City of Arts & Innovation

# City Council Memorandum

**TO:** **HONORABLE MAYOR AND CITY COUNCIL** **DATE: MAY 13, 2025**

**FROM:** **PUBLIC UTILITIES DEPARTMENT** **WARDS: ALL**

**SUBJECT:** **RIVERSIDE TRANSMISSION AND RELIABILITY PROJECT - LOWER VOLTAGE ALTERNATIVES**

## ISSUES:

Receive information on lower voltage alternatives for the Riverside Transmission and Reliability Project.

## RECOMMENDATIONS:

That the City Council receive information on lower voltage alternatives for the Riverside Transmission and Reliability Project.

## BACKGROUND:

The California Public Utilities Commission (CPUC) approved the Riverside Transmission and Reliability Project (RTRP) in 2020. RTRP involves constructing and operating a new, double-circuit 230kV transmission line and new 69kV lines (within RPU's service territory). It also includes a new 230kV substation (Wildlife Substation) for Southern California Edison (SCE) and a new 230/69kV electrical substation (Wilderness Substation) for Riverside Public Utilities (RPU). The new 230kV line would interconnect to SCE's Mira Loma – Vista #1 230kV transmission line and terminate at Wilderness Substation.

The transmission capacity provided by RTRP is critically needed and designed with best available technology to ensure the City of Riverside has a safe and reliable electric distribution system to serve the City's existing customers and support additional growth within the City limits. The purpose and need for the RTRP has not changed since the project's inception. RPU's electricity loads exceeded capacity standards for a safe and reliable electric grid in 2006 for the loss of transformers at the Vista Substation and then in 2024 for the second condition, the loss of a subtransmission line out of the Riverside Energy Resource Center. The RTRP will provide an additional 560-MW of capacity and a much-needed second interconnection to the regional grid.

The Riverside City Council approved the project with a certified environmental impact report (EIR) in 2013. The CPUC granted SCE a Certificate of Public Convenience and Necessity (CPCN) and directed SCE to construct the project on March 18, 2020. The City Council reaffirmed its support and commitment to the RTRP on May 14, 2024 (attached report). As explained in the attached

report, Riverside's current distribution system capacity supports electricity demand that exceeds the electric utility industry's prudent operating standards and practices to maintain a safe and reliable electric grid (see attached Federal Energy Regulatory Commission Reliability Primer).

As part of the approval process and before their decision, the CPUC requested a detailed analysis of various alternatives with a specific focus on low voltage alternatives (see attached Lower Voltage and Other Design Alternatives Report (Lower Voltage Report)). The CPUC determined, based on the criteria for approving the project, that the RTRP was the preferred alternative due to having lower costs and lesser impact on the environment. When the Lower Voltage Report was completed, the proposed RTRP did not include undergrounding 2.1 miles of the transmission lines through Jurupa Valley, which the CPUC ultimately approved. The cost of the approved RTRP increased from $405.3 million (in nominal 2023 dollars) to $521 million – an increase of $115.7 million. Regardless of the final approved project, the costs for the lower voltage alternatives were compared to the initial cost estimate of $405.3 million; however, it could be assumed that similar undergrounding and additional costs would be incurred by the lower voltage alternatives, raising those options costs.

On February 4, 2025, Council Member Conder requested a briefing "…on the potential cost savings via multiple 69 kV lines vs. single 220 kV line. What are the cost savings of parallel lower voltage lines and undergrounding for fire protection?" This staff report and presentation provide the requested overview.

## DISCUSSION

When evaluating alternatives to RTRP, the project purpose and need must be met, as well as other factors. The CPUC identified these criteria in their evaluation of the alternatives.

Essential to the evaluation of the alternatives was the requirement to evaluate each alternative against the following criteria:

1. Does the Alternative avoid or substantially lessen significant effects of the [proposed project], 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 (below)?
3. Is the Alternative feasible?

The RTRP has a defined purpose and need, as outlined and discussed in the 2013 FEIR. The project objectives, which still stand today, are:

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

An additional and reasonable requirement to help minimize costs and environmental impacts was that the alternative evaluated had to be sourced from SCE’s existing or planned substations closest to Riverside (if planned, the substation had to be completed in a timely manner to meet

the RTRP objectives). None of the alternatives were found to be superior to the proposed RTRP project and would have had greater environmental impacts or would not have satisfied the project objectives.

Three lower voltage alternatives were evaluated. Each is described below (for full details of the alternatives, see the attached Lower Voltage Report):

- Alternative A – Single Source; Total firm 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.

- 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.

The total length of the transmission lines and the total number of structures to support the lines for the three alternatives, substation consideration, and costs compared to the RTRP were:

- **RTRP** (as studied in the Lower Voltage Report):
  - 9.7 miles for two 230 kV transmission lines along one route
  - 63 structures (47 steel poles, 12 lattice towers, 4 riser poles)
  - Cost: $405.3 million nominal 2023 dollars
- **Alternative A:**
  - 43.8 miles for seven 69 kV lines on three double-circuit routes and one single-circuit route crossing 207 parcels
  - 654 structures (650 steel poles, 4 riser poles)
  - Requires expansion and reconfiguration of the Mira Loma Substation
  - Cost: $499.1 million
- **Alternative B:**
  - 30.3 miles for seven 69 kV lines on two double-circuit routes and one single-circuit route crossing 118 parcels
  - 335 structures (333 steel poles, 2 riser poles)
  - Utilizes Mira Loma and Etiwanda Substations and requires construction and reconfiguration of a new Circle City Substation (located in Corona)
  - Cost: $1,064.2 million in nominal 2023 dollars

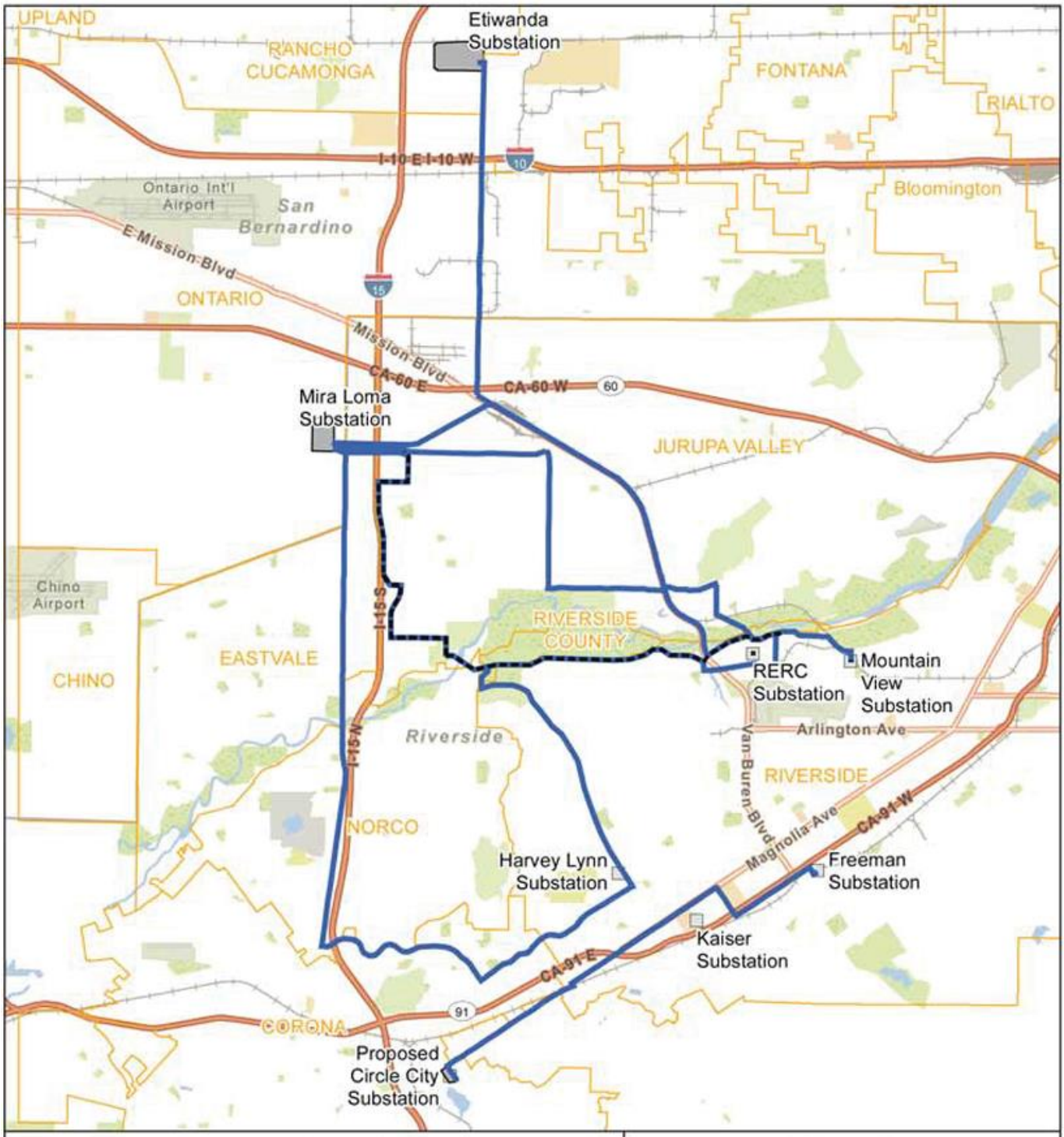


Figure 1

**69 kV Alternative Routes**

- **Alternative C:**
  - 20.2 miles for four 69 kV lines on two double-circuit routes crossing 77 parcels
  - 409 structures (407 steel poles, 2 riser poles)
  - In the City of Riverside, 360 to over 500 acres of land to support the PV solar facility and BES (unknown number of parcels or location)
  - Utilizes the Mira Loma Substation
  - Cost: $503.4 million in nominal 2023 dollars

For each of the alternatives to meet the objectives of the Project (as listed above), they had to provide a similar or greater capacity to deliver sufficient electricity to the City of Riverside and RPU's distribution system to meet the prudent safety standards to ensure reliable electric service. Because of the need to provide a minimum of 560 MW of capacity for existing customers and new load growth, each alternative was designed to meet the defined need. As such, they include more power lines, poles/structures with the associated right-of-way easements, and an increase in the needed infrastructure and land area at each of SCE's substations. These factors are key contributors to the increased environmental and cost impacts of the alternatives.

The RTRP was designed as a transmission project to provide the most effective and efficient design to deliver the needed capacity to Riverside. Electric power transmission is the bulk transfer of electrical energy from generating power plants to electrical substations. Electricity is transported on transmission lines over long distances at high voltages of 200kV or more, which minimizes the loss of electricity, maximizing efficiency. The RTRP includes two parallel 230 kV lines.

Losses of electricity on lines are inevitable. When electricity flows on a wire, some energy is dissipated as heat, known as losses. This is due to the electrical resistance. The losses are proportional to the current flowing through the wire. The higher the current, the greater the losses will be.

Electricity is measured in units of power called Watts. Watts is determined from the product of current (measured in amps) and voltage (measured in volts). In a power system, the voltage is constant while the current fluctuates based on consumer demand. The power consumption over time is measured in watt-hours, as seen on electric utility bills. As the voltage on the lines decreases, the loss of electricity along the line increases – meaning that more lines are necessary to deliver the same amount of power.

All the lower voltage alternatives require additional lines and routes because the lines will be at a lower voltage. Lower voltage lines have higher power losses than higher voltage lines – hence the need to have multiple lines to achieve the same amount of power delivered to Riverside. To minimize the losses of electricity and maximize efficiency, higher voltage transmission lines, like the RTRP, are typically used.

*Lower Voltages Alternatives are Technically Infeasible*

Expanding Vista Substation

One of the first alternatives that was evaluated was to expand the Vista Substation and provide more capacity to Riverside through this existing infrastructure. However, there is not enough physical space to expand the Vista Substation.

The Vista Substation was planned and designed for four 230/69kV transformer banks due to safety, reliability, operational flexibility, short circuit duty, and load-serving capability

considerations. There are four 230/69 kV transformer banks at Vista Substation (the maximum build-out for this substation), with two banks dedicated to the City of Riverside, which are already at their maximum capacity with no expansion possible. The other two banks are reserved for SCE's distribution needs in the area. Because Vista is situated at the top of a knoll and surrounded by residences, Interstate 215, and the Santa Ana River, no land area is available to expand the substation. Therefore, this alternative was rejected because the Vista Substation has insufficient electrical capacity. Additionally, it does not provide RPU with a second point of interconnection to the transmission system and would not meet the reliability objectives of RTRP.

69kV Alternatives

The first 69kV alternative, Alternative A, would require two transformers to provide 560 MW of capacity to be installed at the Mira Loma Substation. This constitutes a technological constraint because, at this time, only one transformer position is available. Installing two transformers would require additional land area and some reconfiguration of the existing equipment at the substation, also increasing the impacts of the substation on neighboring properties.

Alternative B presents significant difficulties due to spatial limitations and the number of lines that would have to be crossed. Additionally, the second alternative 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 to reach the proposed Circle City Substation site. This alternative actually increases the number of miles of the new 230 kV transmission line compared to the RTRP Hybrid Proposal by at least two miles to provide electricity to the Circle City Substation. This new 230 kV transmission line would traverse through more densely developed and populated areas in Eastvale, Norco, and Corona than the areas affected by the RTRP.

Similar to the first alternative, Alternative C would require two transformers to be installed at the Mira Loma Substation. As stated above, this constitutes a technological constraint because, at this time, only one transformer position is available. Additionally, Alternative C requires the design and construction of a large-scale PV and BES facility within Riverside's service territory. Finding a site for this purpose is also likely infeasible. A site has not been identified within the City where a facility of the requisite size – which SCE and Riverside estimate would need a minimum of 360 acres of land and more likely 600 acres suitable for a 60 MW solar facility – could realistically be sited. Any site would likely need to be larger than this to account for terrain, access, and setbacks from any existing residential. 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.

RPU would need to upgrade or add substations for all these alternatives. Riverside's existing distribution system infrastructure cannot support multiple additional 69 kV connections at its current substations. The following detailed studies are still needed: power flow analyses, relay protection coordination, short-circuit duty, grounding, charging current, and extending the synchronous optical network (SONET) to SCE substations, depending on further consideration of lower-voltage alternatives and evaluating system performance and determining whether any upgrades—such as line additions, substation upgrades, reconfigurations, or the construction of a new 69 kV switching station—will require further studies. These upgrades may trigger additional project approvals and implementation delays, thereby increasing the risk of failing to meet the reliability objectives of the RTRP Hybrid Proposal, as well as additional costs related to new improvement sites (costs for RPU's infrastructure upgrades were not included in the Lower Voltage Report analysis).

## *Environmental Impacts Increase for Lower Voltage Alternatives*

Many routes identified for the 69 kV Alternatives did not undergo detailed review as part of the 2013 FEIR process, meaning that since many of the alternatives need additional lines, baseline data collection and impact evaluations would be necessary for two or three additional routes depending on the alternative. For example, all three alternatives would be constructed on lands that could support sensitive biological resources regulated under the Western Riverside County Multiple Species Habitat Conservation Plan (MSHCP). As a result, consultations with the Regional Conservation Authority and the preparation of an MSHCP Consistency Analysis Report are likely required. Due to the number of crossings over the Santa Ana River, an MSHCP Determination of Biologically Equivalent or Superior Preservation (DBESP) may also be necessary. Additionally, potential impacts to federally listed species in San Bernardino County would require surveys and consultations with the 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 Act may also need to be implemented, given the absence of a federal nexus. Impacts to state-listed species could require consultations with the California Department of Fish and Wildlife (CDFW), and an Incidental Take Permit (pursuant to Section 2081(b) of the Fish and Game Code) may be required. All alternatives may involve mitigation fees related to impacts on vernal pool wetlands, small mammals, and burrowing owl habitat near the Mira Loma Substation.

Several identified corridors may also affect water resources, potentially requiring authorization under the Clean Water Act (CWA) Section 404, a CWA 401 Water Quality Certification, Waste Discharge Requirements, and/or a Streambed Alteration Agreement. Federal and state laws protect cultural resources within these corridors, and meeting the criteria for significance under the National Register of Historic Places may also require surveys and consultations with the State Historic Preservation Officer. Environmental surveys (biological, water, and cultural) mandated by regulatory agencies could take up to three years based on required protocols. These surveys would then be used for consultations with the agencies mentioned above.

Because the number of routes increases with each of the alternatives, aesthetic impacts also increase. All alternatives included a portion of the lines both above and below ground. Undergrounding of these routes would incur significant cost increases because undergrounding all portions of the project would cost over four times more than overhead lines. At the time of the study, it was estimated that the average cost for overhead 69 kV was $1.85 million per mile, and the cost for undergrounding 69 kV was $7.75 million per mile (nominal 2023 dollars estimated in 2017). These costs would be higher now.

Also, due to the increased number of routes, the alternatives all have an increased impact on population, housing, and environmental justice communities. This is simply due to the need for additional lines for a lower voltage alternative to meet Riverside's needs.

The table on the next page is a summary of the environmental impact that would be expected when compared to the RTRP (as evaluated in the study).

| 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 |

*Implications of a Lower Voltage Alternative – Riverside Incurs Project Costs*

Riverside would likely need to pay for the design, permitting, and construction of any lower voltage alternatives because they would not be considered to be transmission under FERC and CAISO rules. In late 2004, Riverside submitted an application to SCE for the RTRP, proposing the establishment of a second 230 kV point of interconnection based on its analysis of reliability considerations. Riverside determined this design to be the most reliable solution for providing service. In June 2006, the CAISO approved the RTRP as "a necessary and cost-effective addition to the ISO Controlled Grid," directing SCE to complete construction of the RTRP as soon as possible, ideally by the second quarter of 2009. In 2009, FERC approved the Transmission Owner (TO) Tariff Interconnection Agreement between SCE and Riverside, which established the terms

for the development and construction of the RTRP.

FERC oversees the interstate transmission of electricity, including the CAISO, which operates transmission systems within its jurisdiction. Transmission system owners are subject to the CAISO's tariff. Under the CAISO Tariff, and as relevant to the RTRP, costs associated with High Voltage Transmission Facilities (200 kV or greater) that fall under CAISO's "Operational Control" are recovered through the High Voltage Access Charge (HVAC), regardless of ownership. The Transmission Owner (TO) can recover a share of the HVAC proportional to its retail load (MWh). SCE and Riverside pay their share of the HVAC costs based on their respective loads, as do all other load-serving entities using the high-voltage CAISO-controlled grid. Thus, under the current HVAC design, the costs for the RTRP are shared among all users of the high-voltage CAISO-controlled grid, proportional to their usage.

The CAISO-controlled grid also includes lower voltage transmission facilities, such as those operating at 138 kV or 69 kV. The costs for these lower voltage transmission facilities are recovered under the Low Voltage Access Charge (LVAC), with customers in a Transmission Owner's Transmission Access Charge Area who take service from these facilities responsible for paying the LVAC.

In contrast to CAISO-controlled transmission, most of SCE's distribution service falls under the jurisdiction of the CPUC, which governs retail rate authority. However, when distribution facilities are used to serve wholesale loads, such as Riverside's, FERC retains rate jurisdiction. SCE's tariffs for wholesale customers, under FERC's jurisdiction, include the TO Tariff and the Wholesale Distribution Access Tariff (WDAT). The WDAT governs the transportation of power through SCE's Distribution System, which is typically separate from the CAISO Grid and serves local loads. Facilities or parts constructed by the Distribution Provider for the sole benefit of a specific Distribution Customer are called "Direct Assignment Facilities," and the costs are recovered from the users of those facilities. Under the current CAISO Tariff, the 69 kV Alternatives would not fall under the HVAC or LVAC.

RPU believes the 69 kV Alternatives would be considered non-CAISO-controlled distribution assets directly assigned to Riverside. If this were the case, the costs would be recovered through the WDAT, and the responsibility for most of the costs would fall on Riverside ratepayers. While tariffs can be modified through an application to FERC, SCE does not anticipate applying for such a change, nor does it consider such a change appropriate. However, Riverside has the right, under the Federal Power Act, to seek changes to the tariffs. Both SCE and Riverside agree that FERC has jurisdiction to determine how the 69 kV Alternative facilities should be classified for cost allocation.

*Longer Timelines for Lower Voltage Alternatives*

It is impossible to develop, design, and construct the lower Voltage Alternatives within the same period as the RTRP. As discussed in the Lower Voltage Report and noted in this staff report, technological challenges and environmental impacts are likely greater than the approved project. Lower voltage alternatives are also more costly than the RTRP. A lower voltage alternative does not avoid or reduce the project's environmental impacts, cost, or timing.

Concerning timing, all three alternatives discussed in the Lower Voltage Report are expected to increase the timeframe for project completion relative to the RTRP. Depending on the extent of subsequently required engineering and design modifications, as well as permitting and related regulatory proceedings, acquisition of property, and easements, the additional time necessary for the completion of any of the Alternatives would be five years or more.

*Reduction of Fire Risk*

In general, the undergrounding of electrical lines reduces wildfire risk. Underground lines are protected from weather, falling debris, and accidental contact, which minimizes the chance of electrical faults or sparks that could ignite a fire. However, at the request to review this project with underground 69kV lines, the costs would be significantly higher and paid by Riverside ratepayers, create greater environmental impacts, and increase the project's timeframe.

In the decision denying the City of Norco's Petition for Modification of Decision 20-03-001, the Administrative Law Judge reiterated: "The Commission's SEIR determined the project poses a less-than-significant risk of wildfire. The Commission's SEIR also considered and eliminated "Alternative 8," which was a proposal to underground the entire transmission line." Commissioner Randolph, in her comments following the CPUC's vote denying the City of Norco's Petition for Modification, expressed that the CPUC takes consideration of wildfire hazards very seriously and that SCE would be using technologies in their development and construction of the RTRP that would comply with all requirements for electric equipment to reduce wildfire risk as established by both the CPUC and the Office of Energy Infrastructure Safety.

*Conclusion*

Lower voltage alternatives are not suitable or feasible and do not result in cost savings.

- Lower voltage alternatives do not meet most, if not all, of the project's key objectives and include infeasible system upgrades at SCE's substations.
- All alternatives would result in greater environmental impacts than the RTRP, further rendering them unsuitable.
- Alternatives are not viable substitutes for the RTRP, as they cannot be successfully implemented within a reasonable timeframe, considering economic, environmental, legal, social, and technological factors, along with other considerations that justify rejecting impractical or undesirable alternatives.
- Alternatives result in higher costs, and undergrounding these routes would incur significant cost increases because undergrounding would cost over four times more than the cost for overhead lines, and the majority of the costs would be burdened by Riverside ratepayers.

The need for a second interconnection to ensure safe and reliable electricity for the City of Riverside, as a regional hub for the Inland Empire, has not changed since the inception of the RTRP. Choosing any of these lower voltage alternatives could result in significant delays to a project almost twenty years past its original CAISO approval date. It remains critical in addressing significant reliability risks.

**The lower voltage alternatives do not effectively meet Riverside's system needs and are inferior to the RTRP.**

## STRATEGIC PLAN ALIGNMENT:

This item contributes to **Strategic Priority No. 6 - Infrastructure, Mobility & Connectivity** and **Goal 6.2**. - Maintain, protect and improve assets and infrastructure withing the City's built environment to ensure and enhance reliability, resiliency, sustainability and facilitate connectivity.

This item aligns with each of the five Cross-Cutting Threads as follows:

1. **Community Trust** – Riverside is actively engaged with the Riverside Transmission Reliability Project (RTRP) and is providing timely and reliable information to inform policy makers on potential actions that may need to be taken to protect and serve the public interest.

2. **Equity** – Riverside is supportive of the City's racial, ethnic, religious, sexual orientation, identity, geographic, and other attributes of diversity and is committed to advancing the fairness of treatment, recognition of rights, and equitable distribution of services.

3. **Fiscal Responsibility** – RTRP as designed and approved has been found to be the most economic and fiscally responsible method for project delivery to Riverside customers.

4. **Innovation** – Riverside is keeping abreast of interconnection needs to the state electric transmission grid to respond to and prepare for any potential impacts to the community.

5. **Sustainability & Resiliency** – The need for RTRP was derived by the need for reliable supply of electricity. Riverside's lack of sufficient electric delivery capacity from the state electric grid created a risk to the resiliency of the City. RTRP addresses those needs.

**FISCAL IMPACT:**

There is no fiscal impact associated with this informational report.

| | |
|---|---|
| Prepared by: | David Garcia, Utilities General Manager |
| Certified as to availability of funds: | Kristie Thomas, Chief Financial Officer |
| Approved by: | Mike Futrell, City Manager |
| Approved as to form: | Rebecca McKee-Reimbold, Interim City Attorney |

Attachments:
1. City Council Staff Report from May 2024
2. RTRP Lower Voltage and Other Design Alternatives Report
3. Federal Energy Regulatory Commission Reliability Primer
4. Presentation