts (MW) of transformation and delivery capacity (approximately doubling Riverside's current capacity of 557 MW from SCE's 230 kV bulk power transmission system.

The Project Objectives originally developed in support of the RTRP's purpose and need expressed in the 2013 FEIR also guided the development and evaluation of Alternatives considered in this Report. Specifically, the Project Objectives of the RTRP (and the RTRP Hybrid Proposal) are to:

- Provide sufficient capacity, in a timely manner, to meet existing electric system demand and anticipated future load growth.
- Provide an additional point of delivery for bulk power into the Riverside electrical system, thereby reducing dependence on Vista Substation and increasing overall reliability.
- Split and upgrade the subtransmission electrical system as a function of prudent utility practice.
- Meet Proposed Project need while minimizing environmental impacts.
- Meet Proposed Project need in a cost-effective manner.

The term "reliability" refers broadly to the ability to provide electric service as required by customers in accordance with nationally recognized industry standards relating to continuity of service and ability to withstand system disturbances. The RTRP Hybrid Proposal has several related but distinct Project Objectives for maintaining reliability of service to Riverside customers, including (1) increasing capacity to meet Riverside's existing and forecast demand, (2) providing a second source of delivered energy to Riverside from the SCE/CAISO grid, so that service could be maintained if Vista Substation were out of service, and (3) facilitating configuration of Riverside's distribution system to maximize reliability of distribution service. *See* Section 3.1 for more detailed discussion of the Project Objectives, purpose and need for the RTRP Hybrid Proposal.

1.2.3 Principles and Methodology for Consideration of Alternatives

Consideration of alternatives to the RTRP Hybrid Proposal is generally governed by the CPUC's General Order (GO) 131-D, CEQA, and the California Public Utilities Code. GO 131-D was adopted to be responsive to the requirements of CEQA.[3] The CEQA Guidelines emphasize the selection of a "reasonable range" of alternatives in an environmental impact report (EIR) "which would feasibly attain most of the basic objectives of the project but would avoid or substantially lessen any of the significant effects of the project, and evaluate the comparative merits of the alternatives." [4] Under CEQA, "feasible" means "capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic, environmental, social, and technological factors," but may also take into account "other considerations," permitting the rejection of mitigation measures and/or alternatives that are impractical or undesirable from a policy standpoint.[5] In addition, CPUC Section 1002 states, in relevant part, "the commission, as a basis for granting any certificate pursuant to Section 1001 shall give consideration to the following factors: (1) Community values, (2) Recreational and park areas, (3) Historical and aesthetic values, (4) Influence on environment, …."

Consistent with the standards summarized above, SCE and Riverside sought to identify lower voltage alternatives that would avoid or substantially reduce environmental impacts that would result from the RTRP Hybrid Project while meeting most or all of the Project Objectives in a timely and cost-effective manner. The analysis identified potential lower voltage designs sourced from SCE substations (or in one Alternative a proposed substation) located closest to the Riverside grid, expecting that this approach would be most likely to minimize both environmental impacts and costs of alternatives considered. SCE and Riverside identified potential routes and developed preliminary facilities designs and cost estimates for three 69 kV Alternatives. Following the preliminary but detailed scoping of the three Alternatives, SCE and Riverside evaluated each potential Alternative using the following three inquiries:

1. *Does the Alternative avoid or substantially lessen any significant effects of the RTRP Hybrid Proposal, including consideration of whether the Alternative itself could create significant effects potentially greater than those of the RTRP Hybrid Proposal?*
2. *Does the Alternative accomplish all or most of the basic Project Objectives?*
3. *Is the Alternative feasible?*

See Sections 3.2 and 3.4.1 for more detailed discussion of the principles applicable to the evaluation of alternatives and the methodology for identification of potential alternatives.

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[3] *See* GO 131-D § II (GO 131-D responsive to CEQA's requirements).

[4] Title 14, Cal. Code of Regulations (CEQA Guidelines) §§ 15126.6(a) (Alternatives to the Proposed Project), (f) (Rule of Reason); *see also* CEQA Guidelines § 15124(b) (clear statement of objectives aids in developing alternatives).

[5] California Public Resources Code (Pub. Resources Code) §§ 21061.1 (defining "feasible"), 21081 (no public agency shall approve a project with significant and unavoidable environmental impacts unless the public agency finds "specific economic, legal, social, technological, or other considerations . . . make infeasible the mitigation measures or alternatives identified in the environmental impact report" and "that specific overriding economic, legal, social, technological, or other benefits of the project outweigh the significant effects on the environment"); *see also* CEQA Guidelines §§ 15021(b) ("In deciding whether changes in a project are feasible, an agency may consider specific economic, environmental, legal, social, and technological factors"), 15364 (same); *California Native Plant Soc. v. City of Santa Cruz*, 177 Cal.App.4th 957, 1001 (2009) ("other considerations" referenced in section 21081 include matters of policy).

1.2.4 Alternatives Development in the 2013 FEIR

For background and comparison purposes, Section 3.3 describes alternatives to the RTRP as originally proposed that were evaluated in the 2013 FEIR.

1.2.5 Additional Considerations Affecting Development and Evaluation of Alternatives

1.2.5.1 Technical Considerations

Section 3.4.2 discusses technical considerations used for the development and evaluation of the lower voltage Alternatives studied in this Report, including

- Description of Vista Substation and Riverside generation (Section 3.4.2.1).
- Description of the RTRP and RTRP Hybrid Proposal (Section 3.4.2.2).
- Discussion of Riverside's system growth and load forecasts (Section 3.4.2.3).
- Overhead and underground lines design considerations, including a summary of route lengths, parcels, and structure counts for the three 69 kV Alternatives studied in detail (Section 3.4.2.4).

1.2.5.2 Timing and Permitting Considerations and Reliability Impacts of Potential Delays

Section 3.5 explains in detail that the need to address the reliability concerns arising from Riverside's reliance on the Vista Substation as promptly as possible is urgent. SCE currently has a maximum 557 MW transfer limit under normal operating conditions it can provide to Riverside through Vista Substation, the sole point of interconnection between the Riverside and SCE/CAISO grids. Whenever this loading limit is approached under normal operating conditions, Riverside's internal gas-fired generation must be operated to ensure that the Vista Substation loading does not exceed 557 MW. This load limit has been routinely exceeded during peak demand periods in the past nine years and with increasing frequency. As Riverside's load is forecasted to continue to grow, it is expected that Riverside's internal generation will be increasingly called upon to mitigate the Vista transfer limit issue, but the use of Riverside's internal generation for this purpose faces an uncertain future.

The reliability problem associated with the inadequate Vista transfer limit is further exacerbated if there is a contingency at Vista Substation, *e.g.,* an outage of one or both transformers at Vista Substation. With one of the Vista Substation transformers out, the Vista transfer limit is reduced to 280 MW; when added to Riverside's internal generation of 228 MW (assuming all generation is indeed available), the maximum load-serving capability for Riverside is reduced to 508 MW. Thus, absent any other mitigating measure, involuntary load shedding is highly likely when Riverside's load exceeds 508 MW and there is a single transformer outage at Vista Substation. The numbers of hours that Riverside's load exceeded 508 MW in 2015, 2016 and 2017 are 55, 92 and 143 hours, respectively. If a transformer outage at Vista Substation had occurred at the time of Riverside's peak load, the resulting load shedding in 2015, 2016 and 2017 as a percentage of Riverside's peak load could have been 13.16%, 15.19% and 20.50%, respectively. As Riverside's load is forecasted to continue to grow, the threat of involuntary load shedding of Riverside's customers due to the inadequate Vista Substation transfer limit will continue to grow. If a total collapse of Vista Substation were to occur (for example, due to a severe earthquake or destruction by a fire), it would cause severe and potentially catastrophic disruptions of electrical service to Riverside's customers and SCE's customers served from Vista Substation.

Adoption of any of the 69 kV Alternatives or any of the interim solutions evaluated in this Report inevitably would delay effective mitigation of the reliability issues arising from Riverside's dependence on Vista Substation and prolong exposure of an increasing number of Riverside's customers to risks of extended outages. Implementation or selection of any of the 69 kV Alternatives

for the RTRP Hybrid Proposal could alter the required permitting and licensing process currently underway. SCE and Riverside estimate that delays associated with implementation of any of the 69 kV Alternatives would range from a minimum of 12 to 18 months to five years or more, depending on various factors, an unacceptably long period of time given the increasingly escalating exposures to reliability risks that Riverside will continue to face.

Many of the corridors identified for routes under the 69 kV Alternatives have not been reviewed in detail as part of the 2013 FEIR process, and substantial baseline data collection and impact evaluation may be required along two or three additional line routes. In addition, the current infrastructure of Riverside's distribution system is not expandable to accommodate multiple additional 69 kV connections at its existing substations. Detailed studies would need to be performed to adequately evaluate revised system performance and whether any system upgrades would be triggered by implementation of such an Alternative.

Delays associated with the potential incremental regulatory and infrastructure requirements summarized above would place Riverside's customers at prolonged risk of experiencing outages due to the single source arrangement existing at Vista Substation, Riverside's load currently exceeding SCE's available capacity at the Vista Substation, and the projected load growth as stated in the purpose and need statement (2013 FEIR). In addition, the potential incremental regulatory requirements and associated delays would add significant costs. This would be in addition to the higher cost estimates for the 69 kV delivery facilities (*see* Tables 6, 9, and 12) and the costs already incurred as part of the RTRP CEQA environmental review and Certificate of Public Convenience and Necessity (CPCN) licensing process. Every attempt should be made to conclude SCE's current CPCN application and the development of the SEIR in an expedited fashion to concretely address the reliability issues caused by the inadequate Vista transfer limit.

1.2.5.3 Potential Tariff Implications Relating to Low Voltage Alternatives

Section 3.6 discusses in detail potential issues relating to tariff applicability, classification of facilities, and cost allocation that would arise from implementation of any of the 69 kV Alternatives. In June 2006, CAISO approved the 230 kV RTRP as "a necessary and cost effective addition to the ISO Controlled Grid" and directed SCE "to complete the construction of the [RTRP] as soon as possible and preferably no later than Q2, 2009."[6] In 2009, the Federal Energy Regulatory Commission (FERC) approved the Transmission Owner (TO) Tariff Interconnection Agreement between SCE and Riverside governing the terms of development and construction of the 230 kV RTRP design.[7]

Per the CAISO Tariff and relevant in the case of the RTRP Hybrid Proposal, the costs of High Voltage Transmission Facilities (200 kV or greater) under CAISO's "Operational Control" are recovered via the High Voltage Access Charge (HVAC) regardless of ownership. Under the currently-effective HVAC design, all users of the high voltage CAISO-controlled grid (including Riverside and SCE) would share the costs for the RTRP Hybrid Proposal in proportion to their use of the grid.

Under the currently-effective CAISO Tariff, the 69 kV Alternatives would not be included in the HVAC. Riverside believes that the 69 kV Alternatives may be considered lower voltage transmission

[6] *See* General Session Minutes – Operations Committee Meeting, Cal. Indep. Sys. Operator Corp. (June 16, 2006) at 4.

[7] *S. Cal. Edison Co.*, 127 FERC ¶ 61,211 (2009) (letter order approving Settlement Agreement reflecting Amended Interconnection Facilities Agreement).

facilities that, under the currently-effective CAISO Tariff, would be recovered through the Low Voltage Access Charge (LVAC) paid by customers within the SCE Transmission Access Charge (TAC) Area that take service from such lower voltage facilities. SCE believes that the 69 kV Alternatives would be considered non-CAISO-controlled, distribution assets that, under SCE's currently-effective Wholesale Distribution Access Tariff, would be recovered from Riverside and other users or beneficiaries of the 69 kV facilities, if any.

Classification of any 69 kV Alternative facilities and allocation of associated costs would be subject to the jurisdiction of the FERC.

1.3 Overview of Alternatives and Potential Interim Solutions Considered

As noted above, in response to ALJ Yacknin's Ruling, SCE and Riverside studied lower voltage Alternatives for increasing delivery capability to Riverside that would source from SCE's existing (or, in one Alternative, planned) substations closest to Riverside.[8] This Report identifies and evaluates in detail the following potential 69 kV Alternatives to the RTRP Hybrid Proposal (69 kV Alternatives, *see* Figure 1) that would, if found feasible, potentially meet, in whole or in part, most of the Project Objectives:

- **Alternative A –** Single Source; Total firm9 capacity = Initial 560 MW, Ultimate 840 MW; single substation interconnection (Mira Loma), initially with two 280 MW transformers and ultimately with three 280 MW transformers, with three double-circuit 69 kV lines and one single-circuit line for a total of seven 69 kV circuits.
- **Alternative B –** Three Source; Total firm capacity = 750 MW; single 280 MW transformers at three source substations (transformer capacity = 3 X 280 MW = 840 MW), three substations interconnections (Mira Loma, Etiwanda, and Circle City) with three double-circuit 69 kV lines for a total of six 69 kV circuits; two circuits from each substation. Delivery capacity of this Alternative is limited to 750 MW by 69 kV line circuit deliverability.

[8] As in the 2013 FEIR, a 115 kV alternative was considered conceptually but not carried forward for detailed evaluation for the reasons discussed in Section 4.2.1. In addition, SCE and Riverside considered in concept a design alternative that would include a new 230/69 kV substation on a new site adjacent to or near the two Mira Loma – Vista 230 kV transmission lines but did not study that approach in detail for the reasons explained in Section 4.2.2.

[9] Firm Transmission Service is defined as the highest quality service offered by a Transmission or Distribution Provider to customers under a filed rate schedule that anticipates no planned interruption.

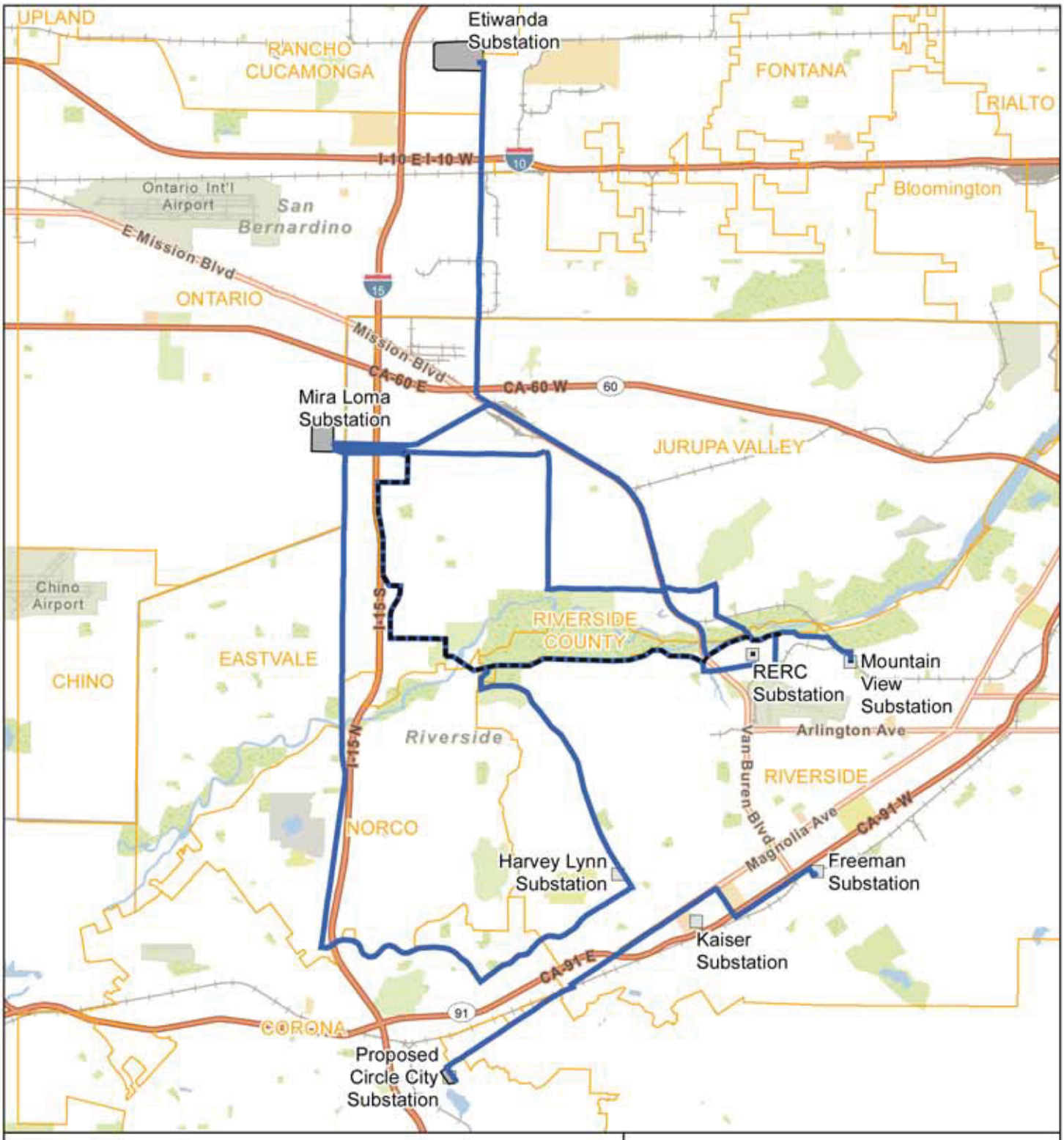

Figure 1

69 kV Alternative Routes

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- **Alternative C –** Single Source; Total firm capacity = 500 MW; single substation interconnection (Mira Loma), two 280 MW transformers (transformer capacity = 2 X 280 MW = 560 MW) with two double-circuit 69 kV lines for a total of four 69 kV circuits (500 MW). Delivery capacity of this Alternative is limited to 500 MW by 69 kV line circuit deliverability. Included with Alternative C is a 60 MW photovoltaic (PV) solar facility and a Battery Energy System (BES) (240 megawatt hours [MWh]). This generation provides substantially less capacity than its rated capability for serving load and for peak shaving purposes.[10]

Analyses of the three 69 kV Alternatives are summarized in Section 1.4.1 and described in detail in Sections 4.2.3.1 (Alternative A), 4.2.3.2 (Alternative B), and 4.2.3.3 (Alternative C).

This Report also evaluates for feasibility and suitability the following potential interim solutions to mitigate the Riverside electrical system impacts:

- Energy Storage System facilities (Battery, Pumped Hydro and Compressed Air).
- Local Generation (Gas-Fired Combustion Turbines and Utility Scale Solar Facility).
- Distributed Energy Resources.
- Energy Conservation programs.

Analyses of potential interim solutions are summarized in Section 1.5 and described in detail in Section 4.3.

1.4 Summary of the Evaluation of 69 KV Alternative Designs

1.4.1 69 kV Alternatives

None of the 69 kV Alternatives studied would have less environmental impact than the RTRP Hybrid Proposal or satisfy most of the Project Objectives.

1.4.1.1 Alternative A

Section 4.2.3.1.1 describes in detail the preliminary routes and facilities designs included in Alternative A, which would include interconnection at a single substation (Mira Loma) with three double-circuit 69 kV lines and one single-circuit line for a total of seven 69 kV circuits. Although the Alternative A design could provide the delivery capacity required by Riverside and a second interconnection to the SCE/CAISO grid, Alternative A would result in increased environmental impacts and be more costly in terms of total dollars as compared with the RTRP Hybrid Proposal.

Provide sufficient capacity, in a timely manner, to meet existing electric system demand and anticipated future load growth. Alternative A initially would provide 560 MW, and as loads increased it could provide up to 840 MW of capacity to meet Riverside's future load growth provided that: (1) three new 280 MW transformers could be physically installed at SCE's Mira Loma Substation, and (2) four new 69 kV line routes could be permitted and necessary rights acquired. Alternative A initially would provide up to 560 MW of capacity with installation of two transformers (matching the initial designed capacity for the RTRP Hybrid Proposal), provided that four new 69 kV

[10] The CPUC recognizes that solar PV generation provides less capacity than rated capability in its load serving capability due to its technological characteristics. For example, CAISO uses monthly Effective Load Carrying Capacity (ELCC) multipliers as sanctioned by the CPUC to reflect the deeply discounted value of solar PV load serving capability; *e.g.*, the ELCC multipliers for calendar year 2018 range from a low of zero for some winter months (January and December 2018), signifying no capacity value assigned to solar PV generation, to a high of 0.448 for the month of June 2018, or less than 50% of the rated capability.

line routes could be permitted and the necessary rights acquired. *See* the discussion in Section 4.2.3.1.1.

However, as discussed in detail in Section 3.5, compared with the RTRP Hybrid Proposal, Alternative A is likely to result in delays in timely addressing Riverside's current and future anticipated electric system demands. The magnitude of the delay associated with Alternative A depends on various factors, including time needed for engineering and design, modification of the environmental analyses in the SEIR under development by the CPUC, and CPUC's licensing of Alternative A. If adoption of the Alternative A design required initiation of a new CEQA process, the resulting delay likely would be five years or more.[11]

Provide an additional point of delivery for bulk power into the Riverside electrical system, thereby reducing dependence on Vista Substation and increasing overall reliability. Alternative A would potentially meet the Project Objectives of providing additional points of delivery for power into a bifurcated Riverside electrical system from SCE's Mira Loma Substation.

Meet Proposed Project need while minimizing environmental impacts. As summarized in Section 1.4.2.1 and discussed in detail in Section 4.2.3.1.2.3, Alternative A would result in increased environmental impacts when compared with the RTRP Hybrid Proposal's environmental impacts.

Meet Proposed Project need in a cost-effective manner. As summarized in Section 1.4.2.2 and discussed in detail in Section 4.2.3.1.2.4, Alternative A's estimated total costs exceed the estimated costs for the RTRP Hybrid Proposal. As described in Section 4.2.3.1.2.4, Alternative A is estimated to cost $499.1 million (nominal 2023 dollars), approximately 23% more than the estimated cost of the RTRP Hybrid Proposal of $405.3 million in nominal 2023 dollars.[12]

1.4.1.2 Alternative B

Section 4.2.3.2.1 describes in detail the preliminary routes and facilities designs included in Alternative B, which would include interconnection at two existing SCE substations (Mira Loma and Etiwanda) and one proposed substation (Circle City), a new 230 kV line to the proposed Circle City Substation from the Mira Loma Substation, and a double-circuit 69 kV line from each of the three substations to Riverside. Alternative B potentially would meet the Project goals of increasing delivery capacity and providing a second source of power and energy to Riverside. However, compared with the RTRP Hybrid Proposal, Alternative B would result in a system that would be more difficult to operate and manage and susceptible to dropping load in a contingency condition,[13] undercutting its

[11] Alternatively, and as discussed in more detail in Section 3.5, the SEIR under development by the Commission could discuss the environmental impacts associated with Alternative A in compliance with CEQA. In that event, the estimated delay resulting from adoption of Alternative A could range from 12-18 months.

[12] The ALJ's ruling at 3 references a project cost of $234.5 million, which was submitted to the CPUC in April 2015 but did not include the underground facilities included in the RTRP Hybrid Proposal. In quarterly meetings with the Energy Division, SCE has shared forecast costs for the RTRP Hybrid Proposal of $353 million (constant 2015 dollars), which equates to $405.3 million in nominal 2023 dollars. For comparison purposes, this Report uses nominal 2023 dollars for the RTRP Hybrid Proposal and all three of the 69 kV Alternatives studied.

[13] The term "contingency condition" is used throughout this Report, and it refers to the system in normal condition with an unexpected failure or outage of a single system component or two components, such as a generator, transmission line, circuit breaker, switch or other electrical equipment.

reliability. Alternative B would result in increased environmental impacts compared with the RTRP Hybrid Proposal and would cost more in terms of total dollars. *See* Section 4.2.3.2.2.3 for detailed discussion of the anticipated environmental impacts of Alternative B and Section 4.2.3.2.2.4 for discussion of Alternative B estimated costs.

Provide sufficient capacity, in a timely manner, to meet existing electric system demand and anticipated future load growth. Alternative B would also potentially provide sufficient capacity to meet existing Riverside electric system demand and anticipated future load growth. While the transformer capacity of Alternative B would be designed to support 840 MW, Alternative B's capacity to deliver that power would be limited to 750 MW (*i.e*., six 125 MW 69 kV circuits (three double-circuit 69 kV lines – three routes). Thus, while it would meet the currently projected needs of Riverside, Alternative B would provide less potential future delivery capacity than the RTRP Hybrid Proposal. *See* the discussion in Section 4.2.3.2.2.1.

Like Alternative A and for the reasons discussed in Section 3.5, as compared with the RTRP Hybrid Proposal, Alternative B is likely to result in delays in timely addressing Riverside's current and future anticipated electric system demands. The magnitude of the delay associated with Alternative B depends on various factors, including time needed for engineering and design, modification of the environmental analyses in the SEIR under development by the CPUC, and CPUC's licensing of Alternative B. If adoption of the Alternative B design required initiation of a new CEQA process, the resulting delay likely would be five years or more.

Provide an additional point of delivery for bulk power into the Riverside electrical system, thereby reducing dependence on Vista Substation and increasing overall reliability. The Alternative B design would add a second source of electricity to Riverside's grid. However, as discussed in detail in Section 4.2.3.2.2.2, Alternative B would result in a system that would be significantly more difficult to operate and manage, as it would provide power to the western half of Riverside's bifurcated distribution system through three different transmission sources: the Mira Loma, Etiwanda, and (proposed) Circle City Substations, resulting in three new distinct and separately sourced "load pockets" within Riverside's service territory. This would make Riverside's system operationally complex, inflexible, difficult to operate and manage, and susceptible to load shedding under contingency conditions.

Meet Proposed Project need while minimizing environmental impacts. As summarized in Section 1.4.2.1 and discussed in detail in Section 4.2.3.2.2.3, Alternative B would result in increased environmental impacts when compared with the RTRP Hybrid Proposal's likely environmental impacts, especially in view of the fact that Alternative B would require installation of a new 230 kV transmission line longer than the 230 kV line included in the RTRP Hybrid Proposal.

Meet Proposed Project need in a cost-effective manner. As summarized in Section 1.4.2.2 and discussed in detail in Section 4.2.3.2.2.4, Alternative B's total costs would far exceed the anticipated costs associated with the RTRP Hybrid Proposal. With the required 230 kV line to Circle City Substation, Alternative B is estimated to cost $1,064.2 million (nominal 2023 dollars) or more than two-and-one-half times the estimated cost of the RTRP Hybrid Proposal of $405.3 million in nominal 2023 dollars.

1.4.1.3 Alternative C

Section 4.2.3.3.1 describes in detail the preliminary routes and facilities designs included in Alternative C, which would include interconnection at a single substation (Mira Loma) with two double-circuit 69 kV lines for a total of four 69 kV circuits. Alternative C would provide 500 MW of additional firm delivery capacity and an additional point of delivery for power into the Riverside electrical system, but it would not effectively reduce Riverside's dependence on Vista Substation and

increase overall reliability. While the CPUC-jurisdictional portion of the Project would cost less than Alternatives A or B or the RTRP Hybrid Proposal, such costs do not include the cost of the additional contemplated generation that would be necessary to provide reliable service to Riverside load.[14] Alternative C also is likely to result in increased environmental impacts compared with the RTRP Hybrid Proposal. *See* Sections 1.4.2.1 and 4.2.3.3.2.2.

Provide sufficient capacity, in a timely manner, to meet existing electric system demand and anticipated future load growth. Alternative C would only provide up to 500 MW of additional firm delivery capacity to meet Riverside's needs. While the transformer capacity of Alternative C would be designed to support 560 MW, Alternative C's capacity to deliver that power would be limited to 500 MW (*i.e*., four 125 MW 69 kV lines). Therefore, Alternative C would not meet the 560 MW capacity goal of the Project and would not meet the power delivery capacity of the RTRP Hybrid Proposal or longer term capacity requirements without the addition of supplemental internal generation. *See* the discussion in Section 4.2.3.3.2.1.

Like Alternatives A and B and for the reasons discussed in Section 3.5, as compared with the RTRP Hybrid Proposal, Alternative C is likely to result in delays in timely addressing Riverside's current and future anticipated electric system demands. The magnitude of the delay associated with Alternative C depends on various factors, including time needed for engineering and design, modification of the environmental analyses in the SEIR under development by the CPUC, and CPUC's licensing of Alternative C. If adoption of the Alternative C design required initiation of a new CEQA process, the resulting delay likely would be five years or more.

Provide an additional point of delivery for bulk power into the Riverside electrical system, thereby reducing dependence on Vista Substation and increasing overall reliability. Alternative C would add a second source of electricity to Riverside's grid but would not effectively reduce dependence on Vista Substation and increase overall reliability. In the event service from Vista Substation was interrupted, Alternative C could only provide a maximum of 680 MW (500 MW of firm delivery capacity plus 180 MW of local generation).[15] Riverside's maximum load is forecasted to be 734 MW in 2038. Thus, Alternative C would fall 54 MW short by 2038, using the assumption that 180 MW of local gas-fired generation would be available in 2038. Alternative C would not effectively replace the

[14] Two potentially viable generation options were considered for Alternative C supplemental generation, *i.e.*, gas-fired peakers and PV Solar with battery energy storage (BES). PV Solar with BES was selected for further study in this Report over gas-fired peakers mainly because of the concerns with the long term viability of gas-fired peakers as sources of firm power in light of increasingly stringent environmental regulations. As noted in Sections 1.5.2.2.1 and 4.3.2.2, the use of additional peakers would likely result in greater air quality impacts, and strict operation permit requirements for gas-fired generation sources regulated by the South Coast Air Quality Management District (SCAQMD) renders continued dependence on peakers questionable. Even if environmentally and legally feasible, the increased use of peakers to meet Riverside's demands would: (1) be less cost effective than the RTRP Hybrid Proposal; (2) suffer from reliability risks due to uncertainties in the availability of natural gas fuel sources; (3) require finding available land to site additional gas-fired generation, and (4) not represent prudent utility practice in that it would defer transformer capacity additions by continued installation of peaking units. Reference Section 4.3.2 Analysis of Interim Solutions for further discussion on large scale utility solar and gas-fired peakers.

[15] Riverside's RERC generation includes 4 – 48 MW units (192 MW), and Springs Generation includes 4 - 9 MW units (36 MW) of generation for a total Riverside internal generation of 228 MW. Under contingency conditions, as described in this Report, one RERC unit would be out of service for a loss of 48 MW, leaving total remaining generation of 180 MW (228 MW – 48 MW).

firm power supplied by Vista Substation in the event that source became unavailable and it would not satisfy the Project's reliability Objective even with the addition of supplemental internal generation. *See* the discussion in Sections 4.2.3.3.2.1 and 4.2.3.3.2.4.

Meet Proposed Project need while minimizing environmental impacts. As summarized in Section 1.4.2.1 and discussed in detail in Section 4.2.3.3.2.2, Alternative C would likely result in increased environmental impacts when compared with the RTRP Hybrid Proposal's likely environmental impacts.

Meet Proposed Project need in a cost-effective manner. As summarized in Section 1.4.2.2 and discussed in detail in Section 4.2.3.3.2.3, Alternative C's estimated costs for delivery facilities alone are less than the estimated costs for the RTRP Hybrid Proposal. Alternative C is estimated to cost $239.4 million (nominal 2023 dollars) for firm delivery facilities. Alternative C would require additional internal generation to provide equivalent capacity (560 MW), and the costs for such internal generation would increase the cost for Alternative C above the cost for the RTRP Hybrid Proposal. Refer to Section 4.2.3.3.2.3 for a breakdown of the Solar and battery energy system costs. The Alternative C total cost, with additional generation, is estimated at $503.4 million as compared to the estimated cost of the RTRP Hybrid Proposal of $405.3 million, approximately 24% more than the estimated cost of the RTRP Hybrid Proposal.

1.4.2 Summary of Conclusions Regarding 69 kV Alternatives

1.4.2.1 Lower Voltage Alternatives would likely Increase Environmental Impacts.

As discussed in detail in Section 3.2, the CEQA Guidelines require that consideration of project alternatives be based primarily on ability to reduce significant environmental impacts relative to the proposed project. All three of the potential Alternatives studied herein would require multiple 69 kV routes as compared with the single double-circuit 230 kV transmission line proposed as part of the RTRP Hybrid Proposal. Further, the 69 kV Alternatives would have higher environmental impacts because of the additional equipment and necessary expansions of Mira Loma Substation and (for Alternative B) Etiwanda Substation and the proposed Circle City Substation. As a result, the areas affected by the potential Alternatives would be more extensive than the area that would be affected by the RTRP Hybrid Proposal, and all of the Alternatives evaluated would increase, rather than "avoiding or substantially lessening any significant [environmental] effects of the project . . . ."[16] *See* Sections 4.2.3.1.2.3 (Alternative A), 4.2.3.2.2.3 (Alternative B), and 4.2.3.3.2.2 (Alternative C).

Further, Alternative B also would require the siting, licensing, and construction of a separate 230 kV transmission line source to be routed to the proposed Circle City Substation that is not part of the currently proposed design for that substation and would likely be approximately 20 percent longer than the 230 kV line proposed as part of the RTRP Hybrid Proposal. The necessary 230 kV line to Circle City Substation was not designed in detail in this Report. However, this source line by itself would increase rather than reduce environmental impacts in comparison to the RTRP Hybrid Proposal due to the similar environmental baseline conditions occurring in the area between the Mira Loma Substation and the Circle City Substation. *See* Section 4.2.3.2.2.3. Effectively, in addition to adding 69 kV lines, Alternative B simply relocates the proposed 230 kV line included in the RTRP Hybrid Proposal into different residential communities to the west without reducing environmental impacts.

Fundamentally, none of the 69 kV Alternatives studied herein would effectively mitigate public opposition to the RTRP Hybrid Proposal. In fact, the 69 kV Alternatives would likely result in

[16] *See* CEQA Guidelines §§ 15126.6 (a) and (f).

increased public opposition because: (1) those currently opposed to the RTRP Hybrid Proposal would likely remain opposed to a 69 kV Alternative located in the same route and/or multiple routes through the same community (*i.e.*, the reduction in voltage and change in facility type may assuage some protesters and intervenors, but SCE and Riverside anticipate the current public opposition would remain largely in place); and (2) because multiple line routes are required to deliver the same load as one, double-circuited 230 kV line, and such lines would be located in jurisdictions and communities not currently impacted by the RTRP Hybrid Proposal, the 69 kV Alternatives will likely prompt these newly impacted communities to object to the 69 kV Alternatives.

1.4.2.2 The Lower Voltage Alternatives would be more Costly than the RTRP Hybrid Proposal

The estimated costs for Alternatives A and B are significantly higher than the projected cost of the RTRP Hybrid Proposal. *See* Sections 4.2.3.1.2.4 (Alternative A) and 4.2.3.2.2.4 (Alternative B). Moreover, although the costs of transmission facilities evaluated under Alternative C are estimated to be less than the estimated cost of the RTRP Hybrid Proposal, the design configuration in Alternative C would not provide the same capacity as the RTRP Hybrid Proposal and would have to be supplemented by additional internal generation to provide reliable service to Riverside's customers and to provide the capacity requirements to meet extended peak load forecasts. For example, adding 60 MW of solar generation to Alternative C would bring the rated capability of this Alternative to 560 MW. The estimated cost range for such a utility scale project, including the addition of a battery energy storage system (240 MWh), a new substation to serve these facilities, and a new 69 kV line to tie into Riverside's distribution system is $264.0 million (nominal 2023 dollars), which would bring the total costs for Alternative C to approximately $503.4 million. *See* Section 4.2.3.3.2.3. This solar cost estimate does not include environmental, project management, legal, regulatory or financing costs.

TABLE 1 LOWER VOLTAGE ALTERNATIVES COST SUMMARY (NOMINAL 2023 DOLLARS)

RTRP Hybrid Proposal	$405.3 million
Alternative A	$499.1 million
Alternative B	$1,064.2 million
Alternative C	$503.4 million.

1.4.2.3 The Lower Voltage Alternatives Studied in this Report would Require Complex Substation Re-designs, Increased Reliability Risks, and Potential Expansions into Adjacent Properties

Each of the 69 kV Alternatives would face space constraints at each of the SCE substations reviewed and would likely require deviations from SCE and industry design standards and prudent planning practices, further complicating the implementation of any of these Alternatives. *See* Sections 4.2.3.1.2.2 (Alternative A), 4.2.3.2.2.1 and 4.2.3.2.2.5 (Alternative B), and 4.2.3.3.2.4 (Alternative C). Expansions of the three substations (Mira Loma for all Alternatives and Etiwanda and Circle City for Alternative B) likely would face challenges regarding potentially incompatible adjacent land uses, sensitive environmental resources, and/or adverse terrain or other hazards. To accommodate the 69 kV Alternatives, the existing layouts of these substations (including angles of current source lines, getaways, circuits, *etc.*) may require alteration to accommodate the new facilities.

Further, each 69 kV Alternative requires the addition of transformers at the source substations that would exceed the design guidelines for the substations and create overall reliability risks to Riverside

customers. *See* Sections 4.2.3.1.2.2, 4.2.3.2.2.5, and 4.2.3.3.2.4. The Alternative A design includes the addition of three transformers at Mira Loma Substation, which would exceed the transformer limit as dictated by SCE's "Subtransmission Planning Criteria and Guidelines" (September 24, 2015) and substation design standards. SCE's standards provide a baseline to evaluate and compare the merits of proposed changes to determine impact on safety, reliability, operations, maintenance, construction and cost. The four A-bank transformer limitation seeks to limit the amount of exposure if the substation were to become unavailable and also allows for a reasonable amount of circuit congestion in the local area. *See* Section 4.2.3.1.2.2.

Alternative B has reliability concerns not only with the addition of transformers to multiple source substations (Mira Loma, Etiwanda, and Circle City), but it also requires significant changes to the configuration of Riverside's distribution system, which would result in reduced reliability as compared to the RTRP Hybrid Proposal. *See* Section 4.2.3.2.2.2.

1.4.2.4 Potential Delays Resulting from Pursuit of Lower Voltage Alternatives would Unacceptably Extend Riverside's Exposure to Reliability Risks and Increase Costs

As discussed in more detail in Section 3.5, pursuing a lower voltage Alternative would likely increase the time required to approve and install the facilities needed to address Riverside's current and future anticipated electric system demands. As referenced previously, the low voltage Alternatives may result in delays of five years or more to the anticipated in-service date of the new interconnection depending on various factors, including time needed for engineering and design, modification of the environmental analyses in the SEIR under development by the CPUC, and CPUC licensing.

Due to the limitations on capacity at Vista Substation (Riverside's sole interconnection with the SCE/CAISO grid), Riverside's customers already are exposed to risk of blackouts, load shedding and outages under contingency conditions, and that risk would be extended and increased if the work already performed to support the RTRP Hybrid Proposal has to start over to pursue a lower voltage Alternative. Such delay would be inconsistent with the Project Objectives and, in addition to potentially extending the in-service date of the project, may substantially increase the project costs as additional efforts are made in support of CPUC licensing. Such costs would be in addition to the significant expense already incurred as part of the CEQA environmental review and CPCN licensing process.

1.4.2.5 Based on Environmental, Social, and Policy Considerations, the Lower Voltage Alternatives are Infeasible

Under California law, feasibility is defined as "capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic, environmental, legal, social, and technological factors."17 No public agency shall approve a project with significant and unavoidable environmental impacts unless the public agency finds "specific economic, legal, social, technological, or other considerations … make infeasible the mitigation measures or alternatives identified in the environmental impact report" and "that specific overriding economic, legal, social, technological, or other benefits of the project outweigh the significant effects on the environment."18 Under CEQA, the "other considerations" referenced in section 21081 have been found to include "policy considerations," permitting the rejection of mitigation or alternatives that are "impractical or

[17] *See* CEQA Guidelines § 15364; *see also* Pub. Resources Code § 21061.1.

[18] *See* Pub. Resources Code § 21081.

undesirable from a policy standpoint."[19] The CEQA Guidelines also stress that the selection of project alternatives should be based primarily on the ability of one or more proposed alternatives to reduce significant impacts relative to the proposed project.[20]

Sections 4.2.3.1.2.5, 4.2.3.2.2.5, and 4.2.3.3.2.4 discuss in detail the feasibility considerations relating to Alternatives A, B, and C, respectively. None of the 69 kV Alternatives is capable of being accomplished within the same time period as the RTRP Hybrid Proposal. Depending on the extent of subsequently-required engineering and design modifications as well as permitting and related regulatory proceedings, the additional time necessary for the completion of any of the Alternatives could be five years or more.[21] As described in Section 3.5, these delays would place the reliability of Riverside's system at continued risk of load shedding and potential distribution system blackout conditions, as SCE and Riverside expect that loading limits on Riverside's sole existing interconnection to the SCE system at the Vista Substation will continue to be exceeded under normal operating conditions during peak demand periods. Under emergency conditions, including an outage of one of the Vista Substation transformers used to serve Riverside, involuntary load shedding is highly likely. Under both normal and emergency conditions, Riverside will be required to continue to rely on internal, gas-fired peaking units that are vulnerable to fuel supply deficiencies associated with the gas system and usage limitations related to air permitting. Increased delay also has the potential to add significant costs to any project. These costs would be in addition to the costs already incurred as part of the RTRP CEQA environmental review and CPCN licensing process. It is critical that any Alternative to the RTRP Hybrid Proposal be capable of completion within the same timeframe. None of the 69 kV Alternatives satisfies that criterion.

Each of the Alternatives is environmentally infeasible due to the requirements for significantly more miles of transmission line to accomplish even some of the basic Project Objectives of the RTRP. The increase in transmission lines would have higher environmental impacts because of a greater footprint with multiple right(s)-of-way (ROWs), greater effects to the community from the greater footprint, and additional equipment being required at Mira Loma, Etiwanda, and the proposed Circle City Substations. Each of the lower voltage Alternatives would extend the environmental and community impacts beyond the footprint of the RTRP Hybrid Proposal.

Social factors also support a finding of infeasibility as to each of the 69 kV Alternatives. The large number of structures and line miles described above in connection with environmental factors will create a greater impact on the communities located adjacent to the facilities for the 69 kV Alternatives relative to the impact that the shorter route and reduced number of structures associated with the RTRP Hybrid Proposal will have on communities adjacent to the project. Because each of the 69 kV Alternatives includes at least one line route that does not follow the same route as the RTRP Hybrid Proposal, SCE and Riverside anticipate that new community opposition could arise and that new environmental analyses of the routes may be required, with a corresponding delay on the project's timing. In addition, each of the 69 kV Alternatives is likely to have larger environmental justice impacts on disadvantaged communities.

Finally, each of the 69 kV Alternatives would cost more, in terms of total dollars and without respect to any tariff implications, than the RTRP Hybrid Proposal. *See* Sections 4.2.3.1.2.4 (Alternative A), 4.2.3.2.2.4 (Alternative B), and 4.2.3.3.2.3 (Alternative C). The cost increases identified in those

[19] *See California Native Plant Soc. v. City of Santa Cruz*, 177 Cal.App.4th 1001 (describing acceptable policy-based infeasibility determinations under CEQA).

[20] *See* CEQA Guidelines § 15126.6(b).

[21] *See* further discussion of potential delay in Section 3.5.

sections do not reflect the potential cost increases associated with delays and new environmental and permitting processes. The increased total costs contribute to an overall finding of infeasibility based on the environmental and social considerations noted above.[22]

1.5 Interim Solutions

In response to the ALJ's directive, SCE and Riverside also evaluated whether various interim solutions might be available to Riverside to mitigate Riverside's electrical system needs. With respect to the Report's consideration of "other interim solutions," it is uncertain and speculative when, if ever, "technological advancements in battery storage and distributed solar [would be] feasible at the project scale" allowing those options to serve as viable alternatives to the RTRP Hybrid Proposal. *See* the discussion in Section 4.3. Nonetheless, this Report explores the potential for various interim solutions to mitigate Riverside's electrical system needs in a manner consistent with the Project Objectives. Section 4.3 contains detailed discussion of potential interim solutions.

1.5.1 Minimum Interim Power Needs

The Vista Substation source to Riverside has a loading limit of 557 MW. For planning purposes, Riverside's total current internal generation capacity is 180 MW under a contingency condition.[23] Thus, Riverside's total current capacity to serve load (internal generation plus Vista Substation transformers) is 737 MW (557 MW + 180 MW).

Any interim solution providing less than 489 MW by 2023 would *not* constitute an equivalent, redundant source of reliable energy in the event power from SCE's Vista Substation was interrupted. Assuming Riverside's internal generation capacity remained constant, this capacity is assumed equivalent to Riverside's forecast need in 2023 (669 MW), less Riverside's assumed internal generation capacity (180 MW), or 489 MW. If the interim solution was to remain in place until 2038, the minimum needed capacity for any interim solution is equivalent to the forecast need in 2038 (734 MW), less Riverside's generation capacity (180 MW) under contingency conditions, or 554 MW.

Based on the facts above and in order to satisfy RTRP's Project Objective of reducing dependence on Vista Substation and increasing overall reliability, this Report assumes any given interim solution would need to supply a minimum of 489 MW of capacity by 2023, ramping up to 554 MW by 2038. *See* the discussion in Section 4.3.1.

1.5.2 Reliance on Interim Solutions Cannot be Expected to Address Riverside's Electrical Needs in lieu of the RTRP Hybrid Proposal

This Report considers the potential for various types of internal generation resources and expanded conservation to meet Riverside's electrical needs on an interim basis. The degree to which such interim solutions might offset Riverside's needed capacity varies with each technology. However, as summarized in this section and discussed in detail in Section 4.3, no interim solution considered could reasonably be expected to satisfy the Project Objectives to provide the capacity needed for future peak loads or increase reliability. These interim solutions would not effectively eliminate the need for a second source to reduce the dependence on Vista Substation to provide 557 MW of power

[22] As described in detail in Sections 4.2.3.1.2.5 and 4.2.3.2.2.5, technological considerations also support conclusions that Alternatives A and B are infeasible.

[23] In this context, the contingency condition refers to the outage of a single internal generating unit (48 MW) at Riverside Energy Resource Center (RERC) whether it is a scheduled or unscheduled outage under normal system conditions. The 737 MW figure also assumes availability of the RERC units (4 - 48 MW) and the Springs Generation units (4 - 9 MW) for needed operational hours.

to Riverside. In view of limitations on suitable sites, as well as the environmental and economic challenges presented by many of these interim solutions, Riverside considers it to be speculative to assume that such interim solutions could satisfy the Project Objectives of the RTRP Hybrid Proposal.

1.5.2.1 Energy Storage

Interim energy storage systems (ESS) considered for this Report include electrochemical (BES), pumped-hydro storage, and compressed-air storage.

While BES could provide benefits to Riverside's electrical system and offset some of Riverside's demand, the deployment of batteries cannot reasonably be expected to offset 489 MW of load by 2023 for the reasons discussed in detail in Section 4.3.2.1. Primarily due to constraints related to the scale and cost of battery technology at this time, the deployment of batteries cannot reasonably be expected to offset the 489 MW of load that is needed in order to provide comparable levels of reliability to the RTRP Hybrid Proposal. Assuming that Riverside could obtain, test, install, and operationally deploy 489 MW of BES by 2023 is unrealistic when viewed in light of the significantly lower (in relative terms) procurement targets established for the California-jurisdictional electric utilities under State law. None of these utilities has been directed to obtain sufficient BES to serve an anticipated 73.1% share of its projected peak load (2023), which is what a 489 MW BES procurement target would be equivalent to with respect to Riverside. Indeed, a 489 MW procurement target of BES for Riverside would exceed the installed grid-scale BES capacity throughout the entire United States as of the first quarter of 2016.[24]

In addition to scale, BES continues to represent an expensive technology, particularly at the quantities needed to provide a viable interim alternative solution to the RTRP Hybrid Proposal. Recently-published studies by Lazard Frères & Co. LLC reflect that the capital cost of lithium-ion energy storage ranges from $1.2 million/MW to $1.7 million/MW for the purpose of gas peaker replacement and $2.3 million/MW to $3.3 million/MW for the purpose of distribution system augmentation.[25] This compares to an average capital cost of $1.0 million/MW for gas peakers and a capital cost of $0.7 million/MW for the RTRP Hybrid Proposal. Although the costs for lithium-ion technology may decrease in the near term,[26] it is unlikely that projected cost decreases in the next five years would be adequate to render this technology economically viable as an alternative to the RTRP Hybrid Proposal.

Finally, BES is incapable of providing the same reliability benefits of the Project and would not obviate the need for a second interconnection to ensure reliability. Even if the scale and cost did not render BES highly impractical, BES simply cannot perform the same functions of the RTRP Hybrid Proposal, and Riverside's electric system would continue to be vulnerable to the loss of the Vista Substation interconnection. In addition, to accommodate charging and discharging for a large BES project, Riverside would need to plan and potentially perform upgrades to its distribution system in order to ensure that the reliability impacts would be manageable and any effects of the BES on the transmission system outside of Riverside are studied, well-understood by SCE and the CAISO, and mitigated if necessary.

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[24] David Hart and Alfred Sarkissian, Deployment of Grid-Scale Batteries in the United States at 8 & n.8 (2016), *available at* https://energy.gov/sites/prod/files/2017/01/f34/Deployment%20of%20Grid-Scale%20Batteries%20in%20the%20United%20States.pdf.

[25] Lazard, Levelized Cost of Storage Analysis – Version 3.0 (2017) at 15, available at https://www.lazard.com/perspective/levelized-cost-of-storage-2017/.

[26] The Lazard analysis (*id.* at 16) predicts a 36% decrease in lithium-ion costs over the next five years.

For all of the reasons summarized above and discussed in greater detail in Section 4.3.2.1, the scale, cost, and technological limitations of BES make BES infeasible as an interim alternative to the Project.[27]

1.5.2.2 Local Generation

In order to provide 489 MW of capacity by 2023, local generation facilities in the form of additional gas-fired combustion turbines ("peakers") or a large, utility-scale solar facility were reconsidered.[28] Consistent with the findings of the 2013 FEIR and for the reasons articulated in Sections 4.3.2.2 and 4.3.2.3, reliance on local generation would not be a viable interim solution to Riverside's electrical needs in lieu of the RTRP Hybrid Proposal.

1.5.2.2.1 Gas-fired Combustion Turbines

The use of additional peakers to provide the needed electrical capacity would likely result in greater air quality impacts. For that reason, the legal feasibility of relying on additional peakers is questionable and speculative at best, in light of the strict operation permit requirements for gas-fired generation sources regulated by the South Coast Air Quality Management District (SCAQMD). Riverside Energy Resource Center (RERC) turbine starts are typically limited to no more than two per day for a total of 1,200 operating hours per year. Based on current SCAQMD regulations, it is unlikely that Riverside would be able to use additional peakers to serve 489 MW of electrical demand by 2023.

Even if legally feasible, in light of the significant number of MWs required, the use of peakers as an interim solution would: (1) likely be prohibitively expensive (or at a minimum, less cost effective than the RTRP Hybrid Proposal); (2) suffer from reliability risks due to uncertainties in the availability of natural gas fuel sources; (3) require finding available land to site additional gas-fired generation; and (4) not represent prudent utility practice in that it would defer transformer capacity additions by continued installation of peaking units. Section 4.3.2.2 discusses these considerations in detail.

1.5.2.2.2 Large, Utility-scale Solar Facility

The use of a large scale solar facility to meet 489 MW of demand by 2023 is likely technically infeasible due to siting constraints for such facilities within or near the City of Riverside. There are currently no large-scale (defined as over 25 MW by SCE and Riverside for the purposes of this Report) solar projects within the City of Riverside. Riverside preliminarily estimates it would need at least 360 acres (approximately 6.0 acres/MW) to support even a 60 MW solar farm, including a battery electric storage system and Riverside interconnection facilities (substation and lines). A screening of contiguous, undeveloped areas, not dedicated to parks/open space within the City of Riverside, revealed that procuring an approximate 360-acre site large enough to accommodate a 60 MW solar facility is infeasible, much less 489 MW of solar capacity. While smaller scale solar facilities of less than 25 MW may be more feasible to site individually, it is unrealistic to expect that

[27] The other types of storage systems (pumped-hydro and compressed-air) are not technically feasible within the City of Riverside. As described in Section 4.3.2.1, geological features necessary to support these technologies do not exist within or near the City of Riverside, and large-scale pumped hydro or compressed air storage located outside of the City of Riverside likely would require a high voltage transmission line similar to what is currently proposed as part of the RTRP Hybrid Proposal in order to deliver the power.

[28] *See* FEIR Volume 2, Section 6.4.2 at 6-27 to 6-30 (considering and dismissing new generation as a viable alternative to the RTRP as proposed).

Riverside can site 489 MW of such facilities in order to reliably satisfy Riverside's electrical capacity needs. Further, as an intermittent generating resource, solar capacity would not meet the Project's Objective to effectively reduce dependence on Vista Substation and increase reliability.

Even if enough sites were available to make solar technically feasible, this interim solution would likely have more environmental impacts than the RTRP Hybrid Proposal, as it would require a larger footprint and also the acquisition and disturbance of new ROWs in support of the interconnection with the Riverside grid. It would also likely be substantially more costly than the RTRP Hybrid Proposal as discussed in Section 4.3.2.3.

1.5.2.3 Distributed Generation

Distributed generation (DG) resources (*e.g.*, fuel cells, micro turbines, photovoltaic solar, wind, landfill gas, digester gas, *etc*.) were also reconsidered.[29] Consistent with the findings of the 2013 FEIR and for the reasons articulated in Section 4.3.2.4, reliance on DG is not anticipated to be a viable interim solution to Riverside's electrical needs in lieu of the RTRP Hybrid Proposal.

A DG resource is typically less than 5.0 MW in net generating capacity, and such resources are located on distribution feeders near customer load. Riverside's estimated current total for DG is less than 30 MW. DG capacity is typically implemented incrementally over time. There is not sufficient data to determine how many kW or MW of DG are actually provided to Riverside from DG users due to the complexity of metering between demand and energy for DG. Since 2008, Riverside has offered incentives for business and residential photovoltaic installations. To date, this program has resulted in approximately 11 MW of local solar generation; expecting that DG capacity could expand by 489 MW by 2023 would be unrealistic. DG resources also typically have a relatively small capacity compared to the cost.

Given the small scale of DG resources and the limited penetration of such resources in the Riverside system to date, reliance on DG could not timely offset the need for 489 MW of additional capacity by 2023 to the Riverside system in order to satisfy the reliability goals of the RTRP Hybrid Proposal. Further, an interim DG solution would not satisfy the Project goals of providing an additional point of delivery for bulk power into the Riverside electrical system and would not split and upgrade the sub-transmission electrical system.

1.5.2.4 Conservation/Demand Response Programs

Energy Conservation and Load Management measures were also reconsidered.[30] Consistent with the findings of the 2013 FEIR and for the reasons articulated in Section 4.3.2.5, reliance on energy conservation and load management would not be a viable interim solution to Riverside's electrical needs in lieu of the RTRP Hybrid Proposal.

Riverside offers a variety of "demand-side management" programs and incentives, including programs encouraging energy efficiency, demand response, and DG. In Riverside's service territory, annual increases in load growth have exceeded the reductions in energy consumption from energy efficiency programs resulting in annual net increases in electrical demand. As noted in Section 3.4.2.3, Riverside's load forecasts already incorporate the observed impacts of Riverside's load

[29] *See* FEIR Volume 2, Section 6.4.2 at 6-30 to 6-31 (considering and dismissing DG as a viable alternative to RTRP as proposed).

[30] *See* FEIR Volume 2, Section 6.4.2 at 6-31 (considering and dismissing energy conservation and load management as a viable alternative to RTRP as proposed).

reduction programs, and expecting such programs to achieve an incremental reduction of 489 MW more (or 77% of Riverside's most recent peak demand (639 MW)) would be unrealistic.

1.6 Conclusion

For the reasons summarized above and as set forth in detail below, there are no feasible lower voltage design alternatives to meet the Project Objectives, and there are no interim solutions available to Riverside to mitigate its needs for the RTRP Hybrid Proposal. The RTRP Hybrid Proposal is environmentally superior and more cost-effective than the lower voltage Alternatives and interim solutions, and it has been designed to address and resolve identified reliability needs of the Riverside electric system. Those needs were identified more than ten years ago, and they continue to exist today. The lower voltage Alternatives and interim measures do not reliably address Riverside's system needs and are inferior to the RTRP Hybrid Proposal.

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2. Introduction and Background

2.1 Brief History of the RTRP and the RTRP Hybrid Proposal

In June 2006, CAISO determined the need for the RTRP as a necessary addition to the CAISO Controlled Grid to meet the needs for reliable service to the City of Riverside and directed its construction. Shortly thereafter, Riverside began the development of the EIR for the RTRP. Riverside issued a public Notice of Preparation (NOP) of the project EIR in January 2007 and later circulated a revised NOP in November 2009.

The City of Riverside's Draft EIR was circulated in August 2011. During 2013, the City of Jurupa Valley approved new development projects in the RTRP alignment. The RTRP Final Environmental Impact Report (FEIR), including SCE's proposed 230 kV transmission line and Wildlife Substation, was certified on February 5, 2013. CEQA litigation ensued beginning with a March 2013 lawsuit by the City of Jurupa Valley. Jurupa Valley's Petition seeking to overturn Riverside's approval of RTRP and certification of the FEIR was denied by the Los Angeles County Superior Court in 2014.[31] Thereafter, the California Court of Appeals affirmed that denial,[32] and the California Supreme Court likewise denied a petition filed by Jurupa Valley.

In April 2015, SCE filed Application No. 15-04-013 for a CPCN to construct the RTRP designated as the environmentally superior alternative in the FEIR and previously approved by Riverside. In May 2015, the CPUC found under CEQA that the Riverbend and Vernola Apartment Community projects approved by Jurupa Valley constituted "changed circumstances" warranting a subsequent CEQA review of the project.

During the third quarter of 2016, SCE reached settlement agreements with two developers resulting in proposed modifications to the RTRP to resolve concerns relating to the new residential developments. SCE subsequently submitted CPCN application revisions to the CPUC (in September 2016) to include the new alignment and underground segments proposed to address the Riverbend and Vernola Apartment Community concerns. A key change was the inclusion of approximately two miles of underground transmission as SCE's preferred alternative in lieu of the originally proposed 230 kV project. The modified 230 kV transmission line, which includes both overhead and underground design, is referred to as the RTRP Hybrid Proposal.

SCE's CPCN application was deemed complete by the CPUC in January 2017. The CPUC also issued a NOP to inform the public that it would be completing a Subsequent EIR (SEIR) to analyze the environmental impacts of the RTRP based on the RTRP Hybrid Proposal.

2.2 ALJ Ruling

On August 15, 2017, ALJ Yacknin issued the Ruling. In relevant part, the Ruling directed:

> Southern California Edison Company ("SCE"), RPU and CAISO … to meet and confer and prepare a joint report…identifying lower voltage designs or other interim design remedies to the proposed project. The report shall address the following:

[31] *City of Jurupa Valley v. City of Riverside* (Super. Ct. Los Angeles County, 2014, No. BS140385).

[32] *City of Jurupa Valley v. City of Riverside* (Nov. 12, 2015, B257623)[nonpub. opn.].

- Identification of a lower voltage design alternative(s) to meet the project objectives, either in full or in part, including the following details:
    a. locations of substation connection points between SCE and RPU;
    b. locations and routing of existing overhead and underground distribution corridors that would be utilized;
    c. locations and dimensions of any required new overhead or underground ROW;
    d. description of how MW targets would be achieved and from which sources;
    e. cost comparison to the proposed project;
    f. Any other pertinent design assumptions or considerations.
    g. If lower voltage design alternatives are found to be infeasible, explain in detail the basis for the infeasibility [.]

- Identification of any other interim solutions available to RPU that would mitigate the electrical system impacts until technological advancements in battery storage and distributed solar are feasible at the project scale.

In response to the ALJ's Ruling, Riverside and SCE developed this joint Report with advice and guidance from CAISO.

3. RTRP Project Objectives and Principles and Methodology for Consideration of Alternatives

Section 3 describes factors and considerations affecting the selection, development, and evaluation of the lower voltage Alternatives explored in this Report.

3.1 RTRP Project Objectives, Purpose and Need

The full description of the purpose and need for the RTRP is included in the 2013 FEIR. For purposes of reference and identification of lower voltage alternatives as directed by the ALJ, this Report includes a summary of the RTRP purpose and need.

The purpose of the RTRP Hybrid Proposal is to provide Riverside with adequate capacity to serve existing load, to provide for long-term system capacity for load growth, and to provide needed system reliability. The rapid population growth and commercial development in Riverside have led to an increase in local electric customers and in their use of electric energy. Currently, the sole source of bulk electrical energy for Riverside electric customers is through SCE's Vista Substation, located within the City of Grand Terrace. As discussed in detail in Section 3.4.2.3, Riverside's electrical demand routinely exceeds the available 557 megawatts (MW) of capacity from Vista Substation, and Riverside forecasts a peak demand growth rate of approximately 0.5% per year for the next 20 years.

It is normal utility practice to have alternate sources of supply at various points in the electric system. A new interconnection to SCE's transmission system is urgently needed to provide capacity for Riverside's existing as well as new electrical load and an additional point of interconnection for reliability purposes. Without this addition, load shedding and area electrical blackouts would eventually be required.[33] In addition, reinforcement is urgently needed to the existing 69 kilovolt (kV) subtransmission system to meet standard reliability criteria. Without reinforcements, load shedding may occur following unplanned 69 kV line outages during peak load conditions. The Board of Governors of the CAISO, which operates California's power transmission system, recognized the need for another interconnection point in Riverside's system in 2006 and directed SCE and Riverside to pursue the RTRP.

The following Project Objectives from the 2013 FEIR were developed in support of the RTRP Purpose and Need which guided the development and evaluation of alternatives considered in the 2013 FEIR:

- Provide sufficient capacity, in a timely manner, to meet existing electric system demand and anticipated future load growth.
- Provide an additional point of delivery for bulk power into the Riverside electrical system, thereby reducing dependence on Vista Substation and increasing overall reliability.
- Split and upgrade the subtransmission electrical system as a function of prudent utility practice.[34]
- Meet Proposed Project need while minimizing environmental impacts.
- Meet Proposed Project need in a cost-effective manner.

[33] Load shedding is the intentional, controlled interruption of electrical load. It is performed by system operators, such as CAISO, or by automatic equipment, in order to protect the electric system from excessive loss-of-life of electrical equipment or from permanent damage, such as from an overload.

[34] The RTRP Hybrid Proposal and the three 69 kV Alternatives studied in this Report all would split the Riverside electrical system. This Project Objective, therefore, does not provide any basis on which to compare the Alternatives and is not discussed at length herein.

These Project Objectives guide the CPUC's development of a range of reasonable alternatives to the RTRP Hybrid Proposal. As described in Section 3.2.2, alternatives are eliminated from further consideration when they fail to meet most of the basic Project Objectives, are infeasible, and/or would not avoid significant environmental impacts.

Alternatives considered and eliminated for the RTRP in the 2013 FEIR and as part of the evaluation in this Report of potential alternatives to the RTRP Hybrid Proposal or interim solutions to address Riverside's system needs are identified and documented in Sections 4.1 and 4.3. The potentially feasible lower voltage Alternatives to the RTRP Hybrid Proposal are described in Section 4.2. As explained in Section 5, this Report concludes that the environmentally superior alternative to meet Project Objectives is the 230 kV RTRP Hybrid Proposal.

3.2 Principles for Consideration of Alternatives

The CPUC's consideration of potential alternatives in reviewing SCE's RTRP licensing applications is generally governed by the CPUC's General Order (GO) 131-D, CEQA, and the California Public Utilities Code.

3.2.1 CPUC's GO 131-D Requires Consideration of CEQA

GO 131-D was adopted to be responsive to the requirements of CEQA.[35] Specifically, GO 131-D requires the preparation of a Proponent's Environmental Assessment (PEA) or equivalent information regarding the environmental impacts associated with a proposed project under the CPUC's jurisdiction, including an exploration of feasible project alternatives that may decrease significant environmental impacts.[36] The 2013 FEIR was submitted in support of RTRP's CPCN application as information equivalent to a PEA.

CEQA Requires Consideration of a "Reasonable Range" of "Feasible" Alternatives

The CEQA Guidelines emphasize the selection of a "reasonable range" of alternatives in an EIR "which would feasibly attain most of the basic objectives of the project but would avoid or substantially lessen any of the significant effects of the project, and evaluate the comparative merits of the alternatives." [37] "Because an EIR must identify ways to mitigate or avoid the significant effects that a project may have on the environment (Public Resources Code Section 21002.1), the discussion of alternatives shall focus on alternatives to the project or its location which are capable of avoiding or substantially lessening any significant effects of the project, even if these alternatives would impede to some degree the attainment of the project objectives, or would be more costly."[38]

Importantly however, an "EIR need not consider every conceivable alternative to a project. Rather it must consider a reasonable range of potentially feasible alternatives that will foster informed decision making and public participation."[39] Thus the "range of alternatives required in an EIR is governed by

[35] *See* GO 131-D § II (GO 131-D responsive to CEQA's requirements).

[36] *See* GO 131-D §§ IX.A.1 h. (environmental impact document(s) required in support of CPCN), IX.B.1.e. (environmental impact document(s) required in support of a Permit to Construct); CEQA Guidelines § 15126.6 (Consideration and Discussion of Alternatives to the Proposed Project).

[37] CEQA Guidelines §§ 15126.6(a) (Alternatives to the Proposed Project), (f) (Rule of Reason); *see also* CEQA Guidelines § 15124(b) (clear statement of objectives aids in developing alternatives).

[38] CEQA Guidelines § 15126.6(b) (Purpose).

[39] CEQA Guidelines §§ 15126.6(a) (Alternatives to the Proposed Project), (f) (Rule of Reason).

a 'rule of reason' that requires the EIR to set forth only those alternatives necessary to permit a reasoned choice."[40] "An EIR need not consider an alternative whose effects cannot be reasonably ascertained and whose implementation is remote and speculative."[41] Of those alternatives that would avoid or substantially lessen any of the significant effects of the project, "the EIR need examine in detail only the ones that the lead agency determines could feasibly attain most of the basic objectives of the project."[42]

Under CEQA, "feasible" means "capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic, environmental, social, and technological factors, or "other considerations" including "policy considerations," which may permit the rejection of mitigation or alternatives that are "impractical or undesirable from a policy standpoint."[43] "Among the factors that may be taken into account when addressing the feasibility of alternatives are site suitability, economic viability, availability of infrastructure, general plan consistency, other plans or regulatory limitations, jurisdictional boundaries (projects with a regionally significant impact should consider the regional context), and whether the proponent can reasonably acquire, control or otherwise have access to the alternative site (or the site is already owned by the proponent)."[44]

Therefore, consistent with CEQA's guidance regarding the selection and evaluation of alternatives, each of the new, lower voltage Alternatives described in Section 4.2.3 below has been evaluated using three inquiries:

> *(1) Does the Alternative avoid or substantially lessen any significant effects of the Proposed Project, including consideration of whether the Alternative itself could create significant effects potentially greater than those of the Proposed Project?*

A key CEQA requirement for an alternative is that it must have the potential to "avoid or substantially lessen any of the significant effects of the project."[45] If an alternative is identified that does not have the potential to provide an overall environmental advantage as compared to the proposed project, it is typically eliminated from further consideration.

For the purposes of this Report, it is not possible to evaluate all of the impacts of the Alternatives in comparison to the RTRP Hybrid Proposal with absolute certainty or specifically quantify impacts. However, it is possible to identify elements of an Alternative that are likely to be the sources of impact and to relate them, to the extent possible, to general conditions in the subject area.

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[40] CEQA Guidelines § 15126.6(f) (Rule of Reason).

[41] CEQA Guidelines § 15126.6(f)(3).

[42] CEQA Guidelines § 15126.6(f) (Rule of Reason).

[43] Pub. Resources Code §§ 21061.1 (defining "feasible"), 21081 (no public agency shall approve a project with significant and unavoidable environmental impacts unless the public agency finds "specific economic, legal, social, technological, or other considerations…make infeasible the mitigation measures or alternatives identified in the environmental impact report" and "that specific overriding economic, legal, social, technological, or other benefits of the project outweigh the significant effects on the environment"); *California Native Plant Soc. v. City of Santa Cruz*, 177 Cal.App.4th 1001 (policy-based infeasibility determinations under CEQA permissible); *see also* CEQA Guidelines §§ 15021(b) ("In deciding whether changes in a project are feasible, an agency may consider specific economic, environmental, legal, social, and technological factors"), 15364 (same).

[44] CEQA Guidelines § 15126.6(f)(1).

[45] CEQA Guidelines §§ 15126.6(a) (Alternatives to the Proposed Project), (f) (Rule of Reason).

(2) Does the Alternative accomplish all or most of the basic Project Objectives?

The EIR need examine in detail only the alternatives the lead agency determines could attain most of the basic Project Objectives.[46] The Project Objectives of the RTRP Hybrid Proposal are described in Section 3.1 above.

(3) Is the Alternative feasible?

Under CEQA, "feasibility" means "capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic, environmental, legal, social, and technological factors," or "other considerations" including "policy considerations."[47]

The approach to each of these questions in evaluating the potential lower voltage Alternatives studied in this Report is described in more detail in Section 4.

3.2.2 Other Considerations for Alternatives

The CPUC's final decision on the project will also be guided by the California Public Utilities Code (PUC) in addition to the requirements of CEQA. Specifically, PUC Section 1002 states, in relevant part

> …The commission, as a basis for granting any certificate pursuant to Section 1001 shall give consideration to the following factors: (1) Community values. (2) Recreational and park areas. (3) Historical and aesthetic values. (4) Influence on environment, …

The discussion of the potential lower voltage Alternatives studied for this Report seeks to aid the CPUC's consideration of "community values" in the RTRP proceeding, foster informed decision-making and a reasoned choice by the CPUC, and also aid in the development of responses to comments on the SEIR. Supported by this Report and others, the final CPCN decision on the RTRP Hybrid Proposal will represent a balancing of the communities' interests, the need to protect environmental resources in the area, and the need for the RTRP.

3.3 Alternatives Development in the 2013 FEIR

The RTRP Project Objectives listed in Section 3.1 guided the development of a range of reasonable alternatives to the RTRP or to the location of the RTRP that were evaluated in the 2013 FEIR. A number of alternatives were considered and either eliminated or kept for detailed analysis within the 2013 FEIR. Alternatives were eliminated from further consideration when they failed to meet most of the basic Project Objectives, were infeasible, or would not avoid significant environmental impacts.

The reasonable routing and siting alternatives included in the 2013 FEIR for the RTRP 230 kV transmission line, 69 kV subtransmission lines, and substation sites were identified through an environmental analysis process that sought to avoid or substantially reduce any potentially significant effects of the RTRP, while satisfying the Project Objectives. Alternatives considered and eliminated from consideration for the RTRP were also identified and documented in Chapter 6 (Section 6.4, Volume 2) of the 2013 FEIR.

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[46] CEQA Guidelines § 15126.6(f)(Rule of Reason).

[47] Pub. Resources Code §§ 21061.1 (defining "feasible"), 21081; *California Native Plant Soc. v. City of Santa Cruz*, 177 Cal.App.4th 1001; *see also* CEQA Guidelines §§ 15021(b), 15364.

A broad range of alternatives were evaluated for the RTRP in accordance with CEQA Guidelines §15126.6(c). The 2013 FEIR, which was upheld by both superior and appellate courts,[48] included an evaluation of the alternatives that were considered but rejected as infeasible for constructability, operational, or environmental impact, or other reasons. Below is a list of the alternatives considered and eliminated within the 2013 FEIR.

Other Voltages

- Subtransmission/Transmission
  - 69 kV
  - 115 kV
  - 500 kV

Non-Wire Alternatives

- New Generation
- Distributed Generation
- Energy Conservation and Load Management

Alternative Technologies

- Underground entire 230 kV High-Voltage Transmission Line
- Underground all 69 kV Subtransmission Lines
- Direct Current Transmission
- Alternative Conductors

Siting and Routing Alternatives

- 230 kV Transmission Line Routes
  - Limonite Route
  - Bain Street Route
  - Eastern Route(s)
- 230 kV Substation Sites
  - Expand SCE's Vista Substation
  - Expand SCE's Mira Loma Substation
  - Expand Riverside's RERC Substation
  - Expand Riverside's Mountain View Substation
- 69 kV Subtransmission Line Routes
- 69 kV Substation Sites

[48] Trial court: *City of Jurupa Valley v. City of Riverside* (Super. Ct. Los Angeles County, 2014, No. BS140385). Court of Appeals: *City of Jurupa Valley v. City of Riverside* (Nov. 12, 2015, B257623) [nonpub. opn.]

The 2013 FEIR applied CEQA Guidelines §15126.6(c) to guide the identification and selection of alternatives for the RTRP including those alternatives that may be eliminated from detailed consideration. The three general elimination criteria that were considered when evaluating the alternatives included (i) alternatives that would fail to meet most of the basic Project Objectives, (ii) alternatives that were determined to be infeasible, and (iii) alternatives that would not avoid significant environmental impacts.

3.4 Methodology for Analysis and Evaluation of Alternatives Studied in This Report

3.4.1 Identification of Alternatives to be Studied

Consistent with the regulatory standards described in Section 3.2, SCE and Riverside sought to identify lower voltage alternatives that would avoid or substantially reduce environmental impacts that would result from the RTRP Hybrid Project while meeting most or all of the Project Objectives in a timely and cost-effective manner. The analysis identified potential lower voltage designs sourced from SCE substations (or in one Alternative a proposed substation) located closest to the Riverside grid, expecting that this approach would be most likely to minimize both environmental impacts and costs of Alternatives considered. SCE and Riverside identified potential routes and developed preliminary facilities designs and cost estimates for three 69 kV Alternatives. Following the preliminary but detailed scoping of the three Alternatives, SCE and Riverside evaluated each potential Alternative using the following three inquiries:

1. *Does the Alternative avoid or substantially lessen any significant effects of the RTRP Hybrid Proposal, including consideration of whether the Alternative itself could create significant effects potentially greater than those of the RTRP Hybrid Proposal?*
2. *Does the Alternative accomplish all or most of the basic Project Objectives?*
3. *Is the Alternative feasible?*

SCE and Riverside also reconsidered some of the alternatives that had been evaluated and rejected in the 2013 FEIR, including a potential 115 kV alternative.

3.4.2 Technical Considerations

The technical considerations discussed within this section were used for the development and evaluation of the lower voltage Alternatives studied in this Report.

3.4.2.1 Vista Substation and Riverside Generation

SCE's existing Vista Substation is Riverside's only source of power from the CAISO-controlled bulk electric system. The only other major source that Riverside uses to supplement the power delivered by SCE through the Vista Substation is the RERC gas-fired generation units, which are operated as peaking units. Vista Substation serves Riverside by way of two 280 MW transformers and seven dedicated 69 kV lines and cannot be expanded due to design limitations, space and construction constraints at the Substation. The service coming from Vista Substation is rated at a maximum capacity of 557 MW. When Riverside's load approaches 480 MW, Riverside's RERC generation units are brought on-line as needed. There are four gas-fired turbines at RERC, and each unit is rated at 48 MW (for a total of 192 MW). In addition there are four 9 MW units (36 MW) at Riverside's Springs Generating plant (Springs) that are rarely dispatched due to start-up limitations.[49] Riverside's

[49] Springs Generation capacity contributions were not included in the FEIR as discussed in FEIR Volume 2, Section 1.5.2. However, these units are included in this Report, because Springs generation is available now and should be included as part of the interim solutions. Springs generation is also included in the long term solutions to maintain consistency throughout this Report. Finally, including the Springs generation provides more

internal generating units are brought on-line as needed to support Riverside's load requirements during extreme weather conditions to provide additional capacity and to prevent overload conditions on the lines and transformers, as well as for other contingencies such as unplanned equipment, transformer, and/or line outages contingencies.

While these generation resources reduce the amount of power that must flow through the transformers at Vista Substation to Riverside by generating and supplying it locally, they are "peaker" units. The number of hours the RERC units can operate is limited by the permit requirements issued by the SCAQMD – 1,200 hours per year and no more than two starts per day. These units are typically run less than four hours per day. The Springs generating units also are subject to start-up and use restrictions. *See* Section 4.3 for additional information on gas-fired generation.

3.4.2.2 The RTRP and the RTRP Hybrid Proposal

The RTRP was determined by SCE, Riverside, and the CAISO to be the preferred approach for providing Riverside with the additional required capacity and a second and independent point of service that would deliver the capacity and reliability needed to meet the electrical demands and load growth projected for Riverside.

The RTRP Hybrid Proposal is currently designed to serve load by looping through the proposed Wildlife Substation (providing two line service) with a double-circuit 230 kV transmission line. The RTRP Hybrid Proposal double-circuit 230 kV transmission line, as designed, has a normal-condition rating of 916 MW and an emergency-condition rating of 1,239 MW. The RTRP Hybrid Proposal is designed to have the capacity to provide for the future expansion of both the Wildlife and Wilderness Substations. Two 280 MW 230/69 kV transformers, such as those installed at Vista Substation, would be part of the RTRP Hybrid Proposal and would approximately double the power that could be supplied to Riverside. The RTRP Hybrid Proposal would provide full redundancy during an unplanned outage of Vista Substation and would meet the Purpose and Need as defined in the 2013 FEIR.

3.4.2.3 Riverside System Growth and Load Forecasts

SCE currently has a loading limit of 557 MW it can provide to Riverside through Vista Substation, the sole point of interconnection between the Riverside and CAISO/SCE grids. This load limit is now routinely exceeded during peak demand periods. For example, in late August 2017, a six day heat wave produced consecutive day maximum temperatures in excess of 105^0 F in the Riverside service area resulting in a new Riverside peak load of 639 MW.[50]

Riverside's peak loads are expected to continue to increase at approximately 0.5 percent per year for the next 20 years, driven primarily by continued load growth in the Commercial and Industrial customer classes. Additionally, the City's population continues to increase at approximately 1.0 percent per year, in turn driving new housing developments and supporting commercial services.

On October 10, 2017, Riverside submitted its 10-year forward system load and 1-in-2 peak forecasts to the CAISO in satisfaction of CAISO Tariff Sections 4.9.5.3 and 4.9.10.1.[51] The Power Resources

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conservatism to the Report. Importantly, the inclusion or exclusion of the 36 MW of Springs generation does not alter the conclusions of either the FEIR or this Report.

[50]A historical assessment of this heatwave suggests that this consecutive day maximum temperature trend approximately corresponded to a 1-in-20 temperature event.

[51] The forecasted loads in the October 2017 forecasts are less than projected loads included in the 2013 FEIR due to economic changes since 2006 when the 2013 FEIR loads were projected.

Planning group used statistically estimated econometric models to produce all Riverside load and peak forecasts. Riverside is forecasting a 591.5 MW 1-in-2 peak for 2018, assuming typical summer temperature conditions. Riverside also calculates peak forecasts for more extreme temperature conditions, such as 1-in-10 and 1-in-20 peak loads, which are 642.4 and 656.8 MW, respectively, for 2018. Figure 2 shows the forecasted 1-in-2 year and 1-in-20 year annual peak loads for the Riverside service territory for 2018 through 2038. The 1-in-20 peak load forecasts represent the upper 5.0 percent probability limits of the 1-in-2 peak forecasts, implying that the observed annual peak loads should only have about a 5.0 percent chance of exceeding these levels. The 1-in-20 peak load forecasts are appropriate to use for planning purposes in order to fully account for extreme weather events, such as the weather event Riverside just experienced in the summer of 2017. Riverside's planning forecasts take into account Riverside's load reduction programs, such as conservation programs and local renewable resources (as well as potential load increasing factors, such as increased demand resulting from expanded charging of electric vehicles). Even considering the effects of load conservation and local renewable programs, Riverside's Power Resource Planning group's October 2017 forecasts predict a 1-in-20 peak load of 669 MW by 2023, 689 MW by 2029, and 734 MW by 2038.

Table 2 and Figure 2 show Riverside's most current projected load growth forecast.

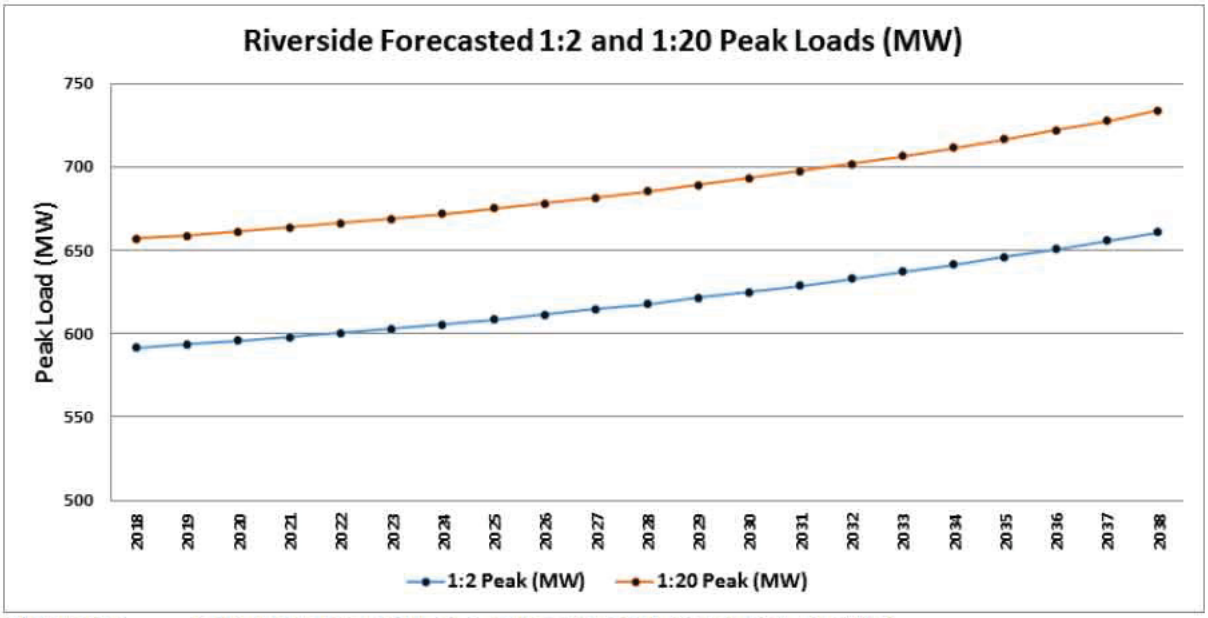

FIGURE 2 RIVERSIDE PROJECTED LOAD FORECAST (GRAPHIC)

TABLE 2 RIVERSIDE PROJECTED LOAD FORECAST (TABULAR)

1 IN 20 ANNUAL PEAK LOADS	
Year	Peak (MW)
2018	656.8
2019	658.8
2020	661.1
2021	663.6
2022	666.2
2023	668.9

1 IN 20 ANNUAL PEAK LOADS	
Year	Peak (MW)
2024	671.9
2025	675.0
2026	678.2
2027	681.7
2028	685.3
2029	689.1
2030	693.1
2031	697.4
2032	701.8
2033	706.5
2034	711.4
2035	716.6
2036	722.0
2037	727.7
2038	733.6

3.4.2.4 Overhead and Underground Lines Design Considerations

3.4.2.4.1 Overhead

The overhead line configuration for each of the 69 kV Alternatives studied in this Report would consist of single pole, double-circuit 69 kV steel structures energized at 69 kV located between the selected Alternative substations and Riverside's electrical system. These single pole structures would be designed to carry distribution and communications underbuild along with two circuits of 69 kV. S*ee* Figure 3. The structures would be direct embedded or placed on anchor bolt foundations depending on the loads imposed on the structures.

The 69 kV conductors would be an SCE standard and would be sized based on the final selected rating of the line through electrical studies. A typical type and size within SCE's 69 kV system is 954 stranded aluminum conductor. The electrical distribution circuits could vary in voltage (33 kV, 12 kV, or 4 kV) depending on the existing distribution voltages along the route. The communication circuit cable sizes and types could vary as well. Further study would determine what conductors and cable would be utilized. New communication circuits may also be necessary for SCE and Riverside's use for operating the new sources from the Alternative substations.

The single-pole structure heights above ground to top of structure would be expected to range from 55 to 90 feet. The majority of the structures would typically be from 65 to 80 feet in height. The span lengths would vary considerably from structure to structure. The average span length is expected to range from 150 feet to 250 feet with spans possibly attaining 400 feet.

The designed structure locations and structure heights would consider the design loading requirements, code clearances, distribution services, overhead obstructions (signs, street lights, traffic lights, *etc.*), ground obstructions (underground facilities affecting foundation or embedment locations), SCE and Riverside standards, and Good Utility Practice.

Other overhead considerations include the location of the poles along the streets. Decisions would have to be made as to whether the poles should be in public ROW or on private lands or a combination of both to minimize the impact the pole locations would have on public and private facilities.

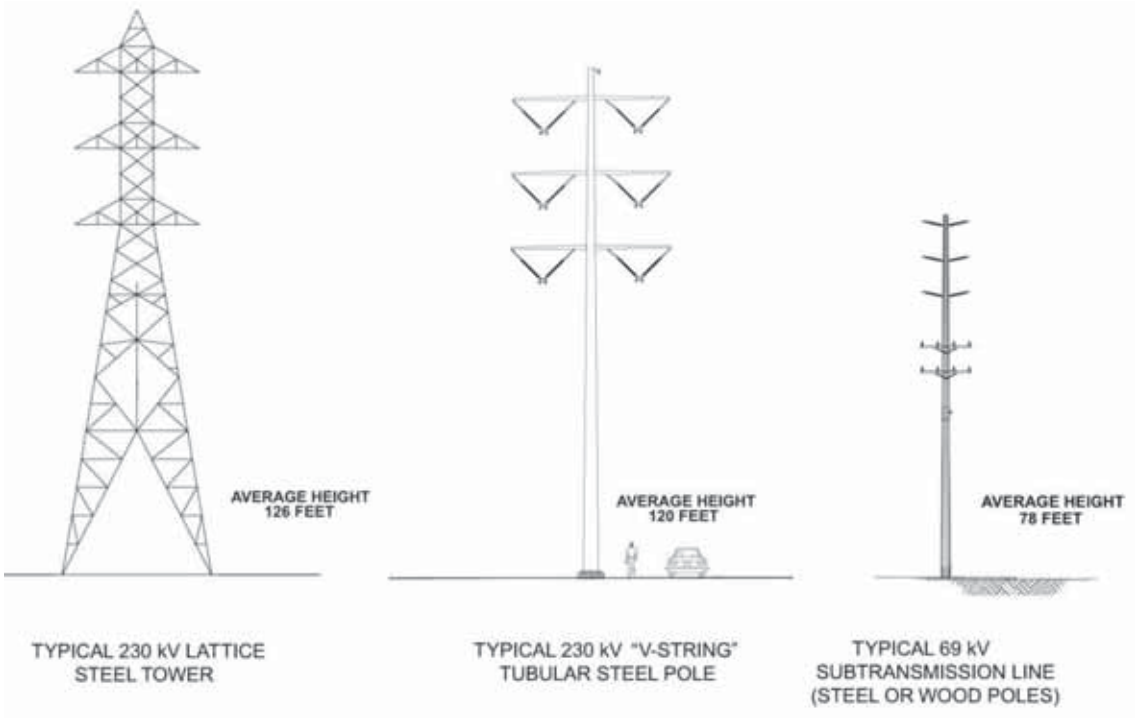

FIGURE 3 TYPICAL 69 KV TANGENT STEEL STRUCTURES VS 230 KV STRUCTURES

Another design challenge is transferring existing services from the existing overhead lines to the new structures. If the new 69 kV overhead line is on the opposite side of street from the existing distribution, and the existing distribution is transferred to the new lines, the service drops to the facilities (businesses, houses, *etc.*) would have to be extended across the street. The other alternative is to leave the distribution, but this would require distribution poles and lines on one side of the street and the new double-circuit 69 kV line on the other side. Installing above-ground facilities on both sides of a right-of-way is contrary to CPUC General Order 95 (para. 31.3) and SCE's design standards and normal practice. If the new double-circuit 69 kV lines could be built on or near the centerline of existing overhead distribution facilities, then the work to transfer the distribution and communications would be complex, but would not result in conflicting/parallel lines on the streets.

3.4.2.4.2 Underground

The underground segments would consist of two underground 69 kV circuits encased in a concrete duct bank. There would be six 5.0-inch conduits with a 4/0 bare copper ground. *See* Figure 4. This concrete duct bank would be approximately two feet wide and two feet deep and buried at least three feet deep from ground line to the top of the duct bank. The trench depth for installation would vary depending on obstructions that would have to be avoided such as other buried electrical lines, storm water lines, sewer lines, water lines, gas lines, communication circuits and other facilities. There may be a requirement to split the circuits to avoid a conflict, and this would have to be addressed in the final design phase of any Alternative.

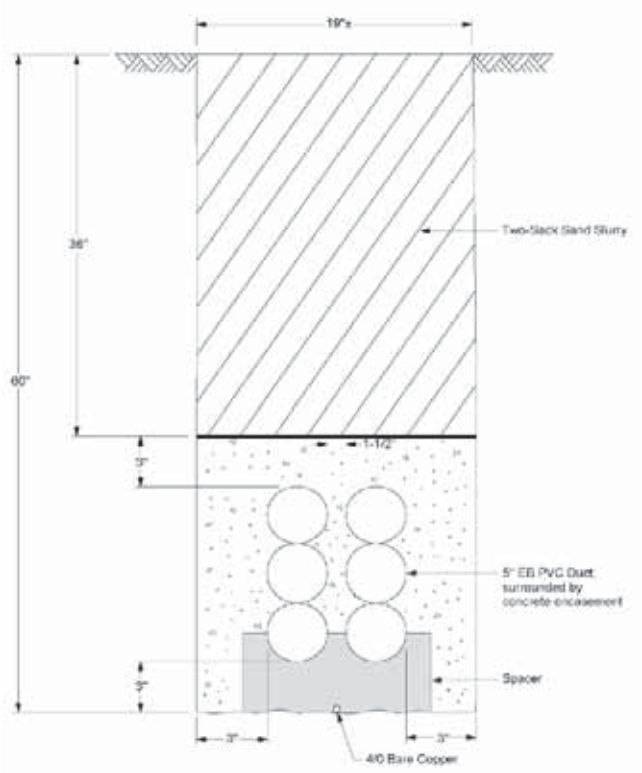

FIGURE 4 TYPICAL 69 KV DUCT BANK

Riser poles would be necessary to transition the conductors/cables from overhead to underground. These riser poles will be double-circuit steel structures placed on anchor bolt foundations. There would be six steel arms supporting the cables, terminations, and lightning arresters. Cables could be placed outside or inside the steel structures.

It is assumed that the existing distribution facilities would not materially change in the selected underground segments and would not be included in the new underground 69 kV system.

3.4.2.5 Overhead and Underground ROW and Structures Requirements

SCE would acquire ROWs for the 69 kV routes evaluated with easement widths of 30 feet for underground and overhead easements. SCE's estimated costs reflect the assumption of ROW acquisition for all parcels crossed, minus the number located in franchise, as shown in Table 3 below. Final engineering design would determine the exact number of private parcels versus franchise, and the cost of acquisition would change in accordance with the parcel count.

The numbers of structures required for the overhead lines are estimated below. The assumption used for an average span length between structures is 200 feet based on SCE's and Riverside's experience installing 69 kV lines in their respective service areas. This span length was divided into the mileage for each of the routes studied to estimate the total structures for each overhead route. Spans will vary considerably following completion of design depending on any number of factors such as pole loading, clearance issues, obstructions in the ROW (above ground and below ground), and provisions for distribution and communications service. The structure totals for the RTRP Hybrid Proposal (based on actual preliminary design) and the 69 kV Alternatives studied are as follows:

- RTRP Hybrid Proposal (9.7 Miles) 63 (47 Steel Poles, 12 Lattice Towers, 4 Riser Poles)

- Alternative A (43.8 miles) 654 (650 Steel Poles, 4 Riser Poles)
- Alternative B (30.3 miles) 335 (333 Steel Poles, 2 Riser Poles)[52]
- Alternative C (20.2 miles) 409 (407 Steel Poles, 2 Riser Poles)

TABLE 3 ROUTE LENGTHS, PARCELS AND STRUCTURE COUNTS

ROUTE*	CONSTRUCTION TYPE	MILES	ALL PARCELS CROSSED	PARCELS CROSSED IN FRANCHISE	TOTAL LENGTH	UG & OH 30 FT BUFFER	OH STRUCTURE COUNT
A1	OH	7.80	58	5	10.48	x	206
A1	UG	2.68	33	22		x	-
A2	OH	7.67	102	34	9.75	x	203
A2	UG	2.08	24	16		x	-
A3	OH	9.09	121	32	10.06	x	240
A3	UG	0.97	7	3		x	-
A4	OH	0.19	3	1	13.49	x	5
A4	UG	13.30	107	94		x	-
B1	OH	4.52	36	4	10.36	x	119
B1	UG	5.84	87	40		x	-
B2	OH	8.17	127	31	12.85	x	216
B2	UG	4.68	32	9		x	-
B3	UG	7.10	166	34	7.10	x	-
C1	OH	7.80	58	5	10.48	x	206
C1	UG	2.68	33	22		x	-
C2	OH	7.67	102	34	9.75	x	203
C2	UG	2.08	24	16		x	-

Notes: UG = underground; OH = overhead; FT = feet.
*Refer to Figures 7, 11, and 17 for Alternative Routes and locations.

[52] Does not include the mileage or structures necessary for the 230 kV transmission line into proposed Circle City Substation as part of Alternative B.

3.5 Timing and Permitting Considerations and Reliability Impacts of Potential Delays in Meeting Project Objectives

The need to address the reliability concerns arising from Riverside's reliance on the Vista Substation as promptly as possible is urgent. SCE currently has two transformers, each nominally rated at 280 MW for a maximum 557 MW transfer limit under normal operating conditions it can provide to Riverside through Vista Substation, the sole point of interconnection between the Riverside and SCE/CAISO grids. Whenever this loading limit is approached under normal operating conditions, Riverside's internal gas-fired generation must be operated to ensure that the Vista Substation loading does not exceed 557 MW.[53] This load limit has been routinely exceeded during peak demand periods in the past nine years and with increasing frequency. For example, the numbers of hours that Riverside's load exceeded 557 MW in 2015, 2016 and 2017 are 9, 18 and 48 hours, respectively. This year, a six-day heat wave in late August settled in over the Riverside service territory producing consecutive day maximum temperatures in excess of 105 degrees Fahrenheit (°F) and culminating in a new Riverside peak load of 639 MW. On October 10, 2017, Riverside submitted its 10-year forward system load and 1-in-2 peak forecasts to the CAISO in satisfaction of CAISO Tariff Sections 4.9.5.3 and 4.9.10.1. Riverside is forecasting a 591.5 MW 1-in-2 peak for 2018, assuming typical summer temperature conditions. Riverside also calculates peak forecasts for more extreme temperature conditions, such as 1-in-10, 1-in-20, and 1-in-40 peak loads, which are 642.4, 656.8 and 669.3 MW, respectively, for 2018.[54] As Riverside's load is forecasted to continue to grow, it is expected that Riverside's internal generation will be increasingly called upon to mitigate the Vista transfer limit issue. As explained in the footnote below, the use of Riverside's internal generation for this purpose faces an uncertain future.

The reliability problem associated with the inadequate Vista Substation transfer limit is further exacerbated if there is a contingency at Vista Substation, *e.g.* an outage of one or both transformers at Vista. The Vista Substation transfer limit is reduced to 280 MW if one transformer is out at Vista Substation; when added to Riverside's internal generation of 228 MW (assuming all generation is indeed available), the maximum load-serving capability for Riverside under this contingency condition is reduced to 508 MW. Thus, absent any other mitigating measure,[55] involuntary load shedding is highly likely when Riverside's load exceeds 508 MW under this contingency condition at Vista Substation. The numbers of hours that Riverside's load exceeded 508 MW in 2015, 2016 and 2017 are 55, 92 and 143 hours, respectively. If this contingency condition at Vista Substation had occurred at the time of Riverside's peak load, the resulting load shedding in 2015, 2016 and 2017 as

[53] In the past 15 years, Riverside has built 228 MW of gas-fired generation (Peakers) within Riverside, primarily in recognition of the Vista Substation transfer limitation and in order to ensure reliability of electric service to Riverside's customers is maintained until the permanent solution in RTRP is put in place. The use of Riverside's gas-fired generation for this purpose faces an increasingly uncertain future due to: (a) some of this generation is older and requires frequent maintenance overhauls, and spare parts are increasingly difficult to replace; (b) given the Aliso Canyon natural gas storage issues, the supply of natural gas is not assured, especially during the summer peak season, and (c) increasingly stringent air regulations and legislative mandates are likely to limit electric generation using fossil fuel.

[54] Riverside's planning forecasts take into account Riverside's load reduction programs, such as conservation programs and local renewable resources (as well as anticipated load increases associated with expansion of electric vehicle charging), but even considering the load reduction programs, Riverside is still forecasting a peak demand growth rate of approximately 0.5% per year for the next 20 years.

[55] Currently, SCE has operating procedures that deal with the condition of one transformer outage at Vista Substation. Under certain conditions, involuntary load shedding (shared between Riverside and SCE) is required if one Vista transformer is out to maintain the integrity of Vista Substation electric equipment.

percentages of Riverside's peak load could have been 13.16%, 15.19% and 20.50%, respectively.[56] As Riverside's load is forecasted to continue to grow, the threat of involuntary load shedding of Riverside's customers due to the inadequate Vista Substation transfer limit will continue to grow.

Although there is currently no analysis as to the likelihood of a total collapse of Vista Substation , *i.e.* both transformers serving Riverside are simultaneously out of service at Vista Substation, it suffices to say that if a total collapse of Vista Substation were to occur (for example, due to a severe earthquake, cyber or terrorist attack, vandalism, fire or some other means), it would cause an unprecedented calamity to Riverside's customers and SCE's customers served from Vista Substation.

Adoption of any of the 69 kV Alternatives or any of the interim solutions evaluated inevitably would delay effective mitigation of the reliability issues arising from Riverside's dependence on Vista Substation and prolong exposure of an increasing number of Riverside's customers to risks of extended outages. Implementation or selection of any of the 69 kV Alternatives for the RTRP Hybrid Proposal could alter the required permitting and licensing process currently underway. SCE and Riverside estimate that delays associated with implementation of any of the 69 kV Alternatives could range from a minimum of 12 to 18 months to five years or more, depending on various factors, an unacceptably long period of time given the increasingly escalating exposures to reliability risks that Riverside will continue to face. Every attempt should be made to conclude SCE's current CPCN application and the development of the SEIR in an expedited fashion to concretely address the reliability issues caused by the inadequate Vista transfer limit.

Many of the corridors identified for routes under the 69 kV Alternatives have not been reviewed in detail as part of the 2013 FEIR process, and baseline data collection and impact evaluation may be required along two or three additional line routes. For example, all three Alternatives would be constructed on lands that have the potential to support sensitive biological resources that are regulated through the Western Riverside County Multiple Species Habitat Conservation Plan (MSHCP), and consultations with the Regional Conservation Authority and a MSHCP Consistency Analysis Report are likely required. Due to the number of crossings of the Santa Ana River, a MSHCP Determination of Biologically Equivalent or Superior Preservation (DBESP) may be required. Potential impacts to federally listed species within San Bernardino County would require surveys and consultations with U.S. Fish and Wildlife Service (USFWS) under Section 10 of the Endangered Species Act. A Habitat Conservation Plan (HCP) under section 10(a)(1)(B) of the Endangered Species Act may be implemented, since there is no federal nexus. Impacts to State listed species may require consultations with the California Department of Fish and Wildlife (CDFW), and an Incidental Take Permit (Section 2081 subdivision (b) of the Fish and Game Code) may be required. All of the Alternatives would potentially require mitigation fees associated with impacts to vernal pool wetlands, small mammals, and habitat loss for burrowing owls around the Mira Loma Substation.

Several of the corridors identified in the Alternatives may result in impacts to water resources that could require authorization under the Clean Water Act (CWA) Section 404, a CWA 401 Water Quality Certification, a Waste Discharge Requirement and/or a Streambed Alteration Agreement. Cultural resources within the routes for the Alternatives that are protected by federal and State laws if they have some level of significance under the criteria of the National Register of Historic Places may also require surveys and consultations with the State Historic Preservation Officer. Environmental surveys (*i.e.,* biological, water, cultural), if required by the regulatory agencies, could result in

[56] Riverside's system peaks in 2015, 2016 and 2017 were 585 MW, 599 MW and 639 MW, respectively. The resulting load shedding as percentages of peak load could have been: (585-508)/585=13.16% for 2015, (599-508)/599=15.19% for 2016 and (639-508)/639=20.50% for 2017.

upwards of three years of surveys based on protocols required. The surveys would then be used to complete the consultations with the regulatory agencies discussed above.

In addition, the current infrastructure of Riverside's distribution system is not expandable to accommodate multiple additional 69 kV connections at its existing substations. Detailed studies such as power flow analyses, relay protection and coordination, short-circuit duty, grounding, charging current, and extension of the synchronous optical network (SONET) to SCE substations remain to be analyzed contingent upon further consideration of any of the lower voltage Alternatives. Studies would also need to be performed to adequately evaluate revised system performance and whether any system upgrades (including line additions, substation upgrades and reconfigurations, addition of a new 69 kV switching station, reactive compensation support devices, *etc.*) would be triggered. This may cause additional project approvals and implementation delays, increasing the risk of failing to meet the reliability Project Objectives of the RTRP Hybrid Proposal and additional costs related to any new sites for improvements.

Delays associated with the potential incremental regulatory requirements summarized above would place Riverside's customers at prolonged risk of experiencing outages due to the single source arrangement existing at Vista Substation, Riverside's load currently exceeding SCE's available capacity at the Vista Substation, and the projected load growth as stated in the purpose and need statement (2013 FEIR). In addition, the potential incremental regulatory requirements and associated delays would add significant costs. This would be in addition to the higher cost estimates for the 69 kV Alternatives (*see* Tables 6, 9, and 12) and the costs already incurred as part of the RTRP CEQA environmental review and CPCN licensing process

3.6 Potential Tariff Implications Relating to Low Voltage Alternatives

In 2002, SCE informed Riverside that its system peak loads were rapidly approaching the limits of delivery capacity at SCE's Vista Substation. Riverside requested SCE to either increase the capacity of the Vista Substation or establish a second point of interconnection to the CAISO grid in order to accommodate and reliably serve Riverside's anticipated load growth. In late 2004, and based on its analyses of reliability considerations, Riverside submitted to SCE an application for the RTRP to establish a second point of interconnection at 230 kV as the design best suited to provide reliable service to Riverside. In June 2006, CAISO approved the RTRP as "a necessary and cost effective addition to the ISO Controlled Grid" and directed SCE "to complete the construction of the [RTRP] as soon as possible and preferably no later than Q2, 2009."[57] In 2009, FERC approved the TO Tariff Interconnection Agreement between SCE and Riverside governing the terms of development and construction of RTRP.[58]

FERC regulates, among other things, the interstate transmission of electricity and the CAISO. In turn, the CAISO operates the transmission systems within its jurisdiction, and the owners of those transmission systems are subject to the CAISO's tariff.

Per the CAISO Tariff and relevant in the case of the RTRP Hybrid Proposal, the costs of High Voltage Transmission Facilities (200 kV or greater) under CAISO's "Operational Control" are recovered via the HVAC regardless of ownership. In general, each Participating Transmission Owner

[57] *See* General Session Minutes – Operations Committee Meeting, Cal. Indep. Sys. Operator Corp. (June 16, 2006) at 4.

[58] *S. Cal. Edison Co.*, 127 FERC ¶ 61,211 (2009) (letter order approving Settlement Agreement reflecting Amended Interconnection Facilities Agreement).

(PTO) is allowed to recover and pays a share of the HVAC proportional to its MWh of retail load. Both SCE and Riverside pay for the costs of the HVAC in proportion to their loads, as do all other Load Serving Entities that use the high voltage CAISO-controlled grid. Thus, under the currently-effective HVAC design, all users of the high voltage CAISO-controlled grid would share the costs for the RTRP Hybrid Proposal in proportion to their use of the grid.

The CAISO-controlled grid also includes lower voltage transmission facilities that are operated at, for example, 138 kV or 69 kV. The costs for such lower voltage transmission facilities are recovered under the LVAC. The customers that pay the LVAC are customers within a Transmission Owner's TAC Area that take service from such lower voltage facilities.

In contrast to CAISO-controlled transmission, the vast majority of SCE's distribution service is governed by the CPUC under its retail rate authority. However, use of distribution facilities to serve eligible wholesale loads (such as Riverside's) is subject to the rate jurisdiction of the FERC. SCE's tariffs for wholesale customers under the jurisdiction of FERC include: (1) the TO Tariff; and (2) the Wholesale Distribution Access Tariff (WDAT).

The WDAT governs transportation of power using the Distribution Provider's (such as SCE's) Distribution System. By definition, Distribution System facilities are not integrated with the CAISO Grid and typically serve local load. Facilities or portions of facilities that are constructed by the Distribution Provider for the sole use/benefit of a particular Distribution Customer requesting service under the Tariff are known as "Direct Assignment Facilities," the costs of which are recovered from the users of such facilities.

Under the currently-effective CAISO Tariff, the 69 kV Alternatives would not be included in the HVAC. Riverside believes that the 69 kV Alternatives may be considered lower voltage transmission facilities that, under the currently-effective CAISO Tariff, would be recovered through the LVAC. In such case, responsibility for a majority of the costs of the 69 kV Alternatives would be recovered from SCE customers, including a small percentage from Riverside, and other users or beneficiaries of low voltage facilities (as opposed to being recovered from all Load-Serving Entities that use the high-voltage CAISO-controlled grid through the HVAC).

SCE disagrees, and believes that the 69 kV Alternatives would likely be considered non-CAISO-controlled, distribution assets directly assigned to Riverside. In that case, the currently-effective WDAT would recover the costs from the users of the 69 kV facilities, and responsibility for a majority of the costs for the 69 kV Alternatives would fall on Riverside ratepayers and other users or beneficiaries of the 69 kV facilities, if any.

While tariffs may be changed through application to FERC, no such application is contemplated or thought to be appropriate by SCE. However, Riverside has rights under the Federal Power Act to seek tariff changes. SCE and Riverside agree that FERC has jurisdiction to determine the classification of any 69 kV Alternative facilities for purposes of cost allocation.

4. Alternatives Evaluation

4.1 Lower Voltage Alternatives Considered in the 2013 FEIR

A broad range of alternatives were evaluated within the 2013 FEIR for the RTRP in accordance with CEQA. (Draft EIR Section 6.4, as included in the 2013 Final EIR [FEIR Section 6.4].) Below is a summary of the 115 kV and 69 kV alternatives evaluated in the 2013 FEIR and the reasons for concluding those alternatives were infeasible.

Lower voltage 115 kV transmission lines have much less capacity than a 230 kV line and would require multiple lines (4 to 5 circuits) to accomplish the same bulk power transfer from SCE to Riverside as the 230 kV RTRP.[59] Several options were evaluated in the 2013 FEIR:

1. Building a new 230/115 kV substation and delivering power to Riverside at Vista Substation via multiple new 115 kV lines.60
2. Building several 115 kV lines from the nearest independent 115 kV interconnection point, which is SCE's Valley Substation in Romoland, 25 miles southeast of Riverside. This would require multiple (4 to 5 circuits) of 25-mile long transmission lines, requiring more ROW than a single 230 kV line and, because it would occupy a much wider footprint through the communities, resulting in greater environmental impact and higher cost (e.g., cost of the land for expanded ROW, longer line lengths).61

These 115 kV alternatives were found to be infeasible.

> *Because of needing many more times the transmission lines to accomplish the same purpose, higher environmental impacts because of a greater project footprint with multiple ROWs, greater effects to the community from the greater footprint, and higher costs, utilizing 115 kV for transmission of additional capacity into Riverside's system was dismissed from further consideration. While some of these additional impacts from this alternative would be significant the cost would be significantly more for the larger ROW and the multiple lines within one corridor, which would make this alternative infeasible.*[62]

A 69 kV alternative source also was considered in the 2013 FEIR. This alternative would require six or more 69 kV subtransmission lines from SCE's Mira Loma Substation to provide similar power transfer capability as the RTRP. Similar to the 115 kV alternatives, multiple 69 kV circuits would require more ROW and would result in a larger footprint, higher environmental impact, significantly more land for the larger ROW, and many more transmission lines within a single corridor. Also, separate and additional 230/69 kV transformers would be required at Mira Loma Substation to support the capacity requirements.[63]

This 69 kV alternative was found to be infeasible.

> *Because of greater impacts to the community, land uses, and natural resources from a wider footprint, higher costs from many more lines to build and maintain, and additional equipment*

[59] FEIR Volume 2, Section 6.4.1, p. 6-26.

[60] FEIR Volume 2, Section 6.4.1, p. 6-26.

[61] FEIR Volume 2, Section 6.4.1, pp. 6-26 – 6-27.

[62] FEIR Volume 2, Section 6.4.1, p. 6-27.

[63] FEIR Volume 2, Section 6.4.1, p. 6-27.

being required at Mira Loma Substation, this alternative was eliminated from further consideration.[64]

For the foregoing reasons, the 2013 FEIR concluded that utilizing 115 kV or 69 kV for transmission of additional electrical capacity into Riverside's system was infeasible.

4.2 New Lower Voltage Alternatives Considered in Response to the ALJ's Ruling

In response to the ALJ's Ruling, SCE and Riverside conducted a new evaluation of potential 115 kV and 69 kV alternatives.

4.2.1 Conceptual Evaluation of 115 kV Alternative

SCE and Riverside considered two possible choices for potential lower voltage alternatives to meet the purpose and need for the RTRP Hybrid Proposal: 69 kV and 115 kV lines. SCE and Riverside considered in concept the potential for 115 kV voltage interconnection options to meet the megawatt target necessary for the Project Objectives of the RTRP Hybrid Proposal but determined not to study any 115 kV alternative in detail, primarily based on the required expansion of the existing transmission substations within the area to provide power via 115 kV facilities to Riverside. As discussed in the 2013 FEIR (FEIR Volume 2, Section 6.4.1, p. 6-26), lower voltage transmission lines such as 115 kV have much less capacity than a 230 kV line and would require multiple circuits to accomplish the same bulk power transfer from SCE to Riverside as the RTRP Hybrid Proposal.

SCE's Vista Substation currently is a 230/115 kV substation as well as a 230/69 kV substation. An expansion of Vista Substation to include new 230/115 kV facilities would be required to accommodate additional power delivery to Riverside at 115 kV. Additionally, it would require several new 115 kV circuits to carry the same bulk capacity of the single proposed 230 kV loop-in included in the RTRP Hybrid Proposal. Vista Substation is already constructed to its designed maximum operating capacity and cannot be expanded. In addition, the 115 kV facilities at Vista Substation are not independent from the existing 69 kV source at Vista Substation, because they share the same 230 kV source. Therefore, this would not meet the RTRP objective for a second independent point of interconnection for Riverside. For these reasons, a 115 kV alternative at Vista Substation was not evaluated in detail for this Report.

The next nearest potential 115 kV interconnection point would be at SCE's Valley 500/115 kV Substation in Romoland, located 25 miles southeast of the Riverside service delivery point. Four or more 25-mile long 115 kV transmission circuits would be required for a Riverside system interconnection to Valley Substation. Like Vista Substation, Valley Substation is also constructed to its designed maximum operating capacity, and there is also no opportunity for expansion. There is not enough existing spare capacity to provide Riverside with 560 MW of 115 kV service. Therefore, a new 560 MW, 115 kV service from Valley Substation is not feasible and was not studied in detail for this Report.

4.2.2 Conceptual Evaluation of New 230/69 kV Substation Alternative

SCE and Riverside considered in concept a design alternative that would include a new 230/69 kV substation located on a new site along and adjacent to or near the two Mira Loma – Vista 230 kV Transmission Lines. This alternative would be similar to the RTRP Hybrid Proposal but would have the new SCE 230/69 kV substation located north of Riverside (adjacent to the 230 kV line) and then have seven to eight 69 kV lines (four routes) extend to a new 66 kV substation in Riverside, rather

[64] FEIR Volume 2, Section 6.4.1, p. 6-27.

than the single double-circuit 230 kV line (one route) included in the RTRP Hybrid Proposal. The service with this design would be similar to the Vista Substation source that currently provides service to Riverside via seven 69 kV lines.

Siting and permitting a new 230/69 kV substation along the Mira Loma – Vista corridor would be challenging, and the multiple 69 kV lines to Riverside in combination would increase the environmental and land-owner impacts and costs associated with this alternative beyond what was evaluated in the 2013 FEIR and for the lower voltage Alternatives studied in this Report. Therefore, this alternative was eliminated from further detailed evaluation.

4.2.3 Three 69 kV Alternatives Studied in Detail (Alternatives A, B and C)

The Lower Voltage Alternatives A, B, and C studied in this Report would consist of seven, six, and four 69 kV circuits, respectively, to serve as Riverside's second source from the SCE/CAISO bulk electric system. Depending on the Alternative, these circuits would emanate from various substations within SCE's system and terminate at different points within Riverside's electrical system. Alternative A is very similar to the 69 kV alternative source considered in the 2013 FEIR that was found to be infeasible. This Report includes a more detailed evaluation of a potential Alternative to utilize seven 69 kV lines emanating from SCE's Mira Loma Substation in response to the ALJ's direction.

SCE and Riverside also evaluated the 69 kV Alternatives for expandability from 560 MW as studied in the FEIR to the ultimate potential capacity of the RTRP Hybrid Proposal. The FEIR discussed two transformers for a total rating of 560 MW (two 280 MW transformers) for the RTRP. The ultimate potential capacity of the RTRP Hybrid Proposal would be 840 MW, with the addition of a third transformer at Wilderness Substation (three 280 MW transformers). Both the Wildlife Substation and Wilderness Substation would be designed to accommodate the addition of a third transformer position. The 230 kV line included in the RTRP Hybrid Proposal is rated at 916 MW (normal-condition rating) which would accommodate the increased capacity of three transformers to 840 MW.

SCE evaluated interconnection at two existing substations and one proposed substation within SCE's system, including: Mira Loma Substation, Etiwanda Substation, and the proposed Circle City Substation. *See* Figure 5. Alternative A would be capable of providing 560 MW initially (two 280 MW transformers) with an ultimate buildout of 840 MW (three 280 MW transformers) and seven 125 MW 69 kV circuits. The Alternative B design (three 280 MW transformers and six 125 MW 69 kV circuits) would be capable of providing 750 MW of delivery capacity (limited by the delivery capacity of the 69 kV lines). The Alternative C design (two 280 MW transformers and four 125 MW 69 kV circuits) would provide a second source but only provide 500 MW of firm power delivery capacity from SCE. Large scale solar generation, including a BES is considered in this Report to provide up to 60 MW of non-firm capacity for Alternative C. This would bring the total capacity of Alternative C to 560 MW, but the additional 60 MW is non-firm intermittent power.[65]

[65] *See* the discussion in Section 4.2.3.3.1.3 regarding the selection of large scale solar to provide supplemental generation under Alternative C.

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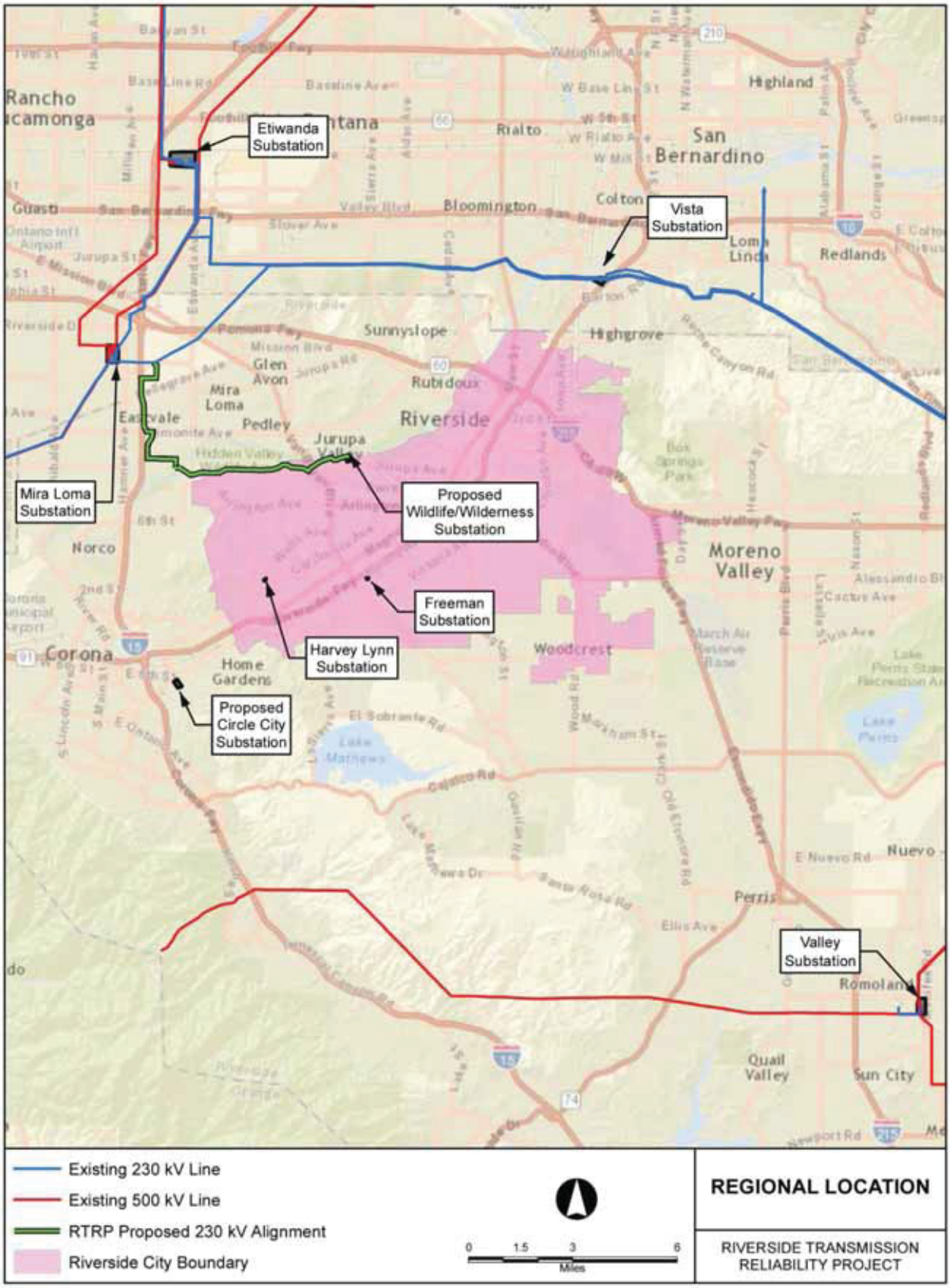

FIGURE 5 **REGIONAL LOCATION OF SUBSTATIONS EVALUATED FOR 69 KV PROJECT ALTERNATIVES**

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4.2.3.1 Alternative A

4.2.3.1.1 Alternative A Description

SCE and Riverside studied a potential 69 kV lower voltage Alternative to serve Riverside's existing demand and projected load growth by supplying electricity from SCE's Mira Loma Substation as a single substation interconnection point. The initial design for this Alternative includes installation of two additional 230/69 kV 280 MW transformers at Mira Loma Substation with a total capacity of 560 MW. A third 230/69 kV 280 MW transformer could be added in the future for 840 MW of capacity. Seven 69 kV circuits would be installed from Mira Loma Substation to Riverside. *See* Figure 6. The Alternative design includes three double-circuit 69 kV structures with two sets of conductors each having a normal condition rating of 125 MW and a four-hour emergency rating of 168 MW. Potential underground sections would be installed as double-circuits in common trench and underground structures with conductors that have a normal condition rating of 125 MW and a four-hour emergency rating of 181 MW. The overhead conductors would be the limiting component (168 MW) under an unplanned single-element contingency event. The design also includes one single-circuit 69 kV line for a total of seven 69 kV circuits. Seven 69 kV circuits are needed in order to have enough line capacity using emergency condition ratings under single-contingency events. In the event of a single-contingency event (unplanned outage of two 69 kV circuits due to a single double-circuit structure failure either overhead or underground) that would remove from service two 69 kV circuits, the remaining five in-service 69 kV circuits would operate at their emergency ratings for a total of 840 MW of capacity (five 69 kV circuits x 168 MW).

The Alternative A design consists of four routes (A1, A2, A3, and A4) from Mira Loma Substation to the Riverside service territory that include both overhead and underground lines as shown on Figure 6 - 69 kV Alternative A Map. All four routes are needed to provide the capacity required to meet Riverside's load growth projections. Routes A1, A2, and A3 would terminate at a new Riverside 69 kV Switching Station located adjacent to Riverside's RERC facility. This location was selected for the RTRP Wildlife and Wilderness Substations and would be suitable for this Alternative as well. Route A4 would terminate at Riverside's Harvey Lynn Substation. Refer to Appendix A for photographs along selected locations for each route associated with Alternative A.

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FIGURE 6 69 KV ALTERNATIVE A MAP

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4.2.3.1.1.1 Route A1 – Mira Loma

Route A1 would consist of approximately 7.8 miles of overhead transmission line and 2.7 miles of underground transmission line. The two assumed underground segments for this route include the underground segment from Limonite Avenue to Goose Creek Golf Club (also included in the RTRP Hybrid Proposal) and the line segment from Van Buren Boulevard to RERC Substation along Jurupa Avenue. The Van Buren/RERC segment is assumed to be underground due to the conflicts that would occur due to existing and proposed overhead lines and the unlikely probability of local government permitting multiple lines within the same street corridor.

Route A1 follows approximately the same alignment as the 230 kV transmission line included in the RTRP Hybrid Proposal. However, the 69 kV route extends to the west on the north portion of the route to Mira Loma Substation, paralleling an existing transmission line on the south. Route A1 also deviates from the proposed 230 kV transmission line route between 68th Street and Limonite Avenue, where the 69 kV line would extend to the intersection of Pats Ranch Road and Limonite Avenue and follow Pats Ranch Road south to its intersection with 68th Street. Route A1 would parallel 68th Street and an existing 69 kV subtransmission line east through the Goose Creek Golf Course where it would re-align with the proposed 230 kV route included in the RTRP Hybrid Proposal within the same proposed corridor. On the south end of Route A1, the 69 kV route deviates from the proposed 230 kV alignment just west of Van Buren Boulevard, where the Alternative would extend to Jurupa Avenue, paralleling this road corridor on the south side to a new 69 kV Switching Station located on the proposed Wildlife Substation site included in the RTRP Hybrid Proposal.

4.2.3.1.1.2 Route A2 – Mira Loma

Route A2 would consist of approximately 7.7 miles of overhead transmission line and 2.1 miles of underground transmission line. The one underground segment in the design for Route A2 is on Cantu-Galleano Ranch Road. There is a SCE overhead 69 kV line on this line segment, and it is assumed that the Route A2 double-circuit 69 kV line would be undergrounded in this area to avoid conflicting with the existing overhead line or creating a tunnel effect on the street by having lines on both sides of the street.

Route A2 extends east from Mira Loma Substation across an undeveloped parcel and is aligned with an existing subtransmission line corridor to the Cantu-Galleano Ranch Road corridor, following the road ROW to the intersection of Bellegrave Avenue. Route A2 then parallels Bain Street between the road ROW and the Bain Street canal south to the intersection of Limonite Avenue. The route then parallels the Limonite Avenue road ROW on the north side to the Hudson Street intersection, where it crosses to the south side of the road and then crosses Van Buren Boulevard. It then parallels Van Buren Boulevard on its east side between the Union Pacific Railroad and the road crossing the Santa Ana River corridor and Hidden Valley Wildlife Area, then turning to the northeast, running between the Santa Ana River Trail and the Riverside Water Quality Control Plant before intersecting with Wilderness Avenue, and terminating at a new 69 kV Switching Station located on the Wildlife Substation site included in the RTRP Hybrid Proposal.

4.2.3.1.1.3 Route A3 – Mira Loma

Route A3 would consist of approximately 9.1 miles of overhead transmission line and 1.0 mile of underground transmission line. Route A3 would be undergrounded along a 1.0 mile section of Van Buren Boulevard. The one underground segment included in the Route A3 design is on Van Buren Boulevard between Harrel Street and Bellegrave Avenue. There is an SCE overhead 69 kV line on this line segment, and it is assumed that the Route A3 double-circuit 69 kV line would be placed

underground in this segment to avoid conflicting with the existing overhead line or creating a "tunnel effect" on the street by having lines on both sides of the street.

Route A3 follows Micro Drive directly east out of Mira Loma Substation, crossing Interstate 15 (I-15) and Wineville Avenue before turning northeast, crossing an industrialized section of Jurupa Valley before intersecting with Van Buren Boulevard just east of Etiwanda Avenue. From here, Route A3 parallels Van Buren Boulevard between the Union Pacific Railroad and the roadway to Limonite Avenue. Route A3 then follows Limonite Avenue on its north side to Pedley Road, where it crosses to the south side of the road to Clay Street. The route parallels Clay Street on the west side to just north of the Union Pacific Railroad, where the route crosses the railroad and enters the Hidden Valley Wildlife Area and crosses the Santa Ana River. The route follows the south side of the Hidden Valley Wildlife Area before intersecting Industrial Street, crossing the Union Pacific Railroad again, and terminating at a new 69 kV Switching Station located on the Wildlife Substation site included in the RTRP Hybrid Proposal.

4.2.3.1.1.4 Route A4 – Mira Loma

Route A4 would consist of approximately 0.2 mile of overhead transmission line and 13.3 miles of underground transmission line. Route A4 would exit the Mira Loma Substation as an overhead line and proceed east to Hamner Avenue, where it would be placed underground. The route would proceed south underground within the Hamner Avenue roadway for approximately seven miles to the intersection of Hidden Valley Parkway. From this point, the underground route would proceed east within the Hidden Valley Parkway and McKinley Street roadways to the intersection of S. Promenade Avenue. Route A4 would continue east underground within the roadways of S. Promenade Avenue and Collett Avenue to the termination point at La Sierra Avenue at the intersection with La Sierra Avenue, the 69 kV circuit would travel north and terminate at Riverside's Harvey Lynn Substation. Except for a short segment located near Mira Loma Substation where the line would cross a greenfield section of private property, Route A4 would be constructed entirely underground within roadway ROW.

Figure 7 shows a diagram of Riverside's Transmission System following completion of the Alternative A design:

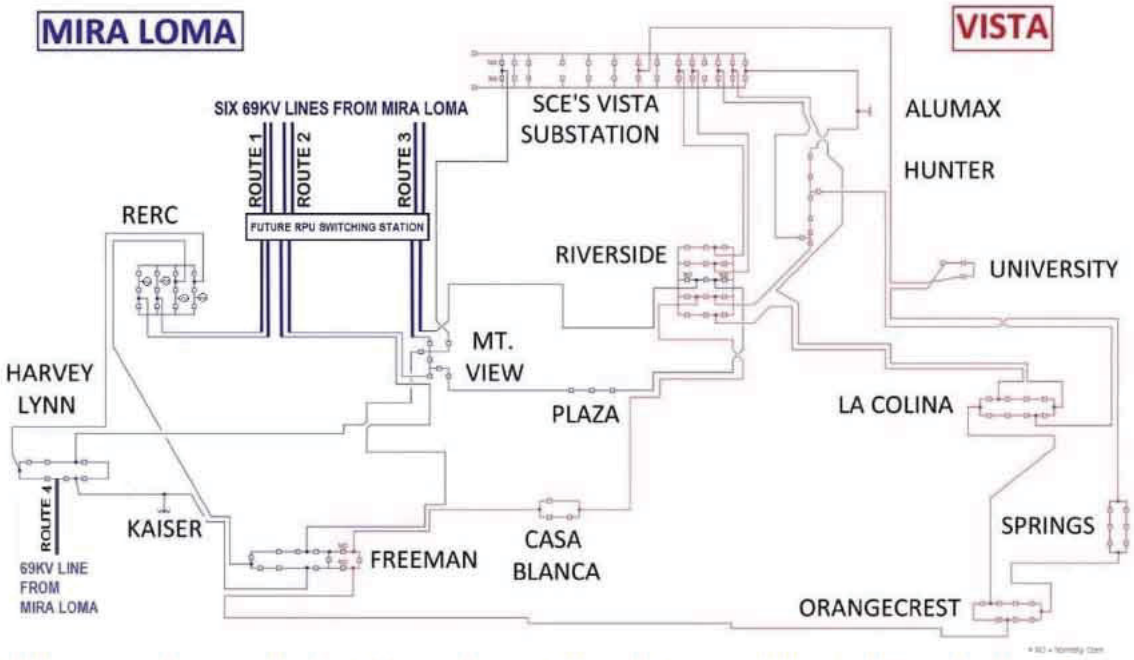

FIGURE 7 RIVERSIDE'S TRANSMISSION SYSTEM FOLLOWING COMPLETION OF THE RTRP ALTERNATIVE A

4.2.3.1.2 Alternative A Evaluation

4.2.3.1.2.1 Technical Considerations

Interconnection at the Mira Loma Substation presents significant difficulties due to limited expansion potential because of engineering, environmental, and land use issues. *See* Figures 8 and 9. SCE evaluated two options at Mira Loma Substation to extend the 230 kV and 69 kV switchracks.

> **Option 1:** Extending the 230 kV switchrack to the west. This likely would be infeasible due to physical space limitations and the difficulty of rerouting the existing transmission lines. *See* Figures 8 and 9. There are three 230 kV towers already installed in the location considered that support four 230 kV transmission lines, a set of 230 kV capacitor banks, and one 500 kV transmission line that would require relocation.

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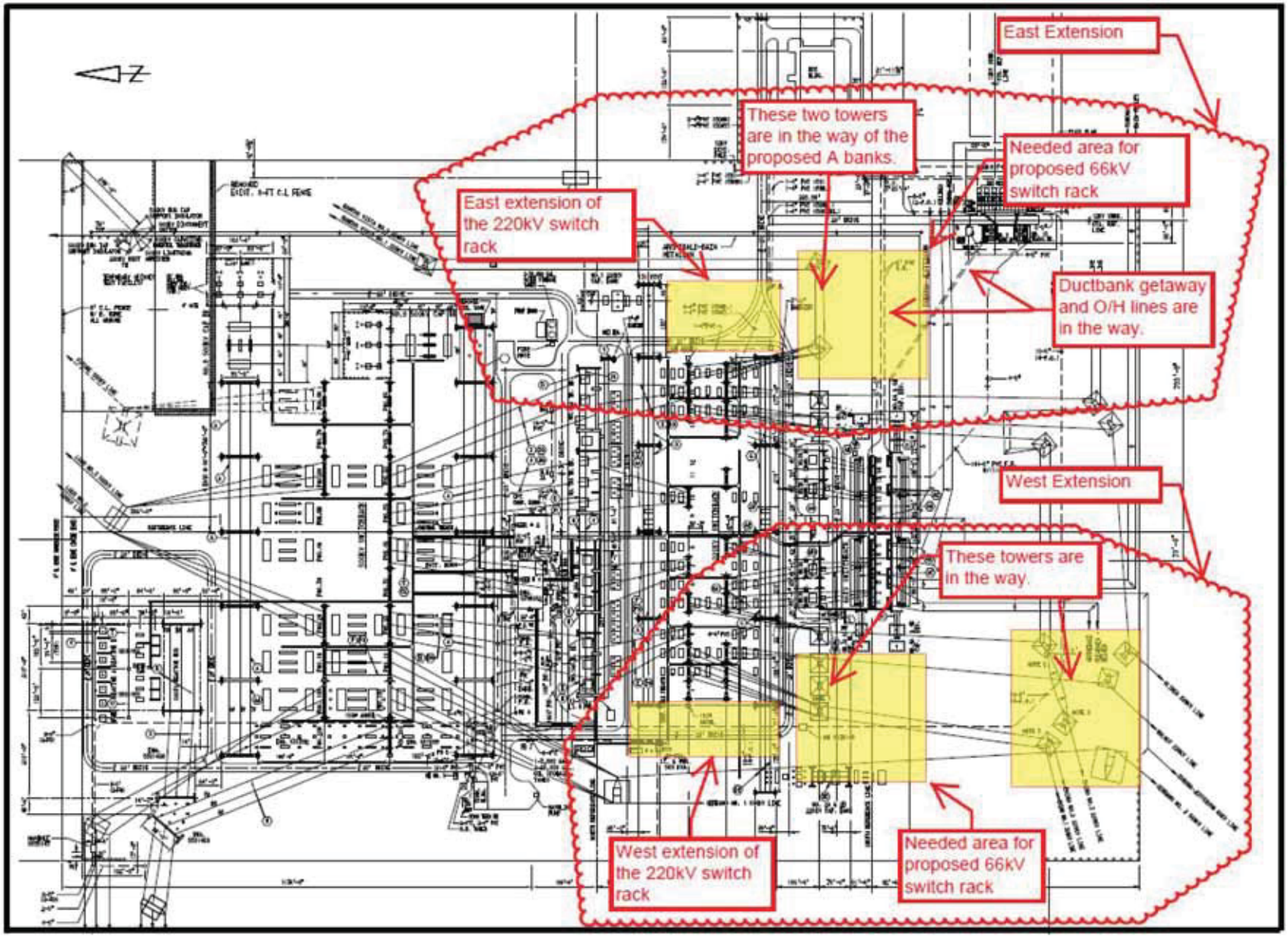

FIGURE 8 **MIRA LOMA SUBSTATION PLOT PLAN**

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FIGURE 9 MIRA LOMA SUBSTATION AERIAL VIEW

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Option 2: Extending the 230 kV switchrack to the east. It will also be difficult to relocate existing facilities, but it was determined to be feasible. *See* Figures 8 and 9. There are two 230 kV towers, two 69 kV tubular steel poles, and several 69 kV underground duct banks in the location considered for the new 69 kV switchrack.

Thus, under the Option 2 approach, installing the necessary equipment at Mira Loma Substation to serve Riverside's existing and projected load appears challenging, but technically feasible.

SCE performed a steady state power flow analysis to assess the impact of Alternative A on SCE's Bulk Electric System. As part of SCE's Annual Transmission Reliability Assessment (ATRA), annual base cases for power flow analysis are developed for a 10-year planning period. The base case developed for the last year (2027) of SCE's 2017 ATRA was used for the Alternative A power flow analysis. Riverside's projected 2027 load (694.5 MW) was modeled in this base case.[66] Power flow analysis was performed for the following three scenarios. *See* Figure 10:

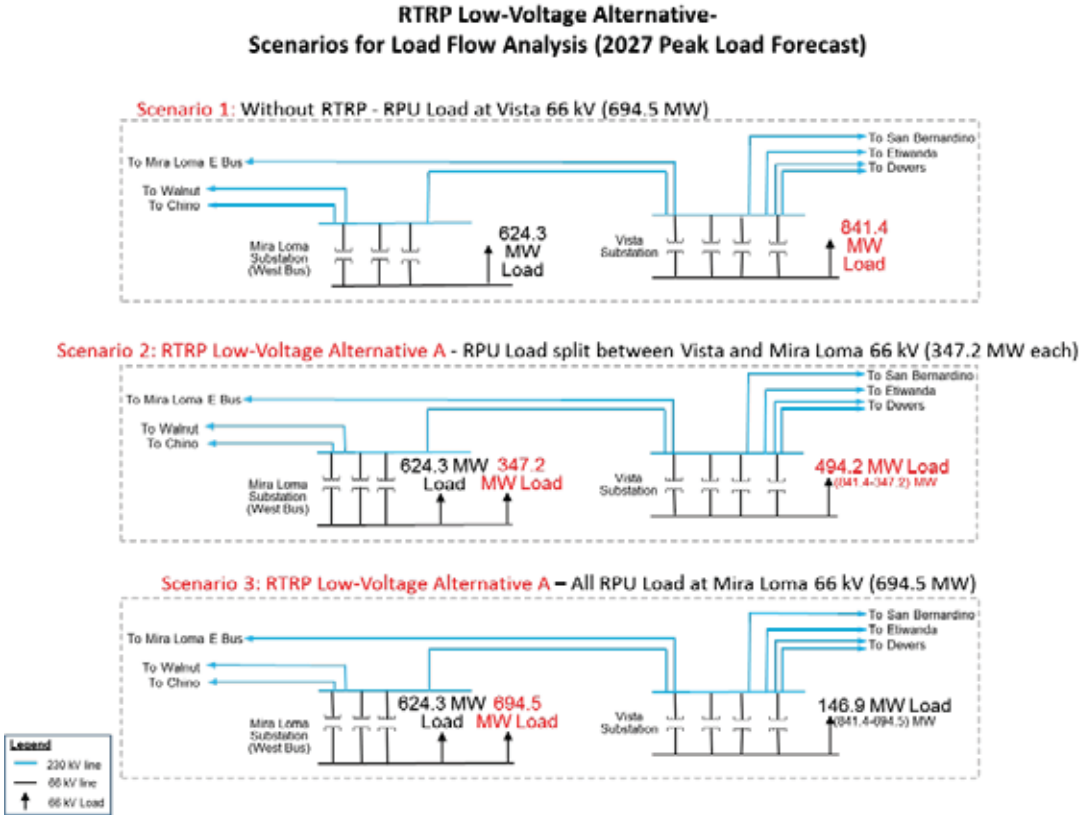

FIGURE 10 RIVERSIDE LOW-VOLTAGE ALTERNATIVE SCENARIOS FOR LOAD FLOW ANALYSIS

[66] The power flow analysis for Alternative A utilized Riverside's 1-in-40 peak load forecast for 2027 rather than the 1-in-20 forecasts utilized for this Report. The results of the power flow analysis would not change if the lower 1-in-20 forecast figure were used.

The analysis was performed using the General Electric International, Inc. Positive Sequence Load Flow (PSLF) program. Contingency Analysis was performed in accordance with the NERC Transmission Planning Standard TPL-001-4 – Steady State & Stability Performance Planning Events categories P0 through P7. No new thermal overloads or voltage issues were identified on SCE's Bulk Electric System in the transmission planning studies evaluated for Alternative A.

4.2.3.1.2.2 Reliability Considerations

Alternative A would meet one Objective of the RTRP Hybrid Proposal by providing a second source to Vista Substation and would provide complete redundancy for the Vista Substation connection through planning year 2038. However, SCE's current design standards generally limit a 230/69 kV transmission substation to four 280 MW transformers; this standard would be exceeded at Mira Loma Substation with the addition of three new 230/69 kV transformers to serve Riverside as incorporated in the Alternative A design, which could reduce the reliability of service to Riverside.

SCE strives to construct substations in a consistent manner, meaning that the substation layouts, switch rack designs, equipment, and operating requirements at each substation are consistent and familiar to the field personnel that are required to operate and maintain the equipment at multiple substations. These standards are developed and revised as necessary based on experience to ensure SCE builds safe, reliable and operable substations on a consistent basis. In addition, the consistent design ensures that upgrades to existing substations and/or construction of new substations are constructed in a manner that provides the lowest total cost of ownership. During emergency conditions, the consistent design allows SCE to bring in "out of town" field crews to help restore power to SCE's customers.

SCE obtains this consistent design through the development and use of standards. In addition, SCE's standards provide a baseline to evaluate and compare the merits of proposed changes to determine impact on safety, reliability, operations, maintenance, construction and cost. The four A-bank transformer limitation seeks to limit the amount of load and customer exposure if the substation were to become unavailable and also allows for a reasonable amount of circuit congestion in the local area.

Further, SCE currently has three transformers in service at Mira Loma; if the fourth remaining transformer position is used for Alternative A, it could accelerate the need for a new SCE A-Station (four 230/69 kV transformers) in order to address both capacity and reliability concerns for the Mira Loma Substation service area.

4.2.3.1.2.3 Environmental Considerations

As described in Section 4.2.3.1.1 and shown in Figure 6, the Alternative A design includes four routes from Mira Loma Substation to the Riverside service territory that include both overhead and underground lines. Route A1 would be approximately 10.48 miles in length. Route A2 would be approximately 9.75 miles in length. Route A3 would be approximately 10.06 miles in length, and Route A4 would be approximately 13.49 miles in length. Thus, a total of approximately 43.8 miles of 69 kV lines would be required for Alternative A, an increase of approximately 34 miles of ROW as compared to the RTRP Hybrid Proposal (9.7 miles).

SCE and Riverside conducted a preliminary evaluation of potential environmental impacts along the routes for Alternative A for the following resource categories:

- Aesthetics
- Hydrology and Water Quality
- Agricultural and Forestry

- Land Use and Planning
- Air Quality and Greenhouse Gas Emissions
- Mineral Resources
- Noise
- Biological Resources
- Population and Housing
- Cultural Resources
- Public Services and Utilities
- Geology and Soils
- Recreation
- Hazards and Hazardous Materials
- Transportation and Traffic

This analysis was intended to qualitatively evaluate impacts as a means to compare Alternative A to the RTRP Hybrid Proposal, providing a level of detail consistent with CEQA standards regarding the analysis of alternatives.

Several methodologies were utilized to collect and review publicly available environmental and land use data within each 69 kV Alternative studied. Methods included: incorporating readily available Geographical Information System (GIS) coverages for Alternatives that cross or parallel the RTRP Hybrid Proposal's alignment routes, review of maps and published literature, and review of files and records from SCE projects in the area, federal, State, and local regulatory agencies. For biological and water resources, a 500-foot buffer was evaluated for potential impacts. Refer to Appendix B for SCE's Environmental Screening Report identifying the data sources on which biological and water resource evaluations were based for all of the 69 kV Alternatives studied in this Report.[67]

4.2.3.1.2.3.1 Environmental Impacts from Alternative A

The following outline provides a broad overview of the various environmental resource categories reviewed and potential routing constraints and areas of potential concern along Alternative A:

- Parcel segmentation potentially limiting future land uses resulting from the four transmission line alignments.
- Traversing existing industrial development parking areas potentially affecting access, available parking, and internal circulation.
- As compared to the RTRP Hybrid Proposal, an increased number of street crossings and construction activities for a greater distance within road ROW, impacting traffic along high traffic volume corridors and associated road networks, such as Bellegrave Avenue, Limonite Avenue, Van Buren Boulevard, Hamner Avenue, Hidden Valley Parkway, S. Promenade Avenue, and La Sierra Avenue. High volume intersections include:

[67] In order to develop Appendix B, a desktop GIS environmental screening tool was utilized to identify and compare potential environmental impacts of the lower voltage Alternatives' routes against the RTRP Hybrid Proposal. Each lower voltage Alternative and its associated routes, as well as the proposed RTRP Hybrid Proposal, were buffered 500 ft. The ESRI GIS Screening tool was then used to analyze publicly available environmental data (*e.g.,* CDFW's California Natural Diversity Database [CNDDB] records and USFWS critical habitat) as well as data previously collected by SCE. Impacts from each route for each Alternative (A-B-C) were then quantified and compared to the RTRP Hybrid Proposal using the same desktop method. Other than the fieldwork already performed for the 2013 FEIR, RTRP Hybrid Proposal, and subsequent EIR (currently in development by the CPUC), no fieldwork was conducted specifically for the proposed lower voltage Alternatives evaluated in this Report.

    - Limonite Avenue/Van Buren Boulevard
    - Van Buren Boulevard/Jurupa Avenue
    - Cantu-Galleano Ranch Rd/Etiwanda Avenue
    - Bellegrave Avenue/Bain Street
    - Hidden Valley Parkway/Hamner Avenue/I-15 Interchange
- Increased traffic impacts for the construction of approximately 44 miles of 69 kV transmission lines for four routes that include both overhead and a significant amount of underground lines within major arterials in the Cities of Jurupa Valley, Norco, Corona, and Riverside.
- Logistical, space, and design constraints related to structure placement in the Limonite Avenue/Van Burn Boulevard intersection due to existing overpass and railroad corridor.
- Potential need for private land ROW acquisition adjacent to road ROW for underground segments.
- New impacts on railroad operations and encroachment within railroad ROWs which would require approval and close coordination with Union Pacific Railroad.
- Potential increases in air/dust emissions. Also, dust and air impacts would shift to the north and east into other residential and commercial areas of Jurupa Valley. These impacts would be short-term, local, and consist predominantly of exhaust from mobile construction vehicles and equipment, fugitive dust along construction access roads, trenching activities, and concrete mixing operations. Areas subject to poorer air quality are those sites immediately adjacent to the ROW during surface-disturbing construction activities.
- Increased potential for cultural impacts and tribal concerns related to two additional routes (as compared to the RTRP Hybrid Proposal) over the Santa Ana River and along undeveloped utility corridors.
- Reduced recreation values on Goose Creek Golf Course similar to the proposed route in the 2013 FEIR.
- Additional routes, not previously considered in the 2013 FEIR, in the Hidden Valley Wildlife Area/Santa Ana River Trail. Additional routes will have impacts on vegetation, wildlife, visual, and recreation resources (including conflicts with the Santa Ana River Trail). Additional land conversions would undergo a National Park Service's National Environmental Policy Act (NEPA) analysis and mitigation for Land and Water Conservation Fund (LWCF) conversion and replacement.
- Visual impacts created by Alternative A (Route A1) result in structure and vegetation contrasts similar to the RTRP Hybrid Proposal that block views or degrade the scenic quality of the Santa Ana River corridor, surrounding mountains, and other scenic areas from sensitive viewpoints; there also would be impacts on the City of Jurupa Valley I-15 entry corridor from three additional highway crossings.
- Visual impacts associated with additional riser pole structures located on Cantu-Galleano Ranch Road and Bain Street/Bellegrave Avenue adjacent to a residential area.
- Increased visual impacts along Bain St. Currently, there is no 69 kV transmission line along the San Servaine River Channel.
- Visual impacts on the City of Riverside designated Parkway and Gateway (Van Buren Boulevard).

- The 69 kV riser poles would be more visually prominent than the typical 69 kV transmission line structures.
- Adjacent to three schools: Jurupa Valley High School, Mira Loma Middle School, and Van Der Molen Elementary.
- Noise level impacts would increase under Alternative A as compared with the RTRP Hybrid Proposal due to the increase in the footprint of the proposed Alternative. Noise impacts would be temporary, but Alternative A would also shift noise impacts into other residential and commercial areas further east and north in Jurupa Valley.
- Conflicts with the Riverside Water Quality Control Plant are comparable to the RTRP Hybrid Proposal as evaluated in the 2013 FEIR.
- Jurisdictional water and wetland delineation will be required based on Alternative A location. The purpose of this delineation is to identify the extent of federal and State jurisdiction within Alternative A pursuant to Sections 401 and 404 of the federal Clean Water Act, as well as Section 13260 of the State Porter Cologne Water Quality Control Act and Section 1602 of the California Fish and Game Code.
- Wildlife impacts associated with Alternative A are expected to increase as compared with the RTRP Hybrid Proposal due to the three additional routes and would have to be evaluated; this includes the following known federal and State threatened and endangered species or habitats:
    - Delhi Sands flower-loving fly (*Rhaphiomidas terminatus abdominalis*) – two-year protocol surveys may need to be conducted in undeveloped open-spaces with Delhi Sands. The three additional routes included in the Alternative A design increase the footprint into these soil types as compared with the RTRP Hybrid Proposal.
    - Riparian Bird Species – additional routes will impact additional riparian areas important to these species:
        - Least Bell's vireo (*Vireo bellii pusillus*)
        - Southwestern willow flycatcher (*Empidonax traillii extimus*)
        - Western yellow-billed cuckoo (*Coccyzus americanus occidentalis*)
    - Small Mammals – additional routes along riparian and open space corridors have the potential to increase impacts to these species:
        - Los Angeles pocket mouse (*Perognathus longimembris brevinasus*)
        - Northwestern San Diego pocket mouse (*Chaetodipus fallax falla*)
        - San Bernardino kangaroo rat (*Dipodomys merriami parvus*)
    - Burrowing owl (*Athene cunicularia*) – State listed species, has the potential to occur along Alternative A and adjacent to Mira Loma Substation within San Bernardino County and would require surveys and consultations with the CDFW under the California Endangered Species Act. This species has been losing habitat in the area due to urban expansion limiting the species to remaining open spaces. Additional 69 kV routes have the potential to impact nesting pairs along open space corridors. Additionally, previous SCE projects have recorded the presence of burrowing owls adjacent to Mira Loma Substation, and potential expansion could have a higher probability of impacts.

- Vernal Pool Fairy Shrimp – vernal pools south and west of the Mira Loma substation have been identified by previous SCE projects. Expansion of the substation to accommodate Alternative A would need to be evaluated.
- Federally listed San Diego Fairy Shrimp has the potential to occur along Alternative A, adjacent to the Mira Loma substation within San Bernardino County and would require surveys and consultations with USFWS under Section 10 of the Endangered Species Act.

Alternative A would be constructed on lands that have the potential to support sensitive biological resources that are regulated through the Western Riverside County MSHCP. Several surveys may be required to determine species or habitat presence per the MSHCP requirements. Some of the surveys potentially required are listed below.

- MSHCP narrow endemic plant survey
- MSHCP small mammal survey
- MSHCP riparian/riverine survey
- MSHCP Burrowing owl survey
- MSHCP Vernal Pool and Vernal Pool Fairy Shrimp Habitat

The increased footprint for the Alternative A design could impact the following USFWS critical habitats crossed by Alternative A:

- Least Bell's vireo – Alternative A would increase the footprint from the 2013 FEIR from approximately 128 acres to 202 acres. Note: most Least Bell's vireo critical habitat was avoided in the 2013 FEIR.
- Santa Ana sucker (Catostomus santaane) – Alternative A would increase the footprint from the 2013 FEIR from approximately 105 acres to 150 acres. Note: All Santa Ana sucker habitat was avoided in the 2013 FEIR.

4.2.3.1.2.3.2 Environmental Justice Impacts from Alternative A

With respect to Environmental Justice and impacts on disadvantaged communities, the Alternative A design would shift the routes further to the east and into disadvantaged communities already impacted by transportation corridors and commercial industrial areas. Environmental Justice data were obtained from the Office of Environmental Health Hazard Assessment (OEHHA) and California Environmental Protection Agency (CalEPA) California Communities Environmental Health Screening Tool (CalEnviroScreen 3.0). CalEnviroScreen is a tool used to help identify California communities that are disproportionately burdened by multiple sources of pollution. The most susceptible areas have the highest scores, with disadvantaged areas scoring at or above the 76th percentile within the State. The CiScore percentile breakouts for Alternative A versus the RTRP Hybrid Proposal are shown in Table 4.

TABLE 4 ALTERNATIVE A ENVIRONMENTAL JUSTICE COMPARISON TO THE RTRP HYBRID PROPOSAL

PERCENTILE	ALTERNATIVE A	RTRP HYBRID PROPOSAL
	DISTANCE	DISTANCE
76-80	14.33	6.85
81-85	5.90	0.98
86-90	4.35	0
91-95	0.18	0
96-100	0	0
Total Distance Crossing	**24.76**	**7.83**

PERCENTILE	ALTERNATIVE A DISTANCE	RTRP HYBRID PROPOSAL DISTANCE
Disadvantaged Areas		

4.2.3.1.2.3.3 Alternative A Would Cause Greater Environmental Impacts than The RTRP Hybrid Proposal

Overall, Alternative A would increase environmental impacts as compared with the RTRP Hybrid Proposal due to an additional 34.8 miles of ROW and introducing three additional routes currently not affected by the RTRP Hybrid Proposal. Table 5 provides a summary comparison of the environmental resources reviewed and differences in potentially significant impacts between Alternative A and the RTRP Hybrid Proposal.

TABLE 5 ALTERNATIVE A AND RTRP HYBRID PROPOSAL IMPACTS COMPARISON

ENVIRONMENTAL RESOURCE	RTRP HYBRID PROPOSAL[1]	69 KV ALTERNATIVE A
Aesthetics	Significant	Similar; reduced in specific corridors but dispersed overall net increase of new lines in sensitive areas
Agricultural and Forestry	Significant	Similar
Air Quality and Greenhouse Gas Emissions	Significant as to Air Quality	Increased
Biological Resources	Less than Significant	Increased
Cultural Resources	Less than Significant	Increased
Geology and Soils	Less than Significant	Increased
Hazards and Hazardous Materials	Less than Significant	Similar
Hydrology and Water Quality	Less than Significant	Increased
Land Use and Planning	Less than Significant	Increased
Mineral Resources	Less than Significant	Similar
Noise	Less than Significant	Increased
Population and Housing	Less than Significant	Similar
Public Services and Utilities	Less than Significant	Increased
Recreation	Less than Significant	Increased
Transportation and Traffic	Less than Significant	Increased

[1] Potential impacts identified for the RTRP Hybrid Proposal are from the 2013 FEIR evaluation of the overhead design originally proposed for the RTRP; as noted in the 2013 FEIR, impacts for the RTRP Hybrid Proposal, including underground segments, may be different.

4.2.3.1.2.4 Estimated Costs for Alternative A

The total cost estimate for Alternative A is $ 499.1 million in nominal 2023 dollars, which is approximately 23% greater than the current cost estimate of $ 405.3 million for the RTRP Hybrid Proposal. Table 6 shows the components included in the $ 499.1 million cost estimate for Alternative A. This cost estimate includes two 280 MW transformers and seven circuits (three double-circuit lines, one-single circuit line; four routes), which compares to the RTRP Hybrid Proposal with two transformers at Wilderness Substation and with comparable line ratings; Alternative A - 875 MW (seven 125 MW lines normal condition rating) and 230 kV line included in the RTRP Hybrid Proposal – 916 MW (normal condition rating).

TABLE 6 ALTERNATIVE A PRELIMINARY COST ESTIMATE, FULLY LOADED COSTS (NOMINAL 2023 DOLLARS)

ROUTE SPECIFICS			ENGINEERING, PROCUREMENT AND CONSTRUCTION (EPC) COSTS		EASEMENT COSTS		EPC + EASEMENT TOTAL ($mil)
Route	Construction Type	Miles	Cost Per mile ($mil)	EPC Total ($mil)	Easement Area (square feet) (in millions)	Total Easement Cost ($mil)	
Route A1 (10.48 miles)	Overhead	7.80	$1.85	$14.4	1.2	$15.8	$30.2
	Underground	2.68	$7.75	$20.8	0.4	$5.5	$26.3
Route A2 (9.75 miles)	Overhead	7.67	$1.85	$14.2	1.2	$15.2	$29.4
	Underground	2.08	$7.75	$16.1	0.3	$3.6	$19.7
Route A3 (10.06 miles)	Overhead	9.09	$1.85	$16.8	1.4	$20.8	$37.6
	Underground	0.97	$7.75	$7.5	0.2	$1.8	$9.3
Route A4 (13.49 miles)	Overhead	0.19	$1.85	$0.4	0.0	$0.4	$0.8
	Underground	13.30	$7.75	$103.1	2.1	$26.7	$129.8
Mira Loma Substation Upgrades							$31.1
Licensing and Permitting							$26.7
Environmental							$9.6
Transmission Telecom (Fiber Optic)							$2.3
Telecommunications							$0.8
Other Costs (Mira Loma Relocation Costs)							$16.1
Fully Loaded Costs*							$369.7
35% Contingency							$129.4
Total Cost Estimate							$499.1

* Nominal dollars, excludes cost of financing.
* Does not include ITCC.
* Does not include Riverside system upgrades cost.
* Costs are subject to increase should more underground work be needed for transmission routes than assumed.

4.2.3.1.2.5 Alternative A is Not Feasible

Under California law, feasibility is defined as "capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic, environmental, legal, social, and technological factors."[68] No public agency shall approve a project with significant and unavoidable environmental impacts unless the public agency finds "specific economic, legal, social, technological, or other benefits of the project outweigh the significant effects on the environment."[69] Under CEQA, the "other considerations" referenced in section 21081 have been found to include "policy considerations" permitting the rejection of mitigation or alternatives that are "impractical or undesirable from a policy standpoint."[70] The CEQA Guidelines also stress that the selection of project alternatives should be based primarily on the ability of one or more proposed alternatives to reduce significant impacts relative to the proposed project.[71]

Alternative A is not capable of being accomplished within the same time period as the RTRP Hybrid Proposal, and, based on the foregoing analysis of technological challenges and environmental impacts, is likely to increase, rather than avoid or reduce, the environmental effects of the project. Alternative A is also more costly than the RTRP Hybrid Proposal. Alternative A should therefore be rejected for reasons of infeasibility.

With respect to timing, Alternative A is expected to increase the timeframe for completion of the project relative to the RTRP Hybrid Proposal. Depending on the extent of subsequently-required engineering and design modifications as well as permitting and related regulatory proceedings, the additional time necessary for the completion of any of the Alternatives could be five years or more.[72] As described in Section 3.5, these delays would place the reliability of Riverside's system at continued risk of load shedding and potential distribution system blackout conditions, as SCE and Riverside expect that loading limits on Riverside's sole existing interconnection to the SCE system at the Vista Substation will continue to be exceeded under normal operating conditions during peak demand periods. Under emergency conditions, including an outage of one of the Vista Substation transformers used to serve Riverside, involuntary load shedding is highly likely. Under both normal and emergency conditions, Riverside will be required to continue to rely on internal, gas-fired peaking units that are vulnerable to fuel supply deficiencies associated with the gas system and usage limitations related to air permitting. It is critical that any Alternative to the RTRP Hybrid Proposal be capable of completion within the same timeframe. Alternative A does not satisfy that criterion.

Consideration of technological factors supports a finding that Alternative A is infeasible. Alternative A would require additional transformers to be installed at the Mira Loma Substation, which constitutes a technological constraint because, at this time, only one transformer position is available. Alternative A requires a minimum installation of two additional transformers in order to provide 560 MW of capacity. Even if additional land to install the second transformer could be acquired, the addition of more than one transformer at this location would be inconsistent with SCE and industry

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[68] *See* CEQA Guidelines § 15364; *see also* Pub. Resources Code § 21061.1.

[69] *See* Pub. Resources Code § 21081.

[70] *See California Native Plant Soc. v. City of Santa Cruz,* 177 Cal.App.4th 1001 (2009) (describing acceptable policy-based infeasibility determinations under CEQA.

[71] *See* CEQA Guidelines § 15126.6[b].

[72] *See* further discussion of potential delay in Section 3.5.

design standards, which could reduce the reliability of service to Riverside.[73] SCE's design standards are adopted to reflect sound engineering practices in order to mitigate reliability and operability concerns. Under Alternative A, SCE would likely face an accelerated need for a new A-Station in order to address capacity and reliability concerns for the Mira Loma service area.

In addition to technological factors, Alternative A is likely to increase environmental impacts as is described with greater particularity in Section 4.2.3.1.2.3.1. With respect to environmental factors, Alternative A requires seven 69 kV circuits along four separate routes to deliver an equivalent amount of energy as the RTRP Hybrid Proposal; this is equivalent to an estimated total of 43.8 miles of new line routes – consisting of three double-circuit 69 kV routes and one underground segment – which would create new environmental and landowner impacts. The RTRP Hybrid Proposal is 9.7 miles long, so the impacts for Alternative A are estimated at being three to four times greater from a routing perspective. The RTRP Hybrid Proposal consists of 63 steel structures, while Alternative A is estimated for 654 steel structures. The diversification of the 69 kV routes suggests that vulnerabilities to electric power flows stemming from structure damage from traffic and/or other environmental conditions may be decreased. At the same time however, the 69 kV routes would place a far greater number of structures into public ROWs, which may increase potential public safety concerns such as "car hit pole" incidents.

The roughly ten-fold increase in the number of structure locations would also have a large impact on affected landowners in terms of securing easements and mitigating view shed concerns. While the RTRP Hybrid Proposal impacts 71 parcels with its overhead double-circuit 230 kV line, Alternative A is estimated to impact 284 parcels with double-circuit 69 kV overhead lines, a significant increase. The likely impacts to wildlife are also greater under Alternative A.

Social factors also support a finding of infeasibility. The large number of structures and line miles described above in connection with environmental factors will create a greater impact on the communities located adjacent to the Alternative A facilities relative to the impact that the shorter route and reduced number of structures associated with the RTRP Hybrid Proposal will have on communities adjacent to the project. Given that three out of the four line routes do not follow the same route as the RTRP Hybrid Proposal, SCE and Riverside anticipate that new community opposition could arise and that new environmental analyses of the routes may be required, with a corresponding delay on the project's timing. As shown in Table 4, Alternative A is likely to have larger environmental justice impacts on disadvantaged communities.

Finally, Alternative A would cost more, in terms of total dollars and without respect to any tariff implications, than the RTRP Hybrid Proposal. As documented in Section 4.2.3.1.2.4, SCE and Riverside currently estimate the cost of Alternative A at $499.1 million, which is approximately $94 million (or approximately 23%) above the cost of the RTRP Hybrid Proposal. This added cost does not reflect the potential cost increases associated with delays and new environmental and permitting processes.

The increased total costs contribute to an overall finding of infeasibility based on the technological, environmental, social, and policy considerations noted above.

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[73] *See* SCE Subtransmission Planning Criteria and Guidelines (September 24, 2015). SCE's standards, subtransmission planning criteria and guidelines are considered proprietary and contain confidential material. Relevant portions of same can be made available upon request provided appropriate safeguards are in place to protect their confidentiality.

4.2.3.2 Alternative B

4.2.3.2.1 Alternative B Description

Alternative B would utilize two existing SCE 230/69 kV substations (Mira Loma and Etiwanda) and would modify the design for a proposed SCE distribution substation (Circle City) to add a 230 kV interconnection and 230/69 kV transformation. One double-circuit 69 kV line would emanate from each substation for a total of three double-circuit lines (Route B1, Route B2, and Route B3), three ROWs, and six circuits as shown on Figure 11 - 69 kV Alternative B Map. Interconnection to Riverside's system would be from Mira Loma Substation to Harvey Lynn Substation (one circuit) and to the existing 69 kV line between Kaiser Substation and Harvey Lynn Substation (one circuit). There would be two circuits to Freeman Substation from Circle City Substation and two circuits to Mountain View Substation from Etiwanda Substation.

In addition, Alternative B would require the construction of a new 230 kV transmission line feed to the proposed Circle City Substation similar to the 230 kV line included in the RTRP Hybrid Proposal. The 230 kV feed necessary for Alternative B is not included in the currently proposed plan for the Circle City Substation and would be a minimum of two miles longer than the 230 kV line included in the RTRP Hybrid Proposal. An alignment and detailed design for this required 230 kV interconnection to the Circle City Substation has not been developed for this Report; therefore the discussion of potential environmental impacts from Alternative B includes typical impacts to be expected and level of magnitude of those impacts in comparison to the RTRP Hybrid Proposal only and not a specific impact analysis for the necessary 230 kV transmission line.

Refer to Appendix A for photographs along selected locations for each 69 kV route associated with Alternative B.

4.2.3.2.1.1 Route B1 – Mira Loma

Route B1 would consist of approximately 4.5 miles of overhead transmission line and 5.8 miles of underground transmission line. Route B1 would be undergrounded from Limonite Avenue to the Goose Creek Golf Club. The underground section would parallel Limonite Avenue on the north, follow Pat's Ranch Road along road ROW, follow 68th Street to the Goose Creek Golf Course, and emerge as an overhead line just north of the Santa Ana River. Route B1 is identical to Route A1 (*see* Section 4.2.3.1.1.1) north of the Santa Ana River. South of the Santa Ana River, the line route would deviate from the Route A1 corridor just east of the river crossing, extend south to Arlington Avenue, and follow the Arlington Avenue street ROW to the intersection with La Sierra Avenue. Route B1 would then follow the La Sierra Avenue road ROW south to the Harvey Lynn Substation and the tap point between Harvey Lynn and Kaiser Substations. Except for a short segment located just north of Arlington Avenue where the line would cross a greenfield section of private property, Route B1 south of the Santa Ana River would be constructed entirely underground within road ROW.

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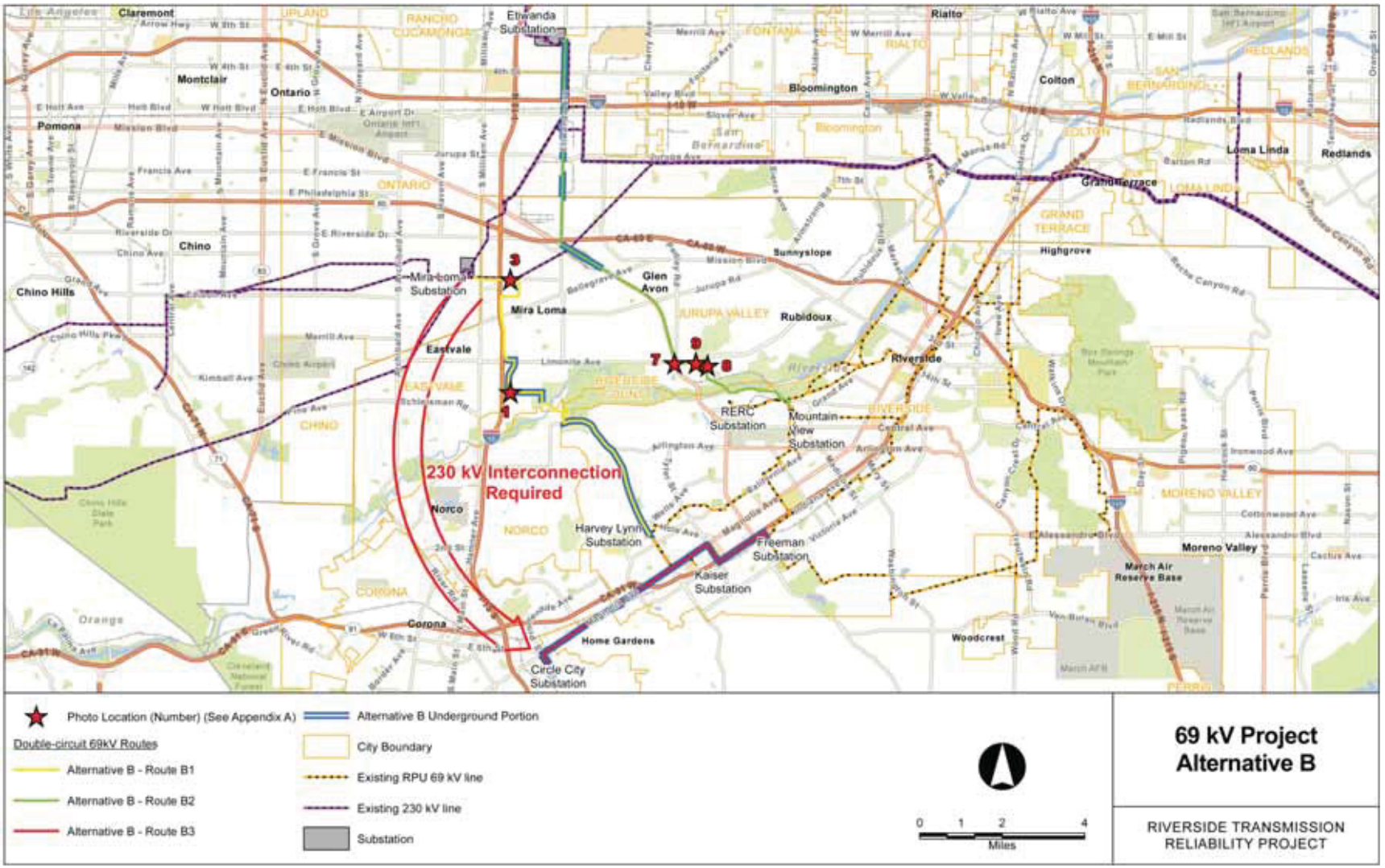

FIGURE 11 69 KV ALTERNATIVE B MAP

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4.2.3.2.1.2 Route B2 – Etiwanda

Route B2 would consist of approximately 8.2 miles of overhead transmission line and 4.7 miles of underground transmission line. Route B2 is similar to Route A3 as described in the segment along Van Buren Boulevard between Riverside Drive and the interconnection with Riverside's system north of Mountain View Substation. However, instead of interconnecting at existing lines just north of the Mountain View Substation, Route B2 would interconnect directly into Mountain View Substation. In addition, Route B2 would deviate from Route A3 by extending along Van Buren Boulevard northwest to Etiwanda Avenue, following Etiwanda Avenue north to Etiwanda Substation. Route B2 would be undergrounded in the same sections as Route A2 along Van Buren Boulevard to the intersection with Etiwanda Avenue and along two sections of Etiwanda Avenue between Marlay Avenue and East Philadelphia Avenue, and between Jurupa Avenue and the Etiwanda Substation.

4.2.3.2.1.3 Route B3 – Circle City

Route B3 would consist of approximately 7.1 miles of underground transmission line. Route B3 would be constructed entirely underground and is located along Lessen Lane, Magnolia Avenue, Tyler Street, and Indiana Avenue within street ROW from the proposed Circle City Substation to the Freeman Substation.

4.2.3.2.2 Alternative B Evaluation

4.2.3.2.2.1 Technical Considerations

SCE and Riverside evaluated using three substation sources to provide 750 MW of delivery capacity to Riverside. The three substations included SCE's existing Mira Loma and Etiwanda Substations and SCE's future proposed Circle City Substation. Alternative B includes a single 280 MW transformer at each of the three substations. One double-circuit line would emanate from each of the three substations to Riverside for a total delivery capacity of 750 MW.[74]

All three substations would be configured for supplying 250 MW each to Riverside. Each of these substations would supply the power via overhead and/or underground double-circuit 69 kV circuits each with conductors having a normal condition capacity of 125 MW (total of 250 MW for each double-circuit line) and with a four-hour emergency capacity of 168 MW (total of 336 MW for each double-circuit line. The load at Riverside would be served by installing overhead double-circuit 69 kV circuits each with conductors having a normal condition capacity of 125 MW and with a four-hour emergency capacity of 168 MW (336 MW from each substation). Underground sections included in the Alternative B design would also be double-circuited in common trench and common underground structures with conductors having a normal condition rating of 125 MW and a four-hour emergency condition rating of 181 MW. The overhead conductors would be the limiting component (168 MW) during unplanned single-contingency events. In the event of a single-element contingency (outage of two 69 kV circuits due to the failure of a single double-circuit structure either overhead or underground), the four remaining 69 kV circuits described under Alternative B would operate at an emergency capacity totaling 672 MW (4 X 168 MW).

[74] Alternative B is limited by the line rating of 125 MW normal condition rating (6 X 125 MW = 750 MW) rather than by the transformer rating. *See* Figure 11.

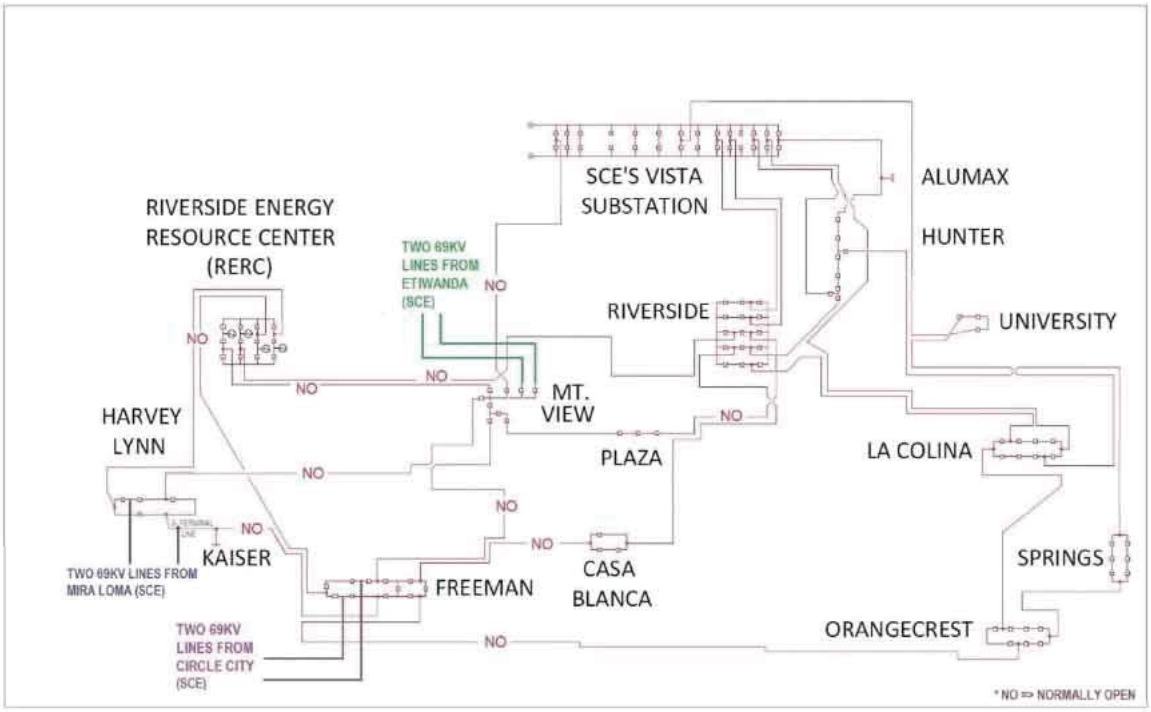

FIGURE 12 RIVERSIDE'S TRANSMISSION SYSTEM – FOLLOWING COMPLETION OF ALTERNATIVE B

The feasibility of installing the necessary equipment at each Alternative B substation is described below.

4.2.3.2.2.1.1 Mira Loma Substation Source

As discussed under Alternative A in Sections 4.2.3.1.2.1 and 4.2.3.1.2.2, the Mira Loma Substation interconnection presents difficulties due to limited expansion potential because of engineering, environmental, and land use constraints. SCE's current design standards limit the number of transformers at 230/69 kV substations to four transformers total rated at 280 MW each. SCE currently has three transformers in service at Mira Loma; if the fourth remaining transformer position is used for Alternative B, it could accelerate the need for a new SCE A-Station (four - 230/69 kV transformers) in order to address both capacity and reliability concerns for the Mira Loma Substation service area. *See* Sections 4.2.3.1.2.1 and 4.2.3.1.2.2 for more discussion on Mira Loma Substation.

4.2.3.2.2.1.2 Etiwanda Substation Source

As explained above, SCE's current design standards limit the number of transformers at 230/69 kV substations to four transformers total, rated at 280 MW each. Like Mira Loma Substation, this technological constraint relating to available transformer space constrains the Etiwanda Substation under Alternative B as well.

In addition to this limitation, Alternative B would require significant physical modifications to the Etiwanda Substation footprint that present major challenges. SCE's Substation Engineers evaluated the feasibility of two options at Etiwanda Substation to extend the 230 kV and 69 kV switchracks. *See* Figures 13, 14, and 15.

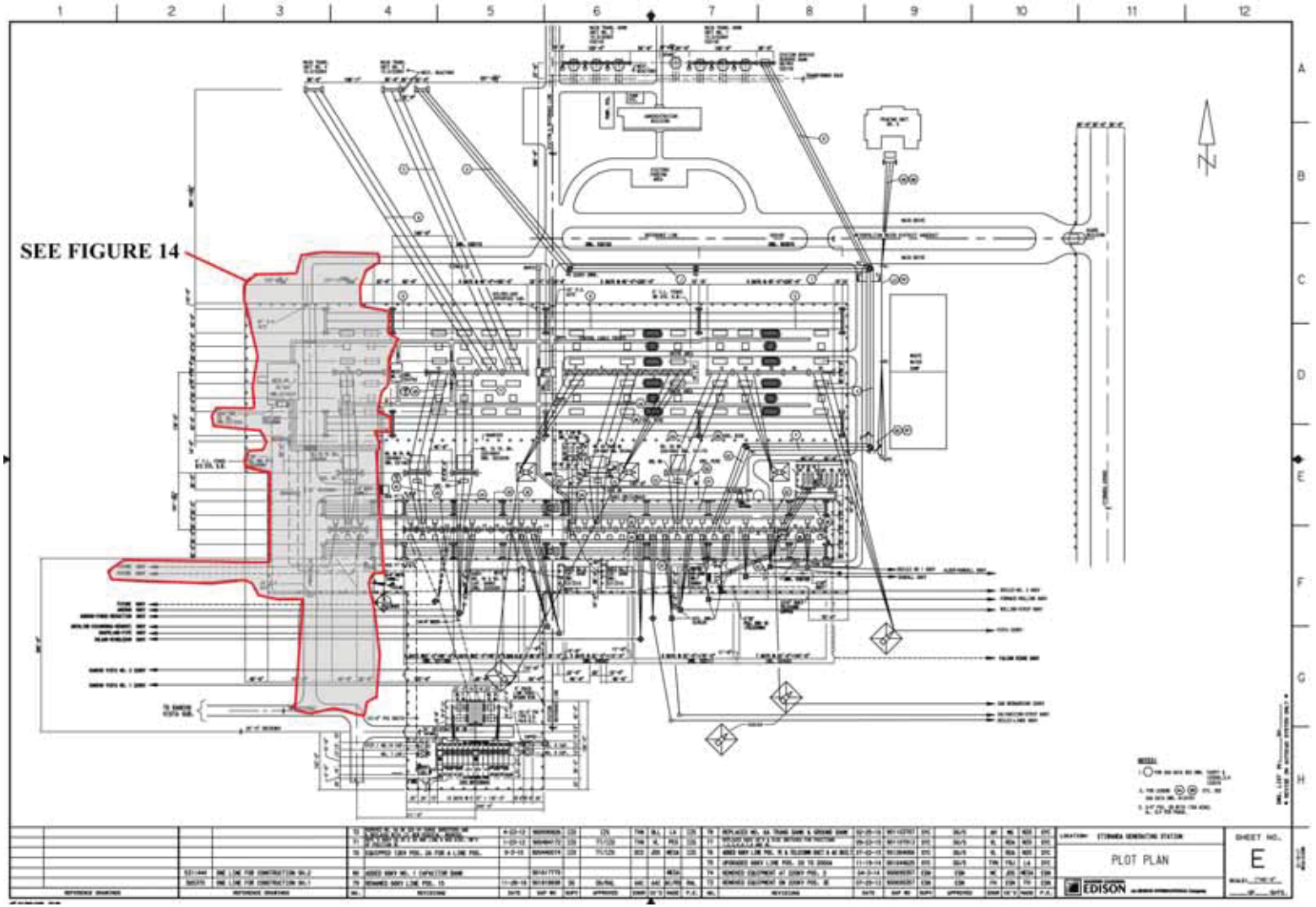

FIGURE 13 ETIWANDA SUBSTATION PLOT PLAN

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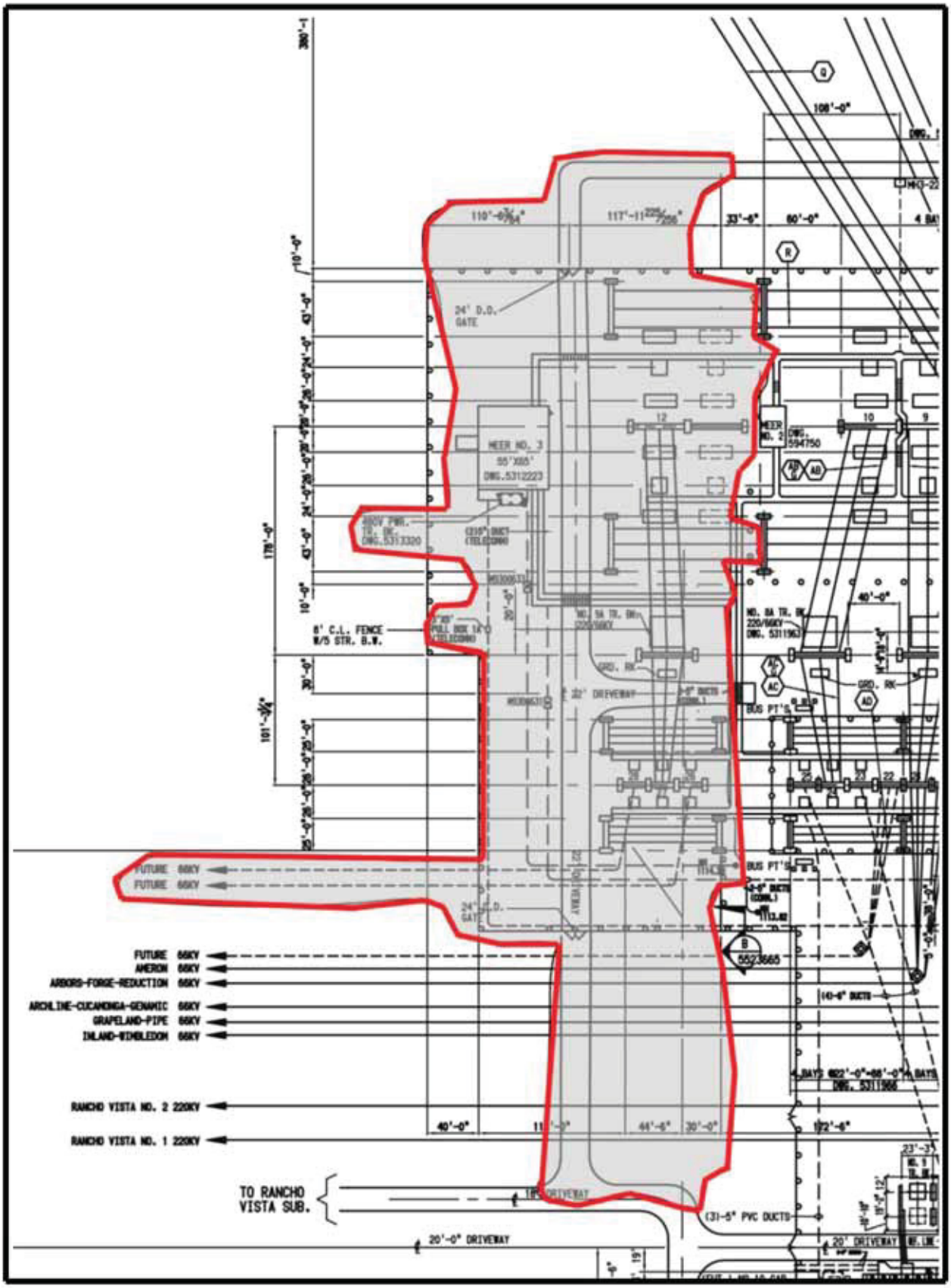

FIGURE 14 ETIWANDA SUBSTATION-WESTERN AREA MODIFICATIONS

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FIGURE 15 ETIWANDA SUBSTATION AERIAL VIEW

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Option 1: Extend the 230 kV and 69 kV switchracks to the east. This was determined to be infeasible due to physical space limitations. There is insufficient space within the existing substation property to extend the switchrack to the east. Switchrack extensions to the east would require the acquisition of the property adjacent to the east side of the substation. This property is owned by a third party generator and currently contains a well, waste water sump, and two customer-owned 69 kV lines. It is assumed that this land is being utilized by the customer and is essential to the operation of their business.

Option 2: Extend the 230 kV and 69 kV switchracks to the west. There is sufficient space within the existing substation property to extend the switchracks to the west even though there are conflicts with the existing Mechanical Electric Equipment Room, driveway, and trailers. The required 69 kV circuits would need to exit the substation due south. Several transmission and subtransmission lines are located south of any proposed westward extension:

- Etiwanda-Rancho Vista Nos. 1 & 2 230 kV Transmission Lines.
- Mira Loma-Rancho Vista Nos. 1 & 2 230 kV Transmission Lines.
- Etiwanda-Grapeland-Pipe 69 kV Transmission Line.
- Etiwanda-Ameron 69 kV Transmission Line.
- Etiwanda-Arbors-Forge-Reduction 69 kV Transmission Line.
- Etiwanda-Archline-Cucamonga-Genamic 69 kV Transmission Line.
- Etiwanda-Inland-Wimbledon 69 kV Transmission Line.

The Etiwanda Substation interconnection presents significant difficulties due to spatial limitations and the number of lines that would have to be crossed. To avoid crossing these lines, the new 69 kV circuits serving Riverside would most likely have to exit the substation via underground getaways.

4.2.3.2.2.1.3 Circle City Substation Source

The Alternative B design also includes modification of SCE's currently proposed, but not approved, Circle City Substation, planned for location in the City of Corona, to add a 230 kV interconnection and a double-circuit 69 kV line to Riverside. The current proposal for the Circle City Substation is awaiting a DEIR from the CPUC and has a current need date of 2024. The need date and anticipated in-service date of the proposed Circle City Substation (if approved) would not meet the need date of Riverside to receive a second source of power and the needed additional capacity. Further, alternative sites and designs may still be considered by the CPUC with respect to the proposed Circle City Substation, which may also call into question that site's use by any alternative to the RTRP Hybrid Proposal.

SCE currently intends for the Circle City Substation to be a distribution substation, but Alternative B would require modification of the existing design plans to allow for a 230 kV line to connect Circle City to the 230 kV system. Without the 230 kV line, Alternative B would fail to meet the Objectives established for the RTRP Hybrid Proposal. The Alternative B design would require two 230 kV source transmission lines that would likely originate from SCE's existing Mira Loma Substation and traverse a minimum of 11 miles[75] until the lines terminated at the proposed Circle City Substation site. The Alternative B design configuration for the Circle City Substation would include two 230/ 69 kV 280 MW transformers to serve SCE customer load in the City of Corona and the surrounding area and one additional 230/69 kV 280 MW transformer to serve Riverside. Under the design contemplated as part of Alternative B, upgrading the substation to 230/69 kV to accommodate the

[75] Depending on routing this value could increase by several miles.

required A Banks for service to SCE customers and to Riverside would result in a non-standard substation. *See* Section 4.2.3.1.2.2 for explanation of SCE's policy regarding standardization of substation design.

Two new 69 kV circuits (single double-circuit ROW) from Circle City Substation would be routed to and terminated at Freeman Substation within Riverside's electrical system. Circle City Substation would be located approximately seven miles from the termination point within Riverside's electrical system.

At a minimum, the following increases to the current proposed Circle City Substation scope (currently under CPUC review and awaiting an DEIR) also would be required:

- 230 kV towers.
- 230 kV switchrack.
- Three 280 MW 230/69 kV transformers.
- Additional 69 kV switchrack.
- Egress routes for two additional 69 kV circuits to serve Riverside.

The size and dimensions of the property currently being considered for the substation as originally proposed could not accommodate all of the required facilities. *See* Figure 16.

In addition, use of the proposed Circle City Substation would increase the number of miles for construction of 230 kV transmission line as compared to the RTRP Hybrid Proposal by at least two miles through more densely developed and populated areas than the areas that would be affected by the RTRP Hybrid Proposal, thereby increasing costs, environmental impacts, and the need for property acquisition. The area between Mira Loma Substation and the proposed Circle City Substation is densely populated and developed with both residential and commercial/industrial land uses. A high-level review of the area for this Report did not identify siting opportunities to construct 230 kV transmission lines without significant land and rights impacts and acquisitions.

In light of the numerous reliability considerations discussed in Section 4.2.3.2.2.2 below, SCE did not perform a power flow analysis for Alternative B. Because Riverside's load would be split among four of SCE's source substations under Alternative B (including the existing Vista Substation source), SCE expects that the power flow analysis results would show less impact on the Bulk Electric System than Alternative A (Riverside served from two SCE source substations, Vista and Mira Loma). The potential impacts of the reliability considerations below, however, would require a more extensive analysis.

FIGURE 16 CIRCLE CITY SUBSTATION AERIAL VIEW AND PLOT PLAN

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4.2.3.2.2.2 Reliability Considerations

Alternative B provides a second source of electricity to Riverside and, if found feasible, could provide the capacity required to meet future load growth up to 750 MW. A fourth route was considered for this Alternative which would have provided one or more additional circuits that would have matched the 840 MW ultimate design capacity for the RTRP Hybrid Proposal. The impacts to Riverside's system reliability by adding one or two more circuits beyond the six described for this Alternative were significant. It was determined to see if the reliability concerns could be reduced by limiting this Alternative to six circuits. Even with this reduction in number of circuits interconnecting with Riverside it was determined that the reliability concerns with Alternative B are significant for the following reasons:

- Alternative B forces Riverside to divide the western portion of the system into discrete radial load pockets, as the SCE source systems (Mira Loma, Etiwanda, Circle City, and Vista) cannot be paralleled. SCE does not allow paralleling of these systems due to the effect of fault impedances from different sources on operation and protection elements of the electrical network (e.g., synchronization, protection co-ordination, switching). Creation of radial load pockets that cannot be paralleled reduces operational flexibility.
- A contingency loss of any SCE source (e.g., loss of a double-circuit tower, loss of two circuits) would force Riverside to immediately drop load. It cannot be instantaneously or automatically transferred to another source, as this would require appropriate coordination to avoid system paralleling.
- Alternative B will result in longer outages (hours versus minutes) and black-out times due to the above reasons. It is Riverside's goal to maintain system reliability indices; SAIDI (System Average Interruption Duration Index) less than 50 minutes per year and SAIFI (System Average Interruption Frequency Index) fewer than 1.15 interruptions per customer per year. Under Alternative B, Riverside will not be able to meet its goal to serve its customers reliably.
- Normally, Riverside distribution substations are served by two sources. Alternative B reduces the number of source lines to some substations and reduces reliability. Riverside's Harvey Lynn, Freeman and Mountain View Substations would experience less reliability due to reduced connectivity to other Riverside stations than exists today.
- Sensitive customer substations (hospitals, etc.) may be affected by the reduction in reliability.
- Riverside's RERC generating facility would be underutilized due to islanded operation of the Harvey Lynn, Freeman and Mountain View Substations. To provide support to any of these stations, RERC would need to follow separately a specific timeline for synchronizing requests and 30-minute start-up sequences and comply with environmental permit restrictions on number of hours of operation.
- Alternative B offers reduced capacity during outage of Vista Substation due to load transfer limitations resulting from the islanded load pockets (e.g., Mountain View and Freeman Substations have ties to the Vista-fed system. The Harvey Lynn Substation source cannot be used to support Vista-fed systems in absence of the tie-line). For these reasons, full utilization of the three sources (coming from Mira Loma, Circle City and Etiwanda) and RERC cannot be achieved during an outage of Vista Substation, and Alternative B cannot provide complete redundancy for the Vista interconnection.

4.2.3.2.2.3 Environmental Considerations

As described above, Alternative B would utilize two existing SCE 230/69 kV substations (Mira Loma and Etiwanda) and would require a modified design for a proposed SCE 230/69 kV substation (Circle

City), with one double-circuit 69 kV line from each substation for a total of three double-circuit lines (Route B1, Route B2, and Route B3), three ROWs, and six circuits as shown on Figure 11 - 69 kV Alternative B Map. Route B1 would be approximately 10.4 miles; Route B2 is approximately 12.9 miles, and Route B3 is approximately 7.1 miles. An approximate total of 30.4 miles of 69 kV lines would be required for Alternative B. In addition to the 69 kV lines that have been identified and mapped as part of this analysis, Alternative B would require a new 230 kV transmission source into the proposed Circle City Substation that would likely be at least 11 miles in length and would require an extensive routing and siting analysis to be performed similar to the RTRP 230 kV siting analysis as described in the 2013 FEIR, Section 6.2.1. Thus, Alternative B would increase ROW requirements by approximately 31.7 miles (41.4 miles – 9.7 miles) as compared to the 9.7 mile ROW required for the 230 kV line included in the RTRP Hybrid Proposal.

SCE and Riverside conducted a preliminary evaluation of the environmental resource categories listed in Section 4.2.3.1.2.3 for potential impacts along Alternative B using the methodology described in Section 4.2.3.1.2.3. This analysis was intended to qualitatively evaluate impacts as a means to compare Alternative B to the RTRP Hybrid Proposal, providing a level of detail consistent with CEQA standards regarding the analysis of alternatives.

4.2.3.2.2.3.1 Environmental Impacts from Alternative B

The following outline provides a broad overview of the various environmental resource categories reviewed and potential routing constraints and environmental concerns for Alternative B:

- Visual impacts created as a result of structure and vegetation contrasts and the blocking of views or degradation of the scenic quality of the Santa Ana River corridor, surrounding mountains, and other scenic areas from sensitive viewpoints as a result of an additional river crossing; impacts on views of the City of Jurupa Valley I-15 entry corridor; similar visual impacts to the visual character of urban neighborhoods and the Santa Ana River corridor due to the required 230 kV interconnection to the Circle City Substation.
- Visual impacts on the City of Riverside designated Gateway and Parkway (Van Buren Boulevard).
- Air/dust emissions are anticipated to increase due to the increased footprint and underground/trenching activities. A portion of these impacts would also shift further east and south into other residential and commercial areas within the City of Jurupa Valley and Riverside. Alternative B's air and dust impacts would be short-term, local, and consist predominantly of exhaust from mobile construction vehicles and equipment, fugitive dust along construction access roads, trenching activities, and concrete mixing operations. Areas subject to poorer air quality are those sites immediately adjacent to the ROW during surface-disturbing construction activities.
- Cultural resources and tribal concerns are generally low except in undeveloped open space and park/recreation areas (e.g., Hidden Valley Wildlife Area). Additional surveys would be required to evaluate impacts of shifting/adding additional routes east and south along the Santa Ana River corridor.
- Reduced recreation values on Goose Creek Golf Course similar to the proposed route in the 2013 FEIR.
- Short term impacts on the visual character of the Arlington Avenue and La Sierra Avenue designated Parkway and Scenic Boulevard as a result of construction.
- Visual impacts of overhead to underground transition structures as seen from the Santa Ana River Trail, nearby residences and Arlington Avenue designated Parkway and Scenic Boulevard.

- As compared to the RTRP Hybrid Proposal, an increased number and multiple crossings of streets and construction activities for a greater distance within road ROW, impacting traffic along high traffic volume corridors and associated road networks such as Etiwanda Avenue, Van Buren Boulevard, Arlington Avenue, and Magnolia Avenue. High volume intersections include:

    - Limonite Avenue/Van Buren Boulevard
    - Arlington Avenue/La Sierra Avenue
    - La Sierra Avenue/Magnolia Avenue
    - Tyler Street/Magnolia Avenue
    - Limonite Avenue/Clay Street
    - Magnolia Avenue/CA 91
    - Van Buren Boulevard/Etiwanda Avenue/CA 60

- Additional riser pole structures located on Etiwanda Avenue causing increased visual impacts.
- Impacts on the visual character of the Etiwanda Avenue commercial areas as a result of street tree removal.
- Private land ROW acquisition may be necessary adjacent to road ROW for underground segments.
- Impacts on railroad operations and encroachment within railroad ROWs, which would require approval and close coordination with Union Pacific Railroad.
- Noise level impacts would increase due to the increase in the footprint of Alternative B as compared with the RTRP Hybrid Proposal. Noise impacts would be temporary but would shift further east into residential areas of Jurupa Valley and south into residential and commercial areas in the City of Corona and Riverside.
- Jurisdictional water and wetland delineation will be required based on the location of Alternative B routes. The purpose of this delineation is to identify the extent of federal and state jurisdiction within Alternative B pursuant to Sections 401 and 404 of the federal Clean Water Act, as well as Section 13260 of the State Porter Cologne Water Quality Control Act and Section 1602 of the California Fish and Game Code.
- Alternative B may reduce impacts within the Hidden Valley Wildlife Area for vegetation, wildlife, visual, and recreation resources (including conflicts with the Santa Ana River Trail) as compared to the 230 kV route for the RTRP Hybrid Proposal as evaluated in the 2013 FEIR. However, the routes in the Alternative B design would need to be evaluated for LWCF conversion and replacement.
- Resource impacts associated with Alternative B, including impacts on known federal and State threatened and endangered species or habitats, are expected to increase as compared to the RTRP Hybrid Proposal due to the three additional 69 kV routes and the longer length and location of the 230 kV line required to interconnect Circle City Substation at 230 kV. Routes for the Alternative B design are within recorded areas known for threatened and endangered species and habitats. Protocol surveys may be required for the following species to determine potential impacts and permitting requirements:

    - Delhi Sands flower-loving fly-two-year protocol surveys may need to be conducted in undeveloped open-spaces with Delhi Sands. The three additional routes included in the Alternative B design increase the footprint into these soil types.
    - Riparian Bird Species – additional routes will impact additional riparian areas important to these species:
        - Least Bell's vireo.

        - Southwestern willow flycatcher.
        - Western yellow-billed cuckoo.
    - Small Mammals – additional routes along riparian and open space corridors have the potential to increase impacts to these species:
        - Los Angeles pocket mouse – also referenced in site records surrounding the Etiwanda substation.
        - Northwestern San Diego pocket mouse.
        - San Bernardino kangaroo rat – potential habitat identified by previous SCE projects adjacent to Etiwanda substation.

- Burrowing owl – a State listed species, has the potential to occur along Alternative B within San Bernardino County and would require surveys and consultations with the CDFW under the California Endangered Species Act. This species has been losing habitat in the area due to urban expansion limiting the species to remaining open spaces. The additional 69 kV routes included in Alternative B have the potential to impact nesting pairs along open space corridors. Additionally, previous SCE projects have recorded the presence of burrowing owls adjacent to Mira Loma Substation, and potential expansion could have a higher probability of impacts.
- Vernal Pool Fairy Shrimp – vernal pools south and west of the Mira Loma substation have been identified by previous SCE projects.
- Alternative B would be constructed on lands that have the potential to support sensitive biological resources that are regulated through the Western Riverside County MSHCP. Several surveys may be required to determine species or habitat presence per the MSHCP requirements. Some of the surveys potentially required are listed below:
    - MSHCP narrow endemic plant survey.
    - MSHCP small mammal survey.
    - MSHCP riparian/riverine survey.
    - MSHCP burrowing owl survey.
    - MSHCP Vernal Pool and Vernal Pool Fairy Shrimp Habitat.
- USFWS critical habitats crossed by Alternative B include:
    - Least Bell's vireo – The Alternative B footprint would increase the impacted area from approximately 128 acres in the 2013 FEIR to 157 acres. Most Least Bell's vireo critical habitat was avoided in the 2013 FEIR.
    - Santa Ana sucker – The Alternative B footprint would increase the impacted area from approximately 105 acres in the 2013 FEIR to 130 acres. Santa Ana sucker habitat was avoided entirely in the 2013 FEIR.
    - Federally listed San Diego Fairy Shrimp have the potential to occur adjacent to the Mira Loma substation. Least Bell's Vireo and San Bernardino Kangaroo Rat have potential to occur adjacent to Etiwanda substation, within San Bernardino County. Any activities outside of these substations could require surveys and consultations with USFWS under Section 10 of the Endangered Species Act.

4.2.3.2.2.3.2 Environmental Justice Impacts From Alternative B

With respect to Environmental Justice and impacts on disadvantaged communities, Alternative B shifts the affected areas farther to the north, south, and east into disadvantaged communities in Fontana, Corona, Jurupa Valley, and Riverside already impacted by transportation corridors, power

generation and substations, water treatment, and commercial industrial areas. Environmental Justice impacts were estimated using CalEnviroScreen 3.0. CalEnviroScreen is a tool used to help identify California communities that are disproportionately burdened by multiple sources of pollution. The most susceptible areas have the highest scores, with disadvantaged areas scoring at or above the 76th percentile within the State. The CiScore percentile breakouts for Alternative B versus the RTRP Hybrid Proposal are shown in Table 7. Table 7 includes CiScore for the 69 kV routes only and does not include the 230 kV transmission line associated with Alternative B since the location is not known, but consideration of the 230 kV line would likely increase the impacts shown.

TABLE 7 ALTERNATIVE B ENVIRONMENTAL JUSTICE COMPARISON TO RTRP HYBRID PROPOSAL

PERCENTILE	ALTERNATIVE B	RTRP HYBRID PROPOSAL
	Distance	Distance
76-80	10.74	6.85
81-85	2.99	0.98
86-90	5.46	0
91-95	0.18	0
96-100	0.46	0
Total Distance Crossing Disadvantaged Areas	**19.73**	**7.83**

4.2.3.2.2.3.3 Alternative B Would Cause Significantly Greater Environmental Impacts than the RTRP Hybrid Proposal

Overall, like Alternative A, Alternative B would also increase environmental impacts as compared with the RTRP Hybrid Proposal due to an additional 31.7 miles of 69 kV and 230 kV ROW, introducing at least three additional routes currently not affected by the RTRP Hybrid Proposal. Table 8 provides a summary comparison of the environmental resources and differences in potentially significant impacts between Alternative B and the RTRP Hybrid Proposal.

TABLE 8 ALTERNATIVE B AND RTRP HYBRID PROPOSAL IMPACTS COMPARISON

ENVIRONMENTAL RESOURCE	RTRP HYBRID PROPOSAL[1]	69 KV ALTERNATIVE B
Aesthetics	Significant	Increased; reduced in specific corridors but dispersed overall net increase of new lines in sensitive areas; impacts from required new 230 kV line to Circle City Substation similar to RTRP Hybrid Proposal
Agricultural and Forestry	Significant	Increased
Air Quality and Greenhouse Gas Emissions	Significant as to Air Quality	Increased
Biological Resources	Less than Significant	Increased
Cultural Resources	Less than Significant	Increased
Geology and Soils	Less than Significant	Increased
Hazards and Hazardous Materials	Less than Significant	Increased
Hydrology and Water Quality	Less than Significant	Increased
Land Use and Planning	Less than Significant	Increased
Mineral Resources	Less than Significant	Similar
Noise	Less than Significant	Increased
Population and Housing	Less than Significant	Increased
Public Services and Utilities	Less than Significant	Increased
Recreation	Less than Significant	Increased
Transportation and Traffic	Less than Significant	Increased

[1] Potential impacts identified for the RTRP Hybrid Proposal are from the 2013 FEIR evaluation of the overhead design originally proposed for the RTRP; as noted in the 2013 FEIR, impacts for the RTRP Hybrid Proposal, including underground segments, may be different.

4.2.3.2.2.4 Estimated Costs for Alternative B

The total cost estimate for Alternative B is $ 1,064.2 million in nominal 2023 dollars, which is approximately 160% greater than the current cost estimate of $ 405.3 million for the RTRP Hybrid Proposal. Table 9 shows the components included in the $ 1,064.2 million cost estimate for Alternative B. This cost estimate includes the cost of one 280 MW transformer at each of the three source substations (total of three transformers (3 X 280 MW = 840 MW) and two circuits (one double circuit line, one route) from each substation source to Riverside (2 X 125 MW = 250 MW) for a total of 750 MW (6 X 125 MW normal condition line rating). This compares to the RTRP Hybrid Proposal in terms of line ratings, 750 MW versus 916 MW. Since there are three sources, there are three transformers included in the cost estimate, which is one more transformer than included in the RTRP Hybrid Proposal. In addition, the estimated total cost includes a conservative estimate of the cost for the 230 kV line from Mira Loma Substation to Circle City Substation.

TABLE 9 ALTERNATIVE B PRELIMINARY COST ESTIMATE, FULLY LOADED (NOMINAL 2023 DOLLARS)

ROUTE SPECIFICS			ENGINEERING, PROCUREMENT AND CONSTRUCTION (EPC) COSTS		EASEMENT COSTS		EPC + EASEMENT TOTAL ($MIL)
Route	Construction Type	Miles	Cost Per mile ($mil)	EPC Total ($mil)	Easement Area (square feet) (in millions)	Total Easement Cost ($mil)	
Route B1 (10.36 miles)	Overhead	4.52	$1.85	$8.4	0.7	$9.8	$18.2
	Underground	5.84	$7.75	$45.3	0.9	$17.5	$62.8
Route B2 (12.85 miles)	Overhead	8.17	$1.85	$15.1	1.3	$16.8	$31.9
	Underground	4.68	$7.75	$36.3	0.7	$8.0	$44.3
Route B3 (7.10 miles)	Underground	7.10	$7.75	$55.0	1.1	$23.8	$78.8
11-Mile 230 kV Interconnection from Mira Loma to the Proposed Circle City Substations**							$405.3
Mira Loma Substation Upgrades							$16.5
Etiwanda Substation Upgrades							$37.7
Circle City Substation Upgrades							$24.5
Licensing and Permitting							$31.0
Environmental							$11.6
Transmission Telecom (Fiber Optic)							$4.5
Telecommunications							$5.1
Other Costs (Mira Loma Relocation Costs)							$16.1
Fully Loaded Costs*							$788.3
35% Contingency							$275.9
Total Cost Estimate							$1,064.2

* Nominal dollars, excludes cost of financing.

* Does not include ITCC.

* Does not include Riverside system upgrades cost.

* Costs are subject to increase, should more underground work be needed for transmission routes than assumed.

** Alternative B conservatively includes $405.3 million for the needed 11-mile 230 kV interconnection from Mira Loma Substation to Circle City Substation. The $405.3 million figure is the currently estimated cost of the RTRP Hybrid Proposal. This estimate is conservative with respect to the 11-mile 230 kV interconnection from Mira Loma Substation to Circle City Substation, as it is likely that this line would cost more than the RTRP Hybrid Proposal: it is longer (at least 11 miles vs. approximately 9.7 miles) and would be sited within a more urbanized and developed area, increasing the potential for undergrounding and cost to secure rights-of-way (via negotiated transaction, or if necessary, condemnation).

4.2.3.2.2.5 Alternative B Is Not Feasible

As explained previously with respect to Alternative A, under California law, feasibility is defined as "capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic, environmental, legal, social, and technological factors," but may also take into account "other considerations" permitting the rejection of alternatives that are impractical or undesirable from a policy standpoint.[76] Under CEQA, the selection of project alternatives should be based primarily on the ability of one or more proposed alternatives to reduce significant impacts relative to the proposed project.[77]

As with Alternative A, Alternative B is not capable of being accomplished within the same time period as the RTRP Hybrid Proposal, and, based on the foregoing analysis of technological challenges and environmental impacts, is likely to increase, rather than avoid or reduce, the environmental effects of the project. Alternative B is also substantially more expensive than the RTRP Hybrid Proposal. Alternative B should be rejected for reasons of infeasibility.

Alternative B is expected to increase the timeframe for completion of the project relative to the RTRP Hybrid Proposal. Depending on the extent of subsequently-required engineering and design modifications as well as permitting and related regulatory proceedings, the additional time necessary for the completion of any of the Alternatives could be five years or more, and, given that Alternative B includes construction of another 230 kV line that is longer than the line in the RTRP Hybrid Proposal, SCE and Riverside believe that any delays would be well in excess of five years.[78] As described in Section 3.5, these delays would place the reliability of Riverside's system at continued risk of load shedding and potential distribution system blackout conditions, as SCE and Riverside expect that loading limits on Riverside's sole existing interconnection to the SCE system at the Vista Substation will continue to be exceeded under normal operating conditions during peak demand periods. Under emergency conditions, including an outage of one of the Vista Substation transformers used to serve Riverside, involuntary load shedding is highly likely. Under both normal and emergency conditions, Riverside will be required to continue to rely on internal, gas-fired peaking units that are vulnerable to fuel supply deficiencies associated with the gas system and usage limitations related to air permitting. It is critical that any alternative to the RTRP Hybrid Proposal be capable of completion within the same timeframe. Alternative B does not satisfy that criterion.

Alternative B is also likely to significantly increase environmental impacts. With respect to environmental factors, Alternative B requires a new 230 kV circuit that is longer than the RTRP Hybrid Proposal, plus six 69 kV circuits along three separate routes to deliver an equivalent amount of energy as the RTRP Hybrid Proposal. This configuration would create new environmental and landowner impacts. The three 69 kV line routes would result in a total of 30.4 line miles, and the 230 kV line would be at least 11 miles, versus the 9.7-mile RTRP Hybrid Proposal. The increased line mileage correspondingly increases the environmental impacts. The RTRP Hybrid Proposal consists of 63 steel structures, while Alternative B is estimated to include 335 steel structures, which would also have a large impact on affected landowners in terms of securing easements and mitigating view shed concerns as well as increase vulnerabilities to damage from, for example, traffic and other environmental conditions. While the RTRP Hybrid Proposal impacts 71 parcels with its overhead

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[76] *See* CEQA Guidelines § 15364; *see also* Pub. Resources Code §§ 21061.1, 21081; *California Native Plant Soc.*, 177 Cal.App.4th at 1001 (describing acceptable policy-based infeasibility determinations under CEQA).

[77] *See* CEQA Guidelines § 15126.6(b).

[78] *See* further discussion of potential delay in Section 3.5.

double-circuit 230 kV line, Alternative B is estimated to impact 163 parcels with double-circuit 69 kV overhead lines, a significant increase.[79] Finally, the likely impacts to wildlife are greater under Alternative B.

Social factors also support a finding of infeasibility. The large number of structures and line miles described above in connection with environmental factors will create greater impacts on the communities located adjacent to the Alternative B facilities relative to the impact that the shorter route and reduced number of structures associated with the RTRP Hybrid Proposal will have on communities adjacent to the project. Given that the line routes for Alternative B do not follow the same route as the RTRP Hybrid Proposal and would entail a longer 230 kV line, SCE and Riverside anticipate that new community opposition would arise and that new environmental analyses of the routes may be required, with a corresponding delay of the project's timing. As shown in Table 7, Alternative B is likely to have larger environmental justice impacts on disadvantaged communities.

As explained in Sections 4.2.3.2.2.1 and 4.2.3.2.2.2 above, while possible in theory, Alternative B would also pose significant technological, engineering, and design challenges, as well as impact SCE's planning for its customers in the vicinity of Riverside. For example, if the only remaining transformer position available at Mira Loma were taken by Alternative B, SCE would likely face an accelerated need for a new A-Station in order to address capacity and reliability concerns for the Mira Loma service area. Alternative B would also require significant physical modifications to the Etiwanda Substation footprint that present major challenges, including the avoidance and/or relocation of existing infrastructure (*e.g.*, a well, a waste water sump, multiple 69 kV circuits, *etc*.). Moreover, Alternative B would require modification of the proposed Circle City Substation (currently proposed as a distribution substation) to allow for a 230 kV line connection that would likely require SCE to enlarge the dimensions of the proposed substation footprint. Upgrading the substation to 230/69 kV to accommodate the required A Banks for service to SCE customers and to Riverside would result in a non-standard substation. *See* Section 4.2.3.1.2.2 for explanation of SCE's policy regarding standardization of substation design.

Further, as explained in Section 4.2.3.2.2.2, there are significant reliability and management concerns created by Alternative B. Specifically, Alternative B is expected to, among other things: reduce operational flexibility by creating radial load "pockets" in Riverside's service territory that cannot be paralleled; result in longer outages and black-out times; necessarily result in inefficiencies in the operation of Riverside's RERC generating facility; and impose load transfer limitations and reduced capacity in the event of an outage of Vista Substation. The potential for Alternative B to result in a system which is difficult to manage, unstable, and inherently less reliable (all at a significantly increased cost) contravene prudent utility practice and design. Alternative B is contrary to these sound policies and should be found infeasible on that basis.

Finally, Alternative B would cost significantly more, in terms of total dollars and without respect to any tariff implications, than the RTRP Hybrid Proposal. As documented in Section 4.2.3.2.2.4, SCE and Riverside currently estimate the cost of Alternative B at over $1 billion, approximately $659 million (or approximately 163%) above the cost of the RTRP Hybrid Proposal. This added cost does not reflect the potential cost increases associated with delays and new environmental and permitting processes.

[79] The figures above for parcel and structure counts reflect only the 69 kV lines included in Alternative B. The 11-mile 230 kV line from Mira Loma Substation to Circle City Substation would affect additional parcels and add more structures.

The increased total costs and noted technological challenges contribute to an overall finding of infeasibility based on environmental, social, and policy-based considerations regarding prudent electrical system planning and use of ratepayer funds noted above.

4.2.3.3 Alternative C

4.2.3.3.1 Alternative C Description

The Alternative C design provides electrical power from a single 230/69 kV substation (Mira Loma) source with two double-circuit 69 kV lines to Riverside. *See* Figure 17 - 69 kV Alternative C Map.[80] The total firm delivery capacity from SCE to Riverside under Alternative C would be 500 MW. Large scale utility solar generation, including a BES is considered in this Alternative to provide up to 60 MW of non-firm capacity. This would bring the total capacity of Alternative C to 560 MW, but the additional 60 MW would provide substantially less capacity than its rated capability for serving load and for peak shaving purposes.

Refer to Appendix A for photographs along selected locations for each 69 kV route associated with Alternative C. A description of each 69 kV route is included below. A detailed description of the necessary supplemental internal generation (large scale utility solar and BES) associated with this Alternative is not included, as the siting for such a large scale project has not been identified and is not likely feasible in the Riverside area. Please refer to Section 4.3 for a description of the size and feasibility of other solutions considered, including solar and BES.

4.2.3.3.1.1 Route C1 – Mira Loma (same as Route A1)

Route C1 would consist of approximately 7.8 miles of overhead transmission line and 2.7 miles of underground transmission line. Route C1 is identical to Route A1 as described above in Section 4.2.3.1.1.1.

4.2.3.3.1.2 Route C2 - Mira Loma (same as Route A2)

Route C2 would consist of approximately 7.7 miles of overhead transmission line and 2.1 miles of underground transmission line. Route C2 is identical to Route A2 as described in Section 4.2.3.1.1.2.

[80] SCE and Riverside considered Etiwanda Substation and Circle City Substation as potential source points from SCE's system for Alternative C. Interconnection to the proposed Circle City Substation and the Etiwanda Substation would be less viable options than interconnection to the Mira Loma Substation, primarily due to the need for a new 230 kV source (similar to the 230 kV line included in the RTRP Hybrid Proposal) to be routed and constructed into the proposed Circle City Substation, the spatial limitations of accommodating 230/69 kV and separate 69 kV transformers and other infrastructure, and the distance from Etiwanda Substation to the Riverside system.

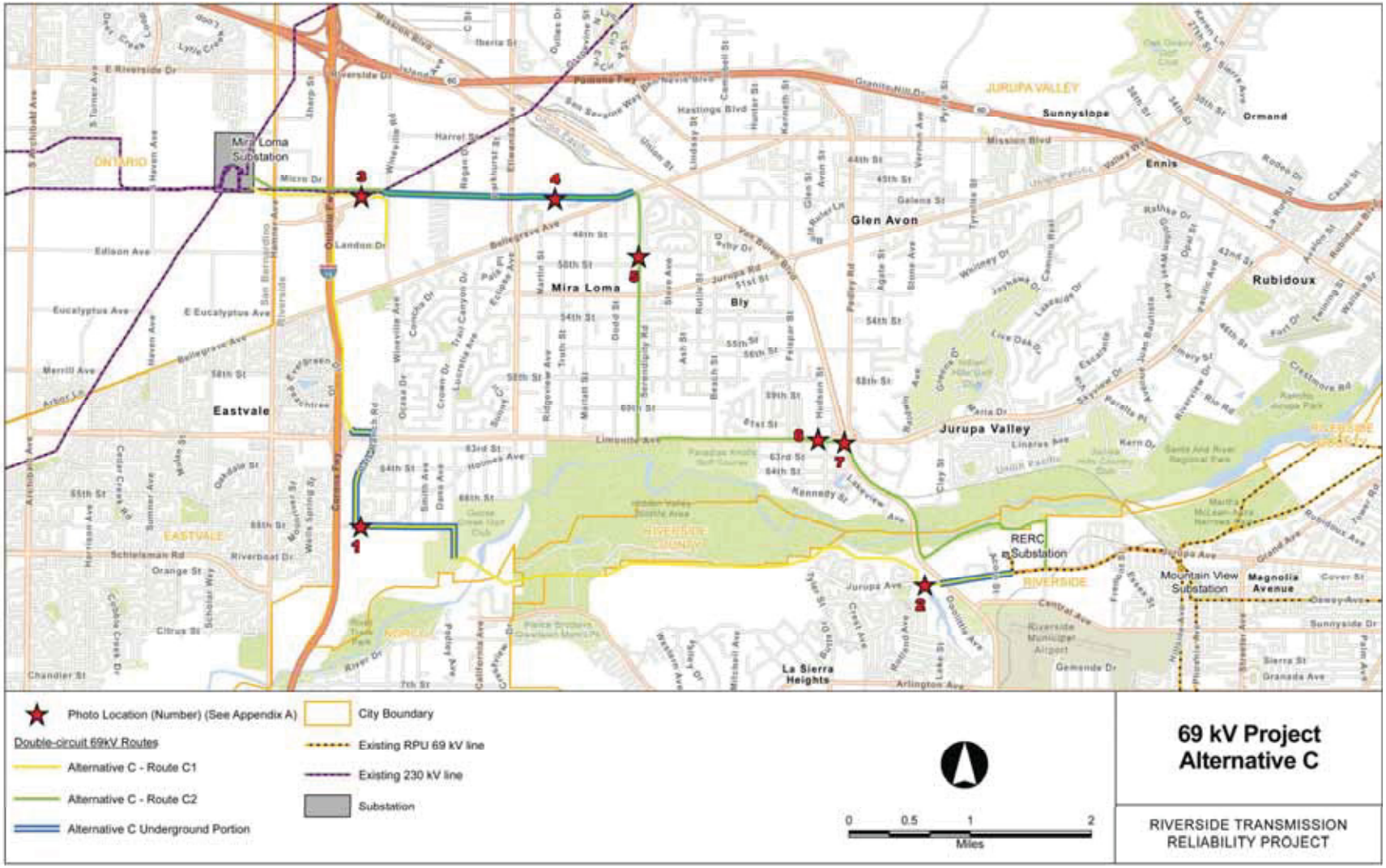

FIGURE 17 69 KV ALTERNATIVE C MAP

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4.2.3.3.1.3 Supplemental Internal Generation

Two potentially viable generation options were considered for Alternative C supplemental generation, *i.e.*, gas-fired peakers and PV Solar with BES. PV Solar with BES was selected for further study in this Report over gas-fired peakers mainly because of concerns with the long term viability of gas-fired peakers as sources of firm power in light of increasingly stringent environmental regulations and State mandate to use increasing amounts of renewable resources.

At the regional level the South Coast Air Quality Management District (SCAQMD) has increasingly tightened up its regulation associated with NOx emissions, one of the main sources of emissions of gas-fired generation, making it increasingly challenging to operate gas-fired generation. At the State level the California legislature has progressively enacted legislation that mandates the use of increasing amount of renewable resources to serve retail loads. The State legislature has already considered legislation in the last legislative year to mandate the use of non-carbon resources to supply 100% of retail load by a date certain. These factors call into question the long term viability of gas-fired peakers as a source of firm power. *See also* the discussion of uncertainties regarding natural gas supply in Section 4.3.2.2.

4.2.3.3.2 Alternative C Evaluation

4.2.3.3.2.1 Technical Considerations

Alternative C includes the installation of two transformer banks (230/69 kV) with a capacity of 560 MW (two – 280 MW) and four 69 kV circuits (500 MW) to a new switchyard located within Riverside at the Wildlife/Wilderness site. *See* Figure 18. Alternative C is similar to Alternative A except that two double-circuit lines would be installed rather than three double-circuit lines and one single circuit line, which would limit the total capacity of the Alternative. The two line routes are described in detail in Section 4.2.3.1.1 under Routes A1 and A2 (corresponding to Routes C1 and C2).

This Alternative, as configured, would not provide sufficient firm capacity to serve Riverside's current load or forecast load and would not provide redundancy for the Vista Substation, which is rated at 557 MW. The four 69 kV circuits in Alternative C limit the transfer capability of this Alternative to 500 MW based on the line ratings of 125 MW for normal operation (4 X 125 MW). In order to address the line rating limits of 500 MW, a large utility scale solar project (60 MW) that includes BES (240 MWh) was considered for this Alternative. The 60 MW of solar generation plus BES would provide power, during operating periods as designed, to meet load and to provide peak shaving. However, it would not be firm capacity like the capacity sourced from the Mira Loma substation. Therefore, Alternative C would not provide reliability equivalent to the RTRP Hybrid Proposal. This is discussed further in Sections 4.2.3.3.2.1 and 4.2.3.3.2.4.

SCE concluded that a power flow analysis for Alternative C was not necessary. The power flow analysis for Alternative C would be the same as for Alternative A but with an offset of load due to the supplemental Riverside generation. Therefore, power flow analysis for Alternative C would not provide any additional insights.

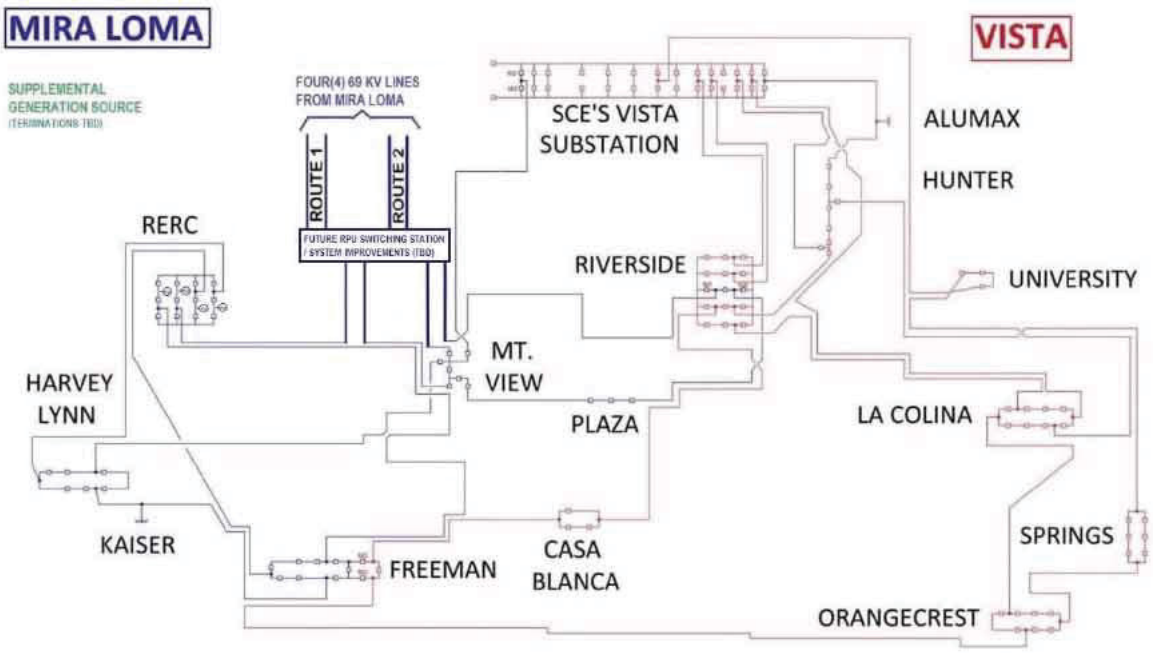

FIGURE 18 RIVERSIDE'S TRANSMISSION SYSTEM – FOLLOWING COMPLETION OF RTRP ALTERNATIVE C

4.2.3.3.2.2 Environmental Considerations

Alternative C would source from a single 230/69 kV substation (Mira Loma) with two double-circuit 69 kV routes. Route C1 would be approximately 10.5 miles; Route C2 would be approximately 9.8 miles. A total of approximately 20.3 miles would be required for the lines associated with Alternative C, an increase of 10.6 miles of line ROW as compared to the RTRP Hybrid Proposal.

4.2.3.3.2.2.1 Environmental Impacts from Alternative C

SCE and Riverside conducted a preliminary review of the environmental resource categories listed in Section 4.2.3.1.2.3 to evaluate potential impacts from Alternative C. Refer to Appendix B for SCE's Environmental Screening Report for Alternative C.

Possible routing constraints, impacts and areas of potential routing concern are identical to Alternative A as described in Section 4.2.3.1.2.3 in relation to the shared routes between the two Alternatives: Route A1 is identical to Route C1, and Route A2 is identical to Route C2. Therefore, please refer to Section 4.2.3.1.2.3 for a listing of general environmental impacts resulting from Alternative A 69 kV routes that describe the same expected impacts from the construction of the two 69 kV routes that are a part of Alternative C.[81]

However, Alternative C would require an additional generation source in order to meet capacity needs for Riverside. Therefore Alternative C would have environmental impacts associated with this additional generation, which is assumed to be a large scale solar development in or near the Riverside

[81] However, Alternative A includes two additional 69 kV routes and would therefore have additional and likely more significant adverse transmission line related impacts as compared to Alternative C.

system. Please refer to Section 4.3.2.3 for a description of the potential size and feasibility of a large-scale solar facility.

4.2.3.3.2.2.2 Environmental Justice Impacts From Alternative C

With respect to Environmental Justice and impacts on disadvantaged communities, the Alternative C design would shift the routes farther to the east and into disadvantaged communities already impacted by transportation corridors and commercial/industrial areas. Environmental Justice data were obtained from the OEHHA and CalEPA's CalEnviroScreen 3.0. The CiScore percentile breakouts for Alternative C versus the RTRP Hybrid Proposal are shown in Table 10. Table 10 includes CiScore for the 69 kV routes only and does not include the large scale generation associated with Alternative C since the location is not known.

TABLE 10 ALTERNATIVE C ENVIRONMENTAL JUSTICE COMPARISON TO RTRP HYBRID PROPOSAL

PERCENTILE	ALTERNATIVE C	RTRP HYBRID PROPOSAL
	Distance	Distance
76-80	11.0	6.85
81-85	4.60	0.98
86-90	1.10	0
91-95	0	0
96-100	0	0
Total Distance Crossing Disadvantaged Areas	**16.70**	**7.83**

4.2.3.3.2.2.3 Alternative C Would Cause Greater Environmental Impacts than the RTRP Hybrid Proposal

Overall, like Alternatives A and B, Alternative C would also increase environmental impacts as compared with the RTRP Hybrid Proposal due to an additional 10.6 miles of 69 kV ROW, introducing an additional route currently not affected by the RTRP Hybrid Proposal. In addition to the multiple 69 kV routes that have been identified within this Report, it should be noted that even greater environmental impacts would be associated with the large scale solar and BES generation that would be required by Alternative C. Table 11 provides a summary comparison of the environmental resources and differences in potentially significant impacts between Alternative C and the RTRP Hybrid Proposal.

TABLE 11 ALTERNATIVE C AND RTRP HYBRID PROPOSAL IMPACTS COMPARISON

ENVIRONMENTAL RESOURCE	RTRP HYBRID PROPOSAL[1]	69 KV ALTERNATIVE C
Aesthetics	Significant	Increased; reduced in specific corridors but dispersed overall net increase of new lines in sensitive areas; additional impacts from solar facility
Agricultural and Forestry	Significant	Similar
Air Quality and Greenhouse Gas Emissions	Significant as to Air Quality	Increased
Biological Resources	Less than Significant	Increased
Cultural Resources	Less than Significant	Increased
Geology and Soils	Less than Significant	Increased
Hazards and Hazardous Materials	Less than Significant	Similar
Hydrology and Water Quality	Less than Significant	Increased
Land Use and Planning	Less than Significant	Increased
Mineral Resources	Less than Significant	Similar
Noise	Less than Significant	Increased
Population and Housing	Less than Significant	Similar
Public Services and Utilities	Less than Significant	Increased
Recreation	Less than Significant	Increased
Transportation and Traffic	Less than Significant	Increased

[1] Potential impacts identified for the RTRP Hybrid Proposal are from the 2013 FEIR evaluation of the overhead design originally proposed for the RTRP; as noted in the 2013 FEIR, impacts for the RTRP Hybrid Proposal, including underground segments, may be different.

4.2.3.3.2.3 Estimated Costs for Alternative C

The estimated cost for the delivery facilities included in the Alternative C design is $239.4 million. Table 12 shows the components included in the $239.4 million cost estimate for the Alternative C delivery facilities, including two 280 MW transformers at Mira Loma Substation and four 69 kV circuits (two double-circuit lines with two routes). However, the total cost estimate for Alternative C is $503.4 million, including the estimated costs for the delivery facilities plus a cost estimate of $264 million for a large utility scale solar project (PV Solar – Crystalline Utility Scale) that includes a BES (Lithium-Ion Peaker Replacement = 240 MWh rating (60 MW X 4 hours).

TABLE 12 ALTERNATIVE C PRELIMINARY COST ESTIMATE, FULLY LOADED (NOMINAL 2023 DOLLARS)

ROUTE SPECIFICS			ENGINEERING, PROCUREMENT AND CONSTRUCTION (EPC) COSTS		EASEMENT COSTS		EPC + EASEMENT TOTAL ($MIL)
Route	Construction Type	Miles	Cost Per mile ($mil)	EPC Total ($mil)	Easement Area (square feet) (in millions)	Total Easement Cost ($mil)	
Route C1 (10.48 miles)	Overhead	7.80	$1.85	$14.4	1.2	$16.1	$30.5
	Underground	2.68	$7.75	$20.8	0.4	$4.5	$25.3
Route C2 (9.75 miles)	Overhead	7.67	$1.85	$14.2	1.2	$13.7	$27.9
	Underground	2.08	$7.75	$16.1	0.3	$3.2	$19.3
Mira Loma Substation Upgrades							$29.5
Licensing and Permitting							$16.0
Environmental							$10.1
Transmission Telecom (Fiber Optic)							$1.8
Telecommunications							$0.8
Other Costs (Mira Loma Relocation Costs)							$16.1
						Fully Loaded Costs*	$177.3
35% Contingency							$62.1
						Total Firm Source Cost Estimate	**$239.4**
Solar PV/BES							**$264.0**
						Total Cost Estimate	**$503.4**

* Nominal dollars, excludes cost of financing.
* Does not include ITCC.
* Does not include Riverside system upgrades cost.
* Does not include supplemental generation cost.
* Does not include the costs for a new Riverside Switchyard.
* Costs are subject to increase, should more underground work be needed for transmission routes than assumed.

The Solar PV/BES capital cost estimate breakdown is as follows:

1. 60 MW Solar PV – Crystalline Utility Scale Solar Farm = $84M (60 MW X $1.4M/MW)
2. 240 MWh BES (Lithium-Ion Peaker) = $69.6M ($0.29M/MWh X 240 hours)
3. One Substation (1 - 69/34.5 kV transformer, 4 - 34.5 kV circuits, 2 – 69 kV line positions, control building, Supervisory Control and Data Acquisition (SCADA), relay & protection, metering, grounding, fencing, foundations, structures and other appurtenant items for a complete installed substation = $8M
4. One Double-Circuit 69 kV Line (4 miles) = $8M
5. Land Acquisition = $94M (6 acres per MW, 60 MW X 6 acres = 360 acres X $6 square feet [$261,360/acre] = $94,089,600)[82]
6. Total cost = $264M ($84M + $70M +$8M + $8M + $94M)

The estimates for Solar PV and for the BES were derived from Lazard's Levelized Cost of Energy Analysis (Capital Cost Comparison) – Version 11.0 and Lazard's Levelized Cost of Storage Analysis – Version 3.0 (Capital Cost Comparison), respectively.[83] This solar facility cost estimate does not include costs for permitting, management, legal, regulatory or financing costs.

The total cost for Alternative C, including the solar facility is $503.4M.

4.2.3.3.2.4 Alternative C is Not Feasible

As explained previously with respect to Alternatives A and B, under California law, feasibility is defined as "capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic, environmental, legal, social, and technological factors," but may also take into account "other considerations" permitting the rejection of alternatives that are impractical or undesirable from a policy standpoint.[84] Under CEQA, the selection of project alternatives should be based primarily on the ability of one or more proposed alternatives to reduce significant impacts relative to the proposed project.[85]

As with Alternatives A and B, Alternative C is not capable of being accomplished within the same time period as the RTRP Hybrid Proposal, and, based on the foregoing analysis of technological challenges and environmental impacts, is likely to increase, rather than avoid or reduce, the environmental effects of the project. Alternative C is also more expensive than the RTRP Hybrid Proposal. Alternative C should be rejected as infeasible.

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[82] An industry average for how many acres are needed for a solar farm is somewhere between 4 to 8 acres per MW. This Report uses 6.0 acres per MW, which is the mid-range value of the estimates as researched for this Report.

[83] Lazard's Levelized Cost of Energy Analysis – Version 11.0 is available at https://www.lazard.com/perspective/levelized-cost-of-energy-2017. If a solar PV project of this size was found to be feasible within the City of Riverside, it could possibly be sited and installed by a third party under a Power Purchase Agreement (PPA). In that situation, the cost to Riverside would be based on a levelized cost per an agreed-upon schedule under the PPA. However, a capital cost estimate is appropriate for comparing the cost of the solar generation facility included in Alternative C with the estimated costs for the other Alternatives and the RTRP Hybrid Proposal.

[84] *See* CEQA Guidelines § 15364; Pub. Resources Code §§ 21061.1, 21081; *California Native Plant Soc*, 177 Cal.App.4th at 1001 (describing acceptable policy-based infeasibility determinations under CEQA).

[85] *See* CEQA Guidelines § 15126.6(b).

With respect to timing, Alternative C is expected to increase the timeframe for completion of the project relative to the RTRP Hybrid Proposal. Depending on the extent of subsequently-required engineering and design modifications as well as permitting and related regulatory proceedings, the additional time necessary for the completion of any of the Alternatives could be five years or more.[86] As described in Section 3.5, these delays would place the reliability of Riverside's system at continued risk of load shedding and potential distribution system blackout conditions, as SCE and Riverside expect that loading limits on Riverside's sole existing interconnection to the SCE system at the Vista Substation will continue to be exceeded under normal operating conditions during peak demand periods. Under emergency conditions, including an outage of one of the Vista Substation transformers used to serve Riverside, involuntary load shedding is highly likely. Under both normal and emergency conditions, Riverside will be required to continue to rely on internal, gas-fired peaking units that are vulnerable to fuel supply deficiencies associated with the gas system and usage limitations related to air permitting. It is critical that any Alternative to the RTRP Hybrid Proposal be capable of completion within the same timeframe. Alternative C does not satisfy that criterion.

Technological factors render Alternative C infeasible. With respect to the Mira Loma Substation, as explained above, SCE's current design standards limit the number of transformers at its 230/69 kV substations to four transformers total, rated at 280 MW each. If the final transformer position available at Mira Loma is taken by one of the transformers required for Alternative C, SCE would still be required to acquire additional land to install the second transformer, and this would result in non-compliance with SCE and industry design standards, which could reduce the reliability of service to Riverside.[87] As explained in Section 4.2.3.1.2.2, SCE's design standards are adopted to reflect sound engineering practices in order to mitigate reliability and operability concerns. Under Alternative C, SCE would likely face an accelerated need for a new A-Station in order to address capacity and reliability concerns for the Mira Loma service area. Moreover, from a technological perspective, Alternative C is the least effective of the three Alternatives studied in meeting the established Project Objectives, as the reduced number of 69 kV conductors would limit the additional capacity available to Riverside upon completion of the project to only 500 MW, short of Riverside's needs, and would not provide redundancy for the Vista Substation.

With respect to the additional internal generation resources that would be needed if Alternative C is adopted, the large scale solar facility and accompanying BES would not, by virtue of the intermittent nature of solar and the inherent operability limitations of BES, provide Riverside with the firm power that Riverside requires in order achieve the reliability Project Objectives.

In addition to technological factors, Alternative C is likely to increase environmental impacts as discussed in Section 4.2.3.3.2.2. Alternative C requires four 69 kV circuits along two separate routes to deliver less energy than provided for under the RTRP Hybrid Proposal. Despite its reduced functionality, this configuration would create new environmental and landowner impacts. The two 69 kV line routes would result in an estimated total of 20.3 line miles versus the 9.7-mile RTRP Hybrid Proposal. Roughly doubling the line mileage correspondingly doubles the environmental impacts. Alternative C would use an increased number of steel structures (409 steel structures needed for

[86] *See* further discussion of potential delay in Section 3.5.

[87] *See* SCE Subtransmission Planning Criteria and Guidelines (September 24, 2015). SCE's standards, subtransmission planning criteria and guidelines are considered proprietary and contain confidential material. Relevant portions of same can be made available upon request provided appropriate safeguards are in place to protect their confidentiality.

Alternative C versus 63 for the RTRP Hybrid Proposal) and land parcels (160 for the overhead segments as compared with 71 for the RTRP Hybrid Proposal), which would impact affected landowners and increase the challenges of securing easements. The additional structures would also increase vulnerabilities to damage from, for example, traffic and other environmental conditions. Finally, the likely impacts to wildlife are greater under Alternative C.

Installing a large scale solar facility within the Riverside service territory is also likely infeasible. As is discussed in Section 4.3.2.3, Riverside has not identified any locations within the City where a facility of the requisite size – which SCE and Riverside estimate would need to be at least 360 acres for a 60 MW solar facility – could realistically be sited. Attempting to site such a facility outside of the Riverside service territory, even if feasible from an environmental perspective, would still require added transmission facilities to ensure the output of such a facility could be delivered to the Riverside system.

Social factors also support a finding of infeasibility. The large number of structures and line miles described above in connection with environmental factors will create greater impacts on the communities located adjacent to the Alternative C facilities relative to the impact that the shorter route and reduced number of structures associated with the RTRP Hybrid Proposal will have on communities adjacent to the project. The C1 Line route follows the RTRP Hybrid Proposal route, but line route C2 does not. SCE and Riverside anticipate that new community opposition would arise and that new environmental analyses of the route C2 may be required, with a corresponding delay of the project's timing. As shown in Table 10, Alternative C is likely to have larger environmental justice impacts on disadvantaged communities.

Finally, Alternative C would cost more in terms of total dollars and without respect to any tariff implications than the RTRP Hybrid Proposal. SCE and Riverside currently estimate the cost of Alternative C at $503.4 million, which is $98.1 million (or approximately 24%) above the cost of the RTRP Hybrid Proposal. This added cost does not reflect the potential cost increases associated with delays and new environmental and permitting processes.

The increased total costs contribute to an overall finding of infeasibility based on technological, social, and policy-based considerations regarding prudent electrical system planning and use of ratepayer funds noted above.

4.3 Other Interim Solutions Considered

In addition to the foregoing lower voltage Alternatives, the ALJ directed that this Report consider and evaluate "other interim solutions available to RPU that would mitigate the electrical system impacts until technological advancements in battery storage and distributed solar are feasible at the project scale." At this time, it is unknown when technological advancements in battery storage and distributed solar will become feasible at the project scale and could therefore serve as viable permanent alternatives to the RTRP Hybrid Proposal, and attempting to identify a specific year when these circumstances may arise would be speculative. Nonetheless, pursuant to the ALJ's directive, SCE and Riverside have considered and assessed a variety of potential interim solutions that may mitigate Riverside's electrical system needs in a manner consistent with the Project Objectives. As discussed below, none of the interim solutions that the parties considered is capable of providing adequate mitigation.

4.3.1 Minimum Interim Power Needs

The Vista Substation source to Riverside has a loading limit of 557 MW. For planning purposes, Riverside's total current internal generation capacity is 180 MW (RERC 3 X 48 = 144 MW + Springs 36 MW) under single-contingency conditions that would shut down a RERC unit.[88] Thus, Riverside's total current capacity to serve load (comprised of Riverside's existing internal generation resources plus the Vista Substation transformers) is 737 MW (557 MW + 144 MW + 36 MW).

Riverside's Power Resource Planning group projects a peak load of 669 MW by 2023 and 734 MW by 2038. *See* Section 3.4.2.3. At a minimum, any interim solution would need to be able to address all of Riverside's power needs in the event power from the Vista Substation was unavailable. Any interim solution providing less than 489 MW by 2023 would *not* constitute an equivalent, redundant source of reliable energy in the event power from SCE's Vista Substation was interrupted. Assuming Riverside's internal generation capacity of 180 MW (144 MW + 36 MW) under contingency conditions of one RERC unit out-of-service remains constant, this capacity is assumed equivalent to Riverside's forecast need in 2023 (669 MW), less Riverside's internal generation capacity (180 MW) under contingency conditions, or 489 MW. If the interim solution remains in place until 2038, the minimum needed capacity for any interim solution is equivalent to the forecast need in 2038 (734 MW), less Riverside's internal generation capacity (180 MW) under contingency conditions, or 554 MW. In order to satisfy the Project Objective of reducing dependence on Vista Substation and increasing overall reliability, this Report assumes any given interim solution would need to supply a minimum of 489 MW of capacity by 2023, ramping up to 554 MW by 2038.

The analysis of interim solutions set forth below focuses primarily on whether any of the interim solutions is realistically capable of supplying a minimum of 489 MW of capacity by 2023 (and correspondingly, 554 MW of capacity by 2038). As shown below, the interim solutions are not adequate substitutes for the RTRP Hybrid Proposal, even as a temporary bridge to a future time period in which technological advancements may permit reliance on battery storage and/or distributed solar facilities. Even under severely reduced capacity figures that reflect the elimination of the RTRP Hybrid Proposal's policy goal of mitigating current reliability risks arising from Riverside's dependence on a sole point of interconnection to the SCE system – removal of which is viewed as unreasonable and unrealistic by Riverside and SCE given the Project's intended purpose – none of the interim solutions meets Riverside's system needs.

4.3.2 Analysis of Interim Solutions

The interim solutions that SCE and Riverside evaluate below include:

- Energy Storage System facilities (Battery, Pumped Hydro and Compressed Air).
- Local Generation (Gas-Fired Combustion Turbines & Utility Scale Solar Facility).
- Distributed Energy Resources.
- Renewable Generation.
- Energy Conservation programs.

These technologies and programs have different attributes that, in concept, can help Riverside manage its electric system reliably and efficiently, and Riverside is already availing itself of some of these programs and technologies. For example, the interim solutions that generate power could potentially provide capacity to meet Riverside load and could be used for peak shaving. Indeed, this is exactly how Riverside's existing gas-fired generation and distributed generation is operated and functions

[88] In this context, the contingency condition refers to the loss of a single RERC generating unit.

within the Riverside electric system today. Similarly, Riverside's energy conservation programs are key components of Riverside's retail service offerings and provide benefits to Riverside in terms of offsets to load.

The interim solutions that SCE and Riverside have evaluated can provide support in the form of additional capacity to the baseload power that Vista Substation provides Riverside, although, as discussed below, none of the solutions can be deployed on an interim basis on a sufficient scale to either obviate the need for the RTRP Hybrid Proposal entirely or provide an adequate temporary bridge to an unknown future date when battery storage and distributed solar may fully replace the need for the RTRP Hybrid Proposal. Despite their varying degrees of incremental capacity benefits, none of these interim solutions would adequately mitigate the risk of an interruption or outage of Riverside's sole interconnection to the SCE system at the Vista Substation. None of the interim solutions is capable of replacing the total power that would be lost due to an interruption or outage at the Vista Substation, and Riverside would continue to face the very real risk of load shedding and/or distribution system blackouts that the RTRP Hybrid Proposal is intended to avoid.

4.3.2.1 Energy Storage Systems

ESS encompasses a range of technologies and may include:

- Electrochemical (battery) storage.
- Pumped-hydro storage.
- Compressed-air storage.

Generally speaking, while a BES could provide benefits to Riverside's electrical system, and Riverside is actively exploring the deployment of pilot programs in order to understand and potentially expand usage of BES within its electric system, BES is not an adequate substitute for the RTRP Hybrid Proposal, even on an interim basis. Primarily due to constraints related to the scale and cost of battery technology at this time, the deployment of batteries cannot reasonably be expected to offset the 489 MW of load that is needed in order to provide comparable levels of reliability to the RTRP Hybrid Proposal.

First, with respect to the potential scale of BES deployment, the currently-effective storage procurement targets imposed under State law (Assembly Bill 2514) by the CPUC on the California-jurisdictional investor-owned electric utilities (including SCE, Pacific Gas and Electric Company, and San Diego Gas & Electric Company or "SDG&E") total 1,325 MW of ESS,[89] plus an additional 500 MW pursuant to Assembly Bill 2868.[90] Assuming that Riverside could obtain, test, install, and operationally deploy 489 MW of BES by 2023 is especially unrealistic when viewed in light of the

[89] *See, e.g.*, CPUC Order Instituting Rulemaking Pursuant to Assembly Bill 2514 to Consider the Adoption of Procurement Targets for Viable and Cost-Effective Energy Storage Systems (R.10-12-007), *Decision Adopting Energy Storage Procurement Framework and Design Program* (D.13-10-040), *available at*: http://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M079/K533/79533378.PDF, at 2, 15 (requiring initial procurement of ESS by SCE and PG&E of 580 MW and 165 MW by SDG&E consistent with AB 2514); California Assembly Bill 2514 (2010, Skinner), *available at*: http://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=200920100AB2514, (requiring the CPUC to pen a proceeding to determine appropriate targets for ESS); California Assembly Bill 2868 (2016, Gatto), *available at*: http://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=201520160AB2868, (requiring an additional 500 MW of distributed energy storage systems distributed equally among the utilities).

[90] While these requirements do contain some technology and locational specifications, not all of the procured ESS is required to consist of battery technologies.

significantly lower (in relative terms) procurement targets established for the California-jurisdictional electric utilities under State law. Notably, none of these utilities has been directed to obtain sufficient BES to serve an anticipated 73.1% share of its projected peak load, which is what a 489 MW BES procurement target would be equivalent to with respect to Riverside. Even at lower procurement levels that, as discussed above, would not meet the reliability Project Objectives, Riverside would need to procure BES well in excess of required levels for the California investor-owned utilities as a share of peak load. For example, a 60 MW BES project represents approximately 9.0% of Riverside's projected peak load in 2023, whereas SCE's State procurement requirement represents only approximately 2.3% of its 2023 peak load.[91] Riverside's current procurement target for energy storage, established in September 2017, is 6 MW by 2020, representing 1% of its peak load.

Also with respect to scale, a 489 MW procurement target is also unrealistic in view of current levels of BES deployment nationally. A 2016 study summarizing the then-current status of grid-scale BES deployments throughout the United States based upon reported data in the Department of Energy's Global Energy Storage Database found that, as of the first quarter of 2016, only 400 MW of grid-scale BES (consisting of 205 projects ranging in size from 4 kW to 36 MW) were deployed throughout the United States, excluding non-operational facilities and projects then under some phase of development and/or construction.[92] A 489 MW procurement target of BES for Riverside would exceed the installed grid-scale BES capacity throughout the entire United States as of the first quarter of 2016.

Second, in addition to scale, BES continues to represent an expensive technology, particularly at the quantities needed to provide a viable interim alternative solution to the RTRP Hybrid Proposal. Recently-published studies by Lazard Frères & Co. LLC reflect that the capital cost of lithium-ion energy storage ranges from $1.2 million/MW to $1.7 million/MW for the purpose of gas peaker replacement and $2.3 million/MW to $3.3 million/MW for the purpose of distribution system augmentation.[93] This compares to an average capital cost of $1.0 million/MW for gas peakers and a capital cost of $0.7 million/MW for the RTRP Hybrid Proposal. Although the costs for lithium-ion technology may decrease in the near term,[94] it is unlikely that projected cost decreases in the next five years would be adequate to render this technology economically viable as an alternative to the RTRP Hybrid Proposal.

Third, BES is incapable of providing the same reliability benefits of the Project and would not obviate the need for a second interconnection to ensure reliability. Even if the scale and cost did not render BES highly impractical, BES simply cannot perform the same functions of the RTRP Hybrid Proposal, and Riverside's electric system would continue to be vulnerable to the loss of the Vista Substation interconnection. Assuming BES could be deployed in sufficient quantities, current BES technology limits discharging to a specified number of hours. For example, a 240 MWh BES would provide 60 MW of capacity over four hours. This limited capability does not obviate the need for the

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[91] SCE's forecast for 2023 is 24,726 MW. *See* California Energy Commission, 2017 Integrated Energy Policy Report (Docket # 17-IEPR-01), *available a*t: http://www.energy.ca.gov/2017_energypolicy/. 580 MW of ESS as required under D.13-10-040 is approximately 2.3% of SCE's total 24,726 MW of predicted 2023 load.

[92] David Hart and Alfred Sarkissian, Deployment of Grid-Scale Batteries in the United States at 8 & n.8 (2016), *available at* https://energy.gov/sites/prod/files/2017/01/f34/ Deployment%20of%20Grid-Scale%20Batteries%20in%20the%20United%20States.pdf.

[93] Lazard, Levelized Cost of Storage Analysis – Version 3.0 (2017) at 15, available at https://www.lazard.com/perspective/levelized-cost-of-storage-2017/.

[94] The Lazard analysis (*id.* at 16) predicts a 36% decrease in lithium-ion costs over the next five years.

RTRP Hybrid Proposal within the five year timeframe and would leave the Riverside electric system vulnerable to contingencies involving the Vista Substation.

Further, Riverside's existing distribution system would need to be modified and/or upgraded to be able to offer sufficient connectivity for charging capacity in the vicinity of installed BES locations. Battery storage solutions involve both charging and discharging; when discharging, a battery is a resource, and when charging, it is a load. To accommodate charging and discharging for a large BES project, Riverside would need to plan and potentially perform upgrades to its distribution system in order to ensure that the reliability impacts would be manageable and any effects of the BES on the transmission system outside of Riverside are studied, well-understood by SCE and the CAISO, and mitigated if necessary.

While SCE and Riverside are committed to exploring BES further outside of this proceeding and to meeting all applicable State policy mandates relating to storage procurement, BES deployment is not an adequate interim mitigation. At this time, SCE and Riverside are unaware of BES deployments on a comparable scale elsewhere in the United States for the specific purpose of transmission upgrade deferral, and BES would not, in the use case presented here, remove the need for a second point of interconnection between the SCE and Riverside systems. For all of the reasons stated above, the scale, cost, and technological limitations of BES make BES infeasible as an interim alternative to the RTRP Hybrid Proposal.

Beyond BES, other storage systems such as Pumped-Hydro and Compressed-air storage are not feasible within the City of Riverside at any size. There are siting, environmental, economic, and technical challenges with these technologies as they pertain to Riverside:

a. A pumped-hydro energy storage system would require a water source and two large-capacity reservoirs at different elevations. It could require hundreds of acres of land for sufficient reservoir capacity to provide over 500 MW of capacity, and the two reservoirs would have to be at different elevations. These features do not exist within the City. A pumped-storage facility located outside of the City likely would require a high voltage transmission line similar to what is currently proposed as part of the RTRP Hybrid Proposal, as the energy would have to be delivered to Riverside to meet the Project Objectives. Given that a large scale pumped storage facility has not been installed within the United States in the past ten years, it is impractical to assume that a pumped storage facility could be sited and constructed (including associated transmission lines) in order to provide any level of capacity to Riverside by 2023.[95]

b. Compressed-air storage systems are being constructed with large capacities (100+ MW), but they require some form of underground geologic formation (abandoned mine, porous rock, *etc.*) in order to store the compressed air. No such formation exists within the City of Riverside. Additionally, a high voltage transmission line similar to what is currently proposed as part of the RTRP Hybrid Proposal likely would be required for a compressed-air storage facility located outside of the City.

4.3.2.2 Gas-Fired Generation

A gas-fired generation alternative would not meet the Project Objectives of the RTRP Hybrid Proposal. Adding more local gas-fired generation would result in greater environmental (footprint and

[95] *See* Hart at 17 ("It is worth noting that no new pumped hydro capacity has been added in the U.S. in more than a decade.").

air quality) and economic impacts (costs to Riverside ratepayers), operational permit requirements, and reliability risks due to uncertainty of available fuel sources.

As noted elsewhere, the sole source of external bulk energy supply for Riverside is through the 230/69 kV transformers at the Vista Substation. Riverside's electrical demand has exceeded the available 557 MW of capacity from Vista Substation since 2006, and this was a primary driver in Riverside's decision to develop local generation resources – the RERC units – capable of meeting Riverside's energy needs during peak load conditions.[96] These local generation resources were constructed within Riverside in part to mitigate the capacity limits of Vista Substation until a second point of interconnection could be established. In effect, Riverside has already undertaken the installation of peaking capacity as an interim solution pending completion of the RTRP Hybrid Proposal.

While the RERC units reduce the power that must flow through the transformers at Vista Substation to Riverside by generating and supplying it locally, they are "Peaker" units. As such, the number of hours these units can operate is limited by the permit requirements issued by the SCAQMD. The permit requirements issued by the District are very stringent. Each of the four turbines at RERC (48 MW each) and the Springs Generation (36 MW) is restricted to rolling 1,200 and 1,550 equivalent hours, respectively, of operation per year. If one turbine is unavailable for a long time, another one can be used for the remaining hours of the one that is down. Note that hours are determined based on pounds of emissions that the generators emit. The turbines' starts are limited to no more than two per day for a total of 1,200 operating hours per year. Typically these units are not run for more than four hours a day.

It is not <u>feasible</u> to install additional gas-fired generation in Riverside's service area due to air quality issues as well as siting, operational, and economic considerations. In light of the significant number of MWs required (up to 489 MW), the use of Peakers as an interim solution would: (1) be less cost effective than the RTRP Hybrid Proposal; (2) suffer from reliability risks due to uncertainties in the availability of natural gas fuel sources; (3) likely be impossible to site within the City of Riverside;[97] and (4) not represent prudent utility planning in that it would defer transformer capacity additions by continued installation of peaking units.

With regard to fuel supply uncertainties, the well-documented and ongoing limitations at the Aliso Canyon natural gas storage facility, which is a source of natural gas supply for the Riverside Peaker units as well as other natural gas units throughout southern California, suggest that utilities should not look toward the expansion of natural gas Peakers as a means of addressing reliability needs, at least until the long-term status of the Aliso Canyon facility is clarified. As the Energy Division is likely aware, the CAISO, working in conjunction with its stakeholders, the CPUC, and Southern California Gas Company has adopted various measures intended to mitigate the risks to the electric system stemming from use-limitations at Aliso Canyon over the period of impaired Aliso Canyon operations. In connection with those efforts, Riverside determined that because of the capacity limitations at the Vista Substation and its dependence on the RERC Peakers during times when demand is at its highest to avoid distribution system blackouts, Riverside would be disproportionately impacted if its use of the RERC units during a high load period coincided with a natural gas curtailment. Riverside explained in comments to the CAISO that, "as a result of these local constraints [referring to the import limitation at Vista] … [Riverside] must utilize [its] internal gas-fired resources to prevent

[96] As noted elsewhere, Riverside's 36 MW Springs Generating Plant is rarely used due to operating constraints and because it is not as economical as the RERC units.

[97] Riverside estimates that it would have to find at least a 42 acre site, which is highly unlikely within Riverside.

blackouts …" and that the gas company's curtailment requirements would, for this reason, have an "unduly harsh impact," including, potentially, load-shed events.[98] For all of the reasons previously described to the CAISO, installation of additional natural gas units within Riverside would only worsen Riverside's vulnerability to gas system limitations.

4.3.2.3 Large Scale Solar

There are no large scale PV solar projects – defined for the purpose of this Report as 25 MW or greater – within the City of Riverside. Currently, the largest solar installation (Tequesquite) that Riverside has interconnected within its distribution system is 7.3 MW. While a large scale solar facility could help mitigate capacity concerns within the Riverside system during the hours when the facility is operating (thereby helping to provide both baseload capacity and peak shaving), such a facility is not an adequate substitute for an additional point of interconnection with the SCE system, because it would not provide the continuous power than the RTRP Hybrid Proposal could provide. Moreover, there would be significant siting and cost challenges associated with such interim mitigation.

As an initial matter, installation of a large scale solar facility to meet 489 MW of demand by 2023 is technically infeasible due to siting constraints for such facilities within or near the City of Riverside. Acreage estimates for a large scale solar project typically range from 4 to 8 acres per MW of project output, which, for 489 MW of large scale solar capacity, results in a range of 1,956 to 3,912 acres.[99] This is roughly equivalent to 3 to 6 square miles. The City of Riverside currently has a total area of 81.4 square miles, and Riverside would therefore need to dedicate approximately 4-7% of the land within the City to large scale solar facilities in order to provide adequate interim capacity as compared with the RTRP Hybrid Proposal. A screening of contiguous, undeveloped areas that are not dedicated to parks/open space within the City of Riverside reveals that procuring an approximately 360-acre site large enough to accommodate even a much smaller 60 MW solar farm is infeasible, let alone the minimum of 1,956 acres that would be needed to support 489 MW of solar capacity. Any available sites adjacent to the City would necessitate an equivalent amount of land and, most fundamentally for purposes of providing an interim alternative to the RTRP Hybrid Proposal, would also require a second point of interconnection in order to ensure that the capacity would be deliverable, with all of the costs and environmental impact challenges that would accompany attempting to site another such transmission facility in lieu of the RTRP Hybrid Proposal.

Additionally, attempting to install large scale solar facilities as an interim alternative to completing the Project is not cost effective. SCE and Riverside estimate that a facility that would meet Riverside's need for 489 MW of capacity would cost approximately $684.6 million,[100] and that is *before* including the estimated costs for any accompanying BES, which would be a critical component of any large scale solar facility in order to provide an adequate level of functionality given the intermittent nature of solar.

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[98] *See* Comments on Behalf of the Cities of Anaheim, Azusa, Banning, Colton, Pasadena, and Riverside, California on the Aliso Canyon Gas-Electric Coordination Issue Paper, Cal. Indep. Sys. Operator Corp., Aliso-Canyon Gas-Electric Coordination Phase 1 – Issue Paper (Mar. 30, 2016) available at http://www.caiso.com/informed/Pages/StakeholderProcesses/AlisoCanyonGasElectricCoordination.aspx.

[99] In contrast, the RTRP Hybrid Proposal requires a total of approximately 100 acres for ROW.

[100] *See* Lazard's Levelized Cost of Energy Analysis – Version 11.0 at 11 (489 MW X $1.4M/MW = $684.6 million).

One or more smaller scale PV facilities may be more feasible to site and integrate into the City's electrical grid than a large scale solar project, but smaller quantities of solar capacity would not meet the reliability Project Objectives or, potentially, the capacity Project Objectives of the RTRP Hybrid Proposal and would likewise not be cost-effective. For example, if the size of the solar facility were reduced to 60 MW, the costs of large scale solar plus associated BES technology remain extremely high, especially when viewed in light of the diminished reliability associated with such an alternative.

For all of these reasons, SCE and Riverside do not believe that large scale solar facilities, whether or not accompanied by BES, could provide adequate interim mitigation.

4.3.2.4 Distributed Generation

A DG resource is typically less than 5.0 MW in net generating capacity, customer owned, net metered, and connected to the electrical distribution system through the customer's service connection. Examples of DG include rooftop solar, fuel cells, micro turbines, photovoltaic, wind, landfill gas, and digester gas.

Since 2008, Riverside has offered incentives for business and residential photovoltaic installations. Through this program, which Riverside implemented pursuant to the requirements of Senate Bill 1, Riverside has funded over $17.3 million in commercial and residential customer rebates associated with 1,845 solar installations within the City. These installations are capable of producing up to 11 MW of customer-generated solar energy during the hours in which they are operating.

Including the capacity of solar DG resulting from the solar rebate program, Riverside's current estimated installed capacity of DG within its system is less than 30 MW, and the power produced by the DG has not been sufficient to compensate for the observed peak load growth in the Riverside system. Expected incremental DG capacity is not sufficient to compensate for the predicted load growth for the Riverside system and would not allow Riverside to meet the RTRP Project Objectives in a timely manner due to the comparatively small capacity of DG systems. Moreover, deployment of significant quantities of DG may require unknown quantities of upgrades to Riverside's distribution system.

In addition to having a relatively small capacity compared to Riverside's forecasted electrical needs, DG and, particularly, rooftop solar, has a relatively high cost. For example, residential rooftop systems ranging in size from 3 kW to 10 kW have a total capital cost of $2.80 per watt DC, which is more than double the capital cost for utility scale solar.[101] Similar to utility scale solar projects, it would not be cost-effective to develop 489 MW of DG comprised, in significant part, of residential photovoltaic resources, which is the predominant form of DG deployment within the Riverside service territory. As a general matter, DG capacity is limited and, in addition to not materially impacting Riverside's required capacity needs, would not address the reliability need for the RTRP Hybrid Proposal to provide a second point for importing energy to Riverside. While Riverside is committed to reliable, efficient, and economic deployment and management of DG throughout its system, Riverside is likewise committed to procurement of renewable energy consistent with State laws and policies, and, for the reasons discussed above relating to large scale solar, this necessarily includes procurement of renewable energy from sources outside of Riverside. To ensure adequate deliverability of these resources, Riverside must have sufficient and reliable import capability into its system. Because Riverside does not anticipate that all of its energy needs are reasonably capable of

[101] *See* Fu, Ran, Feldman, David, Margolis, Robert, Woodhouse, Mike, and Ardani, Kristen. 2017. U.S. Solar Photovoltaic System Cost Benchmark: Q1 2017. National Renewable Energy Laboratory. NREL/PR – 6A - 68580 at 8. Available at https://www nrel.gov/docs/fy17osti/68580.pdf.

being met through DG, in addition to technical and logistical concerns, distributed generation is not a feasible interim alternative to satisfy Riverside's electricity needs in lieu of the RTRP Hybrid Proposal.

4.3.2.5 Conservation/Demand Response Programs

Energy Conservation and Load Management measures were also reconsidered as possible interim mitigation measures. Consistent with the findings of the 2013 FEIR, reliance on energy conservation and load management is not anticipated to be a viable interim solution to Riverside's electrical needs in lieu of the RTRP Hybrid Proposal.

Riverside, like most electric utilities in California, offers a variety of "demand-side management" programs and incentives, including energy efficiency, demand response, and, as discussed above, DG. In Riverside's service territory, annual increases in load growth have exceeded the reductions in energy consumption from energy efficiency programs resulting in annual net increases in electrical demand that are reflected in Riverside's peak load forecasts. Some of the above-mentioned alternatives to the RTRP were considered in the 2013 FEIR and were dismissed, because their capacity is limited, and they would not meet the Project Objectives such as providing a second point for importing bulk 230 kV energy for reliability purposes. Demand response programs such as "demand-side management" programs and incentives are not considered for system planning purposes in part because participants can opt out of participation at any time.

5. Summary and Conclusion

As is more fully documented in Section 3.5 above, the need for the RTRP Hybrid Proposal to address ongoing reliability risks arising from Riverside's dependence on its sole existing interconnection to the SCE transmission system is acute. In response to the ALJ's directive that SCE, Riverside, and the CAISO consider and evaluate lower voltage design alternatives that may, in full or in part, meet the Project Objectives of the RTRP Hybrid Proposal, SCE and Riverside identified and studied both lower voltage Alternatives and interim solutions that may provide an adequate "bridge" to a time period when BES and distributed generation are feasible at the project scale. After careful evaluation of the identified lower voltage Alternatives as described in this Report, Riverside and SCE have determined that, in addition to being more costly than the RTRP Hybrid Proposal, none of the Alternatives is capable of satisfying the Project Objectives, and none of them is expected to have a reduced environmental impact. With respect to potential interim options, SCE and Riverside assessed a number of approaches that Riverside could temporarily adopt instead of the RTRP Hybrid Proposal, and none of these interim solutions represents a reasonable mitigation alternative to the RTRP Hybrid Proposal. Based on their analyses as fully documented in Section 4 of this Report, SCE and Riverside have concluded that the lower voltage Alternatives and interim solutions are unsuitable and infeasible and should not be adopted.

The analysis in the Report demonstrates that:

- The Alternatives evaluated in this Report would not satisfy most of the specified Project Objectives identified in Section 3.1.
- The lower voltage Alternatives would have greater environmental impacts than the RTRP Hybrid Proposal and therefore would be unsuitable as a threshold matter. Table 13 depicts these impacts.
- The lower voltage Alternatives are not feasible alternatives to the RTRP Hybrid Proposal; *i.e.*, they are not "capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic, environmental, legal, social, and technological factors" and "other considerations" permitting the rejection of alternatives that are impractical or undesirable from a policy standpoint.[102]
- Adopting any of the Alternatives potentially would impose years of delay to a project that is already more than ten years past its initial CAISO approval date and that has been, and continues to be, crucial to addressing serious reliability risks.
- As summarized in Table 14 below, Alternatives A, B, and C are all more expensive than the RTRP Hybrid Proposal.

The CEQA Guidelines (Section 15126.6(b)) stress that the selection of project alternatives must be based primarily on the ability to reduce significant impacts relative to the proposed project. None of the Alternatives would reduce environmental impacts as compared to the RTRP Hybrid Proposal, as summarized in Table 13.

[102] *See* CEQA Guidelines § 15364; Pub. Resources Code §§ 21061.1, 21081; *California Native Plant Soc.*, 177 Cal.App.4th at 1001 (describing acceptable policy-based infeasibility determinations under CEQA).

TABLE 13 LOWER VOLTAGE ALTERNATIVES AND 230 KV PROJECT IMPACTS COMPARISON

ENVIRONMENTAL RESOURCE	RTRP HYBRID PROPOSAL	69 KV ALTERNATIVE A	69 KV ALTERNATIVE B	69 KV ALTERNATIVE C
Aesthetics	Significant	Similar; reduced in specific corridors but dispersed overall net increase of new lines in sensitive areas	Increased; reduced in specific corridors but dispersed overall net increase of new lines in sensitive areas; impacts from required new 230 kV line to Circle City Substation similar to RTRP Hybrid Proposal	Increased; reduced in specific corridors but dispersed overall net increase of new lines in sensitive areas; additional impacts from solar facility
Agricultural and Forestry	Significant	Similar	Increased	Similar
Air Quality and Greenhouse Gas Emissions	Significant as to Air Quality	Increased	Increased	Increased
Biological Resources	Less than Significant	Increased	Increased	Increased
Cultural Resources	Less than Significant	Increased	Increased	Increased
Geology and Soils	Less than Significant	Increased	Increased	Increased
Hazards and Hazardous Materials	Less than Significant	Similar	Increased	Similar
Hydrology and Water Quality*	Less than Significant	Increased	Increased	Increased
Land Use and Planning	Less than Significant	Increased	Increased	Increased
Mineral Resources	Less than Significant	Similar	Similar	Similar
Noise	Less than Significant	Increased	Increased	Increased
Population and Housing	Less than Significant	Similar	Increased	Similar
Public Services and Utilities	Less than Significant	Increased	Increased	Increased
Recreation	Less than Significant	Increased	Increased	Increased
Transportation and Traffic	Less than Significant	Increased	Increased	Increased

Each of the Alternatives is unsuitable under CEQA Guidelines (Section 15126.6(b)) and environmentally infeasible due to the requirements for significantly more miles of transmission line to accomplish even some of the basic Project Objectives of the RTRP Hybrid Proposal. The increase in transmission lines would have higher environmental impacts because of a greater footprint with multiple ROWs, greater effects to the community from the greater footprint, and additional equipment being required at Mira Loma, Etiwanda, and the proposed Circle City Substations. Each of the lower voltage Alternatives would extend the environmental and community impacts beyond the footprint of the RTRP Hybrid Proposal, and none of the Alternatives would avoid or substantially lessen any of the significant effects of the RTRP.

As summarized in Table 14 below, Alternatives A, B, and C would all be more expensive than the RTRP Hybrid Proposal in terms of total dollars.

TABLE 14 LOWER VOLTAGE ALTERNATIVES COST SUMMARY (NOMINAL 2023 DOLLARS)

ALTERNATIVE A	$499.1 million (excludes costs for Riverside switchyard)
ALTERNATIVE B	$1,064.2 million
ALTERNATIVE C	$503.4 million (excludes costs for Riverside switchyard)
RTRP HYBRID PROPOSAL	$405.3 million

It would be contrary to sound policy to adopt an alternative that would cost more, impose greater environmental impacts, and fail to satisfy Project Objectives.

In addition to the lower voltage Alternatives, SCE and Riverside also evaluated other interim solutions that could mitigate impacts to the Riverside electric system until such time as battery storage and distributed solar are feasible at the project scale. None of the interim solutions identified in the Report is capable of providing adequate mitigation:

- Deploying BES on the scale necessary to provide interim mitigation that could defer or replace the need for the RTRP Hybrid Proposal is infeasible, would be unduly costly, would not provide adequate reliability benefits, and would not address Riverside's need to establish a second point of interconnection to the SCE bulk power system.
- Supplemental gas-fired generation would not meet the Project Objectives, would result in environmental and economic impacts, and would augment existing reliability risks to the Riverside system due to uncertainties associated with available gas supply.
- Installing large scale solar resources within the Riverside system is likewise infeasible in view of land requirements. Moreover, solar facilities would not resolve the reliability concerns – such as the need for firm transfer capability and a second point of interconnection – that the RTRP Hybrid Proposal is intended to address.
- Distributed generation, increased conservation, and/or increased demand response likewise cannot substitute for firm transfer capability and would not remove the need to establish a second point of interconnection with the SCE system.

5.1 Conclusion

For all of the foregoing reasons set forth in the Report, there are no feasible lower voltage design alternatives to meet the Project Objectives, and there are no interim solutions available to Riverside to mitigate its needs for the RTRP Hybrid Proposal. The RTRP Hybrid Proposal is environmentally superior and more cost-effective than the lower voltage Alternatives and interim solutions, and it has been designed to address and resolve identified reliability needs of the Riverside electric system. Those needs were identified more than ten years ago, and they continue to exist today. The lower voltage Alternatives and interim measures do not reliably address Riverside's system needs and are inferior to the RTRP Hybrid Proposal.

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APPENDICES

APPENDIX A PHOTOGRAPHS FOR ALTERNATIVE CORRIDORS

APPENDIX B SCE ENVIRONMENTAL SCREENING REPORT

APPENDIX C POWER ENGINEERS QUALIFICATIONS

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APPENDIX A PHOTOGRAPHS FOR ALTERNATIVE CORRIDORS

See Figure 7, Figure 11 and Figure 17 for Photo Locations.

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Photo 1: School and residential conflicts: 68th Street.

Photo 2: Residential Conflicts: Jurupa Avenue

Photo 3: East of Mira Loma Substation.

Photo 4: Adjacent to Jurupa Valley High School.

Photo 5: Adjacent to Mira Loma Middle School

Photo 6: Residential Conflicts: Limonite Avenue

Photo 7: Railroad, Residential and Commercial Conflicts: Van Buren Blvd.

Photo 8: Residential Conflicts: Clay St.

Photo 9: Residential Conflicts: Limonite Avenue.

Photo 10: Etiwanda Ave. / Santa Ana St.

Photo 11: Magnolia Ave. / Grant St.

Photo 12: Hamner Ave / 5th St.

Photo 13: N. McKinley St. / Parkview Dr.

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APPENDIX B SCE ENVIRONMENTAL SCREENING REPORT

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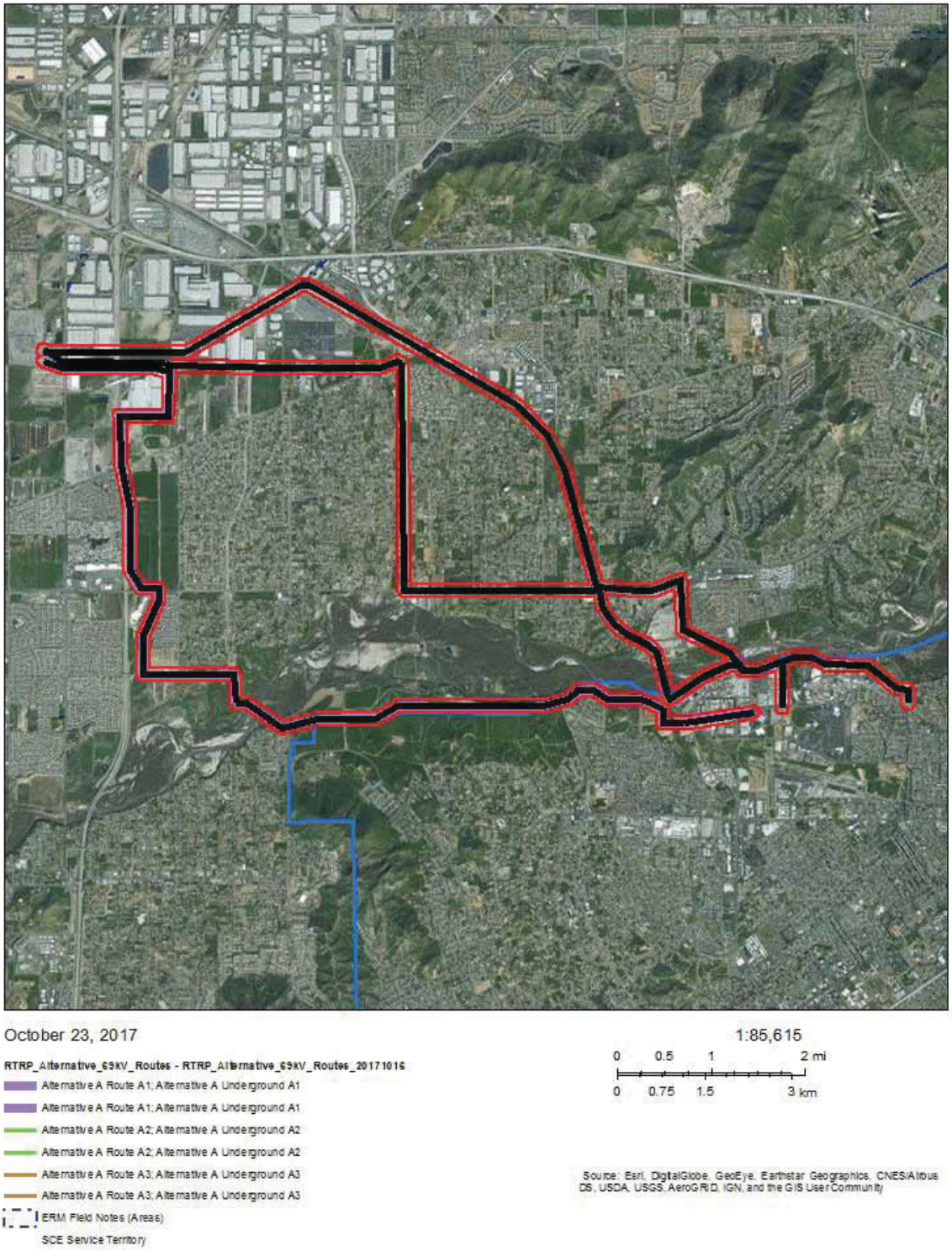
SCE Environmental Screening Report

Area of Interest (AOI) Information

Area : 2,097.08 acres



Summary

Name	Count	Area (acres)	Length (mi)
BIO - Species Points	161	N/A	N/A
BIO - Species Polys	4	0.88	N/A
BIO - Bird Nest Points	33	N/A	N/A
BIO - Desert Tortoise Points	0	N/A	N/A
BIO - Habitat Polys	24	536.58	N/A
CNDDB Poly May 2017	41	5280.74	N/A
CFWO Species Occurrence	24	411.18	N/A
JD Waters ESA	106	18.58	N/A
FEMA Flood Zones	52	2567.99	N/A
Local Coastal Plan (LCP)	0	0	N/A
Government Land, 2016	1	59.74	N/A
MPO Capital Project Footprint	4	840.19	N/A
USFWS Critical Habitat - Polygon Features	2	182.7	N/A
USFWS Critical Habitat - Linear Features	0	N/A	0
AQMD Districts	2	2097.09	N/A

BIO - Species Points

#	Species Name Common	Special Status Type	Occurrence Date	Project Name
1	Least Bell's Vireo	FE: Federally Endangered	August 28, 2016	Riverside Transmission Reliability Project
2	Least Bell's Vireo	FE: Federally Endangered	May 8, 2016	Riverside Transmission Reliability Project
3	Least Bell's Vireo	FE: Federally Endangered	June 16, 2016	Riverside Transmission Reliability Project
4	Least Bell's Vireo	FE: Federally Endangered	May 27, 2016	Riverside Transmission Reliability Project
5	Least Bell's Vireo	FE: Federally Endangered	June 5, 2016	Riverside Transmission Reliability Project
6	Least Bell's Vireo	FE: Federally Endangered	May 16, 2016	Riverside Transmission Reliability Project
7	Least Bell's Vireo	FE: Federally Endangered	July 1, 2016	Riverside Transmission Reliability Project
8	Least Bell's Vireo	FE: Federally Endangered	July 17, 2016	Riverside Transmission Reliability Project
9	American Yellow Warbler	BCC: US Fish and Wildlife Service Bird of Conservation Concern	May 27, 2016	Riverside Transmission Reliability Project
10	American Yellow Warbler	BCC: US Fish and Wildlife Service Bird of Conservation Concern	July 1, 2016	Riverside Transmission Reliability Project
11	American Yellow Warbler	BCC: US Fish and Wildlife Service Bird of Conservation Concern	May 28, 2016	Riverside Transmission Reliability Project
12	California Ground Squirrel	No Special Status Type	May 1, 2016	Riverside Transmission Reliability Project
13	Least Bell's Vireo	FE: Federally Endangered	July 28, 2016	Riverside Transmission Reliability Project
14	Yellow-Breasted Chat	SSC: California Species of Special Concern	June 5, 2016	Riverside Transmission Reliability Project
15	American Yellow Warbler	BCC: US Fish and Wildlife Service Bird of Conservation Concern	June 5, 2016	Riverside Transmission Reliability Project
16	Least Bell's Vireo	FE: Federally Endangered	June 15, 2016	Riverside Transmission Reliability Project
17	American Yellow Warbler	BCC: US Fish and Wildlife Service Bird of Conservation Concern	May 16, 2016	Riverside Transmission Reliability Project
18	Yellow-Breasted Chat	SSC: California Species of Special Concern	June 19, 2016	Riverside Transmission Reliability Project
19	American Yellow Warbler	BCC: US Fish and Wildlife Service Bird of Conservation Concern	June 19, 2016	Riverside Transmission Reliability Project
20	Willow Flycatcher	SE: State Endangered	June 7, 2016	Riverside Transmission Reliability Project
21	Least Bell's Vireo	FE: Federally Endangered	May 26, 2016	Riverside Transmission Reliability Project
22	Least Bell's Vireo	FE: Federally Endangered	May 17, 2016	Riverside Transmission Reliability Project
23	American Yellow Warbler	BCC: US Fish and Wildlife Service Bird of Conservation Concern	June 15, 2016	Riverside Transmission Reliability Project
24	Least Bell's Vireo	FE: Federally Endangered	June 19, 2016	Riverside Transmission Reliability Project

25	Yellow-Breasted Chat	SSC: California Species of Special Concern	June 15, 2016	Riverside Transmission Reliability Project
26	Least Bell's Vireo	FE: Federally Endangered	June 6, 2016	Riverside Transmission Reliability Project
27	Yellow-Breasted Chat	SSC: California Species of Special Concern	May 27, 2016	Riverside Transmission Reliability Project
28	Least Bell's Vireo	FE: Federally Endangered	June 30, 2016	Riverside Transmission Reliability Project
29	Yellow-Breasted Chat	SSC: California Species of Special Concern	June 30, 2016	Riverside Transmission Reliability Project
30	Yellow-Breasted Chat	SSC: California Species of Special Concern	May 26, 2016	Riverside Transmission Reliability Project
31	California Ground Squirrel	No Special Status Type	June 22, 2016	Riverside Transmission Reliability Project
32	American Yellow Warbler	BCC: US Fish and Wildlife Service Bird of Conservation Concern	May 26, 2016	Riverside Transmission Reliability Project
33	Yellow-Breasted Chat	SSC: California Species of Special Concern	July 28, 2016	Riverside Transmission Reliability Project
34	Yellow-Breasted Chat	SSC: California Species of Special Concern	May 18, 2016	Riverside Transmission Reliability Project
35	Brown-Headed Cowbird	No Special Status Type	June 5, 2016	Riverside Transmission Reliability Project
36	Least Bell's Vireo	FE: Federally Endangered	June 7, 2016	Riverside Transmission Reliability Project
37	Yellow-Breasted Chat	SSC: California Species of Special Concern	June 16, 2016	Riverside Transmission Reliability Project
38	Yellow-Breasted Chat	SSC: California Species of Special Concern	May 16, 2016	Riverside Transmission Reliability Project
39	Willow Flycatcher	SE: State Endangered	May 16, 2016	Riverside Transmission Reliability Project
40	Least Bell's Vireo	FE: Federally Endangered	May 28, 2016	Riverside Transmission Reliability Project
41	Least Bell's Vireo	FE: Federally Endangered	May 7, 2016	Riverside Transmission Reliability Project
42	Yellow-Breasted Chat	SSC: California Species of Special Concern	May 28, 2016	Riverside Transmission Reliability Project
43	California Walnut	CRPR 4: Plants of Limited Distribution - A Watch List	June 29, 2016	Riverside Transmission Reliability Project
44	San Diego Black-Tailed Jackrabbit	SSC: California Species of Special Concern	November 21, 2010	Tehachapi Renewable Transmission Project
45	Loggerhead Shrike	SSC: California Species of Special Concern	August 3, 2010	Tehachapi Renewable Transmission Project
46	Loggerhead Shrike	SSC: California Species of Special Concern	January 25, 2012	Tehachapi Renewable Transmission Project
47	Northern Harrier	SSC: California Species of Special Concern	December 14, 2011	Tehachapi Renewable Transmission Project
48	Peregrine Falcon	SE: State Endangered	December 14, 2011	Tehachapi Renewable Transmission Project
49	Loggerhead Shrike	SSC: California Species of Special Concern	December 7, 2011	Tehachapi Renewable Transmission Project
50	Loggerhead Shrike	SSC: California Species of Special Concern	November 30, 2011	Tehachapi Renewable Transmission Project
51	Northern Harrier	SSC: California Species of Special Concern	August 11, 2011	Tehachapi Renewable Transmission Project

52	San Diego Black-Tailed Jackrabbit	SSC: California Species of Special Concern	July 26, 2011	Tehachapi Renewable Transmission Project
53	San Diego Black-Tailed Jackrabbit	SSC: California Species of Special Concern	June 29, 2011	Tehachapi Renewable Transmission Project
54	Northern Harrier	SSC: California Species of Special Concern	December 7, 2010	Tehachapi Renewable Transmission Project
55	Loggerhead Shrike	SSC: California Species of Special Concern	February 25, 2014	Tehachapi Renewable Transmission Project
56	Prairie Falcon	No Special Status Type	December 26, 2013	Tehachapi Renewable Transmission Project
57	Cooper's Hawk	WL: CDFW Watch List	October 21, 2013	Tehachapi Renewable Transmission Project
58	Cooper's Hawk	WL: CDFW Watch List	June 22, 2016	Tehachapi Renewable Transmission Project
59	Cooper's Hawk	WL: CDFW Watch List	March 24, 2016	Tehachapi Renewable Transmission Project
60	White-Faced Ibis	No Special Status Type	December 2, 2015	Tehachapi Renewable Transmission Project
61	Loggerhead Shrike	SSC: California Species of Special Concern	April 7, 2015	Tehachapi Renewable Transmission Project
62	Yellow-Breasted Chat	SSC: California Species of Special Concern	June 6, 2016	Riverside Transmission Reliability Project
63	California Ground Squirrel	No Special Status Type	May 2, 2016	Riverside Transmission Reliability Project
64	Least Bell's Vireo	FE: Federally Endangered	May 18, 2016	Riverside Transmission Reliability Project

#	Count
1	14
2	11
3	9
4	9
5	8
6	8
7	6
8	6
9	4
10	4
11	4
12	4
13	3
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54	1
55	1
56	1
57	1
58	1
59	1
60	1
61	1
62	1
63	1
64	1

BIO - Species Polys

#	Species_Name_Common	Special_Status_Type	Occurrence_Date	Project_Name
1	Paniculate Tarplant	CRPR 4: Plants of Limited Distribution - A Watch List	May 21, 2017	Riverside Transmission Reliability Project

#	Area (acres)
1	0.88

BIO - Bird Nest Points

#	Species_Name_Common	Special_Status_Species	Observation_Date	Project_Name
1	Black Phoebe	No	March 24, 2016	Tehachapi Renewable Transmission Project
2	Black Phoebe	No	April 7, 2014	Tehachapi Renewable Transmission Project
3	Black Phoebe	No	May 27, 2013	Tehachapi Renewable Transmission Project
4	Western Kingbird	No	April 4, 2013	Tehachapi Renewable Transmission Project
5	Black Phoebe	No	March 31, 2013	Tehachapi Renewable Transmission Project
6	House Sparrow	No	June 3, 2012	Tehachapi Renewable Transmission Project
7	Black Phoebe	No	May 23, 2012	Tehachapi Renewable Transmission Project
8	Northern Mockingbird	No	August 17, 2016	Tehachapi Renewable Transmission Project
9	House Finch	No	June 28, 2016	Tehachapi Renewable Transmission Project
10	Hooded Oriole	No	June 15, 2016	Tehachapi Renewable Transmission Project
11	Western Kingbird	No	May 24, 2016	Tehachapi Renewable Transmission Project
12	Black Phoebe	No	May 24, 2016	Tehachapi Renewable Transmission Project
13	Cassin's Kingbird	No	April 12, 2016	Tehachapi Renewable Transmission Project
14	American Crow	No	April 3, 2016	Tehachapi Renewable Transmission Project
15	House Finch	No	March 28, 2016	Tehachapi Renewable Transmission Project
16	House Finch	No	March 25, 2016	Tehachapi Renewable Transmission Project
17	Killdeer	No	March 19, 2014	Tehachapi Renewable Transmission Project
18	House Sparrow	No	March 17, 2016	Tehachapi Renewable Transmission Project
19	Black Phoebe	No	February 28, 2016	Tehachapi Renewable Transmission Project
20	Northern Mockingbird	No	April 19, 2015	Tehachapi Renewable Transmission Project
21	House Sparrow	No	May 7, 2014	Tehachapi Renewable Transmission Project
22	Black Phoebe	No	March 4, 2012	Tehachapi Renewable Transmission Project
23	House Finch	No	August 9, 2011	Tehachapi Renewable Transmission Project
24	Cassin's Kingbird	No	June 26, 2011	Tehachapi Renewable Transmission Project
25	House Sparrow	No	May 10, 2011	Tehachapi Renewable Transmission Project
26	Black Phoebe	No	May 3, 2011	Tehachapi Renewable Transmission Project
27	American Crow	No	April 25, 2011	Tehachapi Renewable Transmission Project

28	Northern Mockingbird	No	April 20, 2011	Tehachapi Renewable Transmission Project
29	House Sparrow	No	April 7, 2011	Tehachapi Renewable Transmission Project
30	House Sparrow	No	March 10, 2011	Tehachapi Renewable Transmission Project
31	Say's Phoebe	No	March 9, 2011	Tehachapi Renewable Transmission Project
32	American Crow	No	March 9, 2011	Tehachapi Renewable Transmission Project
33	American Crow	No	February 23, 2011	Tehachapi Renewable Transmission Project

#	Count
1	1
2	1
3	1
4	1
5	1
6	1
7	1
8	1
9	1
10	1
11	1
12	1
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18	1
19	1
20	1
21	1
22	1
23	1
24	1
25	1
26	1
27	1
28	1
29	1
30	1
31	1
32	1
33	1

BIO - Habitat Polys

#	Habitat_Type	Habitat_Category	Determination_Date	Project_Name
1	Delhi Sands Flower-Loving Fly	Suitable	July 31, 2015	Circle City Substation and Mira Loma-Jefferson Subtransmission Line Project
2	Other	Suitable	June 6, 2016	Riverside Transmission Reliability Project
3	Delhi Sands Flower-Loving Fly	Suitable	June 7, 2016	Riverside Transmission Reliability Project
4	Other	Suitable	June 1, 2016	Riverside Transmission Reliability Project
5	Delhi Sands Flower-Loving Fly	TBD	October 5, 2016	Riverside Transmission Reliability Project
6	Vernal Pool Branchiopods	Suitable	February 26, 2016	Circle City Substation and Mira Loma-Jefferson Subtransmission Line Project
7	Vernal Pool Branchiopods	Suitable	January 6, 2016	Circle City Substation and Mira Loma-Jefferson Subtransmission Line Project
8	Delhi Sands Flower-Loving Fly	Suitable	October 5, 2016	Riverside Transmission Reliability Project
9	Vernal Pool Branchiopods	Suitable	February 3, 2016	Circle City Substation and Mira Loma-Jefferson Subtransmission Line Project

#	Area (acres)
1	413.77
2	62.99
3	33.32
4	21.83
5	1.92
6	1.23
7	0.84
8	0.64
9	0.04

CNDDB Poly May 2017

#	Common Name	Scientific Name	Area (acres)
1	Delhi Sands flower-loving fly	Rhaphiomidas terminatus abdominalis	4105.7
2	western mastiff bat	Eumops perotis californicus	350
3	least Bell's vireo	Vireo bellii pusillus	138.44
4	California glossy snake	Arizona elegans occidentalis	109.17
5	yellow-breasted chat	Icteria virens	107.27
6	yellow warbler	Setophaga petechia	107.27
7	burrowing owl	Athene cunicularia	102.18
8	Southern Cottonwood Willow Riparian Forest	Southern Cottonwood Willow Riparian Forest	88.84
9	Southern California Arroyo Chub/Santa Ana Sucker Stream	Southern California Arroyo Chub/Santa Ana Sucker Stream	53.11
10	Santa Ana sucker	Catostomus santaanae	49.93
11	arroyo chub	Gila orcuttii	44.56
12	Lawrence's goldfinch	Spinus lawrencei	12.95
13	Santa Ana speckled dace	Rhinichthys osculus ssp. 3	11.14
14	Swainson's hawk	Buteo swainsoni	0.05
15	pocketed free-tailed bat	Nyctinomops femorosaccus	0.05
16	Busck's gallmoth	Carolella busckana	0.05
17	western yellow bat	Lasiurus xanthinus	0.05

CFWO Species Occurrence

#	Common Name	Scientific Name	Area (acres)
1	least Bell's vireo	Vireo bellii pusillus	406.21
2	Santa Ana sucker	Catostomus santaanae	4.96

JD Waters ESA

#	Name	ESA Type	Area (acres)
1	NHD	Red	18.58

FEMA Flood Zones

#	Flood Zone	Area (acres)
1	X	2286.39
2	AE	205.25
3	0.2 PCT ANNUAL CHANCE FLOOD HAZARD	41.77
4	A	34.57

Government Land, 2016

#	Agency Name	Agency Area Name	Area (acres)
1	ST	Hidden Valley	59.74

MPO Capital Project Footprint

#	Capital Project Name	EPM	COMP_LEVEL	Area (acres)
1	RTRP/Wildlife Substation	Gary Busteed	Stage 04: Application Production	751.91
2	TRTP 500 kV UG	Jenny McGee	Revegetation	42.47
3	Circle City	Alisa Krizek	Stage 04: Application Production	42.05
4	TRTP 4 -11	Jenny McGee	Revegetation	3.75

USFWS Critical Habitat - Polygon Features

#	Common Name	Scientific Name	Area (acres)
1	Least Bell's vireo	Vireo bellii pusillus	105.77
2	Santa Ana sucker	Catostomus santaanae	76.93

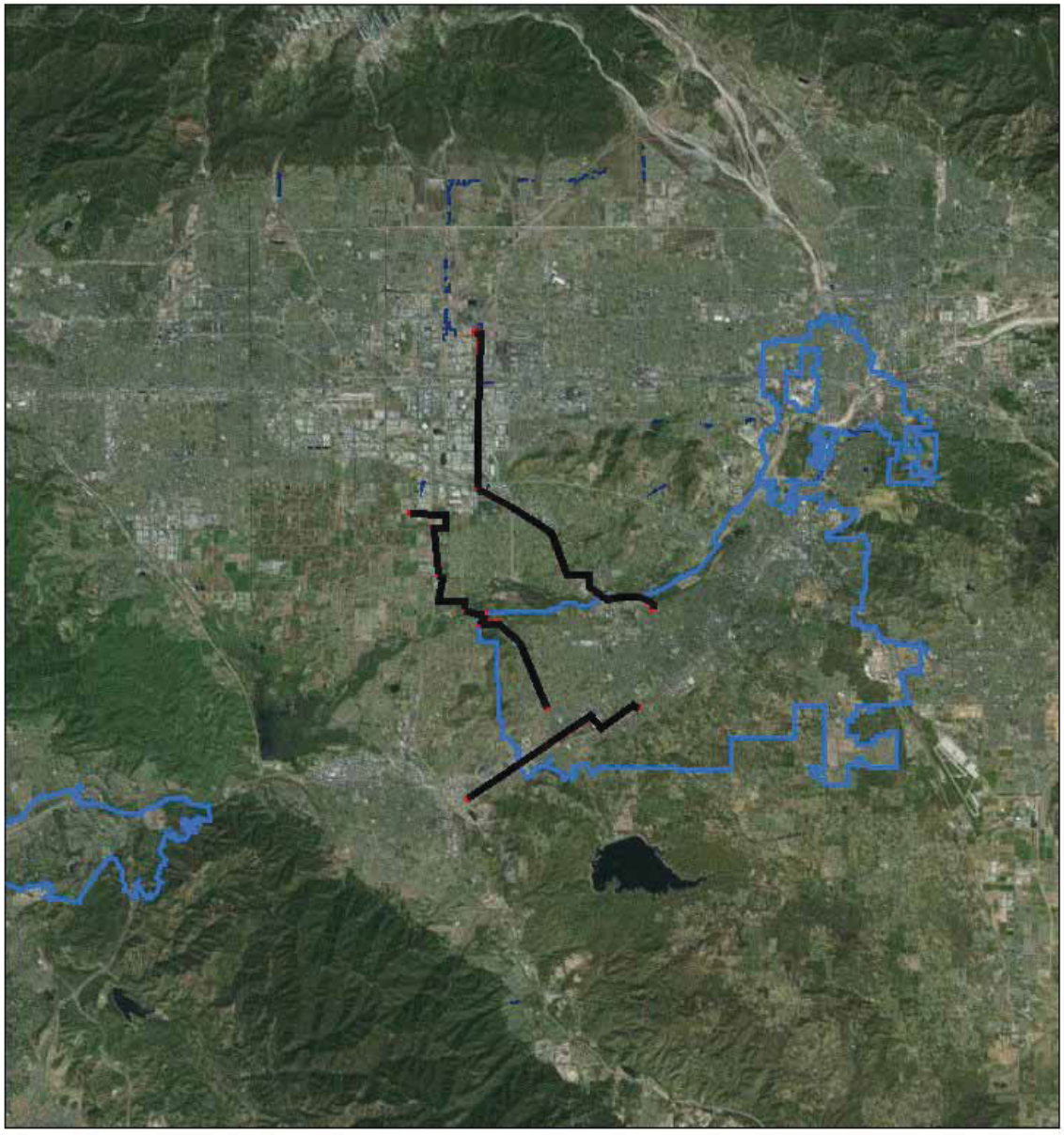
AQMD Districts

#	District Name	Area (acres)
1	South Coast	2097.09

SCE Environmental Screening Report

Area of Interest (AOI) Information

Area : 2,162.24 acres



Summary

Name	Count	Area (acres)	Length (mi)
BIO - Species Points	100	N/A	N/A
BIO - Species Polys	1	0.09	N/A
BIO - Bird Nest Points	34	N/A	N/A
BIO - Desert Tortoise Points	0	N/A	N/A
BIO - Habitat Polys	66	648.93	N/A
CNDDB Poly May 2017	41	4854.59	N/A
CFWO Species Occurrence	20	213.26	N/A
JD Waters ESA	37	8.44	N/A
FEMA Flood Zones	60	3151.45	N/A
Local Coastal Plan (LCP)	0	0	N/A
Government Land, 2016	1	14.77	N/A
MPO Capital Project Footprint	5	560.36	N/A
USFWS Critical Habitat - Polygon Features	2	118.41	N/A
USFWS Critical Habitat - Linear Features	0	N/A	0
AQMD Districts	2	2162.38	N/A

BIO - Species Points

#	Species Name Common	Special Status Type	Occurrence Date	Project Name
1	Unknown	No Special Status Type	November 29, 2016	Lugo-Mira Loma No. 3
2	Unknown	No Special Status Type	November 29, 2016	Lugo-Mira Loma No. 2
3	Least Bell's Vireo	FE: Federally Endangered	August 28, 2016	Riverside Transmission Reliability Project
4	Least Bell's Vireo	FE: Federally Endangered	June 16, 2016	Riverside Transmission Reliability Project
5	Least Bell's Vireo	FE: Federally Endangered	May 16, 2016	Riverside Transmission Reliability Project
6	Least Bell's Vireo	FE: Federally Endangered	May 8, 2016	Riverside Transmission Reliability Project
7	American Yellow Warbler	BCC: US Fish and Wildlife Service Bird of Conservation Concern	May 28, 2016	Riverside Transmission Reliability Project
8	American Yellow Warbler	BCC: US Fish and Wildlife Service Bird of Conservation Concern	June 19, 2016	Riverside Transmission Reliability Project
9	Yellow-Breasted Chat	SSC: California Species of Special Concern	June 19, 2016	Riverside Transmission Reliability Project
10	Least Bell's Vireo	FE: Federally Endangered	July 17, 2016	Riverside Transmission Reliability Project
11	Willow Flycatcher	SE: State Endangered	June 7, 2016	Riverside Transmission Reliability Project
12	Least Bell's Vireo	FE: Federally Endangered	June 5, 2016	Riverside Transmission Reliability Project
13	Least Bell's Vireo	FE: Federally Endangered	July 1, 2016	Riverside Transmission Reliability Project
14	Least Bell's Vireo	FE: Federally Endangered	June 19, 2016	Riverside Transmission Reliability Project
15	Least Bell's Vireo	FE: Federally Endangered	July 28, 2016	Riverside Transmission Reliability Project
16	Least Bell's Vireo	FE: Federally Endangered	May 27, 2016	Riverside Transmission Reliability Project
17	American Yellow Warbler	BCC: US Fish and Wildlife Service Bird of Conservation Concern	July 1, 2016	Riverside Transmission Reliability Project
18	Least Bell's Vireo	FE: Federally Endangered	May 17, 2016	Riverside Transmission Reliability Project
19	American Yellow Warbler	BCC: US Fish and Wildlife Service Bird of Conservation Concern	June 5, 2016	Riverside Transmission Reliability Project
20	Least Bell's Vireo	FE: Federally Endangered	May 28, 2016	Riverside Transmission Reliability Project
21	Yellow-Breasted Chat	SSC: California Species of Special Concern	May 28, 2016	Riverside Transmission Reliability Project
22	Yellow-Breasted Chat	SSC: California Species of Special Concern	June 5, 2016	Riverside Transmission Reliability Project
23	Yellow-Breasted Chat	SSC: California Species of Special Concern	May 27, 2016	Riverside Transmission Reliability Project
24	American Yellow Warbler	BCC: US Fish and Wildlife Service Bird of Conservation Concern	May 27, 2016	Riverside Transmission Reliability Project
25	Yellow-Breasted Chat	SSC: California Species of Special Concern	July 28, 2016	Riverside Transmission Reliability Project
26	Yellow-Breasted Chat	SSC: California Species of Special Concern	May 17, 2016	Riverside Transmission Reliability Project

27	Least Bell's Vireo	FE: Federally Endangered	June 7, 2016	Riverside Transmission Reliability Project
28	Yellow-Breasted Chat	SSC: California Species of Special Concern	June 16, 2016	Riverside Transmission Reliability Project
29	Least Bell's Vireo	FE: Federally Endangered	June 29, 2016	Riverside Transmission Reliability Project
30	San Diego Black-Tailed Jackrabbit	SSC: California Species of Special Concern	November 21, 2010	Tehachapi Renewable Transmission Project
31	Loggerhead Shrike	SSC: California Species of Special Concern	August 3, 2010	Tehachapi Renewable Transmission Project
32	Loggerhead Shrike	SSC: California Species of Special Concern	January 25, 2012	Tehachapi Renewable Transmission Project
33	Northern Harrier	SSC: California Species of Special Concern	December 14, 2011	Tehachapi Renewable Transmission Project
34	Brown-Headed Cowbird	No Special Status Type	June 5, 2016	Riverside Transmission Reliability Project
35	Loggerhead Shrike	SSC: California Species of Special Concern	December 7, 2011	Tehachapi Renewable Transmission Project
36	Loggerhead Shrike	SSC: California Species of Special Concern	November 30, 2011	Tehachapi Renewable Transmission Project
37	Northern Harrier	SSC: California Species of Special Concern	August 11, 2011	Tehachapi Renewable Transmission Project
38	San Diego Black-Tailed Jackrabbit	SSC: California Species of Special Concern	July 26, 2011	Tehachapi Renewable Transmission Project
39	San Diego Black-Tailed Jackrabbit	SSC: California Species of Special Concern	June 29, 2011	Tehachapi Renewable Transmission Project
40	Northern Harrier	SSC: California Species of Special Concern	December 7, 2010	Tehachapi Renewable Transmission Project
41	Loggerhead Shrike	SSC: California Species of Special Concern	February 25, 2014	Tehachapi Renewable Transmission Project
42	Prairie Falcon	No Special Status Type	December 26, 2013	Tehachapi Renewable Transmission Project
43	Cooper's Hawk	WL: CDFW Watch List	October 21, 2013	Tehachapi Renewable Transmission Project
44	Cooper's Hawk	WL: CDFW Watch List	June 22, 2016	Tehachapi Renewable Transmission Project
45	Cooper's Hawk	WL: CDFW Watch List	March 24, 2016	Tehachapi Renewable Transmission Project
46	White-Faced Ibis	No Special Status Type	December 2, 2015	Tehachapi Renewable Transmission Project
47	Loggerhead Shrike	SSC: California Species of Special Concern	April 7, 2015	Tehachapi Renewable Transmission Project
48	Yellow-Breasted Chat	SSC: California Species of Special Concern	July 1, 2016	Riverside Transmission Reliability Project
49	Peregrine Falcon	SE: State Endangered	December 14, 2011	Tehachapi Renewable Transmission Project

#	Count
1	8
2	8
3	7
4	6
5	5
6	4
7	4
8	3
9	3
10	3
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16	2
17	2
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44	1
45	1
46	1
47	1
48	1
49	1

BIO - Species Polys

#	Species_Name_Common	Special_Status_Type	Occurrence_Date	Project_Name
1	Paniculate Tarplant	CRPR 4: Plants of Limited Distribution - A Watch List	May 21, 2017	Riverside Transmission Reliability Project

#	Area (acres)
1	0.09

BIO - Bird Nest Points

#	Species_Name_Common	Special_Status_Species	Observation_Date	Project_Name
1	House Sparrow	No	March 17, 2016	Tehachapi Renewable Transmission Project
2	Black Phoebe	No	April 7, 2014	Tehachapi Renewable Transmission Project
3	Black Phoebe	No	May 27, 2013	Tehachapi Renewable Transmission Project
4	Western Kingbird	No	April 4, 2013	Tehachapi Renewable Transmission Project
5	Black Phoebe	No	March 31, 2013	Tehachapi Renewable Transmission Project
6	House Sparrow	No	June 3, 2012	Tehachapi Renewable Transmission Project
7	Black Phoebe	No	May 23, 2012	Tehachapi Renewable Transmission Project
8	Northern Mockingbird	No	August 17, 2016	Tehachapi Renewable Transmission Project
9	House Finch	No	June 28, 2016	Tehachapi Renewable Transmission Project
10	Hooded Oriole	No	June 15, 2016	Tehachapi Renewable Transmission Project
11	Western Kingbird	No	May 24, 2016	Tehachapi Renewable Transmission Project
12	Black Phoebe	No	May 24, 2016	Tehachapi Renewable Transmission Project
13	Cassin's Kingbird	No	April 12, 2016	Tehachapi Renewable Transmission Project
14	American Crow	No	April 3, 2016	Tehachapi Renewable Transmission Project
15	House Finch	No	March 28, 2016	Tehachapi Renewable Transmission Project
16	House Finch	No	March 25, 2016	Tehachapi Renewable Transmission Project
17	Black Phoebe	No	March 24, 2016	Tehachapi Renewable Transmission Project
18	Killdeer	No	March 19, 2014	Tehachapi Renewable Transmission Project
19	Black Phoebe	No	February 28, 2016	Tehachapi Renewable Transmission Project
20	Northern Mockingbird	No	April 19, 2015	Tehachapi Renewable Transmission Project
21	House Sparrow	No	May 7, 2014	Tehachapi Renewable Transmission Project
22	Black Phoebe	No	March 4, 2012	Tehachapi Renewable Transmission Project
23	House Finch	No	August 9, 2011	Tehachapi Renewable Transmission Project
24	Cassin's Kingbird	No	June 26, 2011	Tehachapi Renewable Transmission Project
25	House Sparrow	No	May 10, 2011	Tehachapi Renewable Transmission Project
26	Black Phoebe	No	May 3, 2011	Tehachapi Renewable Transmission Project
27	Northern Mockingbird	No	April 20, 2011	Tehachapi Renewable Transmission Project

28	House Sparrow	No	April 7, 2011	Tehachapi Renewable Transmission Project
29	House Sparrow	No	March 10, 2011	Tehachapi Renewable Transmission Project
30	Say's Phoebe	No	March 9, 2011	Tehachapi Renewable Transmission Project
31	Common Raven	No	February 28, 2011	Tehachapi Renewable Transmission Project
32	American Crow	No	February 23, 2011	Tehachapi Renewable Transmission Project
33	Unknown	TBD	November 29, 2016	Lugo-Mira Loma No. 2
34	Unknown	TBD	November 29, 2016	Lugo-Mira Loma No. 3

#	Count
1	1
2	1
3	1
4	1
5	1
6	1
7	1
8	1
9	1
10	1
11	1
12	1
13	1
14	1
15	1
16	1
17	1
18	1
19	1
20	1
21	1
22	1
23	1
24	1
25	1
26	1
27	1
28	1
29	1
30	1
31	1
32	1
33	1
34	1

BIO - Habitat Polys

#	Habitat_Type	Habitat_Category	Determination_Date	Project_Name
1	Delhi Sands Flower-Loving Fly	Suitable	July 31, 2015	Circle City Substation and Mira Loma-Jefferson Subtransmission Line Project
2	San Bernardino Kangaroo Rat	Suitable	December 27, 2016	Lugo-Mira Loma No. 2
3	Delhi Sands Flower-Loving Fly	Suitable	December 27, 2016	Lugo-Mira Loma No. 2
4	San Bernardino Kangaroo Rat	Suitable	December 27, 2016	Lugo-Mira Loma No. 3
5	Delhi Sands Flower-Loving Fly	Suitable	December 27, 2016	Lugo-Mira Loma No. 3
6	Other	Suitable	June 6, 2016	Riverside Transmission Reliability Project
7	Other	Suitable	June 1, 2016	Riverside Transmission Reliability Project
8	Coastal California Gnatcatcher	Suitable	December 27, 2016	Lugo-Mira Loma No. 2
9	Coastal California Gnatcatcher	Suitable	December 27, 2016	Lugo-Mira Loma No. 3
10	Delhi Sands Flower-Loving Fly	Suitable	June 7, 2016	Riverside Transmission Reliability Project
11	Vernal Pool Branchiopods	Suitable	February 26, 2016	Circle City Substation and Mira Loma-Jefferson Subtransmission Line Project
12	Vernal Pool Branchiopods	Suitable	January 6, 2016	Circle City Substation and Mira Loma-Jefferson Subtransmission Line Project
13	Delhi Sands Flower-Loving Fly	TBD	October 5, 2016	Riverside Transmission Reliability Project
14	Delhi Sands Flower-Loving Fly	Suitable	October 5, 2016	Riverside Transmission Reliability Project
15	Vernal Pool Branchiopods	Suitable	February 3, 2016	Circle City Substation and Mira Loma-Jefferson Subtransmission Line Project

#	Area (acres)
1	257.64
2	76.99
3	76.99
4	74.84
5	74.84
6	29.42
7	17.7
8	13.2
9	13.2
10	10.93
11	1.23
12	0.81
13	0.57
14	0.55
15	0.04

CNDDB Poly May 2017

#	Common Name	Scientific Name	Area (acres)
1	Delhi Sands flower-loving fly	Rhaphiomidas terminatus abdominalis	4141.52
2	western mastiff bat	Eumops perotis californicus	160.29
3	California glossy snake	Arizona elegans occidentalis	144.02
4	orange-throated whiptail	Aspidoscelis hyperythra	86.14
5	burrowing owl	Athene cunicularia	53.98
6	least Bell's vireo	Vireo bellii pusillus	50.49
7	yellow-breasted chat	Icteria virens	49.65
8	yellow warbler	Setophaga petechia	49.65
9	Southern Cottonwood Willow Riparian Forest	Southern Cottonwood Willow Riparian Forest	32.71
10	Los Angeles pocket mouse	Perognathus longimembris brevinasus	19.95
11	Southern California Arroyo Chub/Santa Ana Sucker Stream	Southern California Arroyo Chub/Santa Ana Sucker Stream	16.62
12	Santa Ana sucker	Catostomus santaanae	15.61
13	Lawrence's goldfinch	Spinus lawrencei	12.68
14	arroyo chub	Gila orcuttii	9.1
15	coast horned lizard	Phrynosoma blainvillii	6.75
16	Swainson's hawk	Buteo swainsoni	1.36
17	pocketed free-tailed bat	Nyctinomops femorosaccus	1.36
18	Busck's gallmoth	Carolella busckana	1.36
19	western yellow bat	Lasiurus xanthinus	1.36

CFWO Species Occurrence

#	Common Name	Scientific Name	Area (acres)
1	Los Angeles pocket mouse	Perognathus longimembris brevinasus	135.87
2	least Bell's vireo	Vireo bellii pusillus	74.17
3	Santa Ana sucker	Catostomus santaanae	3.21

JD Waters ESA

#	Name	ESA Type	Area (acres)
1	NHD	Red	8.44

FEMA Flood Zones

#	Flood Zone	Area (acres)
1	X	2559.46
2	0.2 PCT ANNUAL CHANCE FLOOD HAZARD	408.94
3	AE	157.99
4	A	24.92
5	AH	0.13

Government Land, 2016

#	Agency Name	Agency Area Name	Area (acres)
1	DOD	Department Of Defense	14.77

MPO Capital Project Footprint

#	Capital Project Name	EPM	COMP_LEVEL	Area (acres)
1	RTRP/Wildlife Substation	Gary Busteed	Stage 04: Application Production	339.83
2	Falcon Ridge 66/12kV Substation	Marcus Obregon	Stage 05: PreConstruction Planning	150.49
3	Circle City	Alisa Krizek	Stage 04: Application Production	37.11
4	TRTP 500 kV UG	Jenny McGee	Revegetation	21.03
5	TRTP 4 -11	Jenny McGee	Revegetation	11.9

USFWS Critical Habitat - Polygon Features

#	Common Name	Scientific Name	Area (acres)
1	Least Bell's vireo	Vireo bellii pusillus	84.06
2	Santa Ana sucker	Catostomus santaanae	34.35

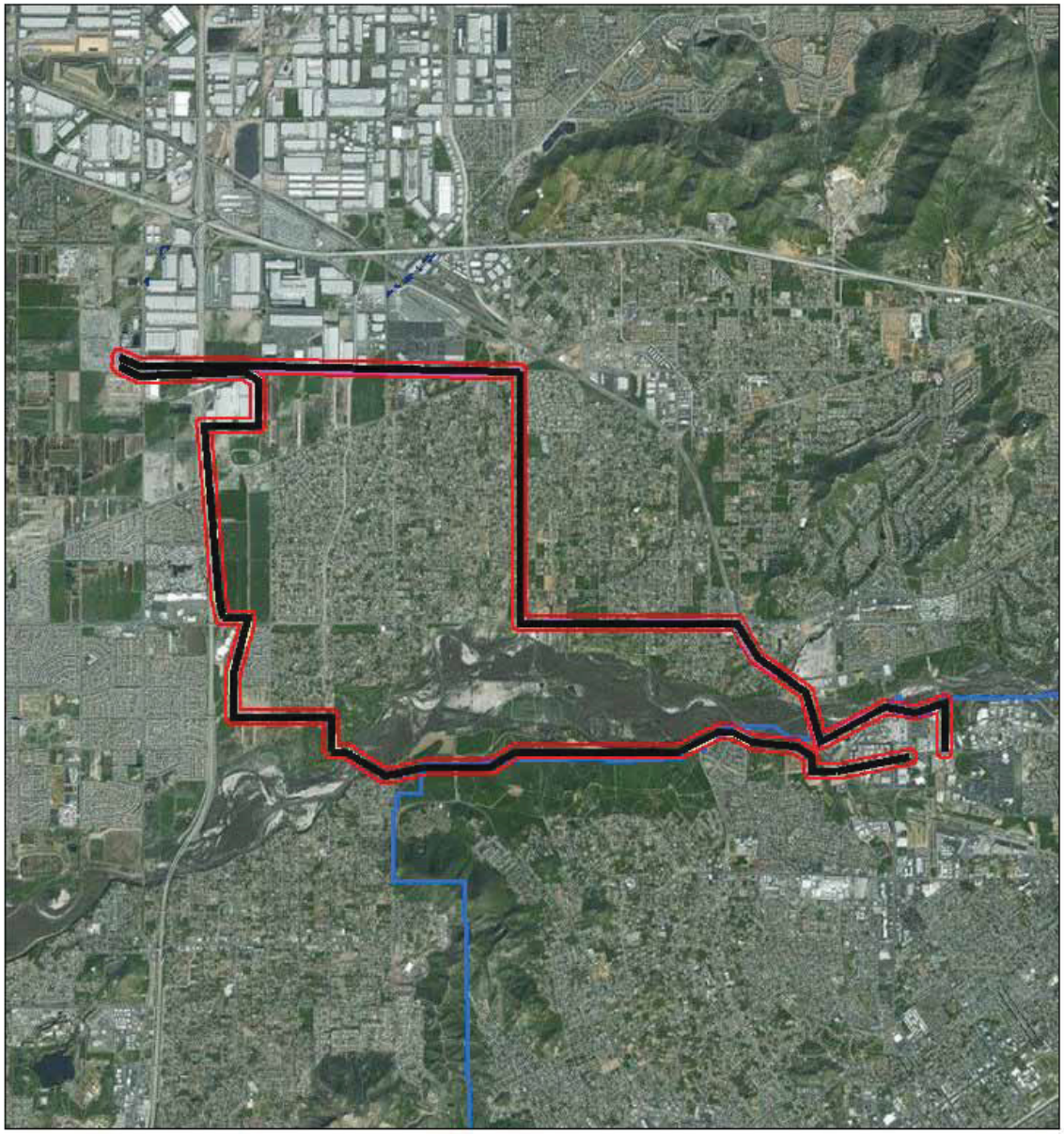
AQMD Districts

#	District Name	Area (acres)
1	South Coast	2162.38

SCE Environmental Screening Report

Area of Interest (AOI) Information

Area : 1,427.17 acres



Summary

Name	Count	Area (acres)	Length (mi)
BIO - Species Points	146	N/A	N/A
BIO - Species Polys	4	0.83	N/A
BIO - Bird Nest Points	33	N/A	N/A
BIO - Desert Tortoise Points	0	N/A	N/A
BIO - Habitat Polys	26	391.82	N/A
CNDDB Poly May 2017	23	2657.49	N/A
CFWO Species Occurrence	22	363.82	N/A
JD Waters ESA	95	15.52	N/A
FEMA Flood Zones	34	1796.48	N/A
Local Coastal Plan (LCP)	0	0	N/A
Government Land, 2016	1	64.82	N/A
MPO Capital Project Footprint	4	779.87	N/A
USFWS Critical Habitat - Polygon Features	2	153.07	N/A
USFWS Critical Habitat - Linear Features	0	N/A	0
AQMD Districts	2	1427.2	N/A

BIO - Species Points

#	Species Name Common	Special Status Type	Occurrence Date	Project Name
1	Least Bell's Vireo	FE: Federally Endangered	August 28, 2016	Riverside Transmission Reliability Project
2	Least Bell's Vireo	FE: Federally Endangered	May 8, 2016	Riverside Transmission Reliability Project
3	Least Bell's Vireo	FE: Federally Endangered	June 16, 2016	Riverside Transmission Reliability Project
4	Least Bell's Vireo	FE: Federally Endangered	May 27, 2016	Riverside Transmission Reliability Project
5	Least Bell's Vireo	FE: Federally Endangered	May 16, 2016	Riverside Transmission Reliability Project
6	Least Bell's Vireo	FE: Federally Endangered	July 17, 2016	Riverside Transmission Reliability Project
7	Least Bell's Vireo	FE: Federally Endangered	July 1, 2016	Riverside Transmission Reliability Project
8	Least Bell's Vireo	FE: Federally Endangered	June 5, 2016	Riverside Transmission Reliability Project
9	Least Bell's Vireo	FE: Federally Endangered	July 28, 2016	Riverside Transmission Reliability Project
10	Least Bell's Vireo	FE: Federally Endangered	June 15, 2016	Riverside Transmission Reliability Project
11	American Yellow Warbler	BCC: US Fish and Wildlife Service Bird of Conservation Concern	July 1, 2016	Riverside Transmission Reliability Project
12	Yellow-Breasted Chat	SSC: California Species of Special Concern	June 19, 2016	Riverside Transmission Reliability Project
13	American Yellow Warbler	BCC: US Fish and Wildlife Service Bird of Conservation Concern	May 27, 2016	Riverside Transmission Reliability Project
14	Yellow-Breasted Chat	SSC: California Species of Special Concern	June 5, 2016	Riverside Transmission Reliability Project
15	California Ground Squirrel	No Special Status Type	May 1, 2016	Riverside Transmission Reliability Project
16	American Yellow Warbler	BCC: US Fish and Wildlife Service Bird of Conservation Concern	May 28, 2016	Riverside Transmission Reliability Project
17	Least Bell's Vireo	FE: Federally Endangered	June 6, 2016	Riverside Transmission Reliability Project
18	American Yellow Warbler	BCC: US Fish and Wildlife Service Bird of Conservation Concern	May 26, 2016	Riverside Transmission Reliability Project
19	Willow Flycatcher	SE: State Endangered	June 7, 2016	Riverside Transmission Reliability Project
20	Least Bell's Vireo	FE: Federally Endangered	June 19, 2016	Riverside Transmission Reliability Project
21	American Yellow Warbler	BCC: US Fish and Wildlife Service Bird of Conservation Concern	May 16, 2016	Riverside Transmission Reliability Project
22	Least Bell's Vireo	FE: Federally Endangered	May 17, 2016	Riverside Transmission Reliability Project
23	Least Bell's Vireo	FE: Federally Endangered	May 26, 2016	Riverside Transmission Reliability Project
24	Least Bell's Vireo	FE: Federally Endangered	June 30, 2016	Riverside Transmission Reliability Project
25	American Yellow Warbler	BCC: US Fish and Wildlife Service Bird of Conservation	June 5, 2016	Riverside Transmission Reliability Project

		Concern		
26	Yellow-Breasted Chat	SSC: California Species of Special Concern	June 15, 2016	Riverside Transmission Reliability Project
27	American Yellow Warbler	BCC: US Fish and Wildlife Service Bird of Conservation Concern	June 15, 2016	Riverside Transmission Reliability Project
28	Loggerhead Shrike	SSC: California Species of Special Concern	January 25, 2012	Tehachapi Renewable Transmission Project
29	Yellow-Breasted Chat	SSC: California Species of Special Concern	May 28, 2016	Riverside Transmission Reliability Project
30	American Yellow Warbler	BCC: US Fish and Wildlife Service Bird of Conservation Concern	June 6, 2016	Riverside Transmission Reliability Project
31	Yellow-Breasted Chat	SSC: California Species of Special Concern	May 27, 2016	Riverside Transmission Reliability Project
32	Yellow-Breasted Chat	SSC: California Species of Special Concern	May 26, 2016	Riverside Transmission Reliability Project
33	Yellow-Breasted Chat	SSC: California Species of Special Concern	June 6, 2016	Riverside Transmission Reliability Project
34	Least Bell's Vireo	FE: Federally Endangered	June 7, 2016	Riverside Transmission Reliability Project
35	Least Bell's Vireo	FE: Federally Endangered	May 18, 2016	Riverside Transmission Reliability Project
36	Yellow-Breasted Chat	SSC: California Species of Special Concern	May 18, 2016	Riverside Transmission Reliability Project
37	Yellow-Breasted Chat	SSC: California Species of Special Concern	June 16, 2016	Riverside Transmission Reliability Project
38	American Yellow Warbler	BCC: US Fish and Wildlife Service Bird of Conservation Concern	June 19, 2016	Riverside Transmission Reliability Project
39	Least Bell's Vireo	FE: Federally Endangered	June 29, 2016	Riverside Transmission Reliability Project
40	American Yellow Warbler	BCC: US Fish and Wildlife Service Bird of Conservation Concern	June 30, 2016	Riverside Transmission Reliability Project
41	Least Bell's Vireo	FE: Federally Endangered	May 7, 2016	Riverside Transmission Reliability Project
42	Yellow-Breasted Chat	SSC: California Species of Special Concern	June 30, 2016	Riverside Transmission Reliability Project
43	California Walnut	CRPR 4: Plants of Limited Distribution - A Watch List	June 29, 2016	Riverside Transmission Reliability Project
44	San Diego Black-Tailed Jackrabbit	SSC: California Species of Special Concern	November 21, 2010	Tehachapi Renewable Transmission Project
45	Loggerhead Shrike	SSC: California Species of Special Concern	August 3, 2010	Tehachapi Renewable Transmission Project
46	Least Bell's Vireo	FE: Federally Endangered	May 28, 2016	Riverside Transmission Reliability Project
47	Northern Harrier	SSC: California Species of Special Concern	December 14, 2011	Tehachapi Renewable Transmission Project
48	Peregrine Falcon	SE: State Endangered	December 14, 2011	Tehachapi Renewable Transmission Project
49	Loggerhead Shrike	SSC: California Species of Special Concern	December 7, 2011	Tehachapi Renewable Transmission Project
50	Loggerhead Shrike	SSC: California Species of Special Concern	November 30, 2011	Tehachapi Renewable Transmission Project
51	Northern Harrier	SSC: California Species of	August 11, 2011	Tehachapi Renewable

		Special Concern		Transmission Project
52	San Diego Black-Tailed Jackrabbit	SSC: California Species of Special Concern	July 26, 2011	Tehachapi Renewable Transmission Project
53	San Diego Black-Tailed Jackrabbit	SSC: California Species of Special Concern	June 29, 2011	Tehachapi Renewable Transmission Project
54	Northern Harrier	SSC: California Species of Special Concern	December 7, 2010	Tehachapi Renewable Transmission Project
55	Loggerhead Shrike	SSC: California Species of Special Concern	February 25, 2014	Tehachapi Renewable Transmission Project
56	Prairie Falcon	No Special Status Type	December 26, 2013	Tehachapi Renewable Transmission Project
57	Cooper's Hawk	WL: CDFW Watch List	October 21, 2013	Tehachapi Renewable Transmission Project
58	Cooper's Hawk	WL: CDFW Watch List	June 22, 2016	Tehachapi Renewable Transmission Project
59	Cooper's Hawk	WL: CDFW Watch List	March 24, 2016	Tehachapi Renewable Transmission Project
60	White-Faced Ibis	No Special Status Type	December 2, 2015	Tehachapi Renewable Transmission Project
61	Loggerhead Shrike	SSC: California Species of Special Concern	April 7, 2015	Tehachapi Renewable Transmission Project
62	Least Bell's Vireo	FE: Federally Endangered	July 16, 2016	Riverside Transmission Reliability Project
63	California Ground Squirrel	No Special Status Type	May 2, 2016	Riverside Transmission Reliability Project
64	California Ground Squirrel	No Special Status Type	June 22, 2016	Riverside Transmission Reliability Project

#	Count
1	12
2	10
3	7
4	7
5	7
6	6
7	6
8	6
9	4
10	3
11	3
12	3
13	3
14	3
15	3
16	3
17	3
18	2
19	2
20	2
21	2
22	2
23	2
24	2
25	2
26	2
27	2
28	1
29	1
30	1
31	1
32	1
33	1
34	1
35	1
36	1
37	1
38	1
39	1
40	1
41	1
42	1

43	1
44	1
45	1
46	1
47	1
48	1
49	1
50	1
51	1
52	1
53	1
54	1
55	1
56	1
57	1
58	1
59	1
60	1
61	1
62	1
63	1
64	1

BIO - Species Polys

#	Species_Name_Common	Special_Status_Type	Occurrence_Date	Project_Name
1	Paniculate Tarplant	CRPR 4: Plants of Limited Distribution - A Watch List	May 21, 2017	Riverside Transmission Reliability Project

#	Area (acres)
1	0.83

BIO - Bird Nest Points

#	Species_Name_Common	Special_Status_Species	Observation_Date	Project_Name
1	Black Phoebe	No	March 24, 2016	Tehachapi Renewable Transmission Project
2	Black Phoebe	No	April 7, 2014	Tehachapi Renewable Transmission Project
3	Black Phoebe	No	May 27, 2013	Tehachapi Renewable Transmission Project
4	Western Kingbird	No	April 4, 2013	Tehachapi Renewable Transmission Project
5	Black Phoebe	No	March 31, 2013	Tehachapi Renewable Transmission Project
6	House Sparrow	No	June 3, 2012	Tehachapi Renewable Transmission Project
7	Black Phoebe	No	May 23, 2012	Tehachapi Renewable Transmission Project
8	Northern Mockingbird	No	August 17, 2016	Tehachapi Renewable Transmission Project
9	House Finch	No	June 28, 2016	Tehachapi Renewable Transmission Project
10	Hooded Oriole	No	June 15, 2016	Tehachapi Renewable Transmission Project
11	Western Kingbird	No	May 24, 2016	Tehachapi Renewable Transmission Project
12	Black Phoebe	No	May 24, 2016	Tehachapi Renewable Transmission Project
13	Cassin's Kingbird	No	April 12, 2016	Tehachapi Renewable Transmission Project
14	American Crow	No	April 3, 2016	Tehachapi Renewable Transmission Project
15	House Finch	No	March 28, 2016	Tehachapi Renewable Transmission Project
16	House Finch	No	March 25, 2016	Tehachapi Renewable Transmission Project
17	Killdeer	No	March 19, 2014	Tehachapi Renewable Transmission Project
18	House Sparrow	No	March 17, 2016	Tehachapi Renewable Transmission Project
19	Black Phoebe	No	February 28, 2016	Tehachapi Renewable Transmission Project
20	Northern Mockingbird	No	April 19, 2015	Tehachapi Renewable Transmission Project
21	House Sparrow	No	May 7, 2014	Tehachapi Renewable Transmission Project
22	Black Phoebe	No	March 4, 2012	Tehachapi Renewable Transmission Project
23	House Finch	No	August 9, 2011	Tehachapi Renewable Transmission Project
24	Cassin's Kingbird	No	June 26, 2011	Tehachapi Renewable Transmission Project
25	House Sparrow	No	May 10, 2011	Tehachapi Renewable Transmission Project
26	Black Phoebe	No	May 3, 2011	Tehachapi Renewable Transmission Project
27	American Crow	No	April 25, 2011	Tehachapi Renewable Transmission Project

28	Northern Mockingbird	No	April 20, 2011	Tehachapi Renewable Transmission Project
29	House Sparrow	No	April 7, 2011	Tehachapi Renewable Transmission Project
30	House Sparrow	No	March 10, 2011	Tehachapi Renewable Transmission Project
31	Say's Phoebe	No	March 9, 2011	Tehachapi Renewable Transmission Project
32	American Crow	No	March 9, 2011	Tehachapi Renewable Transmission Project
33	American Crow	No	February 23, 2011	Tehachapi Renewable Transmission Project

#	Count
1	1
2	1
3	1
4	1
5	1
6	1
7	1
8	1
9	1
10	1
11	1
12	1
13	1
14	1
15	1
16	1
17	1
18	1
19	1
20	1
21	1
22	1
23	1
24	1
25	1
26	1
27	1
28	1
29	1
30	1
31	1
32	1
33	1

BIO - Habitat Polys

#	Habitat_Type	Habitat_Category	Determination_Date	Project_Name
1	Delhi Sands Flower-Loving Fly	Suitable	July 31, 2015	Circle City Substation and Mira Loma-Jefferson Subtransmission Line Project
2	Other	Suitable	June 6, 2016	Riverside Transmission Reliability Project
3	Delhi Sands Flower-Loving Fly	Suitable	June 7, 2016	Riverside Transmission Reliability Project
4	Other	Suitable	June 1, 2016	Riverside Transmission Reliability Project
5	Delhi Sands Flower-Loving Fly	TBD	October 5, 2016	Riverside Transmission Reliability Project
6	Vernal Pool Branchiopods	Suitable	February 26, 2016	Circle City Substation and Mira Loma-Jefferson Subtransmission Line Project
7	Vernal Pool Branchiopods	Suitable	January 6, 2016	Circle City Substation and Mira Loma-Jefferson Subtransmission Line Project
8	Delhi Sands Flower-Loving Fly	Suitable	October 5, 2016	Riverside Transmission Reliability Project
9	Vernal Pool Branchiopods	Suitable	February 3, 2016	Circle City Substation and Mira Loma-Jefferson Subtransmission Line Project
10	Vernal Pool Branchiopods	Suitable	January 7, 2016	Circle City Substation and Mira Loma-Jefferson Subtransmission Line Project

#	Area (acres)
1	295.56
2	55.38
3	21.46
4	14.59
5	1.92
6	1.23
7	0.88
8	0.76
9	0.04
10	< 0.01

CNDDB Poly May 2017

#	Common Name	Scientific Name	Area (acres)
1	Delhi Sands flower-loving fly	Rhaphiomidas terminatus abdominalis	1944.4
2	western mastiff bat	Eumops perotis californicus	191.44
3	least Bell's vireo	Vireo bellii pusillus	109.55
4	Southern Cottonwood Willow Riparian Forest	Southern Cottonwood Willow Riparian Forest	78.91
5	yellow warbler	Setophaga petechia	72.98
6	yellow-breasted chat	Icteria virens	72.98
7	burrowing owl	Athene cunicularia	44.87
8	Southern California Arroyo Chub/Santa Ana Sucker Stream	Southern California Arroyo Chub/Santa Ana Sucker Stream	42.99
9	Santa Ana sucker	Catostomus santaanae	41.47
10	arroyo chub	Gila orcuttii	35.42
11	Lawrence's goldfinch	Spinus lawrencei	12.7
12	Santa Ana speckled dace	Rhinichthys osculus ssp. 3	9.78

CFWO Species Occurrence

#	Common Name	Scientific Name	Area (acres)
1	least Bell's vireo	Vireo bellii pusillus	362.27
2	Santa Ana sucker	Catostomus santaanae	1.54

JD Waters ESA

#	Name	ESA Type	Area (acres)
1	NHD	Red	15.52

FEMA Flood Zones

#	Flood Zone	Area (acres)
1	X	1577.29
2	AE	182.39
3	0.2 PCT ANNUAL CHANCE FLOOD HAZARD	21.37
4	A	15.43

Government Land, 2016

#	Agency Name	Agency Area Name	Area (acres)
1	ST	Hidden Valley	64.82

MPO Capital Project Footprint

#	Capital Project Name	EPM	COMP_LEVEL	Area (acres)
1	RTRP/Wildlife Substation	Gary Busteed	Stage 04: Application Production	708.02
2	Circle City	Alisa Krizek	Stage 04: Application Production	34.43
3	TRTP 500 kV UG	Jenny McGee	Revegetation	34.23
4	TRTP 4 -11	Jenny McGee	Revegetation	3.19

USFWS Critical Habitat - Polygon Features

#	Common Name	Scientific Name	Area (acres)
1	Least Bell's vireo	Vireo bellii pusillus	88.23
2	Santa Ana sucker	Catostomus santaanae	64.84

AQMD Districts

#	District Name	Area (acres)
1	South Coast	1427.2

Southern California Edison (SCE)

APPENDIX C POWER ENGINEERS QUALIFICATIONS

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ENVIRONMENTAL AND ENGINEERING QUALIFICATIONS

Identifying and developing engineering solutions is one of our core competencies.

On the following pages we provide a representative sample of POWER's experience with major transmission system programs, as well as other types of transmission line projects. The project summaries include experience with CPUC GO95, CPUC GO 131-D, CPUC licensing, environmental permitting and other subjects.

These high-profile and schedule-sensitive projects frequently involve complex issues such as:

- Environmental sensitivities.
- Multiple stakeholders;
- Stringent regulatory directives and public agency requirements;
- Need for strong community relations to improve public acceptance;
- Complex permitting requirements, involving federal, state and local permits;
- Challenging and rugged terrain;
- Aggressive budgets and schedules that were met or improved upon.

PACIFICORP
Yreka-Weed 115 kV Transmission Line Upgrade PEA, California

POWER was responsible for producing the PEA for PacifiCorp's proposed 115 kV transmission line project in Siskiyou County, near the Oregon border. The project consisted of approximately 17 miles of transmission line rebuild, two miles of new transmission line, and the upgrade of three substations. POWER was responsible for all environmental studies and impact assessment for the PEA. Coordination with the California Public Utilities Commission (CPUC) was completed to aid in preparing and filing the PEA on a fast-track schedule to ensure the in-service date for this very important electrical capacity project. POWER provided support with surveys and data requests to the CPUC during the preparation of a Mitigated Negative Declaration for the rebuild portion of the project and an EIR for the new transmission line segment of the project. POWER also provided environmental training and construction monitoring for the entire project.

For nearly a decade, POWER has provided high-quality support for LADWP's Barren Ridge Renewable Transmission Project.

LOS ANGELES DEPARTMENT OF WATER AND POWER
Barren Ridge EIS/EIR, California

POWER conducted a joint federal and state environmental review under NEPA and CEQA, including an EIS/EIR, for the Barren Ridge Renewable Transmission Project. To provide access to wind- and solar-generated electricity in the Tehachapi Mountain and Mojave Desert regions, the proposed double-circuit 230 kV facilities would improve the reliability of LADWP's electric delivery system and help the City of Los Angeles meet its Renewable Portfolio Standard obligations mandated by the State of California and the City.

The project included a new transmission line from the existing Barren Ridge Switching Station to a proposed Haskell Canyon Switching Station, added a circuit on an existing line from Haskell Canyon to the Castaic Power Plant, and replaced conductors on the Owens Gorge to Rinaldi line, covering approximately 200 miles of lines. The Forest Service and BLM are federal co-lead agencies and LADWP is the lead state agency.

POWER was responsible for all environmental and land use analyses for the EIS/EIR: biological and cultural field studies, visual, land use, agriculture, transportation, earth and water resources, and noise and socioeconomics. The project area provided habitat for several special status species, including the California red-legged frog, arroyo toad, desert tortoise and California condor. An agency-directed avian risk assessment will examine the relationship between the project's existing and proposed transmission lines and resident and migratory species in Mojave Desert and other habitats.

POWER also conducted an extensive public outreach and scoping program. Supporting public involvement efforts, POWER360, a web-based interactive application linked to the project website, allowed real-time mapping of a property in relation to the proposed transmission line. Interested parties could view basic project information and leave comments directly related to the project for consideration along with comments gathered during onsite public meetings.

POWER prepared all of the pre-construction plans for the project including the Plan of Development for the BLM and the Construction, Operations and Maintenance Plan for the USFS. We also conducted pre-construction cultural resources data recovery, pre-construction surveys, environmental monitoring.

SAN DIEGO GAS AND ELECTRIC

Valley-Rainbow 500 kV Interconnect PEA, California

POWER completed environmental siting and permitting services and preliminary engineering for the proposed Valley-Rainbow 500 kV Interconnect Project. The project included plans for a new 35-mile 500 kV transmission line, a new substation, 52 miles of 230 kV transmission upgrades, a new 7-mile 69 kV transmission line, and five substation upgrades. The project was conceived as a way to bolster transmission capacity in San Diego and Riverside counties, one of the fastest growing areas of the United States.

ENVIRONMENTAL SITING AND PERMITTING

POWER was responsible for a siting study, preparation of the multi-disciplinary environmental planning studies, PEA), special status wildlife species surveys, botanical surveys, Biological Assessment, ethnographic studies, cultural surveys and report, wetland delineations and mitigation studies, and other consultations and permits for the new transmission line. Nearly 200 miles of alternative routes were identified, and POWER provided an analysis considering route opportunities and constraints. The studies, including the PEA, were prepared during the 2000/2001 energy crisis in California in less than nine months and submitted to the CPUC. POWER was also responsible for facilitating public scoping meetings, and assisted the CPUC and BLM in preparing the EIR/EIS for the project.

PRELIMINARY ENGINEERING

POWER performed preliminary engineering services for approximately 35 miles of new 500 kV transmission line as well as the associated transmission line and substation upgrades. Design services included foundation design and preliminary routing and design in PLS-CADD.

RAINBOW SUBSTATION

POWER provided preliminary engineering services for the new 500 kV Rainbow Substation associated with the project. The preliminary engineering supported permitting and major equipment procurement for the new substation. The design included a 1120 MVA autotransformer bank and new 230 kV breaker and one half yard. The 40-acre site presented extensive geotechnical and grading design challenges.

UNDERGROUND FEASIBILITY STUDY

As a result of the public comment process, POWER conducted an evaluation of constructing the line underground for the entire 35 miles in a relatively rural environment. Shorter sections were also considered for some road and river crossings. Self-contained fluid-filled (SCFF) and cross linked polyethylene (XLPE) 500 kV cable systems were examined to determine technical merit and reliability. Several cable manufacturers submitted engineering, cost, and reliability data for these cable types. Simple line models were prepared in PTI's PSSE format for computer analysis to determine conductor size, reactive compensation and voltage drop for the two types of circuits. Environmental aspects were

considered such as right of way width, ground disturbance, land use and esthetics, health and noise issues, vegetation clearing, and erosion control. Cost estimates and a comparison of the impacts and benefits (technical, environmental, and maintenance) of the two underground installations were summarized in a report.

GIS

POWER provided GIS mapping and analysis services to determine the optimal location for the 500 kV transmission line. The project included obtaining data from Riverside and San Diego counties and conducting various forms of geospatial analysis to help prepare the PEA. POWER's GIS and Environmental teams mapped sensitive species, land use, wetlands, soils, and geology, and also determined sensitivity levels for each resource and impact that the potential transmission line would have on them. Viewshed analysis was conducted on the transmission line for recreational, residential, and scenic quality impacts. Final delivery included 200 sets of resource and impact maps totaling 10,000 maps.

PROJECT WEB SITE

The project included development of an interactive web site to facilitate public interaction and comment. The web site was designed to keep federal, state and local agencies, utilities and business owners and residents in Riverside and San Diego counties informed about every aspect of the project. The web site served to answer questions and alleviate concerns about the impacts of the project on the communities and the environment. This was accomplished using up-to-date project status reports, a FAQ (frequently asked questions) section, posting of public involvement opportunities, project documents including descriptions and maps of the proposed route and permit applications, and links to resources and personnel contacts for further information. The web site also served as a central source of information for all members of the project team.

RIVERSIDE PUBLIC UTILITIES

Riverside Transmission Reliability Project, California

POWER is providing environmental, engineering, and engineering procurement and construction support services for the Riverside Transmission Reliability Project (RTRP), a major upgrade to the City of Riverside's electric system. The project will add a second interconnection to the SCE transmission grid.

During Phase I of the RTRP, POWER conducted a routing study to identify four alternative routes for the 230 kV and 69 kV transmission lines and determined that an EIR would need to be developed. During Phase II, POWER provided the city with a Final EIR, Certificate of Public Convenience and Necessity, substation and transmission line design, and construction of 230 kV and 69 kV systems to bring additional power into Riverside Public Utilities' electric system.

POWER is providing conceptual and detailed engineering for many of the components of the RTRP, including the new 230-69 kV Wilderness Substation, four new double circuit 69 kV transmission line segments; and upgrades to eight existing 69 kV substations. POWER has completed and submitted the design to upgrade Harvey Lynn and Freeman substations, which included breaker replacement work. In addition to design, POWER is providing procurement, contractor selection assistance, and engineering support during construction.

SAN DIEGO GAS AND ELECTRIC
Mission-Miguel 230 kV Transmission Line PEA, California

POWER assisted SDG&E in the preparation of the Proponent's Environmental Assessment for a 35-mile-long transmission line upgrade. The project involved placing a new 230 kV conductor on a vacant position on an existing steel pole and relocating 69 kV and 138 kV conductors from an existing lattice tower to a new steel or wood double circuit 69/138 kV pole to be placed in the existing right of way. A 230 kV circuit was also constructed on the existing 69/138 kV lattice tower. The project crossed sensitive open space parks, recreation areas, golf courses and the Otay Sweetwater National Wildlife Preserve. The PEA was necessary to complete the Certificate of Public Convenience and Necessity (CPCN) application to the CPUC, which acted as the Lead Agency.

PACIFICORP
Lassen Substation PEA, California

POWER prepared a PEA to be used in an application for a Permit to Construct from the CPUC. The project includes a new 115/69 kV substation that would replace the original substation. POWER managed the public involvement process which included soliciting comments from interested agencies and the public. This included coordination of a public meeting and evaluation of public comments with regard to identifying and selecting a proposed substation site. Preparation of the PEA focused on habitat assessments, wetland assessments/delineations, and adjacent land uses, including potential visual impacts for local residences. POWER also prepared several simulations for public meetings and the PEA.

RENEWABLE RESOURCES GROUP
Blythe Mesa Solar EIR and EA, California

POWER was the third-party contractor for the Renewable Resources Group, Riverside County, and the BLM California Desert District, hired to prepare a joint EIR and EA (CEQA and NEPA) document for a 485 MW solar photovoltaic project. In addition to the solar PV panels, the project will include up to three substations, up to two O&M buildings and an approximate 4.8-mile, 230 kV transmission line connecting the generating facility to SCE's Colorado River Substation. The project site and transmission right-of-way contain approximately 3,660 acres. A portion of the interconnection line would cross federal land managed by the BLM. POWER provided assistance in all phases of the environmental process, including the Notice of Preparation, scoping meetings, technical studies, and preparation of Draft and Final EIR/EA.

Key biological issues addressed include burrowing owl, desert tortoise, rare plants, and Mojave fringe-toad lizard. A Phase I cultural resources survey was completed and a technical report prepared. A glint and glare study, visual analysis and visualizations, transportation study, water supply assessment, socioeconomic study, and air quality were also conducted. Due to project proximity to the Blythe Airport, a computer animation was prepared to simulate the landing sequence of an aircraft over solar panels. The animation was used to demonstrate to the Riverside County Airport Land Use Commission that glint and glare from the solar panels would not be a public hazard.

RENEWABLE RESOURCES GROUP
Palo Verde Mesa Solar, California

POWER supported Renewable Resources Group and Riverside County in preparing an EIR for the 470 MW Palo Verde Mesa Solar PV Project, which will connect to SCE's Colorado River Substation. POWER provided assistance in all phases of the environmental process, including support in preparation of technical reports required for the project.

PROJECT FEATURES
- 3,250-acre solar facility, including collector substations and O&M buildings to be constructed on the site
- Several interior access roads
- System of underground interior collection power lines located between inverters and substations
- Proposed 14.5-mile 230 kV transmission line placed within a 100-foot-wide right-of-way

POWER'S SERVICES
- Preparation of Draft EIR
- Biological and cultural surveys
- Supporting documentation for visual impacts, glint and glare, traffic, and air quality concerns
- Third-party contractor for the preparation of the Draft EIR

LOS ANGELES DEPARTMENT OF WATER AND POWER
Southern Owens Valley Solar Ranch EIR, California

POWER prepared an EIR for an LADWP solar project located on City-owned lands within the Owens Valley in Inyo County, CA. The Southern Owens Valley Solar Ranch Project will be a 200 MW solar photovoltaic (PV) project on approximately 3,000 acres. POWER prepared technical studies to evaluate proposed and alternative project sites. A range of technical studies were prepared including visual simulations from nearby scenic vantage points and intensive cultural resource evaluations. POWER assisted with project scoping by coordinating public outreach and notification aimed at stakeholders, local land owners, Native Americans, public agencies and the interested public.

LOS ANGELES DEPARTMENT OF WATER AND POWER
Scattergood Olympic Transmission Line EIR, California

POWER prepared an EIR for the proposed Scattergood-Olympic Transmission Line Project. The project included the construction of a new underground 230 kV electric transmission line for a distance of approximately 12 miles connecting the existing Scattergood Generating Station and Olympic Receiving Station. POWER was responsible for conducting technical analyses to address biological and cultural resources, land use, earth and water resources, noise and socioeconomics. The new transmission line involved crossings at Ballona Creek and Centinella Creek, and the study area included habitat for the federally endangered El Segundo Blue Butterfly. POWER also conducted an extensive public outreach and scoping program for this project.

LOS ANGELES DEPARTMENT OF WATER AND POWER
Sylmar Ground Return System Replacement Project EIR, California

POWER is preparing an EIR for the Sylmar Ground Return System Replacement (SGRS) Project. LADWP is proposing to replace the existing underground and marine electrical cables and the existing marine electrode portions of the SGRS to correct system deficiencies.

The SGRS is a vital component of the Pacific Direct Current Intertie Transmission Line, which transmits bulk power between Los Angeles and the Pacific Northwest. The replacement project is proposed to maintain the reliability and stability of the power generation and delivery system for Southern California.

In addition to working with LADWP to prepare a Draft EIR, POWER has also supported technical studies. Key issues focus on construction-related impacts to traffic, noise, and air quality in western Los Angeles and Santa Monica and to the marine environment in Santa Monica Bay.

LOS ANGELES DEPARTMENT OF WATER AND POWER
Scattergood Generating Station Unit 3 Repowering EIR, California

POWER prepared environmental technical reports and a Final Environmental Impact Report for LADWPs Scattergood Generating Station Unit 3 Repowering Project. The EIR was prepared with the LADWP serving as the Lead Agency. POWER also prepared and distributed the Initial Study and Notice of Preparation of Draft EIR. The project consists of replacing the capacity of Scattergood Generating Station Unit 3 with natural gas-fired combustion turbines and heat recovery steam generator(s) operating in both combined and simple cycle configuration. The EIR included a full air quality analysis and an evaluation of the impact of wastewater changes relative to the existing discharge permit. Several other issues that were addressed include aesthetics (visual impacts), biological resources (focused on El Segundo Blue Butterfly), potential for historic resources, paleontological resources, noise generation, wastewater issues, and traffic and transportation.

SOUTHERN CALIFORNIA EDISON
Kimball Substation Air Quality Analysis, California

POWER conducted the air quality analysis and construction emissions estimates for a PEA to obtain a Permit to Construct from the CPUC for the new Kimball Substation near Chino. In addition to the new substation, the project included a new 66 kV subtransmission line and a fiber optic communication network. The project is located within the South Coast Air Quality Management District.

Transmission line projects have been a cornerstone of our business for over 40 years. Our staff includes some of the most respected P.E.'s in the industry.

AN EXPERIENCED PARTNER IN ENGINEERING SOLUTIONS FOR MAJOR TRANSMISSION PROJECTS

We offer specialized expertise with transmission projects, and a proven project approach refined over forty-plus years in the industry. Our transmission and distribution work has earned us a **top five ranking** from *Engineering News Record* and a repeat business rate of nearly 80%. With this depth of experience, we can execute the most challenging projects to the highest technical and regulatory standards. On the following pages we provide a representative sample of our engineering experience with major transmission system programs. The project summaries are focused on engineering work. However, we have also included project summaries where GO95, CPUC Licensing, environmental permitting and other relevant subjects that may come into play. Some of our engineering work comes in the form of Owner's Engineer and Program Manager contracts, which are also included.

These high-profile and schedule-sensitive projects frequently involve complex engineering and construction challenges, such as:

- High-profile projects with multiple stakeholders;
- Multiple projects executed in parallel;
- Hundreds of Millions of dollars in capital costs;
- Stringent regulatory directives and public agency requirements;
- Need for strong community relations to improve public acceptance;
- Complex permitting requirements, involving federal, state and local permits;
- Extensive outage and construction planning;
- Flexible team approach with project owner;
- Full compliance with owner-led safety programs; and
- Aggressive schedules and budgets that were met or improved upon.

SOUTHERN CALIFORNIA EDISON

Transmission Line Rating Remediation (TLRR) Strategic Execution Plan, California

Faced with thousands of discrepancies on its transmission system as a result of NERC rating, Southern California Edison (SCE) hired POWER to develop a Strategic Execution Plan (SEP) to identify and recommend the needed planning, engineering, regulatory, and construction strategies, requirements, and milestones to support SCE's remediation timelines.

PROJECT FEATURES

- Strategic Execution Plan for a 15-year program to remediate SCE's bulk power and radial systems
- Program budget of $1.5 billion
- 262 circuits from 66 kV to 500 kV with 10,000+ discrepancies identified

We have designed and permitted hundreds of miles of transmission lines in California and across the Southwest.

CHALLENGES/ACCOMPLISHMENTS

- Significant percentage of remediation required Permit to Construct (PTC) or Certificate of Public Convenience and Necessity (CPCN) licensing approvals from the California Public Utilities Commission (CPUC).
- Majority of remediation required permits or authorizations from federal land or resource management agencies.
- Developed a scoping template that facilitated prioritization criteria for circuit requirements, schedule, cost, and sequencing.
- Grouped project packages by geographical location, licensing, permitting, outages, and other factors, to streamline scheduling.
- Worked closely with SCE Subject Matter Experts to facilitate plan development.
- POWER360® was successfully used as the collaboration tool for the source documents and SEP development with 1,253 total logins and 3,955 documents downloaded.

SERVICES

- Strategic execution plan development
- Scheduling and cost estimates for 262 circuits
- Project sequencing
- Resource requirement recommendation
- Program reporting via POWER360®
- Upon completion of the SEP, additional "follow-on" services were requested by SCE to support their team through the next project planning stages

SOUTHERN CALIFORNIA EDISON

Transmission Line Rating Remediation (TLRR) North of Magunden Segment, California

Southern California Edison (SCE) hired POWER to evaluate, engineer, and provide construction drawings for discrepancy remediation of four existing 220 kV transmission circuits. The transmission circuits requiring remediation are Magunden-Vestal Numbers 1&2 and Rector-Vestal Numbers 1&2. The total length of the circuits is 137.6 miles with total of 289 discrepancies.

The Project required revalidation from the GO-131D committee which avoids Licensing with the California Public Utility Commission (CPUC). In order for SCE to approach the GO-131D committee with a highly confident mitigation solution POWER completed the following:

- Discrepancy revalidation
- Proposal for three (3) new conductor evaluations to mitigate the identified discrepancies. Conductor were selected based on their high ampacity and low sag characteristics
- Creation of a high level Cost Estimating tool for each of the three (3) conductor alternatives to give an overall cost for each option. This included present cost support and future conductor line loss cost support. Each option proved was a feasible solution to maintain

the requirements set by the GO-131D Committee, with actual design completed.
- Creation of construction stringing and setup sites, foundation boring locations, access road and pad grading provided to SCE as KMZ's and Shape File, such that SCE could create the Project's Strip Map for the GO-131D presentation.
- Preliminary GO-131D meeting support with SCE environmental and TPD crews to vet out construction and environmental issues that may become Project showstoppers.

After SCE GO-131D "Conditional Approval" (waiting final environmental approval), POWER supported this Project with the following final construction documentation for all four (4) line segments:
- Joint support with SCE and POWER to ensure that SCE and GO-95. This task was extremely important to maintain Code Standards for the 90+ Year old towers, which were designed as 151kV structures but are currently being operated at 221 kV.
- PLS-CADD modeling with M4 Structures
- Construction Specifications
- General Arrangement Drawings
- Plan and Profile Drawings
- Tower Data Sheet
- Access Road and Tower Pad Grading Plans
- Foundation Design and Drawing
- Structure Framing Drawing
- Project Bill of Material List (BOM)
- Assembly Drawing and creation which was imported into PLS-CADD to create the BOM. (This approach was new to SCE but the efficiency of this approach was noted)
- Lattice Tower and Tubular H-Frame procurement
- Sag and Tension Drawings
- Use of DBE Contractors for support
- Construction Support

This Project successfully utilized POWER360® (POWER's robust proprietary communication and project management tool). The application allowed POWER and SCE share information and effectively manage the following Project Documentation as a shared approach:
- Project Scope
- Budget
- Schedule
- RFI's
- Meeting Minutes
- Status Report
- Field Visit Photos integrated into the map system
- Environmental Constraints which need to be considered in the design
- Project Submittal Documentations

POWER's Project Team worked closely with SCE Engineering and Drafting to create a group which efficiently reacted to the dynamic project characteristics for both the GO-131D and construction documentation requirements.

Many of the key personnel involved in the TLRR Strategic Execution Plan (above) were proposed for the North of Magunden Engineering Services Project, maximizing continuity of activities in the TLRR Program and minimizing the amount of ramp-up time getting the engineering work started and completed; and

- POWER360®, our proprietary robust communication and project management tool was proposed as an integral part of our engineering proposal. This leverages the previous and current POWER360® activity on the Strategic Execution Plan project.

- POWER included a DBE subcontract strategy in the delivery of this project. Our DBE subcontractor for access roads and civil design has SCE experience and will help contribute to SCE's DBE spending goals.

SCOPE EFFICIENCY STUDY

The Scope Efficiency Study was developed considering design requirements, optimal cost, minimal project disturbance area, permitting, and avoiding the need for licensing. SCE identified a list of remediation approaches which are listed below from most preferred to least preferred.

1. Grade
2. Re-Tension Wire
3. Re-Insulate Hardware
4. Re-Conductor
5. Lower Crossing Wire
6. Nip / Tuck
7. Raise with Body Extension
8. Replace Structure
9. Interset Structure
10. Rebuild Entire Circuit

Component 1:

The design requirement portion will review each remediation approach and estimate the maximum discrepancy magnitude correction. Many of the wire and hardware modification's maximum correction magnitude will be less than three feet. A large portion of discrepancies have a magnitude greater than three feet which would require either reconductor option or one of the structure modification approaches. The type of structure and age of structure / wire will be a consideration in this review.

Component 2:

A relative cost comparison estimation spreadsheet will be developed that estimates the cost differential between each remediation option. The

estimates will not consider costs that are common to each approach (mobilization, access and environmental restrictions). The estimates will provide general guidance on identifying the most economical options. Unique situations during the design process may require specific cost comparisons to determine the more economical solution.

Component 3:
A general disturbance impact review will be done for each remediation option. Unique situations during the design process may require specific disturbance comparisons to determine the least disturbance impact solution.

Component 4:
Minimizing the permitting and licensing requirements is the fourth component of this study. A quick design review will be completed to determine how many potential remediation options are needed to define if permits or licenses are required. POWER will identify guidelines and determine overall remediation approaches for discussion with SCE.

The Scope Efficiency Study included the four components mentioned above. These items were discussed with SCE and an approach / flow chart was developed and become part of the Scope Efficiency Study.

RIGHT OF WAY ACTIVITIES

POWER is supporting SCE on right of way studies (rights check). POWER will provide maps or .kmz files showing existing alignment and access roads. SCE will utilize maps or .kmz files for the right of way study. SCE will provide POWER any special access for updating the maps. The access maps will become part of the construction documents.

PERMITTING ACTIVITIES

Identify airports near project and prepare an FAA Analysis for SCE's use. The analysis will list structures within 20,000 feet of airport and those structure heights. The structure's elevations will be reviewed to determine if the structure is in the airport's approach / clear zone.

POWER will review the project area and prepare a list of utility crossings. Also prepare permit drawings with crossing recommendation for SCE's use. Caltrans's major highway crossing permits may require sealed engineering drawings for guard structure arrangement. POWER will provide these designs and sealed drawings.

POWER will review the project and identify a list of contractor supplied permits. Discussions will be held with SCE to determine if there are schedule advantages to SCE providing some of the identified permits. A list of the contractor required permits will be part of the construction documents.

DISTURBANCE CALCULATIONS

POWER will provide estimated disturbance areas for each remediation. Construction areas will be defined using desktop information and

information from the field visit. The areas will be used by SCE calculating disturbance areas.

OTHER KEY TASKS FOR SCE NOM PROJECT:

- PLS-CADD line modeling
- Conductor design
- Structure design
- Foundation design
- Access road design
- Cost estimate support
- Design documentation
- Material list - BOM
- SCE construction drawings

QA/QC

We use a comprehensive set of processes, beginning with the definition of work scope, schedule, and budget and ending with detailed checking of project deliverables. These management practices define processes to ensure a **consistent level of quality for all project deliverables.**

CONFIDENTIAL CLIENT
Transmission Line Rating Services - NERC Compliance, Phase I, Multiple States

POWER provided the ratings assessment for 1,600 transmission line circuit miles of our client's system in California, Utah, Wyoming, Washington, and Oregon to ensure compliance with the NERC Recommendation to Industry for Facility Ratings Analysis. The scope of this project was to review our client's ratings methodologies and determine if existing lines had NESC clearance violations on lines rated 115 kV, 230 kV, 345 kV, and 525 kV.

The project used a client-obtained LiDAR survey to identify all structure locations and conductor spans within specified corridors. The LiDAR survey detected structure types, pole heights, conductor/shieldwire attachment points, and conductor/shield wire sag conditions as they exist in the field. The LiDAR data also captured topographical data located near or within the right-of-way including: ground elevations, vegetation, man-made structures, line crossings, etc.

POWER reviewed and modeled the data collected in PLS-CADD, then analyzed it so that clearances to ground, vegetation, other conductors, other utilities, and encroachments were identified. POWER also identified the impact of each violation by determining the transmission line's electrical rating in its current condition. The project enabled our client to define where line modifications were required for the circuit to achieve the desired rating.

SOUTHERN CALIFORNIA EDISON
Transmission Line Rating Remediation (TLRR) Strategic Execution Plan, California

This project is described above. A key portion of the work was to perform a high-level total project cost estimate for over 200 circuits. POWER and SCE developed an estimating tool (Excel spreadsheet) for rapid estimating of remediation options and overall project costs. POWER's base costs for project labor, materials and equipment blended well with the costs SCE is experiencing.

SOUTHERN CALIFORNIA EDISON
Transmission Line Rating Remediation (TLRR) North of Magunden Segment, California

This project is described above. POWER is doing detailed cost estimates for each alternative being considered for the project. The alternatives involved new low sag conductors.

AMEREN
NERC Remediation Program, Multiple States

After performing compliance analysis in response to NERC's 2010 Facility Ratings Recommendation, Ameren had a capital project portfolio of $160 million per year through 2022, averaging 25 major transmission upgrade projects per year to meet NERC reliability ratings on the existing network. POWER has developed and implemented a Project Execution Plan to manage the program and is performing the engineering for the upgrade projects.

ACCOMPLISHMENTS

- Streamlined project planning and execution – Established a proactive project planning process, schedule and milestone points, which produced a clear critical path and improved progress tracking.
- Program "playbook" – Developed program execution processes, or a playbook, for how the extended program team would work together. By addressing safety, program and project management, change management, risk management, program controls, document controls, construction management and Ameren functional interfaces, the "playbook" has increased productivity by clarifying team roles and key program processes.
- Integrated master schedule plan – Developed an integrated master schedule planning process for all Ameren's capital projects to enable a two-year rolling planning window and a change process. This plan clarifies the best use of outage windows and leveling of contractor resource requirements through the planning period, and enables efficient "what if" scenario planning to support changes.
- Engineering integration – Seamless integration between POWER's program and POWER's engineering teams has streamlined the engineering interface in project design, material coordination with a third-party material manager, and construction support.
- Real-time progress reporting – Provided daily and weekly progress status reports directly into POWER360®. Information transfer through POWER's program management information system included contractor scheduling, cost estimating and progress reporting.

MAJOR FEATURES

- 7,600 circuit miles of 138 kV, 161 kV, 230 kV and 345 kV transmission lines

SERVICES

- Engineering
- Program management and project management
- Program cost and schedule controls and execution processes
- Integrated master schedule
- Cost estimating services
- Budgeting, including cash flows and contractor purchase orders
- Risk management
- Program management information system (POWER360®)
- Engineering inspection

AMERICAN ELECTRIC POWER

Transmission Line Rerating Program, Multiple States

AEP undertook one of the largest, most complex projects in its history when PJM Interconnection, a regional transmission operator, required it to re-rate approximately 2,000 miles of transmission line to accommodate increased demands caused by regional retirement of coal-fired generation. Faced with a tight four-year time frame, AEP hired POWER to oversee the effort, identify areas of concern and recommend innovative, cost-effective design solutions that were implemented in time to meet PJM's deadline.

ACCOMPLISHMENTS

- Saved more than $3 billion by remediating, not replacing, the lines. Overall project costs were $72.6 million, and a complete rebuild had been estimated to cost $4 billion. As a result, AEP was able to pay for the remediation in a single year, due to the sale of additional power capacity created by the fixes.
- Avoided costly replacement of approximately 37 lattice towers by modifying tower height, installing floating dead-ends and removing swing-angle brackets to fix the clearance issues.
- Kept project on track by using standard materials as much as possible, reducing lead time and meeting a tight schedule.
- Made complex outage schedule visible at a glance by developing an overlay for AEP's transmission GIS program.
- Reduced delays by assembling all permits before the start of construction.

FEATURES

- 2,000 miles of 138 kV and 345 kV transmission line with 302 locations of concern
- Installed 282 new steel poles and 117 new catenary weights
- Cleared vegetation issues on 547 spans
- Resolved 48 right of way encroachments
- Line locations in Indiana bat habitat and wetland areas, requiring surveys and SWPPP preparation

POWER'S SERVICES

- Sag studies and line modeling
- Detailed engineering
- Project management and program management services
- Cost estimating services
- Outage coordination
- Environmental studies, permitting and compliance

TACOMA POWER
LaGrande 115 kV Line Uprating Study, Washington

POWER provided modeling and thermal capacity analysis of an existing 115 kV transmission line. LiDAR survey data, provided by the client, was processed to develop a rational, high quality PLS-CADD terrain model. Obstructions were identified and line structures and conductors accurately placed in the model. A report was prepared that indicated which structures were overloaded and what reinforcements were required to comply with NESC standards. The current rating of the line was established and all NESC clearance violations identified. The second phase of the project consisted of preliminary engineering and cost estimating and analysis to determine various uprating alternatives for the line. These ranged from an alternative with minimal capital investment (intermediate structures and re sag/tension existing conductors) to restringing new conductor up to the capacity of the existing structures.

SOUTHERN CALIFORNIA EDISON
Eldorado-Ivanpah 220 kV Transmission Line Project, California

Southern California Edison's Eldorado-Ivanpah 220 kV Transmission Line and Substation project will deliver up to 1,400 MW from renewable resources in California and Nevada to load sources in southern California. POWER performed transmission line design for a 35-mile double circuit 220 kV transmission line. Where the new line crosses higher voltage lines, special tubular H structures were designed to route the circuits in a horizontal configuration under the existing lines. The new 220 kV line uses an existing 115 kV line right of way. Similar services are being provided for a secondary communications line which will require overhead ground wire on the Eldorado Lugo 500 kV Line to be replaced with optical ground wire. The change out requires structural modifications to the 500 kV towers and outage management. POWER is also providing owner's engineering and construction management services for the project.

SAN DIEGO GAS AND ELECTRIC
Cleveland National Forest Power Line Replacement, California

SDG&E operates and maintains electrical facilities within and outside the Cleveland National Forest (CNF). This power line replacement project was required as part of SDG&E's effort to increase the safety and reliability of existing electric facilities within CNF, including the design of fire-resistant steel poles in this active wildfire region. It requires the replacement of nine 12 kV and 69 kV power lines spread over approximately 880 square miles in eastern San Diego County.

POWER is providing an extensive and experienced engineering staff to perform the engineering as well as bringing on, and managing, seven subcontract firms to meet the 40% DBE participation target. POWER

also provided an experienced Project Manager, Project Controls Manager and Document Control Manager to work closely with SDG&E to form an integrated team.

POWER'S SERVICES

- Project Management
- Support for CPUC filings
- Visualizations and simulations
- Detailed engineering design for overhead transmission and distribution lines
- Detailed engineering design for underground distribution lines
- Bill of materials
- Steel pole inspection at manufacturer's facilities
- Micropile installation supervision
- Complete construction specifications
- Construction support during construction
- As-built drawings

ACCOMPLISHMENTS

- Designed project approach with seamless transitions from preliminary to final design and construction
- Design of fire-resistant steel poles
- Work in difficult mountainous terrain
- Endangered animals
- POWER identified six major tasks (Mobilization, Performance Management, Project Controls, Document Management, Subcontract Management, and Closeout) to verify engineering, permitting, procurement, and construction activities accounted for the restrictions and limitations while staying on schedule
- Project is currently on schedule and within budget
- Exceeding diversity goals

For the Riverside Transmission Reliability Project POWER is providing conceptual and detailed engineering, procurement, contractor selection assistance, and engineering support during construction.

PROJECT FEATURES

- Replace approximately 2,100 existing wood poles with fire-resisting, self-weathering steel poles to meet USFS permitting requirements and minimize visual impacts
- Enhance the safety and reliability of the system
- Minimize environmental impacts during construction
- Support combining more than 70 individual permits for operating and maintaining the system within CNF into one Master Special Use Permit with the USFS
- Aggressive schedule with environmental and seasonal restrictions
- Seventeen separate design engineering and construction packages
- 69 kV subtransmission with 12 kV distribution underbuild and 12 kV distribution standalone facilities
- Removal of 22 miles of existing overhead lines and access roads
- Approximately 26 miles of new underground distribution and 122 miles of overhead transmission and distribution.

RIVERSIDE PUBLIC UTILITIES/SOUTHERN CALIFORNIA EDISON
Riverside Transmission Reliability Project, California

POWER is providing environmental licensing, engineering, and engineering procurement, property acquisition, and construction support services for the Riverside Transmission Reliability Project, a major 230 kV and 69 kV upgrade to the City of Riverside's electric system. The project will add a second 230 kV transmission line interconnection to the Southern California Edison transmission grid.

During Phase I of the RTRP, POWER conducted a routing study to identify four alternative routes for the 230 kV and 69 kV transmission lines within the highly urban areas of western Riverside and San Bernardino Counties. The POWER environmental team in close coordination with SCE and city staff determined that an Environmental Impact Report would need to be developed with the City of Riverside acting as CEQA Lead Agency. Phase II provided the city with a certified Final Environmental Impact Report that was approved by city council with CPUC acting as a Responsible Agency under CEQA. POWER has also provided substation and transmission line design, and construction support for the 69 kV systems within Riverside Public Utilities' electric system.

To comply with GO No. 131-D requirements, a Certificate of Public Convenience and Necessity (CPCN) for the 230 kV transmission line and new 230 kV Wildlife substation will be applied for by SCE utilizing the certified EIR prepared by POWER. This process and approach, developed by the team, avoided the need for SCE to develop a separate Proponent's Environmental Assessment (PEA) which would have put the CPUC as lead agency dictating routing and environmental review, including mitigations, and would likely have lengthened the licensing schedule.

POWER is providing conceptual and detailed engineering for many of the components of the RTRP, including the new 230-69 kV Wildlife/Wilderness Substation, four new double circuit 69 kV transmission line segments; and upgrades to eight existing 69 kV substations. POWER has completed and submitted the design to upgrade Harvey Lynn and Freeman substations, which included breaker replacement work. In addition to design, POWER is providing procurement, contractor selection assistance, and engineering support during construction.

The RTRP project received over 200 pages of public comments on the Draft Environmental Impact Report. POWER worked to diligently and quickly respond to all comments and prepared a defensible Final Environmental Impacts Report that was approved by the City Council and also withstood a CEQA challenge in Los Angeles County court.

TURLOCK IRRIGATION DISTRICT

Fairground to Industrial 69/12 kV Transmission Line Project, California

Turlock Irrigation District hired POWER to perform design and engineering services for Turlock's Fairground to Industrial 0.5-mile double-circuit 69 kV line. The structures needed to accommodate double-circuit 12 kV distribution and ADSS underbuild. POWER coordinated with Turlock to accommodate existing distribution service feeders and taps as well as permitting for a crossing of Highway 99.

FEATURES

- Angle structures comprised engineered structures on reinforced concrete pier foundations.
- Tangent and distribution tap structures consisted of light duty steel structures with direct embedded foundations and engineered soil backfill.

POWER'S SERVICES

- Structure spotting
- Detailed design and engineering
- Material procurement documents and support
- Construction support
- Permitting support

SOUTHERN CALIFORNIA EDISON

Eldorado-Ivanpah Transmission Project Owner's Engineer & Construction Management, Multiple States

The Eldorado-Ivanpah Transmission Project (EITP) was needed to get a highly visible solar client's energy to the electrical grid. The project included modifications to an existing 500 kV line and a new double-circuit, self-supporting lattice, 220 kV transmission line constructed through a very environmentally sensitive area and along two state boundaries. California and Nevada environmental oversight was extreme, focusing on SWPPP, dust control, water restrictions, and protection of endangered species, such as the desert tortoise. As SCE's Owner's Engineer/Construction Manager, POWER provided oversight and coordination of the construction process to meet challenging in-service deadlines, promote a culture of safety, and prevent environmental violations.

ACCOMPLISHMENTS

- Developed new models to manage linear projects, using special tooling, tracking, and problem-solving methods approach.
- Mobilized our signature POWER360® management and collaboration tool to communicate daily project status and share GIS-linked bird nesting areas and bird buffers, map-linked field pictures, detailed reporting and action items.
- Used an innovative GPS-based helicopter navigation system to automate communication of latitude/longitude locations of next locations and buffers.

- Completed the project successfully on time and under budget, despite unexpected delays, to meet the accelerated in-service schedule that had been cut by 8 months.
- Achieved a low safety incident record well below industry levels, with no fatalities or serious injuries.
- Achieved a no-take record of protected plants and species.
- Leveraged key partnerships with DVBE and DBE businesses to assist SCE in achieving specific regulatory and company goals.
- Submitted helicopter plans to gain permits for a Sikorsky S-64 Sky Crane and McDonnell Douglas 530FF for use during construction.

PROJECT FEATURES

- Demolition of existing 35-mile historical 115 kV transmission line.
- New construction of 35-mile double circuit 220 kV transmission line, and OPGW installation.
- Communications wire change-out requiring structural modifications to 500 kV towers.
- Micropile foundations used in difficult rocky conditions.

POWER'S SERVICES

- Design engineering
- Owner's engineer
- Permit support
- Construction management
- Inspection
- Material vendors' assessment/oversight
- Environmental coordination
- Project and program reporting through POWER360®
- Change management
- Risk management
- Schedule oversight and problem resolution
- Construction specification and RFP creation
- Contractor selection support
- Safety reporting

SOUTHERN CALIFORNIA EDISON

Tehachapi Renewables Project 500 kV and 220 kV Transmission Lines, California

The Tehachapi Renewable Transmission Project (TRTP) is the first major transmission project in California being constructed specifically to access multiple renewable generators in a remote renewable-rich resource area. The project is driven by California's aggressive renewable energy mandates. The TRTP includes 250 miles of new and upgraded 500 kV and 220 kV transmission facilities and substations and is being constructed in phases. POWER is providing final design engineering and construction documents for the new Mesa to Mira Loma 500 kV (Segment 8) transmission line. This part of the overall TRTP includes constructing nearly 33 miles of new single- and double-circuit 500 kV transmission line, removing several miles of 220 kV line structures and constructing approximately 7 miles of new double-circuit 220 kV line.

Final design engineering includes final structure spotting, plan and profile drawings, outage and temporary construction planning, foundation design and drawings, detailed access road planning, design and drawings, load drawings and specifications for tubular steel poles, material lists, tower data sheets and preparation and compilation of the complete construction drawing package. For several other project phases POWER has provided cost estimating, preliminary engineering, structure spotting, access road layout, disturbance area identification, impact calculations, and expert witness testimony to support the Proponent's Environmental Assessment for the California Public Utilities Commission.

SOUTHERN CALIFORNIA EDISON
Devers to Valley 500 kV Transmission Line, California

Southern California Edison contracted with POWER Engineers to complete all of the engineering for 60 miles of 500 kV and seven miles of 220 kV lines from the SCE Devers substation to the Valley substation. The line design included all of the SCE lattice tower families and some tubular self- supporting poles. Included in the project was creation of required crossing drawing road access drawings and FAA information for SCE submittal to the different agencies. The project was completed on time and on budget.

SERVICES

- Preliminary and final transmission line design
- Cost estimates
- Structure spotting
- Foundation design
- Construction bid packages and IFC drawings
- Construction support
- Record drawings and documents
- Support for environmental issues and compliance
- Geotechnical plan and borings
- Expert witness testimony to the CPUC

CIVIL/STRUCTURAL PROJECT DELIVERABLES

- All access road and grading construction drawings, including:
  > Construction and permanent roads
  > Spur roads
  > Structure pads
  > Material staging areas
  > Conductor stringing set-up areas
  > Disturbance areas
  > Cut and fill quantities
  > Impact calculations
- Supporting environmental compliance
- Expert witness testimony to the CPUC

SOUTHERN CALIFORNIA EDISON
Devers to Palo Verde #2 500 kV Transmission Line, California

POWER provided construction cost estimates and air quality analysis to support SCE in its supplemental information submittal to the California Public Utilities Commission (CPUC) as part of the Proponent's Environmental Assessment (PEA) evaluation process. The project includes the construction of a new 227-mile, 500 kV transmission line between California and Arizona, within SCE's existing transmission corridor and parallel to an existing transmission line. POWER provided cost estimates for 500 kV lattice tower transmission lines and met with SCE engineering personnel to evaluate potential material and construction costs (vehicles, equipment, materials, etc.) based on SCE design and construction standards.

POWER also investigated the effects of construction practices on air quality to support the PEA by supplying various equipment tables and schedules that demonstrated typical equipment used on the projects, amounts of emissions that would typically be emitted into the atmosphere, the amount of usage and number of trips on various roads, as well as the durations of usage for each equipment type used for construction.