Proposed SCE Reliability Transmission Projects

2026-2027 Transmission Planning Process

Stakeholder Meeting | September 23-24, 2026

Proposed Reliability Projects for the 2026-2027 TPP

- SCE conducts its Annual Transmission Reliability Assessment (ATRA) in coordination with the CAISO. Based on the results, SCE is submitting the nine reliability projects listed below into the 2026-2027 TPP request window.
- The estimated cost range incorporates unit costs in escalated dollars. No detailed engineering was performed as part of the scope development assessment for the project; final scope details will depend on completion of final engineering.

#	Project	Cost Range	Proposed ISD
1	Whirlwind 230 kV SCD Upgrade	$123M to $165M	Q2 2036
2	Rio Hondo 230 kV SCD Upgrade	$1.6M to $2.2M	Q2 2031
3	Whirlwind 500 kV Transmission Line Relocation	$50M to $121M	Q2 2032
4	Mesa 1AA (Fourth) Bank Project	$111M to $149M	Q2 2034
5	Mesa-Vincent No. 2 500 kV Line Conversion	$201M to $262M	Q3 2034
6	Vincent 500 kV Reactive Power Reinforcement	$272M to $365M	Q2 2036
7	Mohave 500 kV Voltage Support	$58M to $78M	Q2 2033
8	New Coolwater CRAS	$10M to $13M	Q4 2031
9	Devers 500 kV Reactive Power Reinforcement	$345M to $455M	Q2 2034
	Portfolio total (9 projects)	**$1.17B to $1.61B**	

1. Whirlwind 230 kV SCD Upgrade

Splitting the 230 kV switchrack and adding a fourth AA bank resolves the SCD exceedance.

Scope of Proposal

- SCE is proposing to split the Whirlwind 230 kV switchrack by opening the existing sectionalizing breakers to mitigate Short Circuit Duty (SCD) issues, and to install a fourth 500/230 kV, 1,120 MVA transformer (AA bank) at Whirlwind 230 kV substation. The fourth AA bank is needed to enable the Whirlwind 230 kV split configuration.
- All proposed work is within the substation. Figure 1-1 depicts the geographical project area in Southern California; Figure 1-2 depicts the preliminary one-line diagram with the proposed upgrades to the Whirlwind 230 kV switchrack.

Figure 1-1: Geographical project area in Southern California.

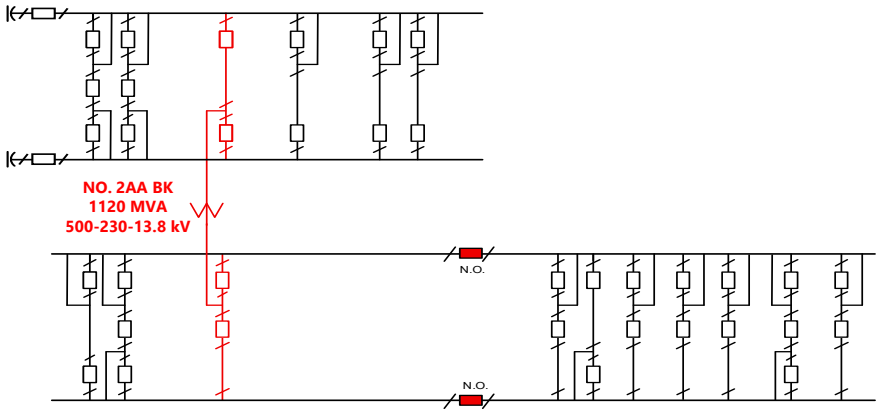


Figure 1-2: One-line diagram highlighting the Whirlwind 230 kV switchrack split and the proposed transformer.

1. Whirlwind 230 kV SCD Upgrade

Short-circuit duty exceeds the 63 kA breaker rating at Whirlwind 230 kV by 2036.

Needs Identification

- In the 2026-2027 TPP, SCD at Whirlwind 230 kV is projected to exceed the interrupting rating (63 kA) of all circuit breakers on the 230 kV bus by 2036.
- SCE proposes mitigations when SCD reaches 95% of CB rating in near-term cases (2 and 5 years) and 100% in long-term cases (10 and 15 years), allowing time for complex scopes and long lead times.
- Sectionalizing breakers cannot be closed without exceeding breaker ratings: under N-1 with two AA banks in parallel, the Whirlwind 230 kV SLG fault exceeds CB capability. Post-project fault duty stays below CB ratings across the study horizon.

Table 1.1: Effectiveness of Proposed Mitigation (Eff. kA / % Duty)

Case / Substation	2028	2031	2036	2041
SLG Pre - Whirlwind 230 kV	59.6 / 94.6%	59.7 / 94.8%	72.0 / 114.2%	72.1 / 114.4%
SLG Post - Whirlwind 230 kV	59.6 / 94.6%	59.7 / 94.8%	53.1 / 84.3%	53.2 / 84.4%
SLG Post - Whirlwind_2 230 kV	N/A	N/A	45.0 / 71.5%	45.1 / 71.6%
3PH Pre - Whirlwind 230 kV	53.9 / 85.6%	53.8 / 85.4%	60.2 / 95.6%	60.3 / 95.8%
3PH Post - Whirlwind 230 kV	53.9 / 85.6%	53.8 / 85.4%	43.7 / 69.3%	43.7 / 69.4%
3PH Post - Whirlwind_2 230 kV	N/A	N/A	39.7 / 63.0%	39.7 / 63.1%
SLG - Sect. CBs closed, two AA banks in parallel	59.6 / 94.6%	59.7 / 94.8%	63.1 / 100.1%	63.1 / 100.2%

1. Whirlwind 230 kV SCD Upgrade

An 80 kA rebuild was rejected on constructability; cost $123M-$165M, in service Q2 2036.

Alternatives Considered

- Replacing the CBs to upgrade the switchrack to 80 kA was evaluated. It is comparable in cost and schedule but poses significant constructability challenges from required work sequencing and outages and adds no transformer capacity.

Estimated Cost and Proposed In-Service Date

- Estimated cost is $123-$165 million in escalated 2036 dollars, accounting for material variability, supply chain issues, and construction delays. No detailed engineering was performed; final scope depends on final engineering.
- The proposed in-service date is June 30, 2036.

2. Rio Hondo 230 kV SCD Upgrade

Upgrading one breaker to 50 kA clears the Rio Hondo 230 kV short-circuit duty exceedance.

Scope of Proposal

- SCE is proposing to increase the interrupting capacity rating of one circuit breaker to 50 kA or greater (X/R = 35) to mitigate Short Circuit Duty (SCD) issues at Rio Hondo 230 kV substation.
- Figure 2-1 depicts the geographical project area in Southern California. Figure 2-2 depicts the preliminary one-line diagram with the proposed upgrades to the Rio Hondo 230 kV switchrack.

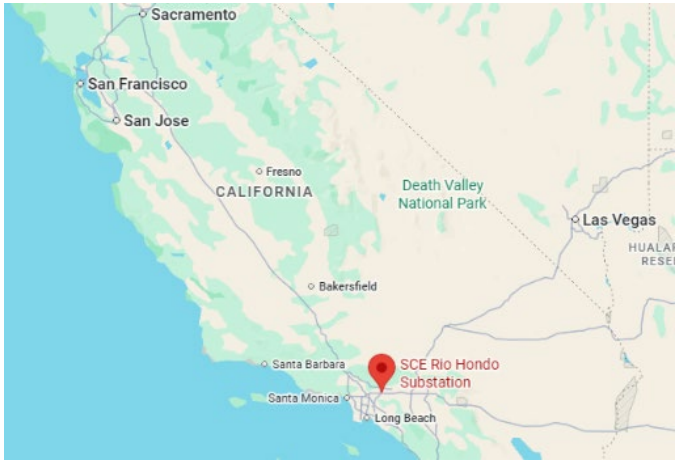


Figure 2-1: Geographical project area in Southern California.

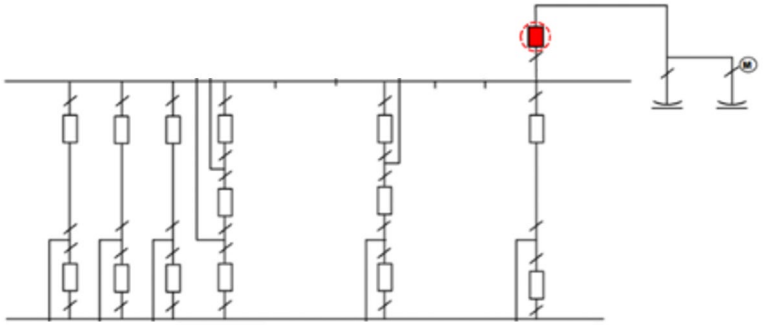


Figure 2-2: One-line diagram highlighting the Rio Hondo 230 kV CB to be upgraded to 50 kA interrupting capacity rating.

2. Rio Hondo 230 kV SCD Upgrade

One Rio Hondo 230 kV breaker exceeds its 40 kA rating by 2036 (105% duty).

Needs Identification

- In the 2026-2027 TPP, it was identified that the SCD at the Rio Hondo 230 kV substation is projected to exceed the interrupting capacity rating of one (1) circuit breaker (CB) by 2036.
- SCD mitigation thresholds are applied as described for Project 1: mitigation is proposed at 95% of the CB interrupting capacity rating in near-term cases and 100% in long-term cases.
- Table 2.1 summarizes pre-project and post-project results for single-line-to-ground (SLG) and three-phase (3PH) faults. Post-project results maintain the projected fault duty below the upgraded CB interrupting capacity rating throughout the study horizon.

Table 2.1: Effectiveness of Proposed Mitigation (Eff. kA / % Duty)

Case / Substation	Rating (kA)	X/R	2028	2031	2036	2041
SLG Pre - Rio Hondo 230 kV	40	17	35.4 / 88.4%	37.4 / 93.5%	42.2 / 105.4%	42.3 / 105.8%
SLG Post - Rio Hondo 230 kV	50	35	35.4 / 70.8%	37.4 / 74.8%	42.2 / 84.3%	42.3 / 84.6%
3PH Pre - Rio Hondo 230 kV	40	17	34.6 / 86.4%	35.3 / 88.2%	38.7 / 96.8%	38.9 / 97.2%
3PH Post - Rio Hondo 230 kV	50	35	34.6 / 69.1%	35.2 / 70.4%	38.2 / 76.3%	38.3 / 76.6%

2. Rio Hondo 230 kV SCD Upgrade

Continued monitoring was rejected; the $1.6M-$2.2M upgrade is in service Q2 2031.

Alternatives Considered

- Continued monitoring was considered because the exceedance was first identified in the 2036 scenario. Because study cases are discrete planning years, it could occur any time between 2031 and 2036. The upgrade needs about five years, so deferring could leave too little time to mitigate.

Estimated Cost and Proposed In-Service Date

- Estimated cost is $1.6-$2.2 million in escalated 2031 dollars, accounting for material variability, supply chain issues, and construction delays. No detailed engineering was performed; final scope depends on final engineering.
- The proposed in-service date is June 30, 2031.

3. Whirlwind 500 kV Transmission Line Relocation

Relocating the 500 kV lines eliminates P4 common-circuit-breaker outage exposure.

Scope of Proposal

- SCE evaluated the relocation of 500 kV transmission lines at Whirlwind Substation to eliminate the P4 contingency that results in an overload of the Antelope-Whirlwind 500 kV transmission line. The proposed project would eliminate the common-contingency exposure.
- Option 1 would remove and relocate the existing 500 kV capacitor banks from the west to the east side of the substation, extend the 500 kV switchrack, and relocate the Midway-Whirlwind 500 kV line to a new position.
- Option 2 would relocate multiple 500 kV transmission lines within the existing switchrack. Either configuration is intended to mitigate the identified Antelope-Whirlwind 500 kV transmission line overload.

Figure 3-1: Geographical project area in Southern California.

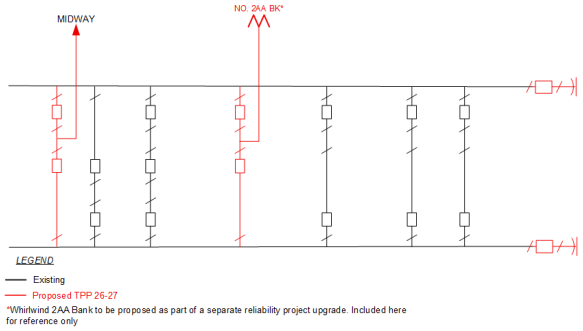


Figure 3-2: Whirlwind 500 kV Transmission Line Relocation Option 1

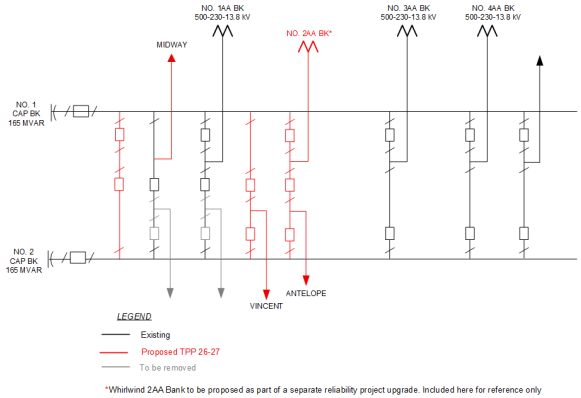


Figure 3-3: Whirlwind 500 kV Transmission Line Relocation Option 2.

3. Whirlwind 500 kV Transmission Line Relocation

A P4 common-breaker outage overloads the Antelope-Whirlwind 500 kV line by 2028.

Needs Identification

- The need was identified in CAISO's 2028 High Renewable sensitivity case, where an Antelope-Whirlwind 500 kV transmission line overload occurs under the P4 common-circuit-breaker contingency involving the Midway-Whirlwind and Whirlwind-Vincent 500 kV lines.
- Separating the affected lines within the Whirlwind 500 kV switchrack removes the common-circuit-breaker exposure and mitigates the identified overload.
- The identified need date is June 30, 2028. Project completion is driven by 500 kV circuit-breaker procurement lead times; SCE will coordinate interim operating measures and project sequencing until the project is in service.

Table 3.1: Identified Need - 2026-2027 TPP Sensitivity Results

Overloaded Facility	Contingency	Study Case	Result
Antelope-Whirlwind 500 kV Line	P4 common circuit breaker - Midway-Whirlwind and Whirlwind-Vincent 500 kV lines	CAISO 2028 High Renewable sensitivity	Overload identified (110.4%)
Antelope-Whirlwind 500 kV Line	Same contingency, post-project (lines separated)	CAISO 2028 High Renewable sensitivity	Overload mitigated

3. Whirlwind 500 kV Transmission Line Relocation

No viable alternative exists; $50M-$121M, in service Q2 2032

Alternatives Considered

- No viable alternatives were identified. Option 1 and Option 2 remain under evaluation, with the preferred configuration confirmed through detailed engineering.

Estimated Cost and Proposed In-Service Date

- Estimated nominal cost is $50-$121 million accounting for material variability, supply chain issues, and construction delays. No detailed engineering was performed; the estimate reflects the greater of the two options evaluated at this stage and remains subject to refinement after field validation and final engineering.
- The identified need date is June 30, 2028, and the proposed in-service date is June 30, 2032. SCE will continue to monitor system conditions with Grid Control and identify interim measures as needed to maintain reliability until the project is placed in service.

4. Mesa 1AA (Fourth) Bank Project

A fourth Mesa 500/230 kV bank adds 1,120 MVA of transformation capacity.

Scope of Proposal

- SCE proposes installing a fourth 500/230 kV transformer bank at Mesa Substation. The project would equip the necessary facilities at Mesa's 500 kV switchrack Position 1W and 230 kV switchrack Position 4E and install one Mesa 1AA 500/230 kV transformer bank rated 1,120 MVA normal and 1,344 MVA emergency.
- The additional bank will mitigate identified thermal violations on the Mesa 500/230 kV transformer banks and increase transformation capacity between the 500 kV and 230 kV systems. All proposed work is within Mesa Substation and is expected to be licensing-exempt. Final bus positions will be determined as part of detailed engineering and internal committee approvals.

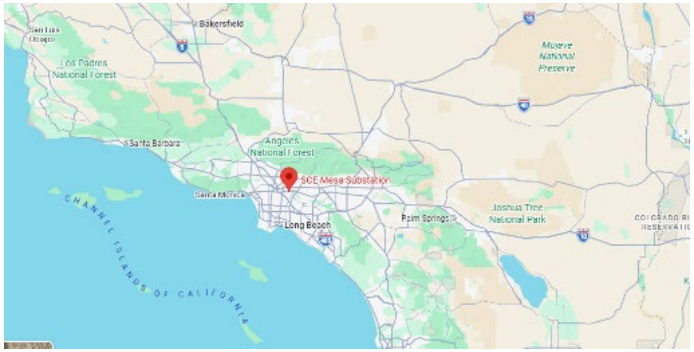


Figure 4-1: Geographical project area in Southern California.

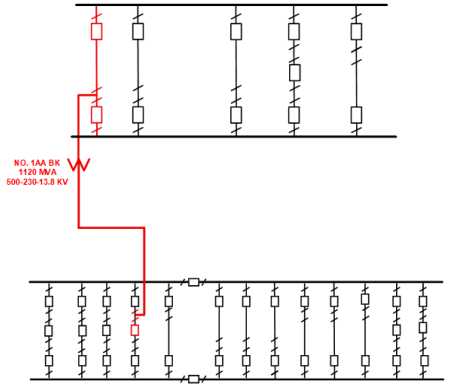


Figure 4-2: One-line diagram of the Mesa 500/230 kV switchrack highlighting the proposed 1AA Bank.

4. Mesa 1AA (Fourth) Bank Project

Mesa AA banks reach 150% loading by 2041; the fourth bank reduces every identified case.

Needs Identification

- Planning studies identified various overloads of the Mesa 500/230 kV AA transformer banks under P1, P4, P6, and P7 contingencies. The highest identified loading is 150% in the 2041 Summer Peak case under a P6 contingency.
- The identified need date is June 30, 2028. Table 4.1 summarizes the applicable contingency results observed in the 2026-2027 TPP cycle and the project's impact in reducing the observed overloads. Cases not shown are below 100%.
- Additional actions are required for persistent overloads, such as re-dispatching LA Basin resources preemptively or in anticipation of the next N-1 outage as part of system readjustment pursuant to SOB-04.

4. Mesa 1AA (Fourth) Bank Project

Post-contingency loading reaches 150% at Mesa; additional actions required for persistent overloads.

Table 4.1: Post-Contingency Loading, Pre-Project → Post-Project (%)

Overloaded Facility	Contingency	2028 Smr Pk	2036 Smr Pk	2041 Smr Pk	2036 Smr OffPk	2041 Wtr Pk
Mesa 3AA or 4AA Bank	P1.3, Loss of Mesa No.4 or 3 500/230 kV transformer	<100	<100	119.2% → **102.0%**	114.5% → **103.1%**	<100
Mesa 2AA Bank	P4.2, Loss of Mesa-Rio Hondo No.1 and Laguna Bell-Mesa No.2 230 kV lines	<100	<100	112.9% → **75.7%**	<100	<100
Center-Mesa 230 kV Line	P6.1.1, Loss of Laguna Bell-Mesa No.2 230 kV line and Mesa No.2 transformer	100.3% → **82.0%**	102.7% → **78.7%**	150.4% → **119.0%**	<100	<100
Mesa 3AA or 4AA Bank	P6.1.2, Loss of Laguna Bell-Mesa No.1 230 kV line and Mesa No.3 or 4 transformer	111.2% → **107.1%**	101.4% → **95.8%**	139.8% → **129.2%**	141.2% → **136.9%**	<100
Mesa 3AA or 4AA Bank	P6.1.2, Loss of Mesa No.2 and Mesa No.4 or 3 transformers	108.8% → **89.2%**	112.6% → **87.6%**	150.2% → **115.9%**	140.2% → **114.6%**	114.0% → **89.8%**
Mesa 2AA Bank	P6.2.2, Loss of Mesa No.3 and Mesa No.4 transformers	<100	108.5% → **75.9%**	132.9% → **91.1%**	119.9% → **83.7%**	104.8% → **73.3%**
Mesa 3AA and 4AA Bank	P7.1, Loss of Laguna Bell-Mesa No.1 and La Fresa-Mesa 230 kV lines	<100	<100	<100	104.3% → **103.0%**	<100
All Mesa AA Banks	P7.1, Loss of Miraloma-Serrano No.1 and 2 500 kV lines	<100	<100	104.5% → **91.3%**	<100	<100

4. Mesa 1AA (Fourth) Bank Project

Operational measures bridge the near term; $111M-$149M, in service Q2 2034.

Alternatives Considered

- Operational mitigations can bridge until in-service: preemptive generation dispatch, ~1,000 MW of storage dispatch, and SOB-04 system readjustment. Closing the Mesa 230 kV bus tie may also help, subject to SCD limits. None match the permanent benefits of the fourth bank.

Estimated Cost and Proposed In-Service Date

- Estimated nominal cost is $111-$149 million including escalation, in escalated 2034 dollars, accounting for material variability, supply chain, and construction complexity. No detailed engineering was performed as part of the scope development assessment for the project; final scope details will depend on completion of final engineering.
- Need date is June 30, 2028; proposed in-service is June 30, 2034. The need date is likely unachievable, so preemptive dispatch and/or SOB-04 readjustment are required as a stopgap.

5. Mesa-Vincent No. 2 500 kV Line Conversion

Converting an existing 500 kV-spec segment creates the Mesa-Vincent No. 2 line.

Scope of Proposal

- SCE proposes to develop the Mesa-Vincent No. 2 500 kV transmission line by converting and using the existing segment of the Rio Hondo-Vincent No. 2 230 kV line that was constructed to 500 kV specifications and shares structures with the existing Mesa-Vincent 500 kV line. The project will also equip the necessary facilities at the Mesa and Vincent 500 kV substations to accommodate the new line.
- The proposed line rating is 3,421 A normal and 3,880 A emergency. The conversion will mitigate the identified thermal overload on the existing Mesa-Vincent 500 kV line, add transmission capability in the south-of-Vincent corridor, and support forecasted load growth in the Metro West area.

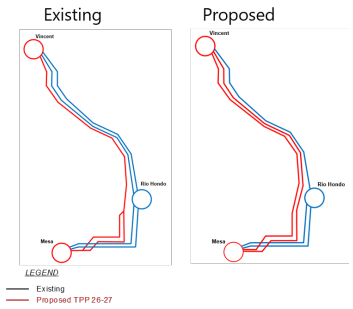


Figure 5-1: Existing and proposed Mesa-Vincent No. 2 500 kV line conversion.

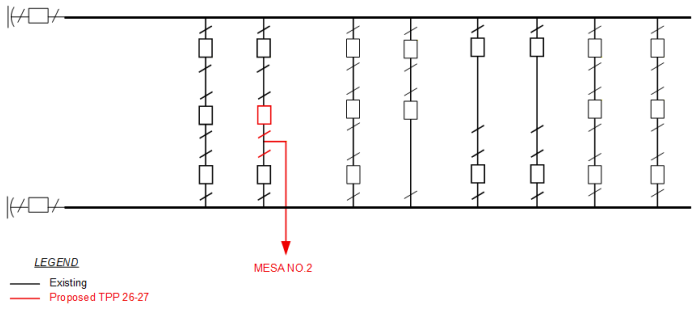


Figure 5-2: Proposed Vincent 500 kV one-line diagram.

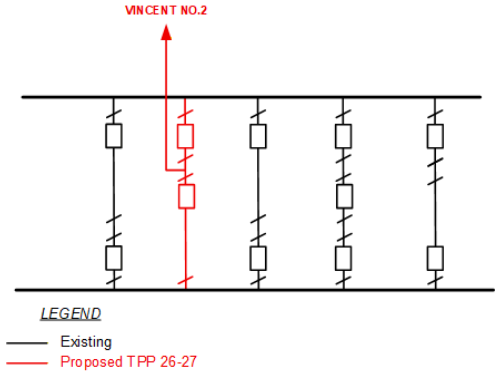


Figure 5-3: Proposed Mesa 500 kV one-line diagram.

5. Mesa-Vincent No. 2 500 kV Line Conversion

Mesa-Vincent 500 kV loading reaches 124%; the conversion reduces the overload in most cases, but additional actions required for persistent overloads.

Needs Identification

- Planning studies identified overloads of the existing Mesa-Vincent 500 kV line under P6 and P7 contingencies in the 2028 and 2041 Summer Peak cases. The highest identified loading is 124% in the 2041 Summer Peak case under a P6 contingency.
- A segment of the Rio Hondo-Vincent No. 2 230 kV line is already built to 500 kV specifications and shares a common structure with the existing Mesa-Vincent line, making conversion a practical permanent mitigation. The identified need date is June 30, 2028.
- The P7 contingency would be reclassified as the Mesa-Vincent No.1 and 2 500 kV lines. Additional actions are required for persistent overloads, such as re-dispatching LA Basin resources preemptively or in anticipation of the next N-1 outage as part of system readjustment pursuant to SOB-04.

5. Mesa-Vincent No. 2 500 kV Line Conversion

Table 5.1 details the P6 and P7 results; the conversion clears most overloads, with some cases needing operational support.

Table 5.1: Post-Contingency Loading, Pre-Project → Post-Project (%)

Overloaded Facility	Contingency	2028 Smr Pk	2031 Smr Pk	2036 Smr Pk	2041 Smr Pk	2036 Smr OffPk
Mesa-Vincent 500 kV Line	P6.1.1, Loss of Lugo-Vincent No.1 and 2 500 kV lines	124.3% → **75.3%**	<100	<100	117.0% → **72.9%**	<100
Mesa-Vincent 500 kV Line	P7.1, Loss of Lugo-Miraloma No.2 and 3 500 kV lines	89.8% → **<100**	41.2% → **<100**	49.2% → **<100**	107.0% → **71.3%**	89.9% → **<100**
Lugo-Rancho Vista 500 kV Line	P7.1, Loss of Lugo-Miraloma No.2 and 3 500 kV lines	62.6% → **<100**	56.3% → **<100**	78.8% → **<100**	94.9% → **<100**	113.3% → **99.7%**
Vincent-Rio Hondo No.1 230 kV Line	P7.1, Loss of Mesa-Vincent 500 kV and Rio Hondo-Vincent No.2 230 kV lines*	<100	<100	<100	108.9% → **108.3%**	<100
Vincent 1AA or 4AA 500/230 kV Bank	P7.1, Loss of Mesa-Vincent 500 kV and Rio Hondo-Vincent No.2 230 kV lines*	<100	<100	<100	106.4% → **106.2%**	<100
Vincent 4AA 500/230 kV Bank	P4.2, Loss of Mesa-Vincent 500 kV line and Mesa 4AA transformer bank	<100	<100	<100	100.7% → **80.8%**	<100
Lugo-Miraloma No.2 or 3 500 kV Line	P6.1.1, Loss of Lugo-Miraloma No.3 or 2 and Lugo-Ranchvst No.1 500 kV lines	<100	<100	<100	102.3% → **88.1%**	122.7% → **109.6%**

5. Mesa-Vincent No. 2 500 kV Line Conversion

SOB-04 readjustment bridges to 2041; conversion costs $201M-$262M, in service Q3 2034.

Alternatives Considered

- Operational mitigations can serve until in-service: SOB-04 system readjustment addresses the potential P6 overload through Summer Peak, and CAISO dispatch of ~1,110 MW of storage can reduce loading. Neither matches the permanent benefits of the 500 kV conversion.

Estimated Cost and Proposed In-Service Date

- Estimated nominal cost is $201-$262 million including escalation, in escalated 2034 dollars, accounting for material variability, supply chain issues, and construction delays. No detailed engineering was performed as part of the scope development assessment for the project; final scope details will depend on completion of final engineering.
- Need date is June 30, 2028; proposed in-service is July 31, 2034. SOB-04 readjustment can be applied until the potential P7 overload occurs in 2041.

6. Vincent 500 kV Reactive Power Reinforcement

A 300 MVAR STATCOM plus 400 MVAR of capacitors lifts Vincent to +1,100/-300 MVAR.

Scope of Proposal

- SCE proposes to equip the required Vincent 500 kV facilities, install one ±300 MVAR Static Synchronous Compensator (STATCOM), and install two 200 MVAR switchable capacitor banks.
- The combined proposed operating range would add +700 to -300 MVAR at 500 kV to the existing 400 MVAR of switchable capacitor banks, resulting in a total of +1,100 to -300 MVAR of reactive support at Vincent 500 kV. Because sufficient space is not available at Mesa for the necessary reactive support, Vincent is the preferred location.

Figure 6-1: Geographical project area in Southern California.

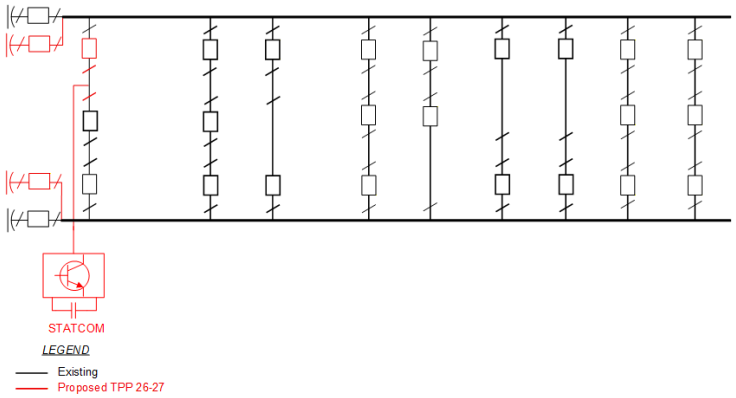


Figure 6-2: Proposed Vincent 500 kV One-line diagram

6. Vincent 500 kV Reactive Power Reinforcement

Mesa 500 kV voltage falls to 1.02 p.u. by 2041, below the scheduled operating voltage.

Needs Identification

- Planning studies identified a reactive-support deficiency at Mesa 500 kV in the 2036 Summer Off-Peak and 2041 Summer Peak cases. Voltage falls to 1.02 p.u. at Mesa in the 2041 Summer Peak base case (P0) - below scheduled operating voltage and leaving insufficient margin for post-contingency recovery.
- The project will provide dynamic and switched reactive support to restore reactive margin and hold scheduled voltage on the Vincent/Mesa 500 kV system.
- CAISO TPP studies identified low voltage and/or slow voltage recovery in the Vincent, Mesa, Devers, Harry Allen, Trout Canyon, Valley, and/or Red Bluff areas across the 2028 Summer Peak High Renewable, 2031 Summer Peak, 2031 Summer Peak High CEC Load, and 2036 Summer Peak study cases. The proposed Vincent 500 kV Reactive Power Reinforcement will add dynamic and switched reactive support to help mitigate these broader voltage-performance concerns.
- Need date is June 30, 2036. The near-term condition is not critical because operator action can bridge it: limiting battery storage charging in the LA Basin alleviates the issue until the more severe 2041 Summer Peak condition.

6. Vincent 500 kV Reactive Power Reinforcement

Table 6.1 details the P0, P1, and P7 voltage results; the reinforcement restores each case to 1.01 p.u. or above.

Table 6.1: Post-Contingency Voltage (p.u.), Pre-Project → Post-Project (%)

Impacted Substation	Low Voltage Limit (p.u.)*	Contingency	2028 Smr Peak	2031 Smr Peak	2036 Smr Peak	2041 Smr Peak	2028 Spr Off Peak	2031 Spr Off Peak	2036 Smr Off Peak	2041 Wtr Peak
Mesa 500 kV	1.04	P0, Base case	-	-	-	**1.02 → 1.04**	-	-	**1.036 → 1.04**	-
	0.9976	P1.2, Loss of Mesa-Miraloma No.1 500 kV Line	-	-	-	**0.973 → 1.014**	-	-	1.018	-
		P7.1, Loss of Lugo-Miraloma No.2 and 3 500 kV lines	-	-	-	**0.990 → 1.02**	-	-	1.014	-
		P7.1, Loss of Mesa-Miraloma 500 kV and Chino-Miraloma No.3 230 kV lines	-	-	-	**0.973 → 1.014**	-	-	1.018	-

*Assuming a 500 kV base

6. Vincent 500 kV Reactive Power Reinforcement

Mesa lacks space, so Vincent is preferred; $272M-$365M, in service Q2 2036.

Alternatives Considered

- Other locations and different mixes of dynamic and switched support were evaluated; siting the equipment at Mesa is not viable due to space limits.
- As an interim operating mitigation, limiting battery-energy-storage-system charging in the Los Angeles Basin can alleviate the low-voltage condition until the more severe 2041 Summer Peak case. This operating action does not provide the same long-term dynamic voltage support capability as the proposed project.
- An additional 700 MVAR of fixed shunts does not fit within the existing substation footprint without substantial added scope. At full constructible scope, its cost and complexity approach the combined ±300 MVAR STATCOM and two (2) 200 MVAR cap bank solution, erasing much of its apparent economic advantage while providing no dynamic support.

Estimated Cost and Proposed In-Service Date

- Estimated nominal cost is $272-$365 million, based on unit costs escalated to 2036 with allowances for material variability, supply chain issues, STATCOM bidding, and potential construction delays. No detailed engineering was performed; final scope depends on completion of final engineering.
- The identified need date and the proposed in-service date are both June 30, 2036; the project is scheduled to be in service when the need materializes.
- SCE will continue coordinating with CAISO to validate the final reactive requirement and preferred mitigation project.

7. Mohave 500 kV Voltage Support

Two 100 MVAR bus shunt reactors hold Mohave 500 kV voltage within operating limits.

Scope of Proposal

- SCE proposes to install two (2) variable 100 MVAR, 500 kV bus shunt reactors at the Mohave 500 kV Switching Station to mitigate persistent high-voltage conditions.
- Two 100 MVAR units are proposed in lieu of a single 200 MVAR unit so that, if either 500 kV bus is removed from service, voltage can still be controlled on the remaining bus. A switchrack expansion to the south is required to accommodate the reactors, remaining within the existing Mohave 500 kV Switching Station property.

Figure 7-1: Geographical project area in Southern Nevada.

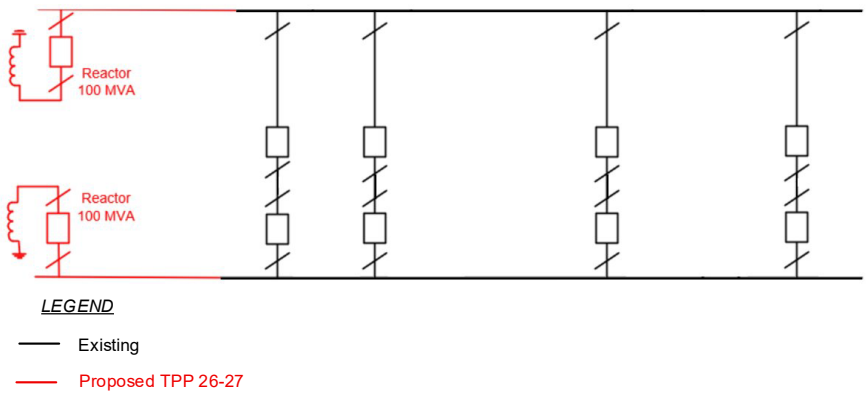


Figure 7-2: Preliminary layout of the proposed Mohave bus shunt reactors.

7. Mohave 500 kV Voltage Support

Mohave bus voltage reaches 545 kV, above the 540 kV high operating limit.

Needs Identification (1/4)

- SCE previously submitted a Mohave 500 kV Bus Shunt Reactor project in the 2025–2026 TPP; the need persists after including other approved 2025-2026 TPP projects.
- Mohave 500 kV bus voltages frequently exceed CAISO normal (535 kV) and high (540 kV) operating limits during light-load, nighttime conditions.
- Restoring the SC6 series capacitor raised transfer capability but also voltage; Lugo is electrically distant, so the Lugo STATCOM cannot mitigate it.
- The proposed reactors absorb reactive power to hold voltage within limits and allow Lugo-Mohave 500 kV to run continuously at 70% series compensation.

Table 7.1: Observed Voltage Conditions vs. Operating Limits

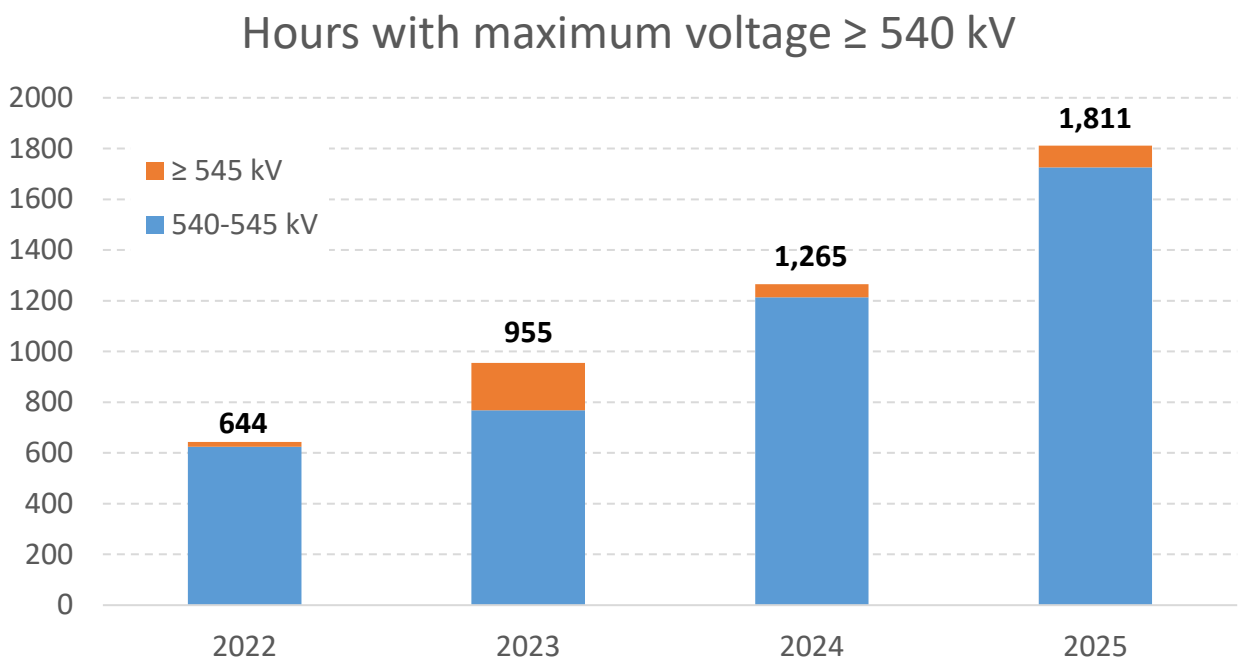
Parameter	Value	Source / Basis
CAISO Planning Standards normal operating limit	535 kV	CAISO Planning Standards / SCE SOB 17
CAISO Planning Standards high operating limit	540 kV	CAISO Planning Standards / SCE SOB 17
Observed Mohave 500 kV bus voltage (peak)	Up to 545 kV	2025-2026 EMS and real-time voltage data
Observed Mohave 500 kV bus voltage (average high)	Approximately 540 kV	2025-2026 EMS and real-time voltage data
Preferred optimal operating voltage	530 kV	SCE operating practice

7. Mohave 500 kV Voltage Support

Hours at or above 540 kV rose 181% between 2022 and 2025.

Needs Identification (2/4)

- Hourly maximum voltage observations show a sustained increase in operation at or above 540 kV.
- The increasing persistence of high-voltage operation supports evaluation of additional reactive power absorption at Mohave 500 kV.



1,811 hours
≥ 540 kV in 2025

+181%
Increase in ≥ 540 kV hours from 2022 to 2025

Trend
625 → 768 → 1,213 → 1,725
hours in the 540-545 kV range

7. Mohave 500 kV Voltage Support

After SC6 insertion, 540 kV exceedances rose from 124 to 2,510 events.

Needs Identification (3/4)

- The restoration of SC6 series capacitor at the Mohave 500 kV Switching Station increased the susceptibility for elevated voltages at the Mohave 500 kV bus, particularly during light-load and low-flow conditions.
- From January to April 2026, prior to the insertion of SC6, the voltage at Mohave 500 kV exceeded 540 kV 124 times. From April to September 2026, after the insertion of SC6, the voltage at Mohave 500 kV exceeded 540 kV 2,510 times.

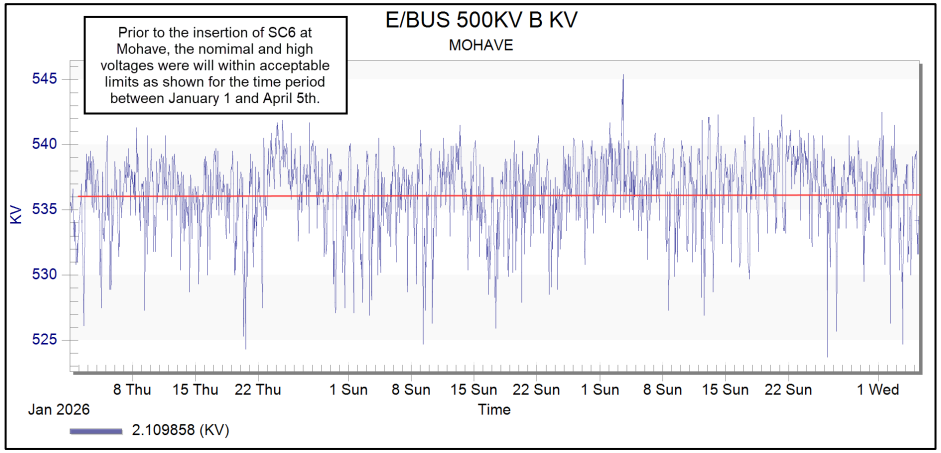


Figure 7-3: EMS data prior to insertion of SC6.

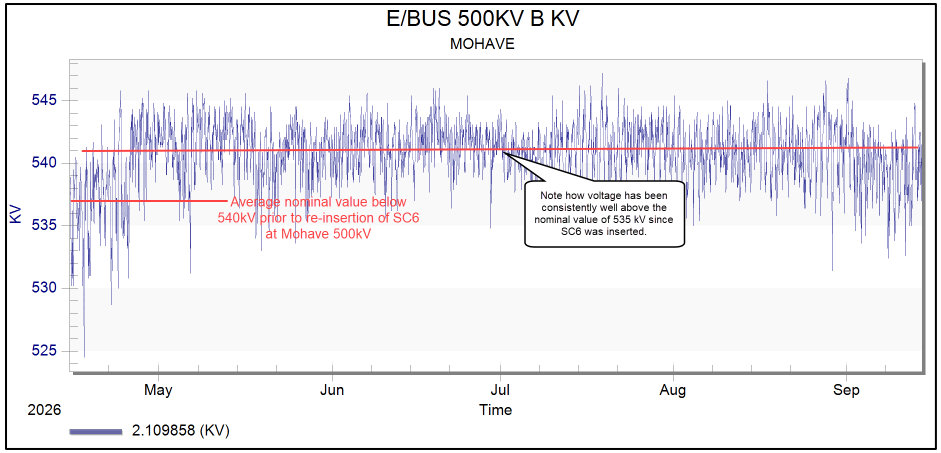


Figure 7-4: EMS Data with SC6 between April and September 2026.

7. Mohave 500 kV Voltage Support

TPP cases confirm the high voltage; two 100 MVAR reactors return voltage near nominal.

Needs Identification (4/4)

- When adjusting the SCE Main system cases used for 2026-2027 TPP, the Mohave high voltage is present under both normal system conditions and an N-1 outage in combination with a long-lead-time equipment outage as shown in Table 7.2 below.
- The proposed corrective action plan of installing two 100 MVAR variable bus reactors mitigates the high voltage violation, with voltage p.u. values close to the nominal voltage of 525 kV.

Table 7.2: 2026-2027 SCE TPP Voltage (p.u.) Results Pre-Project and Post-Project

Impacted Substation	Voltage Limits		Contingency	Cat	No RAS Post Contingency Voltage (p.u.)								Proposed Corrective Action Plan	Post Mitigation Voltage (p.u.)							
	Low Voltage Limit (p.u.)	High Voltage Limit (p.u.)			2028 Summer Peak	2031 Summer Peak	2036 Summer Peak	2041 Summer Peak	2028 Spring Off Peak	2031 Spring Off Peak	2036 Summer Off Peak	2041 Winter Peak		2028 Summer Peak	2031 Summer Peak	2036 Summer Peak	2041 Summer Peak	2028 Spring Off Peak	2031 Spring Off Peak	2036 Summer Off Peak	2041 Winter Peak
Mohave 500 kV		1.100	Loss of Mohave-Eldorado No.1 500 kV line and Lugo-Mohave 500 kV line shunt (t)	P1LLT	1.095	1.101	1.070	1.069	1.113	1.103	1.083	1.087	2x 500 kV variable shunt reactors totaling 200 MVAR	Within limits	1.076	Within limits	Within limits	1.083	1.074	1.076	1.082
		1.080	Basecase	P0	1.068	1.079	1.070	1.071	1.084	1.080	1.080	1.080		Within limits	1.063	Within limits	Within limits	1.068	1.064	1.075	1.077

7. Mohave 500 kV Voltage Support

Line reactor upsizing, an SVS, and a STATCOM were dismissed; $58M-$78M, in service Q2 2033.

Alternatives Considered

- Further upsizing the existing Lugo-Mohave 500 kV line reactor beyond 200 MVAR was dismissed; operating experience since the 2020 upgrade from 100 to 200 MVAR shows additional reactor capacity would provide limited incremental voltage benefit.
- An SVS was dismissed for its footprint extending beyond the property line.
- A STATCOM was dismissed for the same land and cost reasons.

Estimated Cost and Proposed In-Service Date

- Estimated cost is $58-$78 million in escalated 2033 dollars, accounting for material variability, supply chain issues, and construction delays. No detailed engineering was performed; final scope depends on final engineering.
- Proposed in-service is June 30, 2033. Because this is later than the need date, SCE will continue monitoring conditions and develop temporary solutions as needed.

8. New Coolwater CRAS

A dedicated Coolwater CRAS simplifies the existing scheme and preserves full corridor dispatch.

Scope of Proposal

- SCE proposes to separate the Coolwater-area functions from the existing Mojave Desert Remedial Action Scheme (RAS) and the planned Kramer Centralized Remedial Action Scheme (CRAS) and establish a new Coolwater CRAS.
- Under the proposed scheme, generation at Kramer will trip for contingencies involving the four Kramer-Victor 230 kV lines, while generation at Coolwater and Sandlot will trip for contingencies involving the Kramer-Coolwater-Sandlot 230 kV corridor. The project will maintain full generation dispatch within the corridor during normal conditions and fully mitigate the identified thermal violations.

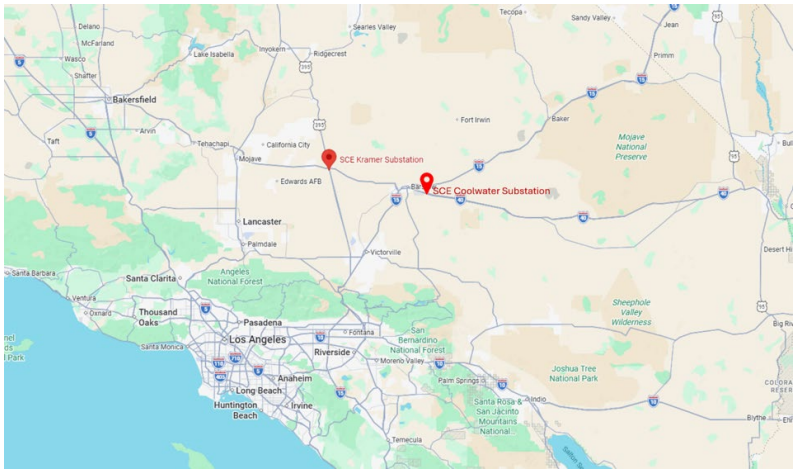


Figure 8-1: Geographical project area in Southern California.

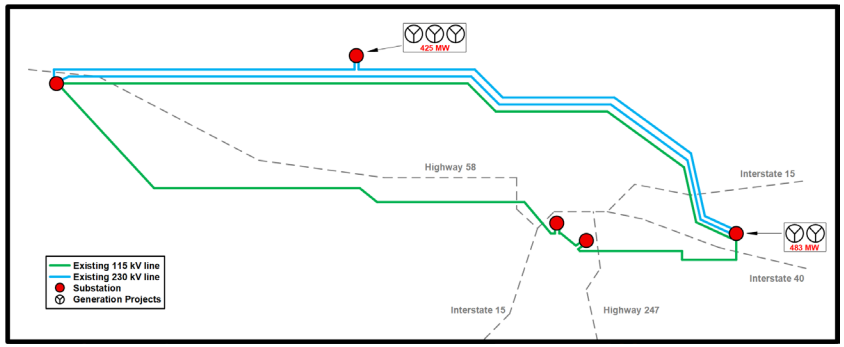


Figure 8-2: Existing topology of the proposed CRAS project.

8. New Coolwater CRAS

Corridor outages overload lines and the Coolwater bank; the CRAS fully mitigates them.

Needs Identification

- Planning studies identified thermal overloads under P1 and P7 conditions following the loss of the Coolwater-Kramer-Sandlot 230 kV transmission corridor. The contingencies overload the remaining transmission lines or the Coolwater transformer bank.
- The existing Mojave Desert RAS and the planned Kramer CRAS are too extensive to satisfy CAISO's guidelines, which favor simple remedial action schemes.
- The identified need date is in 2031. Operating procedures will be required until the permanent CRAS is available.

Table 8.1: Identified Needs and Proposed CRAS Actions

Condition / Contingency	Facility Affected	Proposed CRAS Action	Post-Project Result
P1 and P7, loss of the Coolwater-Kramer-Sandlot 230 kV corridor	Remaining 230 kV corridor lines	Trip generation at Coolwater and Sandlot	Thermal violations fully mitigated
P1 and P7, loss of the Coolwater-Kramer-Sandlot 230 kV corridor	Coolwater transformer bank	Trip generation at Coolwater and Sandlot	Thermal violations fully mitigated
Contingencies involving the four Kramer-Victor 230 kV lines	Kramer-Victor 230 kV lines	Trip generation at Kramer	Thermal violations fully mitigated
Normal (N-0) system conditions	Coolwater-Kramer-Sandlot corridor	No action - full dispatch maintained	No curtailment required

8. New Coolwater CRAS

At $10M-$13M the CRAS is the portfolio's lowest-cost mitigation, in service Q4 2031.

Alternatives Considered

- A second Coolwater 230/115 kV transformer bank was considered, but TPP base cases did not model full generation output in the 230 kV corridor. At higher dispatch levels, such as QC15, it no longer mitigated the thermal overloads, so the Coolwater CRAS remained necessary.
- Continued expansion of the Mojave Desert RAS/Kramer CRAS was also considered, but would add monitored facilities, contingencies, generation-tripping actions, and operational complexity to an already extensive scheme.
- Operating procedures will be required as an interim bridge solution until the permanent Coolwater CRAS is available.

Estimated Cost and Proposed In-Service Date

- Estimated nominal cost is $10-$13 million including escalation, covering relay additions, RTU and CRAS programming, ethernet switches, satellite clocks, lightwave communications, risk, and contingency. No detailed engineering was performed as part of the scope development assessment for the project; final scope details will depend on completion of final engineering.
- Need date is 2031; proposed in-service is December 31, 2031, dependent on coordination with the Kramer and Victor CRAS telecom backbone.

9. Devers 500 kV Reactive Power Reinforcement

A STATCOM and three capacitor banks add +900/-300 MVAR of Devers-area support.

Scope of Proposal

- SCE proposes to equip the necessary facilities at Devers 500 kV, install one plus/minus 300 MVAR Static Synchronous Compensator (STATCOM), and install three (3) 200 MVAR switchable capacitor banks.
- The combined proposed operating range is +900 to -300 MVAR at 500 kV. The project will provide dynamic and switched reactive support to improve Devers-area voltage performance. The final dynamic-versus-switched reactive allocation and control requirements will be confirmed through detailed power-flow and transient-stability studies.

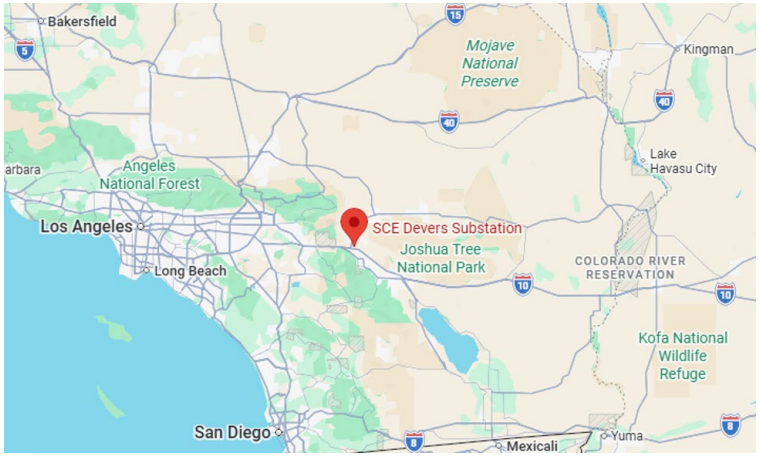


Figure 9-1: Geographical project area in Southern California.

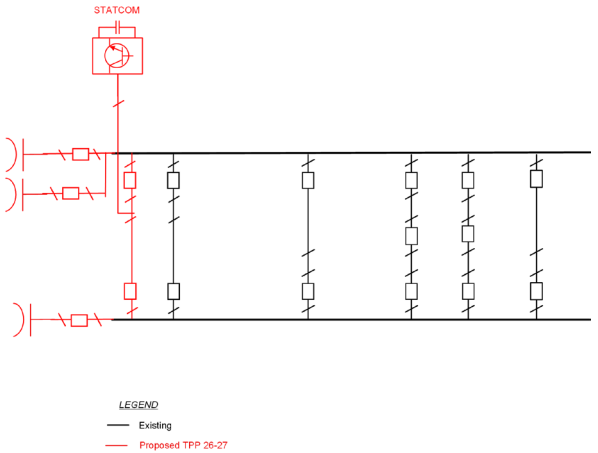


Figure 9-2: Proposed Devers 500 kV one-line diagram

9. Devers 500 kV Reactive Power Reinforcement

Devers low voltage is an existing condition, worsened by prolonged SVS unavailability.

Needs Identification (1/3)

- Extended outages of the existing Devers Static VAR System (SVS) have reduced the availability of reactive support at Devers 500 kV. The Static Var Compensator (SVC) was unavailable for more than six months, from February 28, 2026, through September 8, 2026, and the associated mechanically switched capacitors (MSCs) were unavailable for more than 23 months, from October 12, 2023, through September 24, 2025. During the SVS outage, low-voltage conditions were observed at Devers 500 kV during redispatch events involving Colorado River and Red Bluff renewable generation, as shown in Figure 9-3.

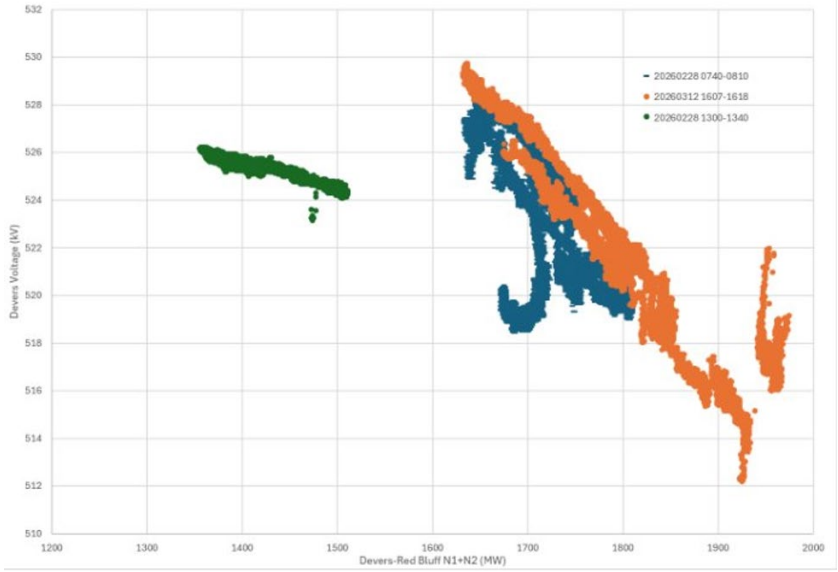


Figure 9-3: Power-dispatch events in March 2026. The **green** event occurred with the Devers SVS, including the SVC and MSCs, available. The **orange** and **blue** events occurred with the Devers SVS unavailable.

9. Devers 500 kV Reactive Power Reinforcement

With the SVS unavailable, low voltages appear under P0 and P1 across all study years.

Needs Identification (2/3)

- The Devers SVS and key equipment have long lead times (208 weeks for the SVS; 115 weeks for the 500 kV shunt capacitor banks), so per TPL-001-5.1 R2.1.5 SCE assessed P0, P1, and P2 performance during a possible extended SVS outage.
- With the SVS unavailable, low voltages appear under normal (P0) conditions in the 2028, 2031, 2036, and 2041 summer peak and spring/summer off-peak scenarios, plus steady-state P1 voltage issues. The proposed project mitigates both.
- Even with the SVS online, SCE observed 0.9905 p.u. at Devers 500 kV under P0 in 2036 Summer Peak; the reinforcement also resolves this condition.

Table 9.1: 2026-2027 SCE TPP Voltage Results with the Existing Devers SVS

Impacted Substation	Voltage Limits		Contingency	Cat	No RAS Post Contingency Voltage (p.u.)						
	Low Voltage Limt (p.u.)	High Voltage Limt (p.u.)			2028 Summ Peak	2031 Summ Peak	2036 Summ Peak	2041 Summ Peak	2028 Spring (Peak	2031 Spring (Peak	2036 Spring (Peak
Vista 230 kV	0.9		Devers-El Casco No.1 230 kV line and Alberhil-Valleysc No.1 500 kV line	P6	-	-	0.892	-	-	-	-
El Casco 230 kV	0.9		Devers-Vsta No.1 230 kV line and Alberhil-Valleysc No.1 500 kV line	P6	-	-	0.8909	-	-	-	-
Valley 500 kV	1.04		Basecase	P0	-	-	1.039	-	-	-	-
Valley 500 kV	0.998		Loss of Valleysc No.3 500/115 kV transformer and Devers SVD ID SV	P1LLT	-	-	0.9747	-	-	-	-
Redbluff 500 kV	1.04		Basecase	P0	-	-	1.036	-	-	-	-
Devers 500 kV	0.998		Valleysc No.3 500/115 kV transformer and Devers SVD ID SV	P1LLT	-	-	0.9905	-	-	-	-
Alberhil 500 kV	0.998		Valleysc No.3 500/115 kV transformer and Devers SVD ID SV	P1LLT	-	-	0.9897	-	-	-	-

9. Devers 500 kV Reactive Power Reinforcement

Extended SVC and MSC outages drop Devers 500 kV to 506.7 kV; the proposed project holds every case within limits.

Needs Identification (3/3)

- Table 9.2 highlights the impacts of the long-lead time equipment of the SVC and MSC out for an extended period of time.
- TPP studies identified low voltage and/or slow voltage recovery in the Devers, Harry Allen, Trout Canyon, Vincent, Mesa, Valley, and/or Red Bluff areas across the 2028 Summer Peak High Renewable, 2031 Summer Peak, 2031 Summer Peak High CEC Load, and 2036 Summer Peak study cases. The proposed project will add dynamic and switched reactive support to help mitigate these broader voltage-performance concerns.

Table 9.2: 2026-2027 SCE TPP Voltage Results (kV) at Devers 500 kV Under Normal System Conditions (P0) without the Existing Devers SVS (SVC and MSC) and with the Proposed Project

Scenario	With MSC and SVC	Without SVC	Without MSC and SVC	With Proposed Project
2028 Summer Peak	523.9	516.4	512.4	Within limits
2028 Spring Off-Peak	528.8	528.6	528.6	Within limits
2031 Summer Peak	525	520.9	517.3	Within limits
2031 Spring Off-Peak	524.9	524.3	524.9	Within limits
2036 Summer Peak	518	510.4	506.7	Within limits
2036 Summer Off-Peak	525	520.3	516.9	Within limits
2041 Summer Peak	528.6	529.7	529.7	Within limits

9. Devers 500 kV Reactive Power Reinforcement

Operating measures must bridge an eight-year gap; $345M-$455M, in service Q2 2034.

Alternatives Considered

- Alternatives remain under evaluation as SCE and CAISO further validate the voltage control need, assess the condition of the existing Devers static VAR system, and confirm the preferred mix of dynamic and switched reactive support.
- In the interim, operating measures may include coordination of renewable generation redispatch and management of available Devers area reactive resources. These measures do not provide the same long-term voltage support capability as the proposed project.

Estimated Cost and Proposed In-Service Date

- Estimated nominal cost is $345-$455 million, based on unit costs escalated to 2034 with allowances for material variability, supply chain issues, STATCOM bidding, and potential construction delays. No detailed engineering was performed; final scope depends on completion of final engineering.
- The need is an existing condition (identified need date 2026); the proposed in-service date is June 30, 2034.
- SCE will continue coordinating with CAISO on interim operating measures including renewable generation redispatch and management of Devers area reactive resources until the project is placed in service.