

PG&E's 2026 Request Window Proposals

CAISO 2026-2027 Transmission Planning Process

September 24, 2026



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PG&E 2026-2027 TPP Reliability Projects

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Reliability Proposals

With expected ISDs
2030–2034

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Projects in Greater Bay Area

Significant load growth
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San Jose, Peninsula, and East
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Rescope Submissions

Rescoping previously
approved projects in
Humboldt, North Coast and
Greater Fresno area

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Additional Load Growth Driven Projects

Addressing load growth in
Central Valley, Central Coast/
Los Padres and Kern areas

- **Meet NERC TPL and CAISO Planning Standards** by addressing identified P0-P7 thermal and voltage deficiencies.
- **Right-size the existing transmission assets where feasible** by maximizing existing and planned facilities capability before pursuing broader expansion
- **Rescope previously approved projects where appropriate** to provide broader reliability benefits and greater long-term value
- **Develop conceptual plans in major growth areas** to identify cost-effective, least-regret solutions aligned with near-term reliability needs with long-term transmission plan



PG&E 2026-2027 TPP Reliability Projects

No.	Project Name	Area	Presenter
1	Reedley–Orosi–Dinuba 70 kV System Reinforcement	Greater Fresno	Rabi Kiran
2	Exchequer 115 kV System Reconfiguration		
3	Watsonville Area Reinforcement (Conceptual)	Central Coast/ Los Padres	
4	South Los Padres Reinforcement (Conceptual)		
5	Lerdo 115 kV System Upgrade (Conceptual)	Kern	Vivian Wang
6	Maple Creek Area Reinforcement	Humboldt	Camille Deatherage
7	Clear Lake–Lower Lake 60 kV Area Reinforcement	North Coast	Reza Arefi
8	Banta–Tracy 115 kV Line Reconductor	Central Valley	Jack Li
9	Hammer–Country Club 60 kV Line Reconductor		
10	Marysville 60 kV Reinforcement		
11	Moraga 115 kV Bus Upgrade Project	Greater Bay Area- East Bay	Yao Xu
12	Newark E-F Bus Tie 230 kV Line Limiting Elements Upgrade Project		
13	Contra Costa–Newark 230 kV Corridor Reinforcement (Conceptual)		
14	Station MA Rearrangement Project	Greater Bay Area- Peninsula	Deepika Mothkuri
15	Millbrae 230 kV Addition & System Reconfiguration (Conceptual)		
16	Edenvale 115 kV Area Reinforcement Project	Greater Bay Area- South Bay	Frank Liu
17	North San Jose & De Anza 230 kV System Import Reinforcement (Conceptual)		
18	Metcalf & East San Jose Reconfiguration (Conceptual)		

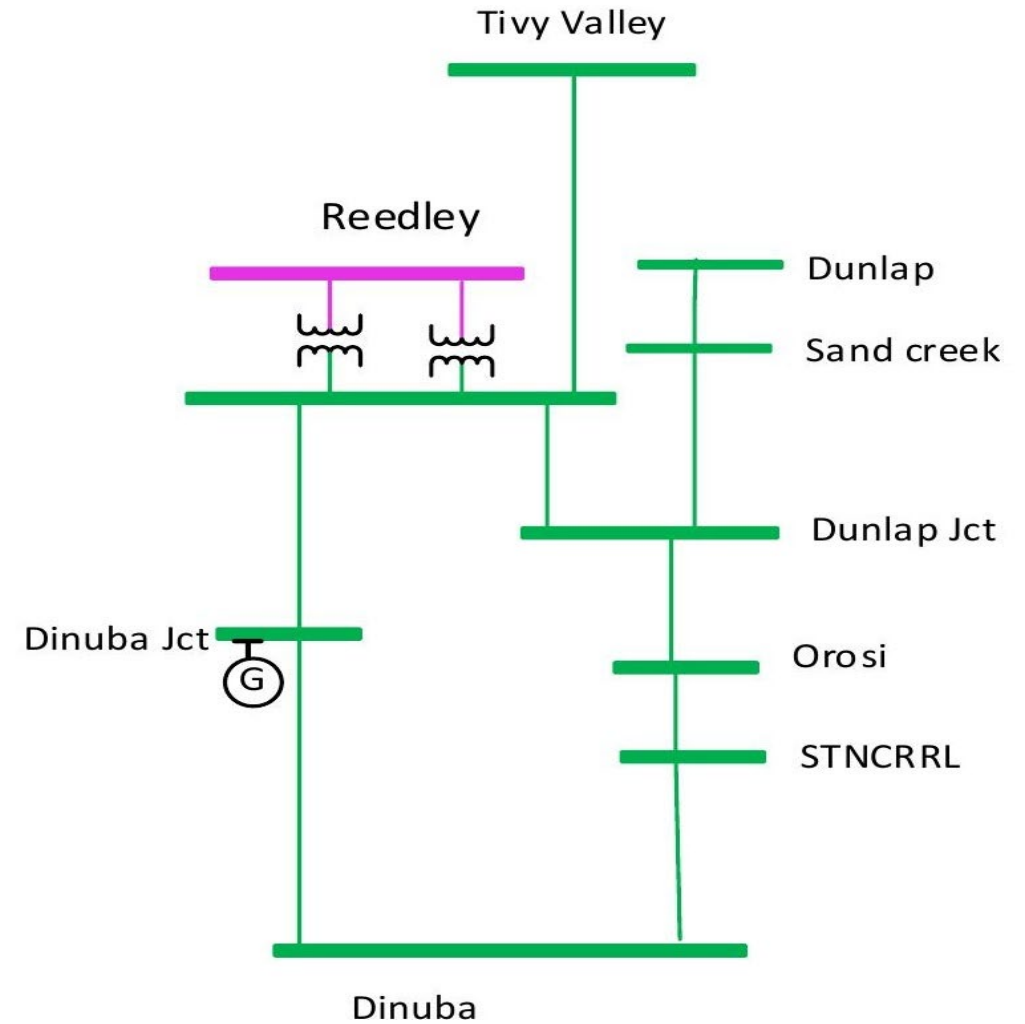
REEDLEY-OROSI-DINUBA 70 KV SYSTEM REINFORCEMENT PROJECT

(Reedley 70 kV Capacity Increase Project Rescope)



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- The Reedley 70 kV sub-area is in Tulare and Fresno Counties.
- The two 115/70 kV transformer banks (#2 and #4) at Reedley Substation provide power to the customers in this 70 kV pocket through the Reedley–Tivy Valley, Reedley–Dinuba #1, Reedley–Orosi and Dinuba–Orosi 70 kV lines.



Existing Single Line Diagram

- Contingency Description**

- P1: Reedley–Orosi 70 kV Line outage
- P1: Reedley–Dinuba #1 70 kV Line outage
- P1: Reedley 115/70 kV Transformer Bank #2 outage

- Power Flow Results**

Fresno Peak		Pre-Project			Post-Project	Contingency	
Facility	Summer Emergency Rating (MVA)	2028	2031	2036	2036	Category	Contingency Name
REEDLEY-DINUBA #1 70KV	62.3	112.6%	117.7%	124.3%	<90%	P1	REEDLEY-OROSI 70KV
REEDLEY-OROSI 70KV (Reedley to Dunlap Jct)	72.7	109.5%	114.8%	121.4%	<90%	P1	REEDLEY-DINUBA #1 70KV
REEDLEY-OROSI 70KV (Dunlap Jct to Orosi)	62.3	117.8%	123.3%	131.0%	<90%	P1	REEDLEY-DINUBA #1 70KV
DINUBA-OROSI 70KV (Stone Corral Jct to Dinuba)	41.8	114.6%	127.5%	127.3%	<90%	P1	REEDLEY-DINUBA #1 70KV
115/70KV TB 4 REEDLEY	110	89.0%	92.0%	101.0%	<90%	P1	REEDLEY 115/70KV TB 2

- **Project Objectives**

- Reconductoring three 70 kV lines and replacing a 115/70 kV transformer #4, addresses the NERC P1 violations identified and increases the load serving capability in the Reedley 70 kV pocket.

- **Preferred Scope**

- Reconductor the Reedley–Orosi 70 kV Line (~10.9 miles) to achieve the minimum required rating of 1126 Amps summer emergency.
- Reconductor the Reedley–Dinuba #1 70 kV Line (~7.8 miles) to the same minimum required rating of 1126 Amps.
- Reconductor the Dinuba–Orosi #1 70 kV Line (~9.8 miles) to the same minimum required rating of 1126 Amps.
- Upgrade Reedley 115/70 kV Transformer Bank #4 to achieve a Summer Normal Rating of 200 MVA (match existing Transformer Bank #3).

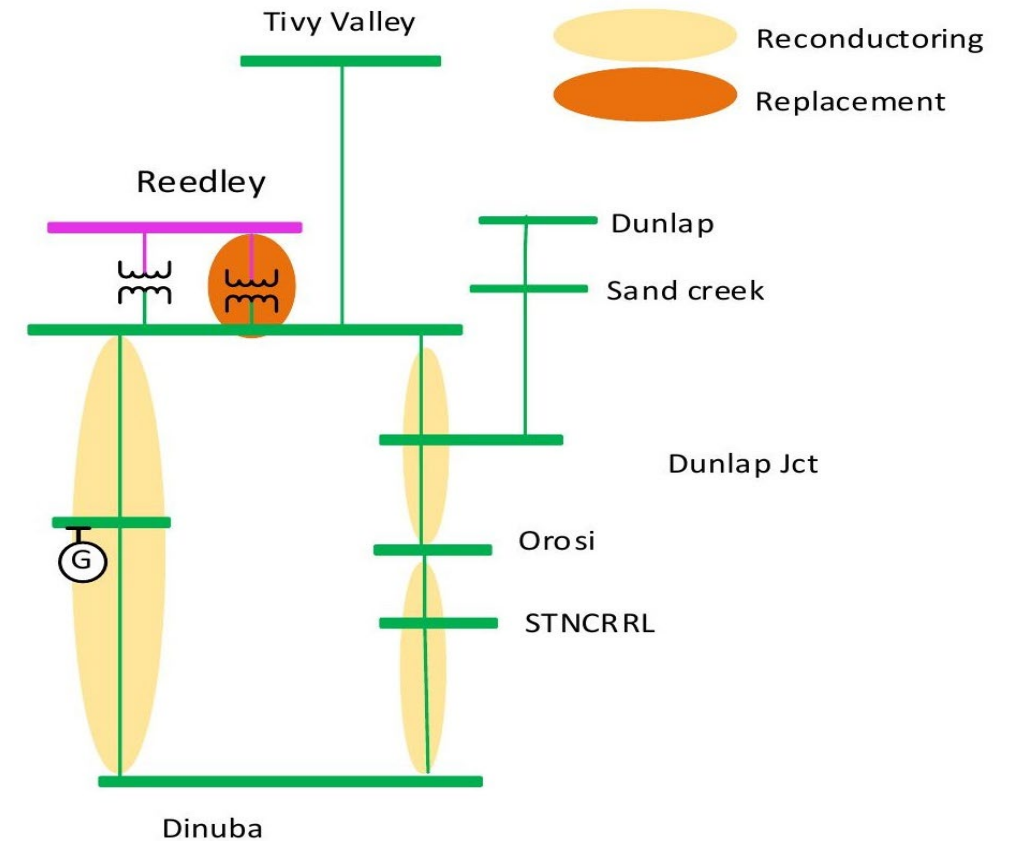
- **Proposed In-Service Date**

- May 2031 or earlier

- **Estimated Cost**

- \$48.5 M - \$97 M *

*AACE Level 5 quality estimates includes a +100% contingency



Proposed Single Line Diagram

Alternatives Considered

Alternative	Reliability Performance	Broader system Benefits	Estimated Cost
Previously Approved Reedley 70 kV Capacity Increase Project	Addresses voltage and thermal violations	Reinforces the existing 70 kV network, however projects costs are higher due to associated substation upgrades at Reedley and Dinuba	\$100 - \$200M
Proposed Reedley – Orosi Dinuba 70 kV System Reinforcement Project	Addresses and mitigates the thermal violations by reconductoring the 70 kV lines and replace the lower rated transformer	Improves load serving capability, operational flexibility, and reduced cost	\$48.5 M - \$97 M

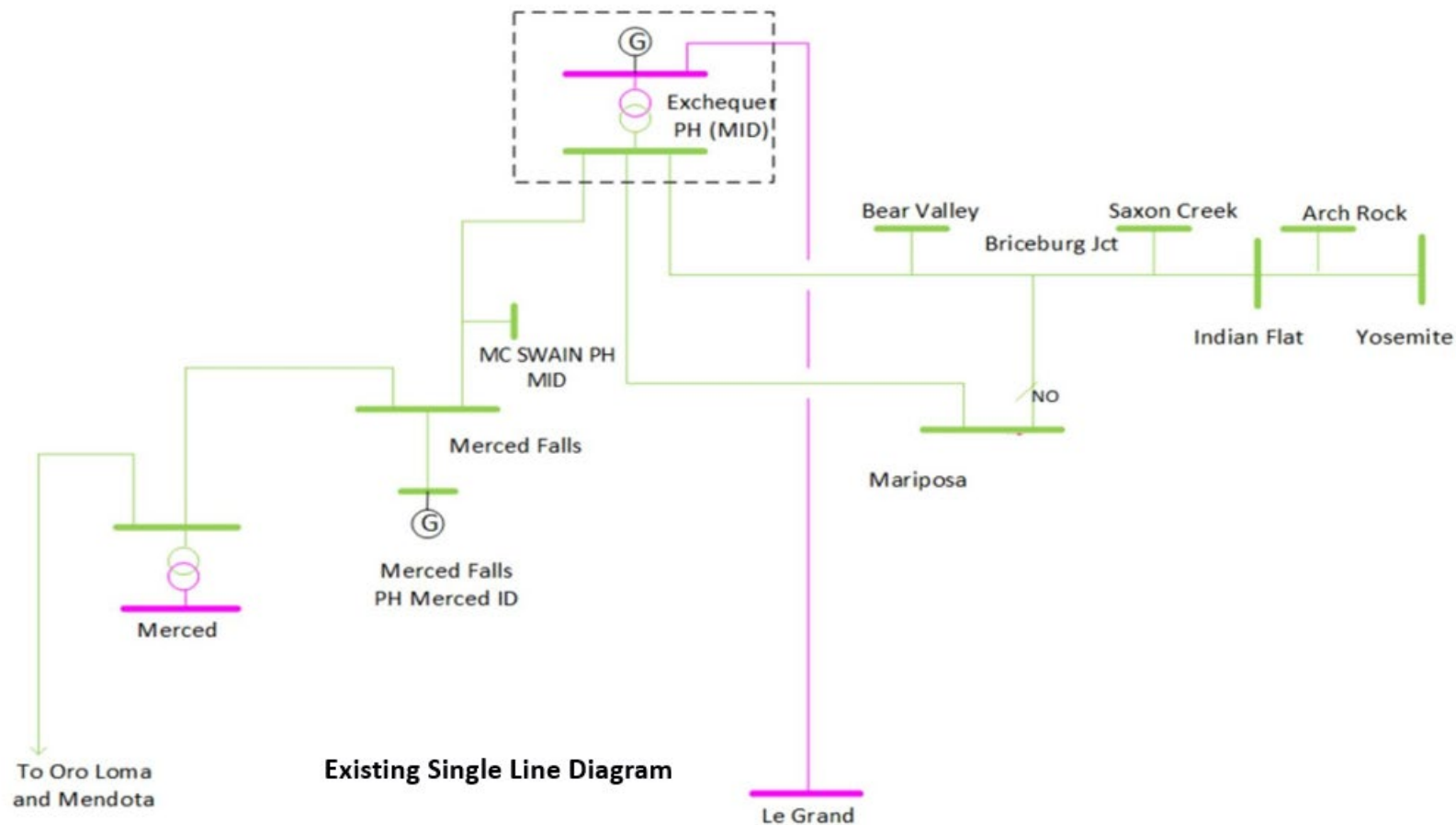
EXCHEQUER 115 KV SYSTEM RECONFIGURATION PROJECT

(Mariposa STATCOM Project Rescope)



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- The Exchequer 70 kV pocket mainly consists of the Mariposa, Bear Valley and Indian Flat Substations.
- Exchequer PH is the main source for this pocket, while the Merced Falls–Exchequer 70 kV Line serves as the secondary source.



- Contingency Description**

- P1: Loss of Exchequer PH generation or 115/70 kV Bank #1 Outage – the 70 kV pocket loses its main source, resulting in severe low voltage at Mariposa and other substations in the vicinity

- Power Flow Results**

Substation	Pre-Project 2036	Post-Project 2036	Category	Contingency Name
Mariposa	0.758	0.939	P1	Exchequer 115/70 kV Bank #1 OR Exchequer PH Generator Outage
Yosemite	0.779	0.956		
Indian Flat	0.782	0.959		
Saxon Creek	0.795	0.969		
Bear Valley	0.802	0.974		
Exchequer	0.822	0.990		
Merced Falls	0.862	0.987		
McSwain	0.864	0.988		

- **Project Objectives**

- Address the low voltage condition caused by a single bank failure or loss of generation at Exchequer PH to eliminate the associated critical single points of failure.

- **Preferred Scope**

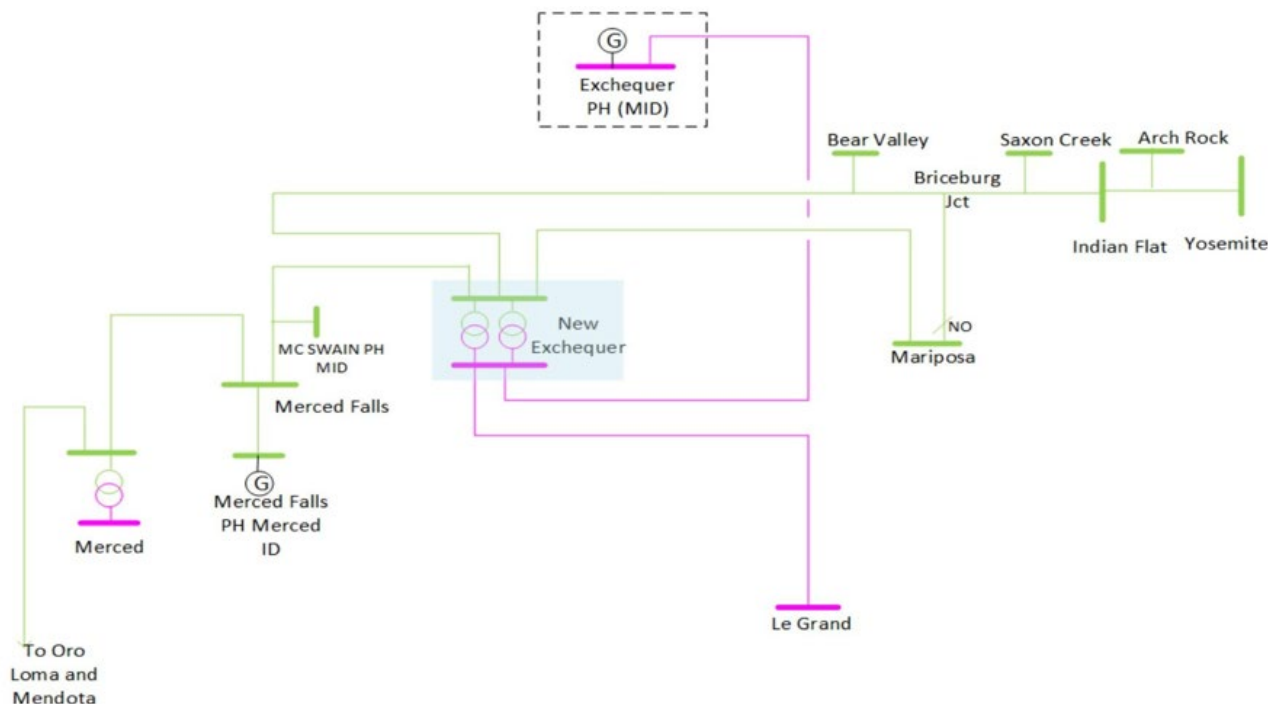
- Build a New Exchequer Substation by looping in the existing Exchequer PH–Le Grand 115 kV line with two 200 MVA 115/70 kV transformers and configure the 115 kV bus to a ring and the 70 kV bus to double-breaker-single-bus (DBSB).
- Reroute existing 70 kV lines and 115 kV lines to the New Exchequer Substation.
- Upgrade the Exchequer 115 kV generator tie line and associated equipment as needed.
- Evaluate the existing Merced Falls–Exchequer 70 kV Overload SPS and the Exchequer–Le Grand 115 kV RAS.

- **Proposed In-Service Date**

- May 2032 or earlier

- **Estimated Cost**

- \$84 M - \$168 M* for the total project



Proposed Single Line Diagram

Alternatives Considered

Alternative	Reliability Performance	Broader system Benefits	Estimated Cost
Previously Approved Mariposa Voltage Support Project	Provides localized reactive support but does not address the underlying weak transmission configuration	No broader system benefits	\$ 45 M
Proposed Exchequer 115 kV Reconfiguration Project	Improves the voltage performance and mitigates voltage violations by reconfiguring the 115 kV source and strengthening the 70 kV system	Improves operational flexibility, elimination of critical single points of failure, upgrades aging infrastructure, and separation of PG&E and Merced Irrigation District Assets at Exchequer PH	\$84M

WATSONVILLE AREA REINFORCEMENT PROJECT

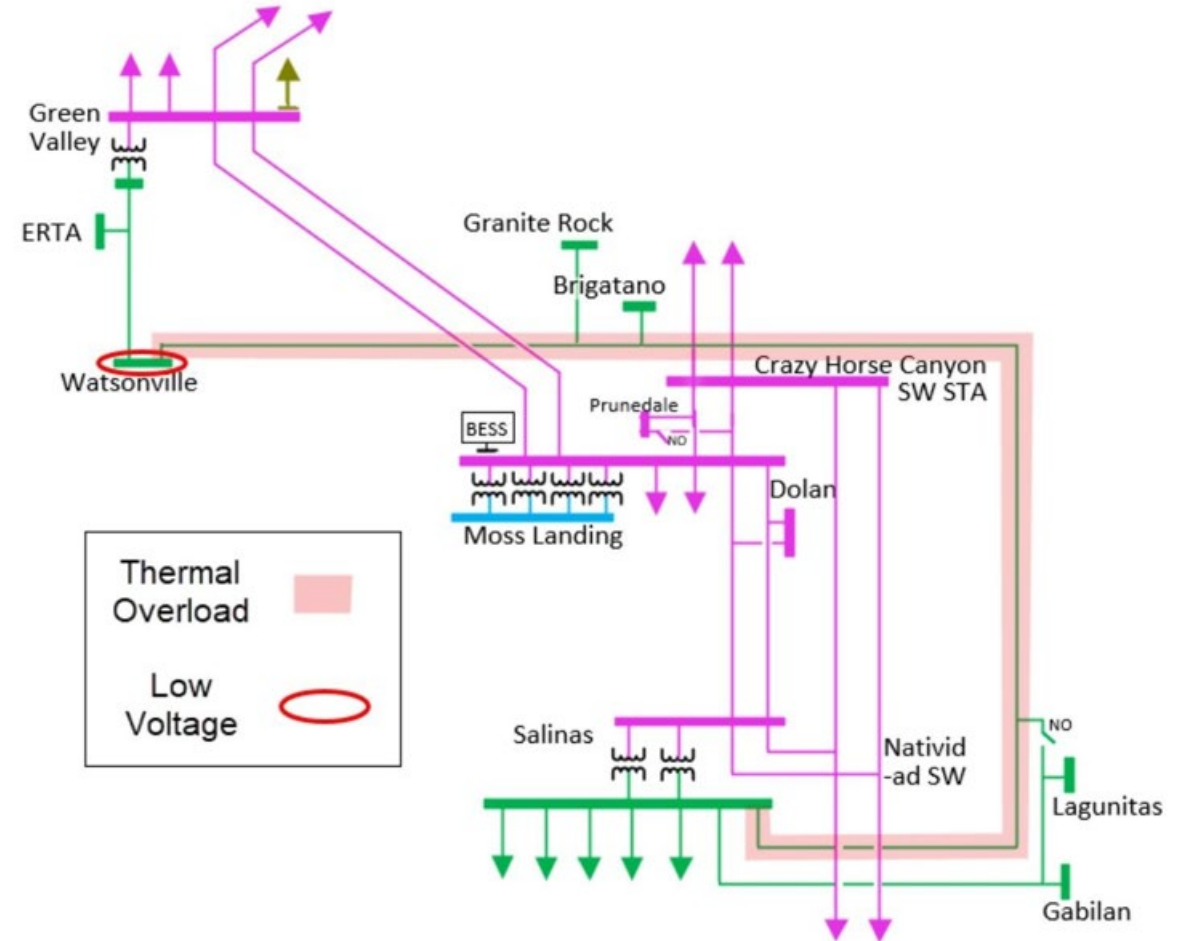
(CONCEPTUAL)



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Area Background

- Watsonville 60 kV Substation is primarily served from Green Valley 115 kV Substation. Under contingency conditions resulting in the loss of this source, the substation is supplied through the 28-mile Watsonville–Salinas 60 kV line, which results in significant voltage drop and low-voltage conditions at Watsonville.
- The Watsonville–Salinas 60 kV line is also the primary source of supply for the Granite Rock and Brigatano substations.
- The existing configuration of the Green Valley, Watsonville and Salinas Substations results in a relatively weak transmission corridor. Following the loss of the Moss Landing–Green Valley 115 kV lines (category P7 – common tower), power normally supplied through the 115 kV system is redirected through the Watsonville–Salinas 60 kV line, resulting in thermal overloads.
- **Related Projects**
 - Reconductoring from Watsonville to Salinas 60 kV (~ 20 miles)



Watsonville Area Deficiencies

Assessment Results

- Contingency Description**

- Thermal overloads and voltage violations are identified under multiple contingency categories , including P1 and P7

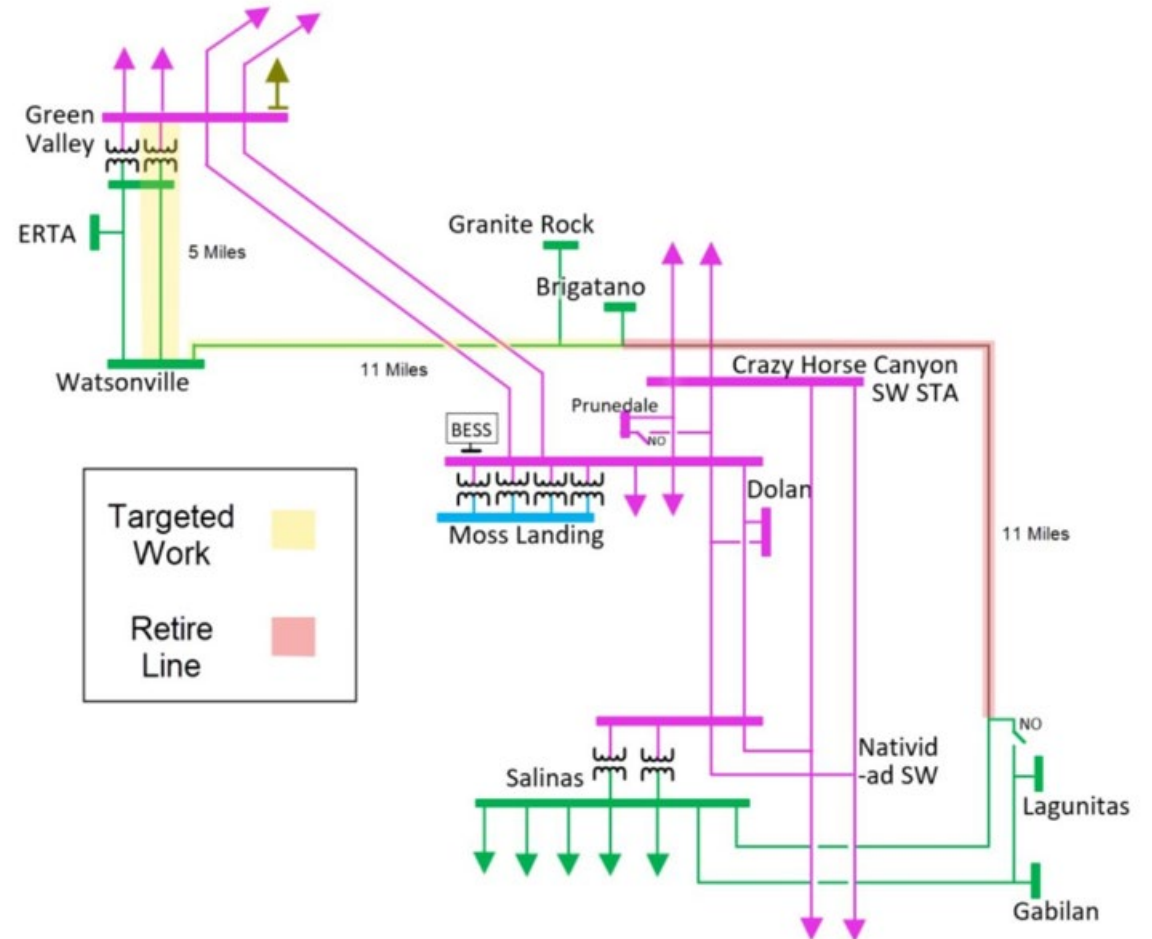
- Selected Power Flow Results**

		Pre-Project				Contingency	
Facility	Summer Emergency Rating (MVA)	2028 (%)	2031 (%)	2036 (%)	2041 (%)	Category	Contingency Name
Watsonville – Salinas 60 kV Line	36	130%	150%	160%	170%	P1/P7	- Green Valley 115 k/60 kV Bank (P1) - Watsonville – Green Valley 70 kV (P1) - Moss Landing – Green Valley #1 and #2 115 KV Line (P7)

Monitored Facility	Pre-Project				Contingency	
Facility Name	2028 (p.u.)	2031 (p.u.)	2036 (p.u.)	2041 (p.u.)	Category	Contingency Name
Green Valley 115 kV	0.70	0.69	0.68	0.68	P1/P7	- Green Valley 115 k/60 kV Bank (P1) - Watsonville – Green Valley 70 kV (P1) - Moss Landing – Green Valley #1 and #2 115 KV Line (P7)
Watsonville 60 kV	0.72	0.70	0.7	0.69		
Brigatano/Granite Rock 60 kV	0.75	0.75	0.75	0.75		

Alternative 1:

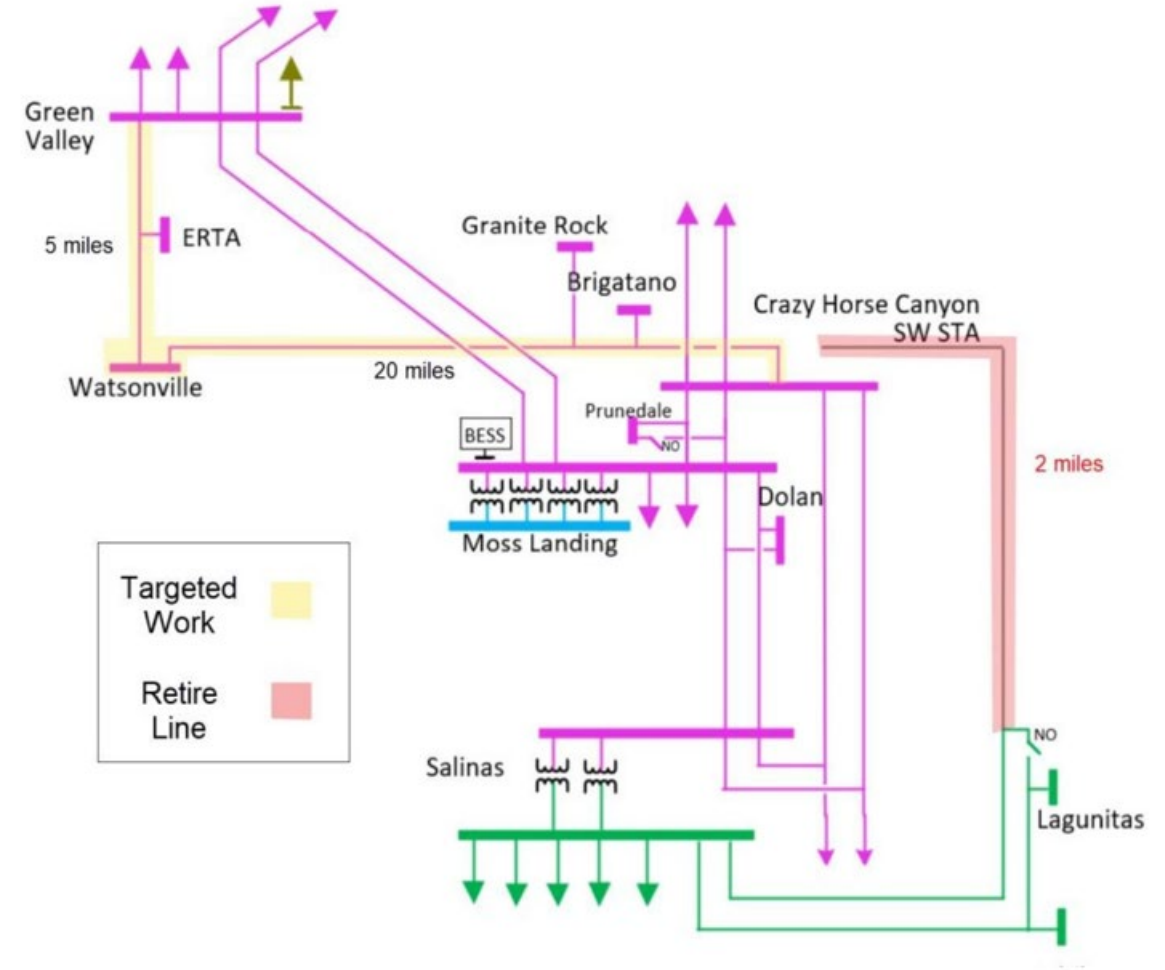
- Install a second 115/60 kV transformer at Green Valley
- Build a second 60 kV line from Green Valley to Watsonville (~ 5 miles)
- Retire ~ 11 miles of the Watsonville–Salinas line between the Brigatano tap and the normal open point near Lagunitas
- Install a 20 MVar STATCOM at Watsonville



Alternative 1 One-Line Diagram

Alternative 2:

- Convert the Green Valley–Watsonville–Crazy Horse Canyon 60 kV path to 115 kV, roughly 20 miles
- Retire roughly 2 miles of the Watsonville–Salinas line between Crazy Horse Canyon and the normal open point near Lagunitas
- Install a 20 MVar STATCOM at Watsonville



Alternative 2 One-Line Diagram

SOUTH LOS PADRES REINFORCEMENT PROJECT

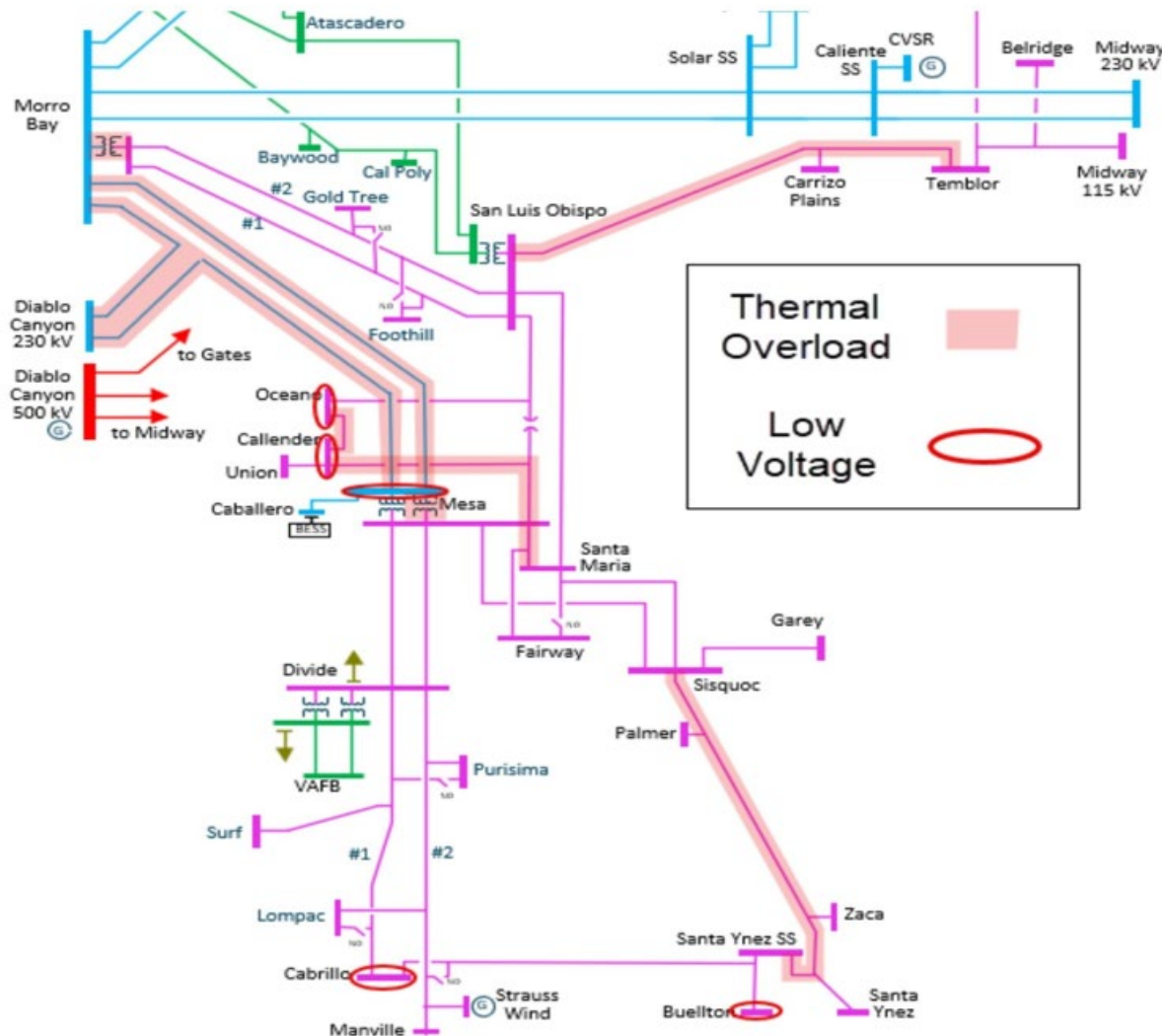
CONCEPTUAL

(Mesa 230/115 kV Spare Transformer Addition Rescope)



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- The Morro Bay and Mesa substations serve as the primary import for this entire sub-area.
- The south Los Padres area is experiencing load growth that is increasing stress on several transmission lines in the area
- Reliability studies identified thermal overloads on critical 230 kV and 115 kV transmission lines, and low-voltage conditions at Mesa 230 kV Substation along with several other 115 kV substations.
- This conceptual proposal evaluates transmission reinforcements to address these reliability risks, increase system resilience, support future load growth and maintain compliance with planning standards.
- **Previously Approved CAISO Projects:**
 - Mesa 230/115 kV Hot Spare Transformer Addition (2223-R-11)
 - South of Mesa Upgrade (Revised) (LP-1819-R-09) – rescoping

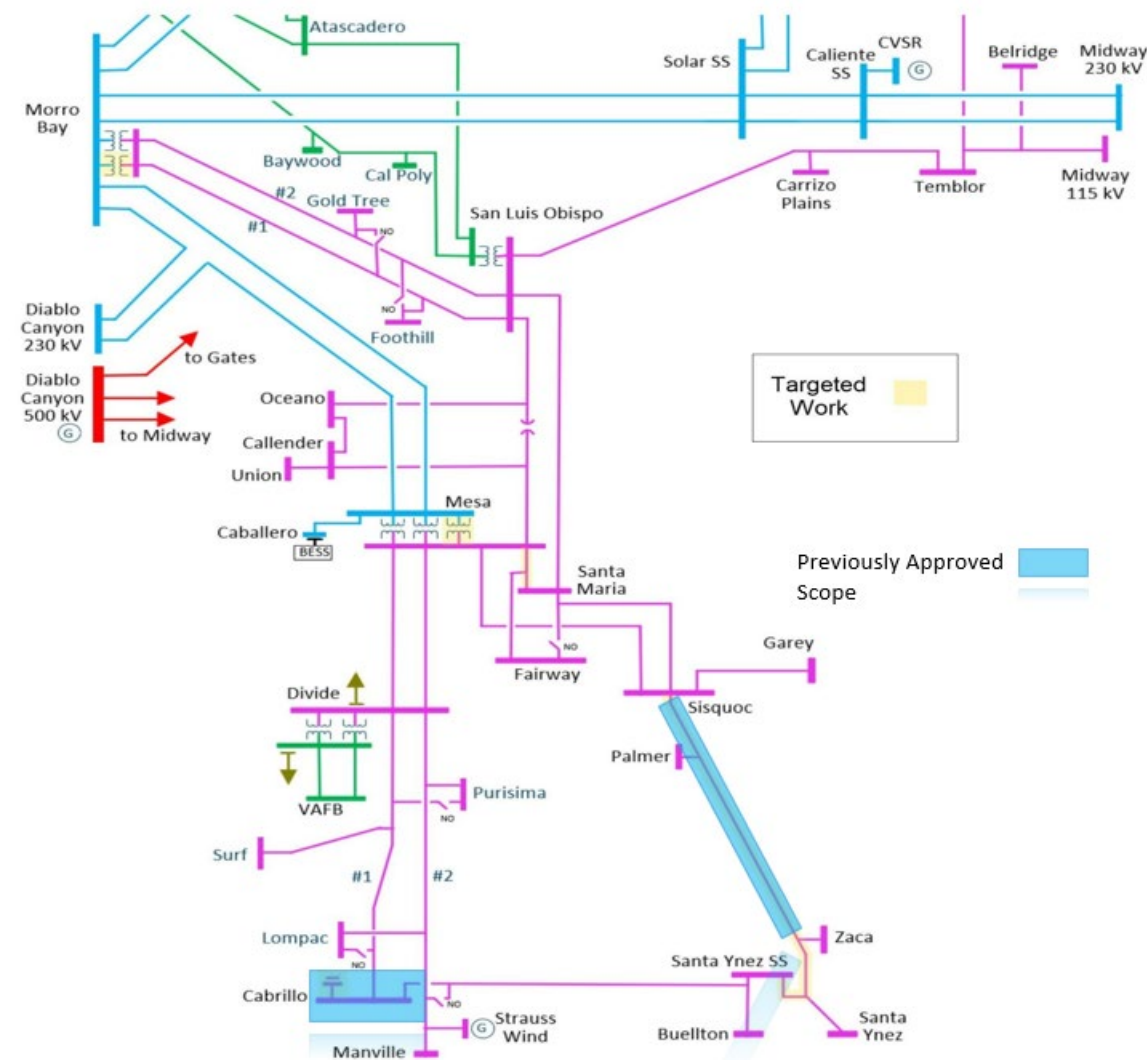


South LP Area Deficiencies

- **Project Objectives**
 - Address the identified NERC TPL thermal overload and low-voltage deficiencies in the southern Los Padres area.
- **Identified Deficiencies**
 - Loss of the single Morro Bay 230/115 kV transformer (category P1), results in thermal overload on the Oceano–Callender 115 kV, Callender–Mesa 115 kV lines.
 - Mesa Substation has two 230/115 kV transformers. If during planned maintenance of one transformer bank (out-of-service), the remaining transformer bank were to trip (category P6), all load south of Mesa would be lost.
 - The Mesa–Divide #1 and #2 lines are double-circuit lines on common structures. On failure of both lines (category P7), power is redirected through the Sisquoc–Santa Ynez line, resulting in thermal overloads and low-voltage conditions.
 - Following loss of the Morro Bay–Mesa 230 kV line (category P1), low-voltage conditions are observed at Mesa Substation.

- **Alternative 1**

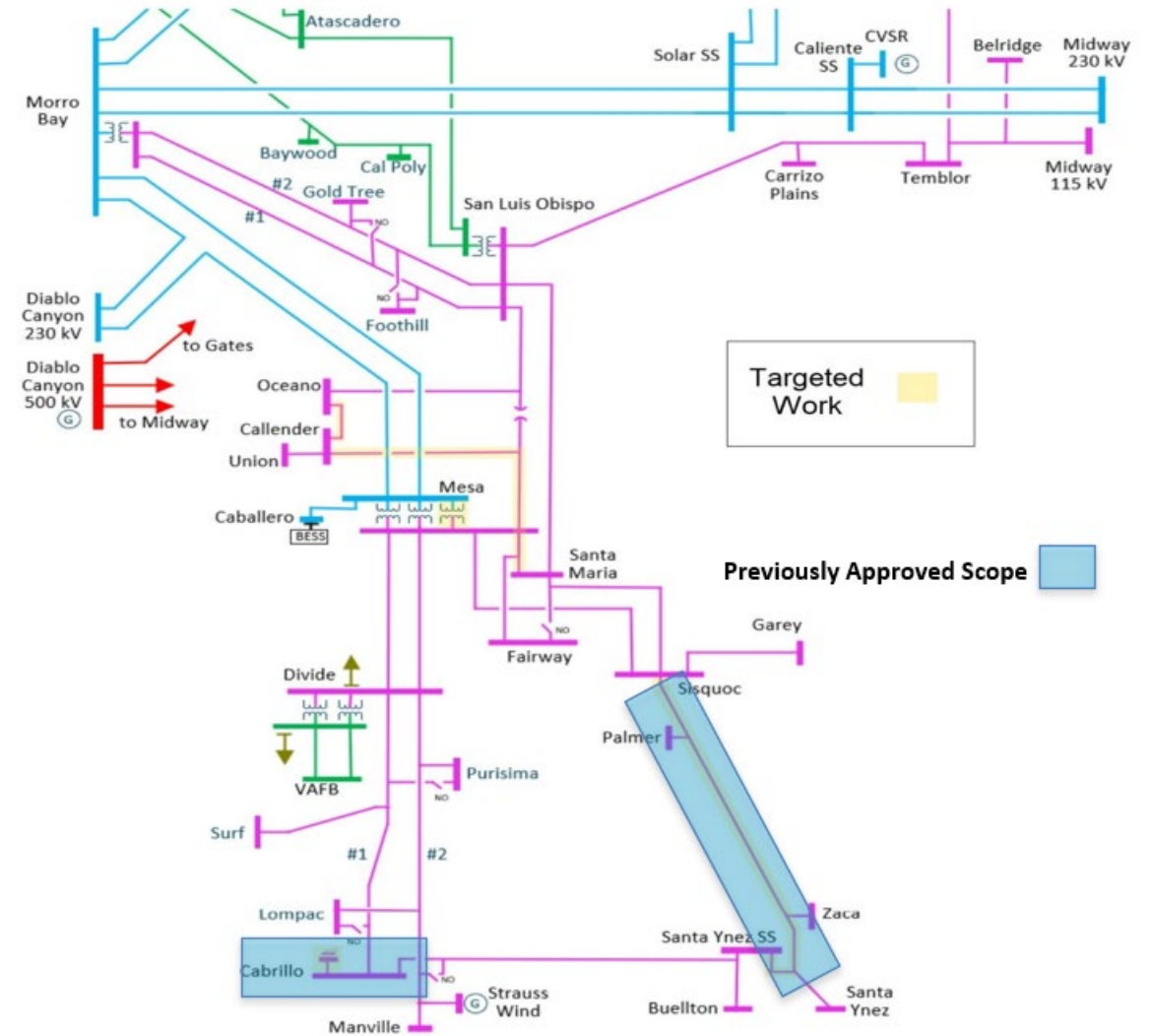
- Add a second 230/115 kV transformer at Morro Bay substation
- Reconductor Mesa–Santa Maria 115 kV with an emergency summer rating of 1440 A
- Voltage support at various 115 kV substations
- Add a third 230/115 kV transformer at Mesa substation



Alternative 1 One-Line Diagram

Alternative 2

- Reconductor the Oceano–Callender 115 kV, Callender–Mesa 115 kV and Mesa–Santa Maria 115 kV lines
- Add a third 230/115 kV transformer at Mesa substation
- Voltage support at various substations



Alternative 2 One-Line Diagram

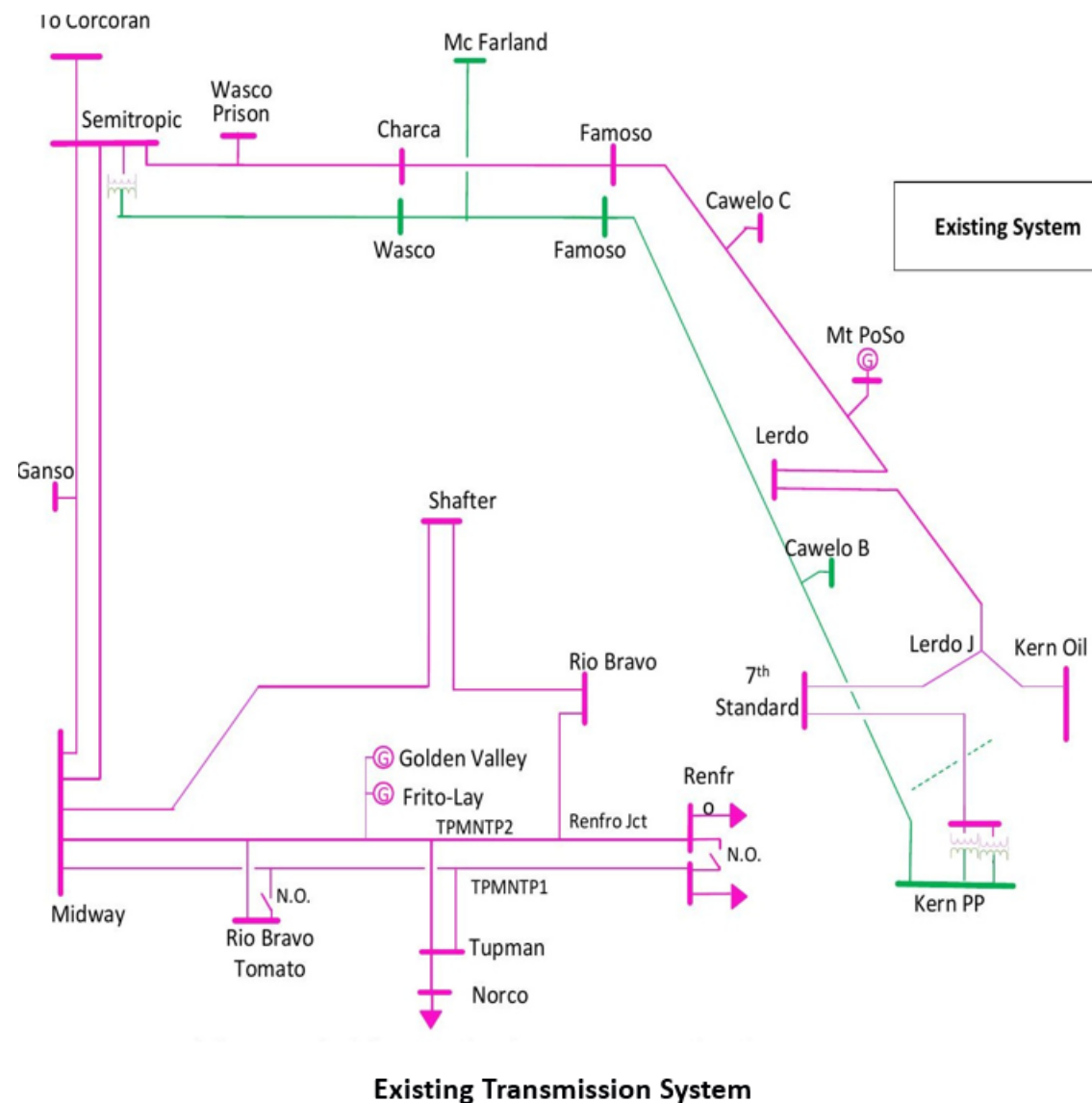
LERDO 115 KV SYSTEM UPGRADE PROJECT

(CONCEPTUAL)



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- The Lerdo area is supplied by Semitropic Substation via a 115 kV path consisting of the Semitropic–Charca, Charca–Famoso and Lerdo–Famoso 115 kV lines, and from the Kern PP via the Lerdo–Kern Oil–7th Standard 115 kV line.
- Lerdo and Famoso 151 kV substations are experiencing increased distribution load growth
- **Related Projects**
 - Kern PP 115 kV Bus Conversion to Breaker and a Half
 - North East Kern 115 kV System Reinforcement Project



- **Contingency Description**
 - Thermal overloads and voltage violations are identified under P3 contingency category
- **Selected Power Flow Results**

		Pre-Project			Contingency	
Facility	Summer Emergency Rating (MVA)	2028 (%)	2031 (%)	2036 (%)	Category	Contingency Name
Lerdo – Kern Oil- 7th Standard 115 kV	96.4	106%	118%	175%	P3	MT POSO 13.80KV GEN UNIT 1 & Semitropic - Chakra or Charka - Famoso 115KV
Semitropic- Charca 115V	99.6	113.1%	127.3%	133.5%	P3	MT POSO 13.80KV GEN UNIT 1 & Lerdo – Kern Oil- 7th Standard 115 kV
Charca – Famoso 115 kV	96.4	96.2	111	113.8		

Conceptual Alternative 1

- Project Objectives**

- With a third 115 kV source added to Lerdo, the Category P3 overloads observed on the 115 kV path will be mitigated.

- Preferred Scope**

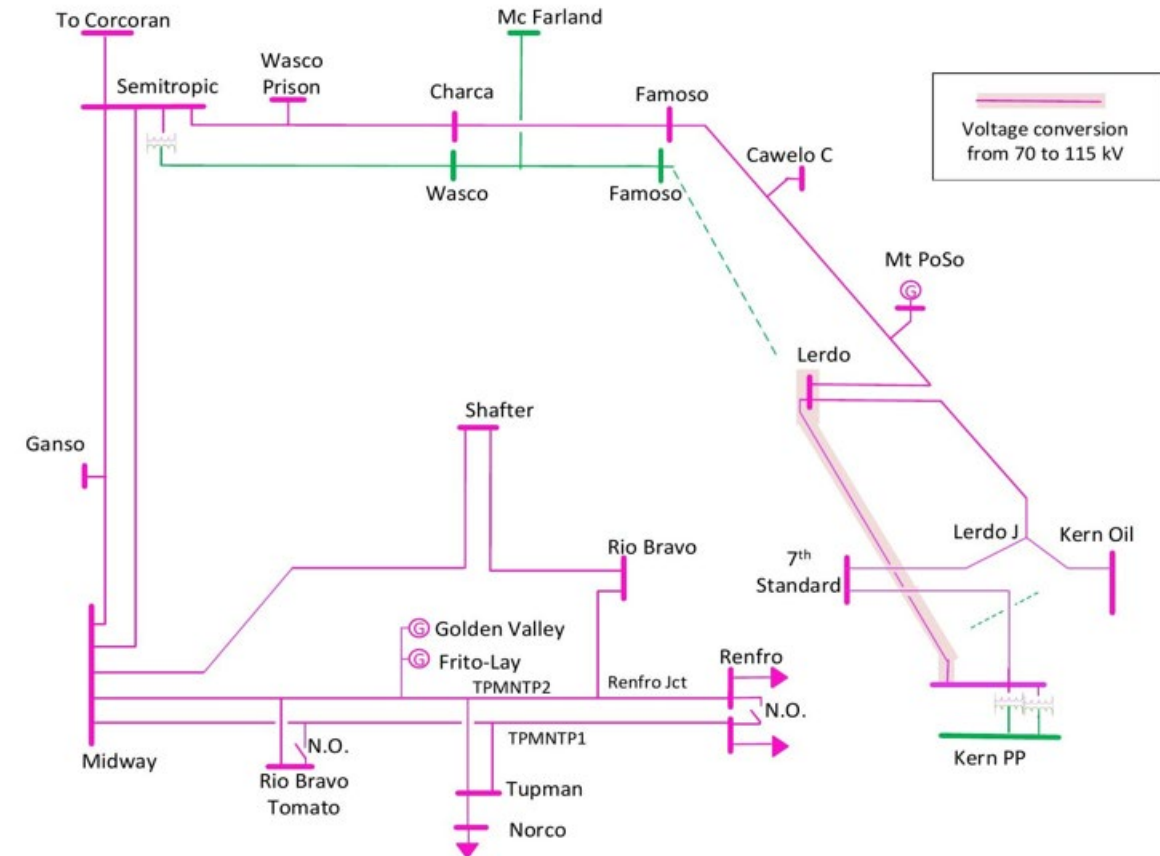
- 115 kV voltage conversion of approximately 11 miles of the Kern–Kern Oil–Famoso 70 kV line, extending from the Kern PP 115 kV/70 kV substation to structure A009/144. The converted line would be extended to and terminated at the Lerdo 115 kV Substation, which would require expanding the Lerdo 115 kV bus.
- The Famoso load would continue to be served radially from the Semitropic 70 kV system; the idle Famoso–Lerdo segment would no longer be needed to serve that load.
- The existing 2.5 MW Cawelo B industrial load on the section identified for voltage conversion could be connected to and served through the distribution system.
- PG&E will evaluate the feasibility of using advanced conductors for the converted 115 kV line.

- Proposed In-Service Date**

- May 2031 or earlier

- Estimated Cost**

- To be determined as part of the Conceptual Project Development



Proposed Alternative

MAPLE CREEK AREA REINFORCEMENT PROJECT

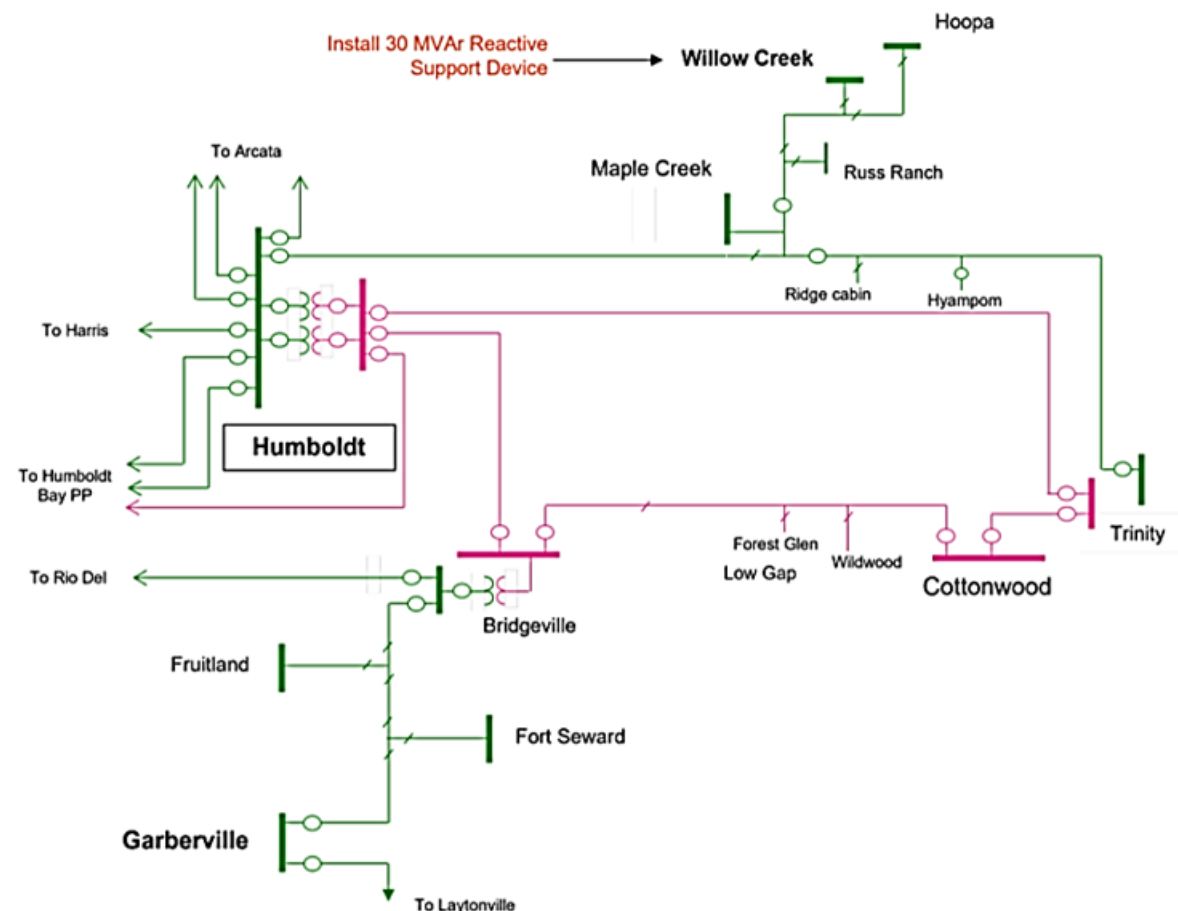
*(WILLOW CREEK REACTIVE SUPPORT PROJECT
RESCOPE)*



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Area Background

- Maple Creek 60 kV transmission pocket is in Humboldt County serving Maple Creek, Willow Creek, Russ Ranch, and Hoopa substations
- The area is supplied from the Humboldt and Trinity sources through long 60 kV transmission paths, resulting in weak voltage performance.
- The previously approved Willow Creek Reactive Support Project proposed to install a 30 MVAR STATCOM at the Willow Creek Substation to address the identified low-voltage issues.



Single Line Diagram with previously approved Willow Creek Reactive Support Project

- **Contingency Description**
 - P1-2: Humboldt-Maple Creek 60 kV Line
 - P2-1: Humboldt-Maple Creek 60 kV Line
- **Power Flow Results**

Monitored Facility	Pre-Project		Post-Project	Contingency	
Facility Name	2028 (p.u.)	2031 (p.u.)	2031 (p.u.)	Category	Contingency Name
Maple Creek 60 kV	0.71	0.74	1.03	P1-2	P1-2: HUMBOLDT-MAPLE CREEK 60 kV MOAS OPENED on HUMBOLDT_MAPLE CREEK
Willow Creek 60 kV	0.63	0.80	0.99		
Hoopla 60 kV	0.61	0.73	0.98		

*The P2-1 contingency have similar voltage performance to P1-2 results showed in the table above..

Project Objectives: Mitigate the identified NERC TPL-001-5 P1 and P2-1 voltage violations by establishing an additional 115/60 kV source and strengthening Maple Creek 60 kV network.

Preferred Scope

- Loop the Humboldt–Trinity 115 kV Line into Maple Creek Substation, establishing the Humboldt–Maple Creek and Maple Creek–Trinity 115 kV line sections.
- Convert the existing Maple Creek Substation into a 115/60 kV substation, including the required 115/60 kV transformer.
- Reconductor approximately 14.1 miles of the Humboldt–Maple Creek 60 kV Line to achieve minimum summer normal rating of 419 Amps and winter normal rating of 551 Amps.

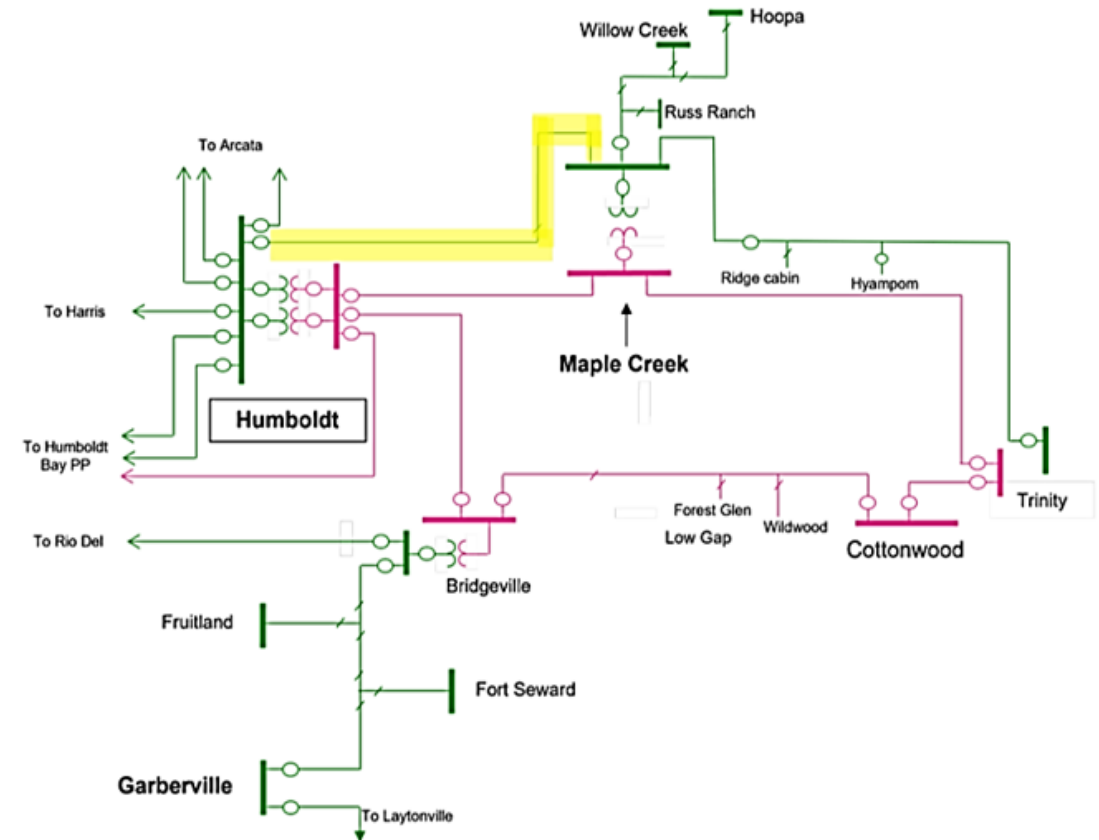
Proposed In-Service Date

- May 2032 or earlier

Estimated Cost

- \$77.7 M - \$155.4 M*

*AACE Level 5 quality estimates includes a +100% contingency



Proposed Project Single Line Diagram

Alternatives Considered

Alternative	Reliability Performance	Broader system Benefits	Estimated Cost
Previously Approved Willow Creek Voltage Support Project	Provides localized reactive support but does not address the underlying weak transmission configuration	No broader system benefits	> \$ 45 M
Proposed Maple Creek Area Reinforcement	Improves the voltage performance and mitigates voltage violations by establishing a new 115/60 kV source and strengthening the 60 kV system	Improves source diversity and operational flexibility; Upgrades aging infrastructure along the Humboldt- Maple Creek corridor	\$77.7 M - \$155.4 M

CLEAR LAKE-LOWER LAKE 60 kV AREA REINFORCEMENT PROJECT

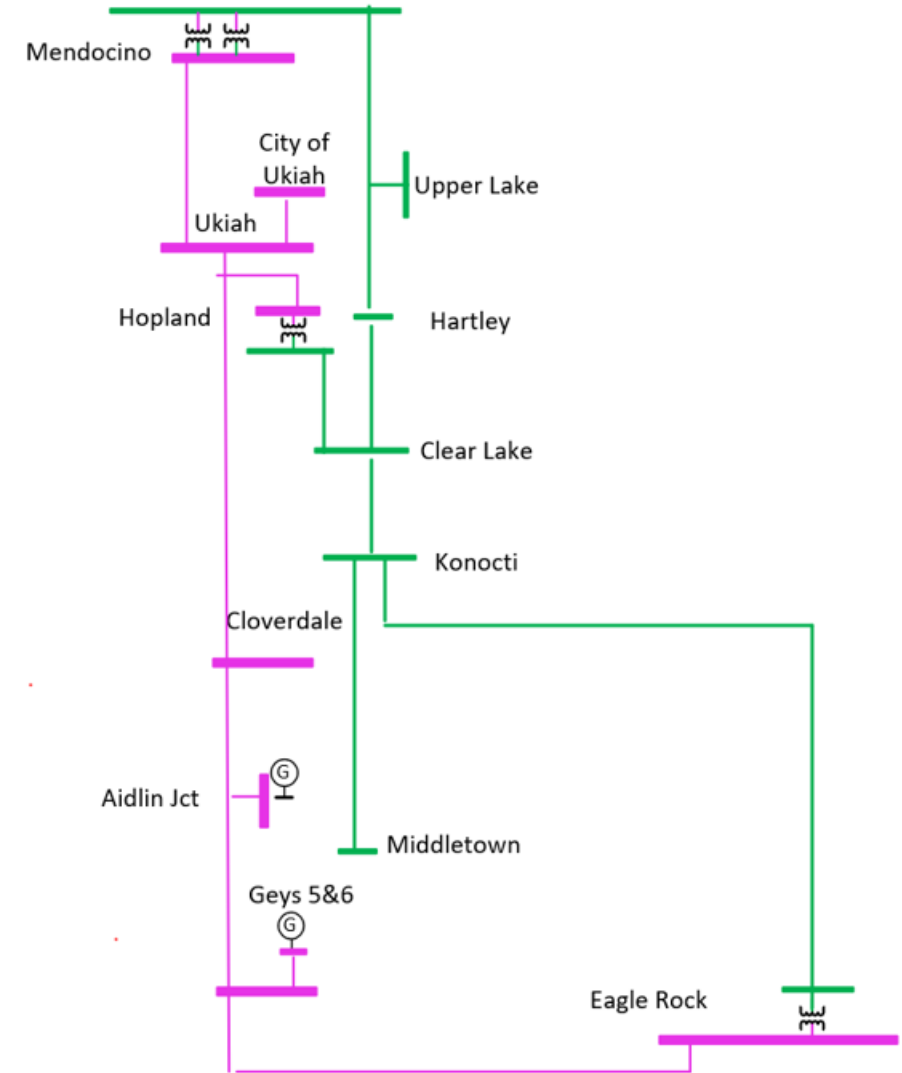
*(CLEARLAKE 60 kV SYSTEM REINFORCEMENT
PROJECT AND KONOCTI – EAGLE ROCK 60 kV
REINFORCEMENT RESCOPE)*



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Area Background

- The Clearlake 60 kV System serves Upper Lake, Hartley, Clear Lake, Konocti and Middletown substations in Lake County.
- The area is supplied through relatively long 60 kV transmission paths from Mendocino/Hopland and Eagle Rock sources.
- There are two previously approved TPP projects addressing low voltage and thermal issues in this pocket:
 - Clearlake 60 kV System Reinforcement
Reconductor 11.5 miles of Clear Lake-Hopland 60 kV line and install a 10-15 MVar shunt capacitor at Middletown 60 kV.
 - Konocti-Eagle Rock 60 kV Reconductoring Project
Reconductor Konocti-Eagle Rock 60 kV (about 10.0 miles) to achieve minimum conductor rating of 954 AMPS for summer normal rating and 1100 AMPS for summer emergency rating.



Existing System Single Line Diagram

Assessment Results

- Contingency Description
 - P0 Voltage Violations and P1 category event that causes loss of Geyser No. 3-Cloverdale 115 kV Line

- Power Flow Results

Thermal Reliability Results

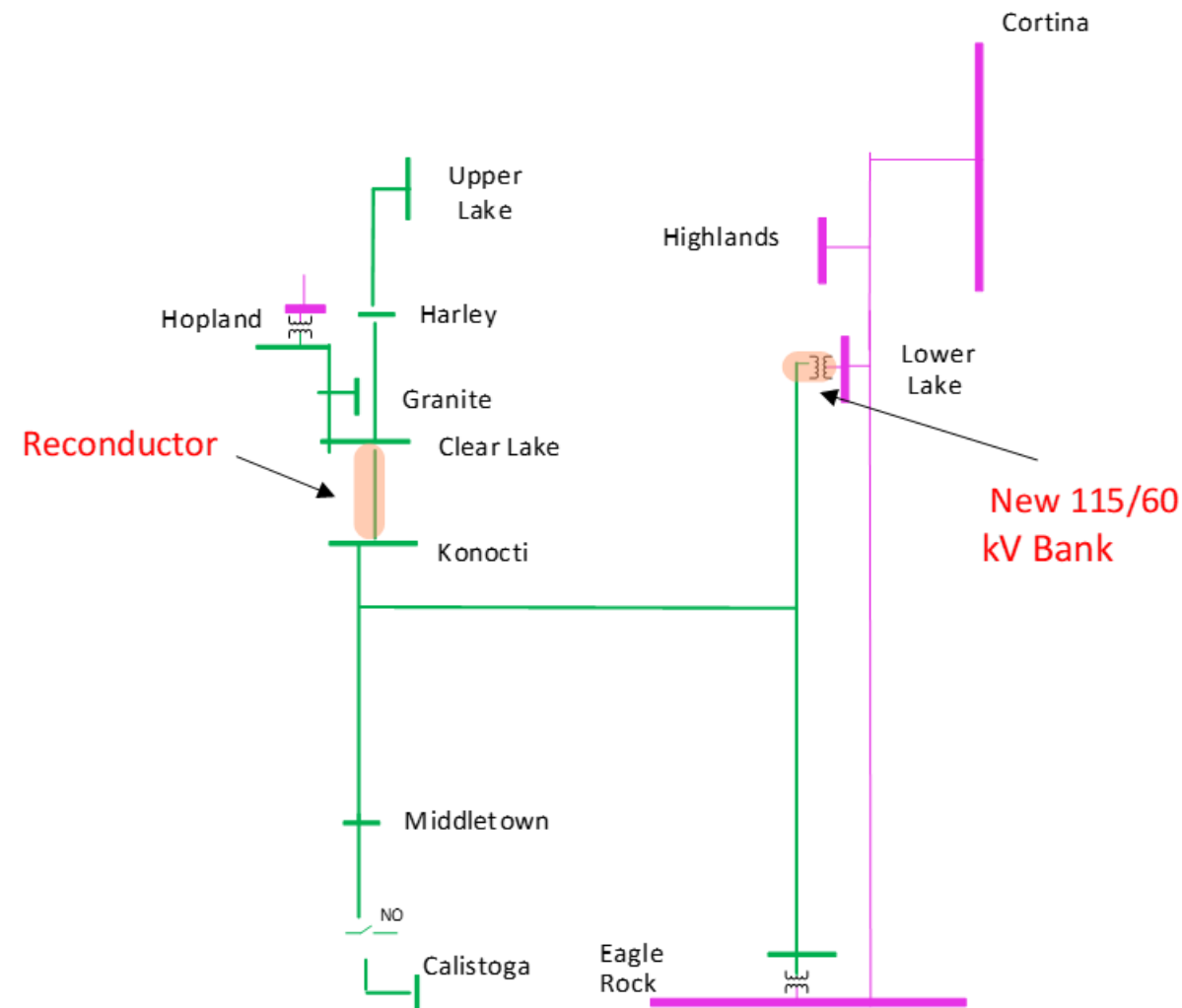
Monitored		Pre-Project			Post-Project	Contingency	
Facility	Rating (MVA)	2028	2031	2036	2036	Category	Contingency Name
Clear Lake-Konocti 60 kV Line	39 (SE)	85.4%	91.9%	98.5%	58.9%	P1	Geyser No. 3-Cloverdale 115 kV Line
Eagle Rock-Konocti 60 kV Line	63 (SE)	97.8%	106.4%	108.9%	62.4%	P1	Geyser No. 3-Cloverdale 115 kV Line
Power Flow Results After Adding New 115/ 60 kV Bank at Lower Lake							
Clear Lake-Konocti 60 kV Line	39 (SE)	113.4%	117.3%	119.1%	61.4%	P1	Geyser No. 3-Cloverdale 115 kV Line

Voltage Reliability Results

Monitored Facility		Pre-Project Voltage (p.u.)			Post-Project Voltage (p.u.)	Contingency	
Facility	kV	2028	2031	2036	2036	Category	Name
Middletown 60 kV	60	0.923	0.920	0.912	0.963	P0	No Contingency

Proposed Project

- **Project Objectives:** Mitigate the identified thermal and voltage reliability deficiencies by establishing an additional 115/60 kV source at Lower Lake and reinforcing the Clear Lake – Konocti 60 kV path.
- **Preferred Scope**
 - Install a 100 MVA transformer bank 115/60 kV at Lower Lake substation
 - Reconductor Clear Lake-Konocti 60 kV (about 10.0 miles) to achieve minimum conductor rating of 635 AMPS for summer normal rating and 740 AMPS for summer emergency rating.
- **Proposed In-Service Date**
 - May 2031 or earlier
- **Estimated Cost**
 - \$41.25M - \$82.5M*



Proposed Project Single Line Diagram

*AACE Level 5 quality estimates includes a +100% contingency

Alternatives Considered

Alternative	Reliability Effectiveness	Broader system Benefits	Estimated Cost
Previously Approved: Clear Lake 60 kV System Reinforcement	Addresses voltage and thermal violations	Reinforces the existing 60 kV network but does not establish an additional transmission source into the Clear Lake area.	\$ 80.75 M
Previously Approved: Konocti – Eagle Rock 60 kV Reinforcement	Addresses the Eagle Rock-Konocti thermal limitation by increasing line capability	Resolves an individual line constraint but does not address the broader reactive support need	\$ 32.5 M
Proposed: Clear Lake – Lower Lake 60 kV Area Reinforcement	Establishes a new 115/60 kV source at Lower Lake and reconductor Clear Lake-Konocti, mitigating the identified voltage and thermal deficiencies	Establishes a new 115/60 kV source, improves source diversity, eliminates the need for the two previously approved projects with a more comprehensive long-term solution	\$ 41.25 M - \$ 82.5 M

The proposed scope provides a more comprehensive system solution with approximately **\$30.75 M** below the combined cost of the two previously approved projects

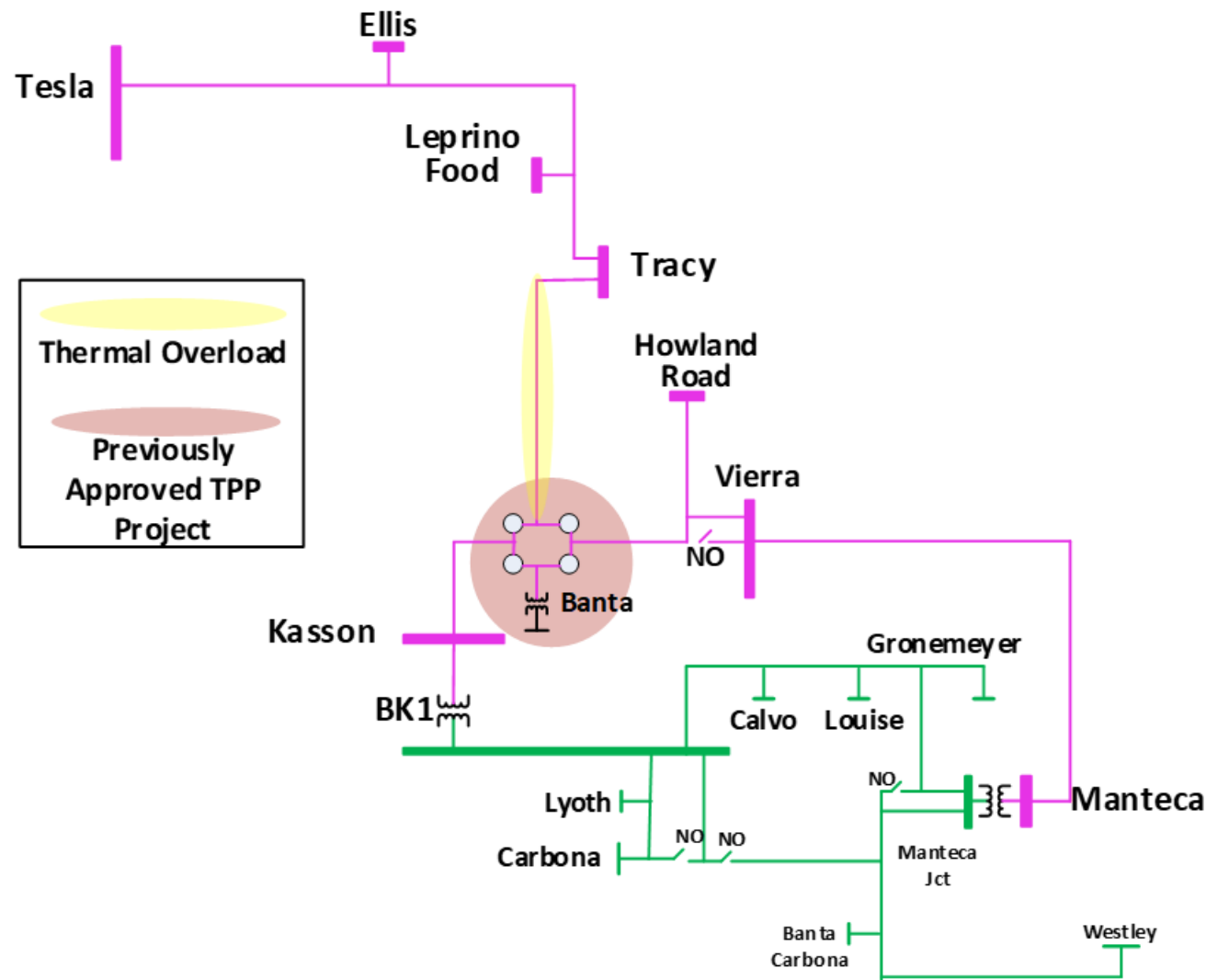
BANTA - TRACY 115 kV LINE RECONDUCTOR PROJECT



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Area Background

- The Tracy 115 kV load pocket is San Joaquin County and is primarily supplied from the Tesla 115 kV and Kasson 115 kV sources.
- Tracy Substation load is forecasted to increase from 112.6 MW in 2028 to 127.4 MW in 2036.
- The previously CAISO approved projects Banta ring bus project will convert the Banta from 60 kV to 115 kV substation and reconfigure the existing Vierra – Tracy – Kasson line into . Kasson – Banta, Banta – Tracy, and Vierra - Banta 115 kV lines.
- The proposed project reinforces the future Banta- Tracy 115 kV Line.



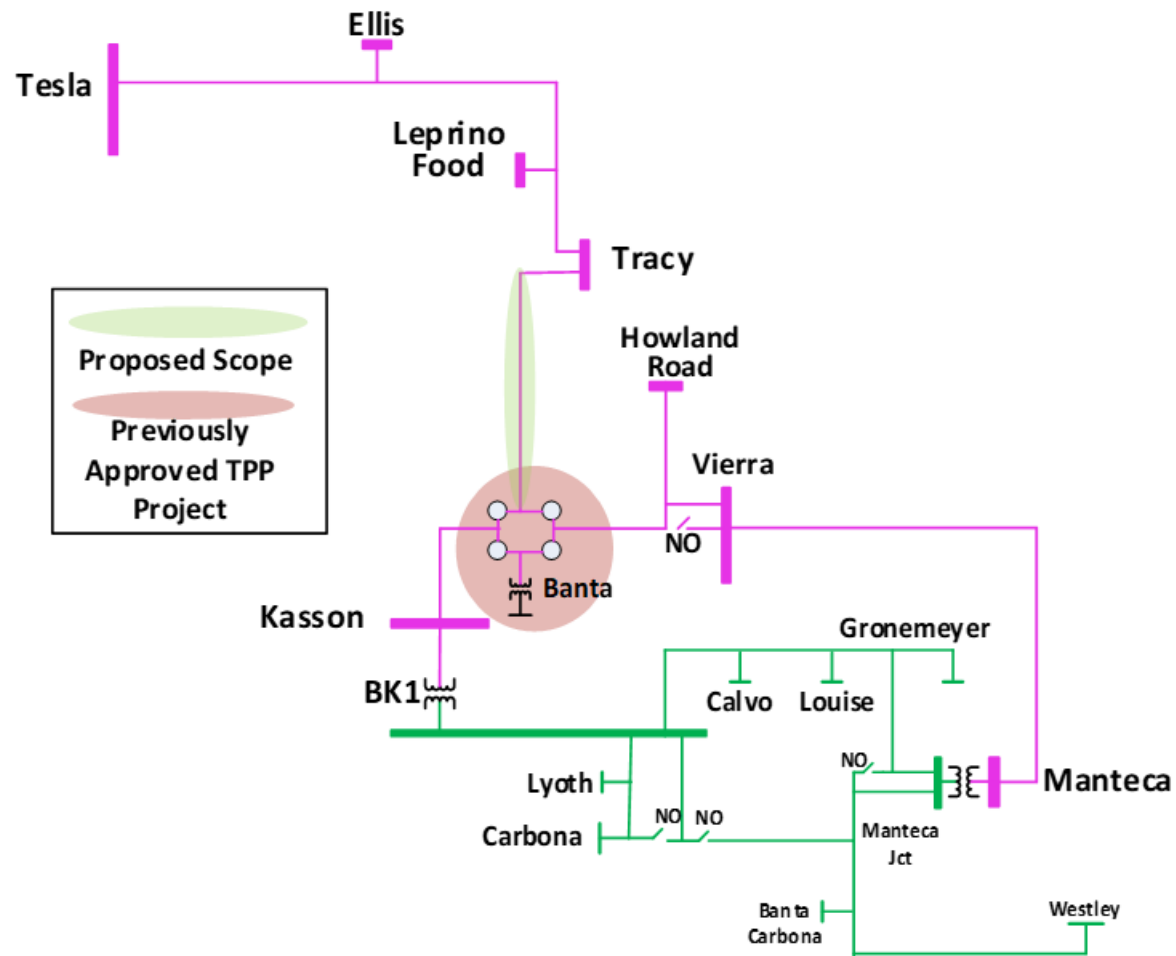
Planned System Single Line Diagram

- **Contingency Description**
 - P1 and P2-1 contingencies affecting the Tesla supply path result in thermal overloads on the future Banta – Tracy 115 kV Line
- **Power Flow Results**

Monitored Facility		Pre-Project			Post-Project		Contingency	
Facility Name	Rating (Amps)	2028 (%)	2031 (%)	2036 (%)	2031 (%)	2036 (%)	Category	Contingency Name
BANTA-TRACY 115 kV	599	106	108	119	34%	37%	P1	P1-2: TESLA-LEPRINO JUNCTION 115 kV
BANTA-TRACY 115 kV	599	107	109	120	34%	38%	P2-1	P2-1: TESLA-TRACY 115KV (TESLA-ELLIS Junction)

Proposed Project

- **Project Objectives:** Mitigate the identified NERC TPL-001-5 P1 and P1, P2-1 thermal violations and provide adequate capacity to serve Tracy area load growth.
- **Preferred Scope**
 - Reconductor the future 3.98 miles Banta - Tracy 115 kV Line to achieve at least 1800 Amp summer emergency rating.
 - Upgrade any limiting components as necessary to achieve full conductor capacity.
- **Proposed In-Service Date**
 - May 2034 or earlier
- **Estimated Cost**
 - \$42.91 M - \$85.82 M*



Proposed Project Single Line Diagram

*AACE Level 5 quality estimates includes a +100% contingency

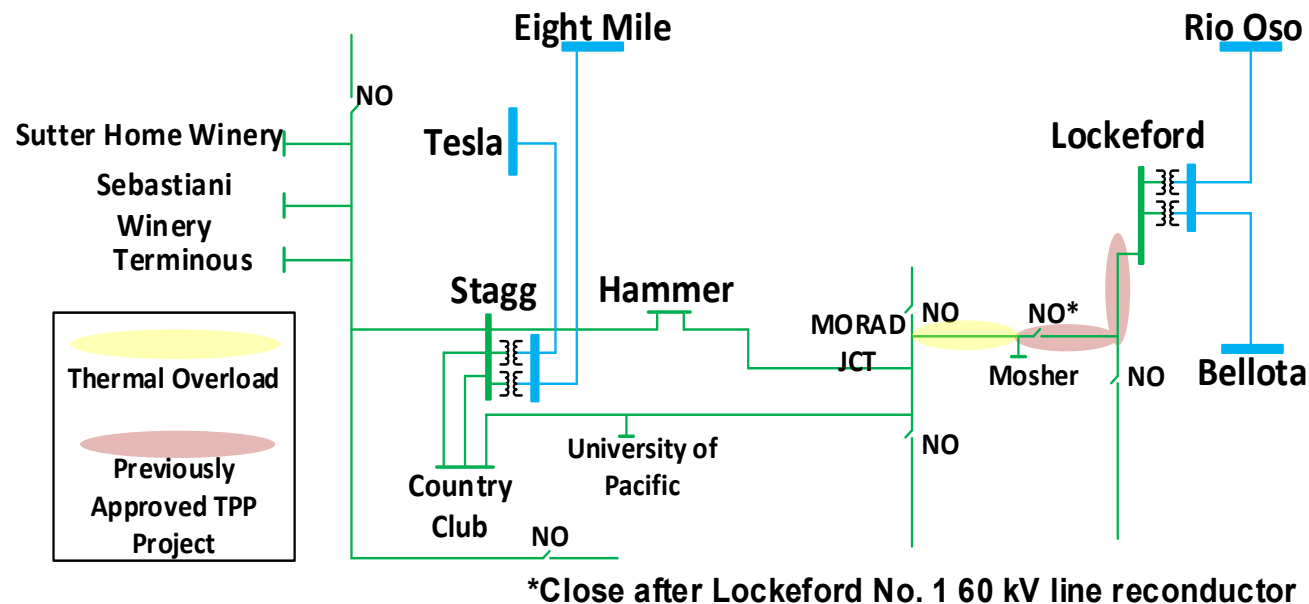
HAMMER – COUNTRY CLUB 60 kV RECONDUCTOR PROJECT



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Area Background

- The Mosher 60kV load pocket is in San Joaquin County and is primarily supplied from the Stagg 230 kV and Lockeford 230 kV sources.
- Mosher substation is served through the Hammer–Country Club 60 kV and the Lockeford #1 60 kV paths.
- Mosher area load is forecasted to increase from 205 MW in 2028 to 235 MW in 2036, increasing contingency loading on the already constrained 60 kV system.
- The previously approved Mosher Transmission Project increases load serving capability from Lockeford by reconductoring the Lockeford #1 60 kV Line. However, following the loss of Lockeford #1 60 kV Line, Mosher pocket remains dependent on the Hammer – Country Club Path.



Existing System Single Line Diagram

- Contingency Description

- P1 loss of the Lockeford #1 60 kV Line causes overload on a section of the Hammer – Country Club 60 kV Line between Mosher Substation and Morada Junction

- Power Flow Results

Monitored Facility	Rating (Amp)	Pre-Project		Post-Project		Contingency	
		2031 (%)	2036 (%)	2031 (%)	2036 (%)	Category	Contingency Name
Hammer - Country Club 60 kV	741	102	121	66	77	P1	P1: Lockeford #1 60 kV line Outage

- **Project Objectives:** Mitigate the identified NERC TPL-001-5 P1 thermal overload and provide adequate capacity for serving the load growth in Mosher area.

- **Preferred Scope**

- Reconductor approximately 1.93 miles of the Hammer–Country Club 60 kV Line between Mosher Substation and Morada Junction to achieve a minimum 1,000 A summer emergency rating.
- Upgrade associated limiting line and/or substation components, as necessary, so that the required conductor capability can be fully utilized.

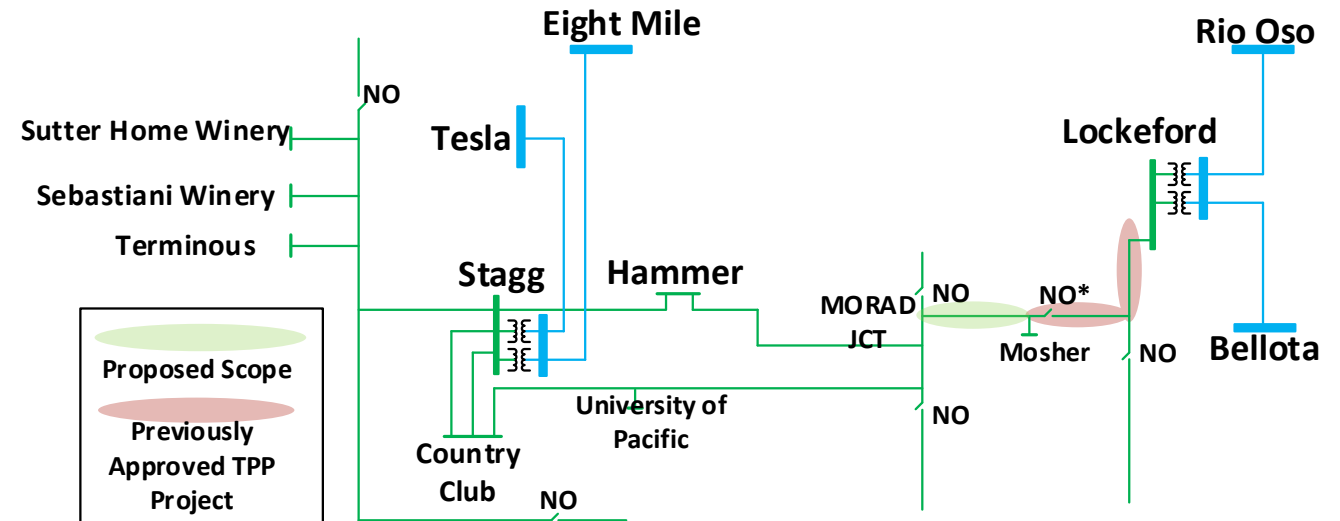
- **Proposed In-Service Date**

- May 2033 or earlier

- **Estimated Cost**

- \$6.69M to \$13.8M*

*AACE Level 5 quality estimates includes a +100% contingency



*Close after Lockeford No. 1 60 kV line reconductor

Proposed Project Single Line Diagram

Alternative Considered: Pre-opening Mosher – Morada Junction was not selected because it does not provide equal reliability improvement and will create low voltage issues.

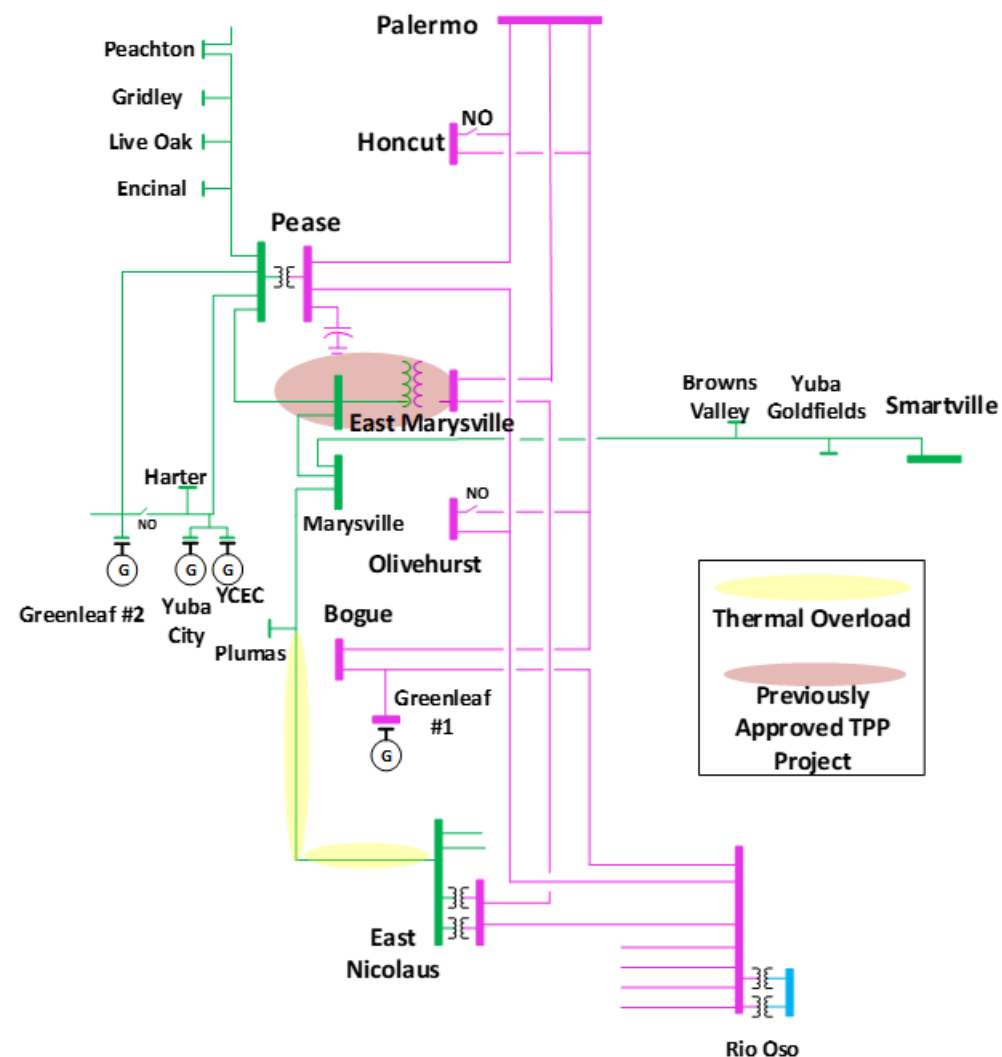
MARYSVILLE 60 kV REINFORCEMENT PROJECT



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Area Background

- The Marysville 60 kV load pocket is in the Sierra area and is supplied from Pease, East Nicolaus and Smartville 60 kV system.
- The previously approved East Marysville 115/60 kV Project will establish East Marysville as an additional source to Marysville 60 kV area.
- The proposed Marysville reinforcement builds on this future configuration by creating an additional 60 kV path through East Marysville.



Planned System Single Line Diagram

- Contingency Description:**

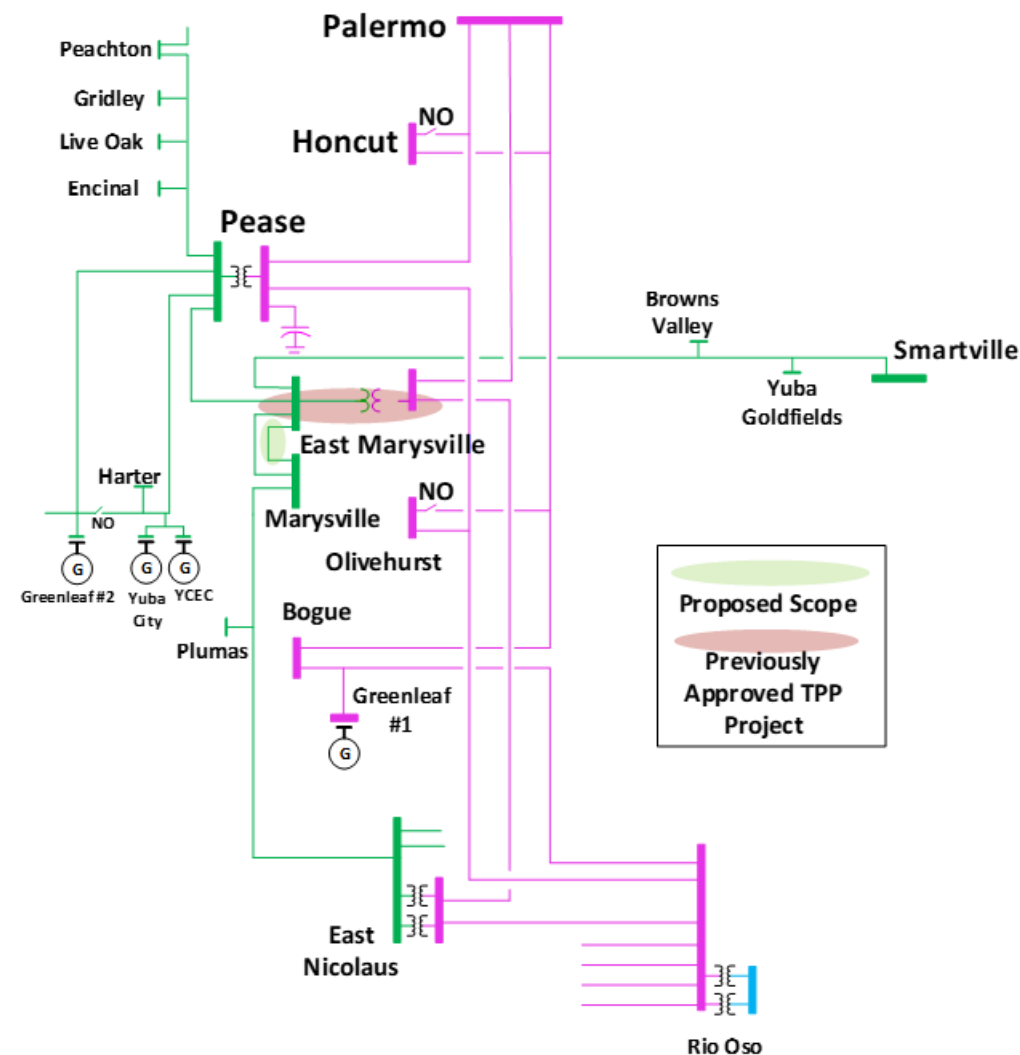
P1 and P3 contingencies involving loss of East Marysville-Marysville #1 60 kV results in thermal overloads on the Nicolaus – Marysville 60 kV

- Power Flow Results:**

Monitored Facility		Pre-Project		Post-Project		Contingency	
Facility Name	Rating (Amp)	2031 (%)	2036 (%)	2031 (%)	2036 (%)	Category	Contingency Name
Nicolaus – Marysville 60kV	344	103	130	24	32	P1	P1-2: East Marysville-Marysville #1 60 kV
Nicolaus – Marysville 60kV	344	119	142	24	32	P3	P3: East Marysville-Marysville #1 60 kV & Narrows #2 Powerhouse 13.80 kV Generator Unit #1

Proposed Project

- **Project Objectives:** Mitigate the identified P1 and P3 thermal overloads and increase load serving capability in the Marysville 60 kV load pocket.
- **Preferred Scope**
 - Loop the Smartville–Marysville 60 kV Line into East Marysville, creating Smartville– East Marysville and the East Marysville–Marysville #2 60 kV Lines.
 - Reconductor approximately 2.52 miles of the East Marysville–Marysville 60 kV Line section to achieve a minimum 1,000 A summer emergency rating.
- **Proposed In-Service Date/Duration**
 - May 2034 or earlier
- **Estimated Cost**
 - \$18.13M-\$36.26M



Proposed Project Single Line Diagram

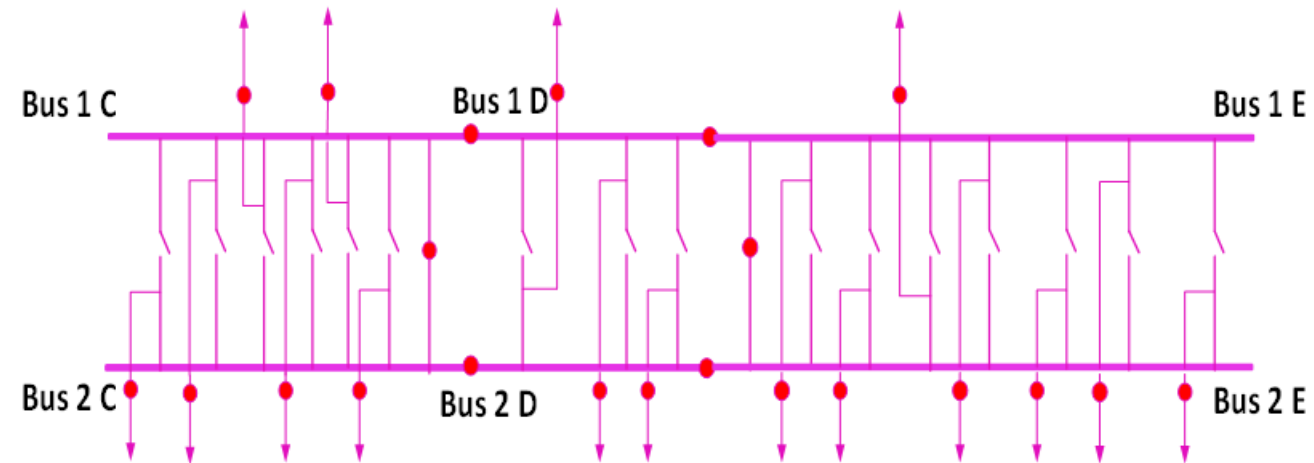
MORAGA 115 kV BUS UPGRADE PROJECT



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Area Background

- Moraga Substation is a major 230/ 115 kV source for the East Bay area, serving cities of Oakland, Alameda and San Leandro.
- Moraga currently has three 230/115 kV transformer banks. The fourth bank was approved in the 2024-2025 CAISO Transmission Planning Process (TPP) with the expected in-service year of 2031.
- The existing Moraga 115 kV Bus is a double bus, single breaker design with three sections.
- The existing Section E has a configuration where an internal bus-tie breaker fault can disconnect multiple critical transmission lines and transformer banks simultaneously.



Existing Single Line Diagram

- Contingency Description**

P2-4 internal fault of Moraga 115 kV Bus-tie Breaker requires isolation of Bus Sections 1E and 2E resulting in simultaneous loss of multiple lines and transformers.

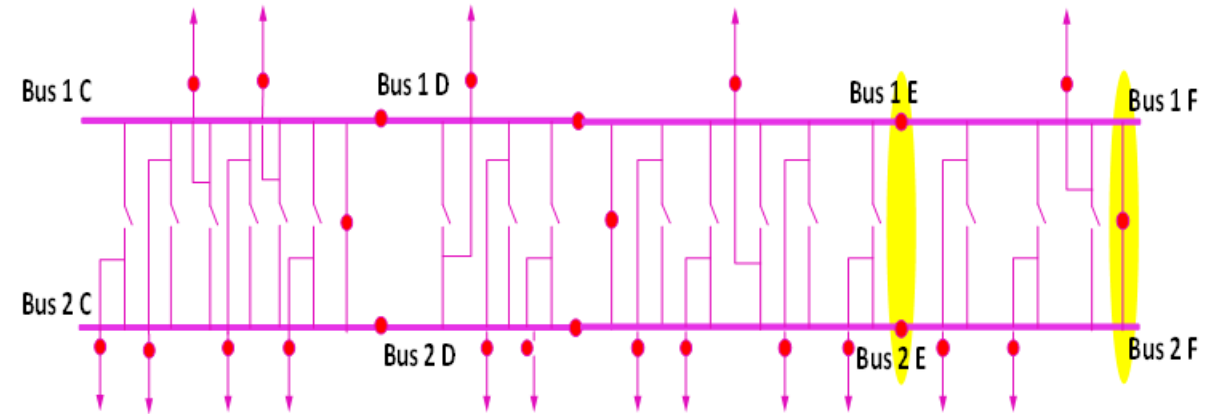
- Power Flow Results**

Monitored Facility		Pre-Project				Post-Project	Contingency	
Facility	Rating (A)	2028 (%)	2031 (%)	2036 (%)	2041 (%)	2041 (%)	Category	Contingency Name
Oakland J-Grant	1603 (SE)	109.7	122.5	146.9	160.9	28.4	P2-4	MORAGA.E 115KV - SECTION 1E & 2E
Grant-Eastshore#1	1143 (SE)	98	108.9	123.6	134.9	37.3	P2-4	MORAGA.E 115KV - SECTION 1E & 2E
Grant-Eden Landing-Eastshore	1143 (SE)	99.8	116	138.4	149.3	53.8	P2-4	MORAGA.E 115KV - SECTION 1E & 2E
East Shore 230 kV/115 kV Transformer Bank #3	462 (SE)	N/A	104.7	102	105.8	48.7	P2-4	MORAGA.E 115KV - SECTION 1E & 2E

SE: Summer Emergency

Proposed Project

- **Project Objectives**
 - Address NERC TPL-001-5 P2 thermal violations.
- **Preferred Scope**
 - Expand and sectionalize the Moraga 115 kV bus Section E to two sections, Section E and Section F.
 - Reconfigure the Moraga-Oakland J 115 kV Line, Moraga-San Leandro#3 115 kV Line and the future Moraga 230/115 kV transformer bank #4, to terminate on Bus Section F.
 - Make protection system upgrades as required.
- **Proposed In-Service Date**
 - May 2032 or earlier
- **Estimated Cost**
 - \$20M - \$40M*



Proposed Single Line Diagram

- **Other Alternatives Considered**

Line-terminal reconfiguration and BAAH conversion were evaluated but not selected due to higher implementation cost relative to the preferred scope.

*AACE Level 5 quality estimates includes a +100% contingency

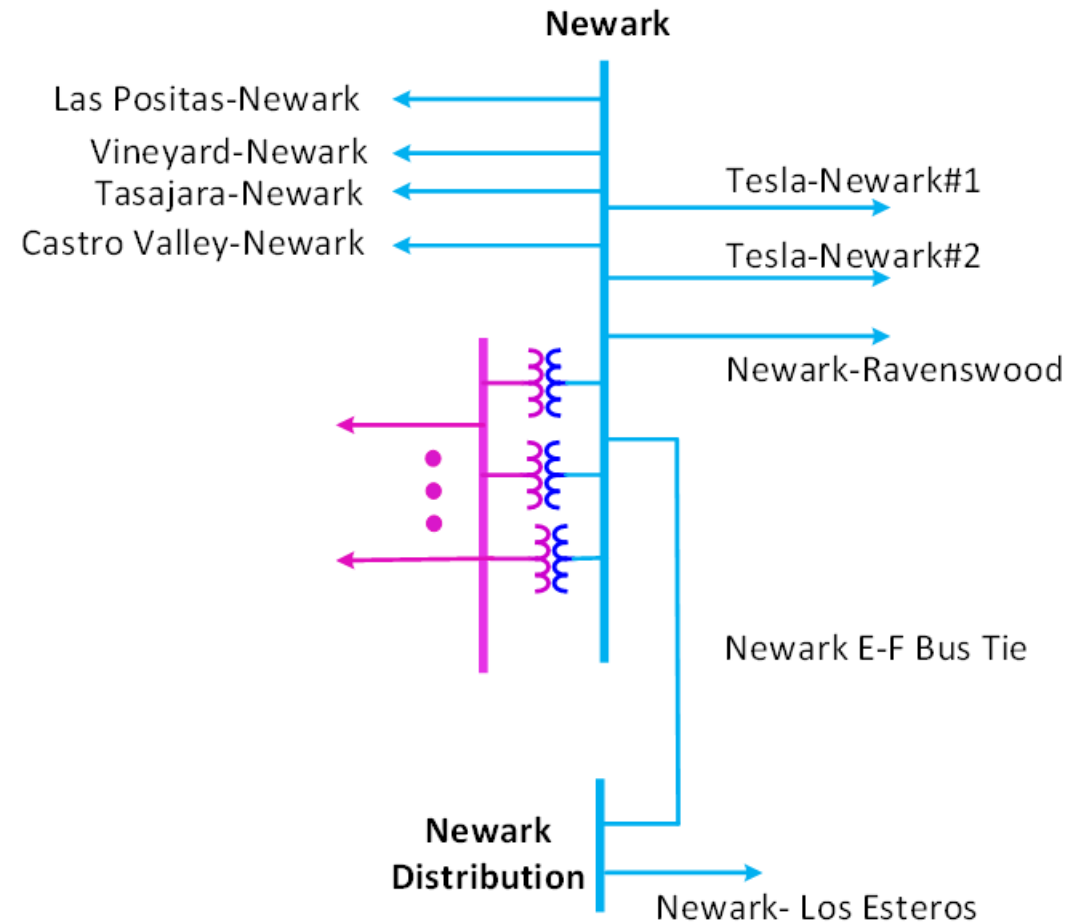
NEWARK E-F 230 kV BUS TIE LIMITING ELEMENTS UPGRADE PROJECT



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Area Background

- The Newark E-F 230 kV Bus Tie connects the Newark 230 kV Substation and Newark 230 kV/21 kV Distribution Substation that serves as a major source for Newark Distribution Substation load.
- The Newark Distribution Station load is forecasted to increase from 239.8 MW in 2028 to 273.2 MW in 2041, increasing loading on the E-F Bus Tie under contingency conditions.
- The existing Bus Tie conductor has substantially greater capability than the current rating and is limited by terminal and substation equipment.



Existing Single Line Diagram

Assessment Results

- Contingency Description:
 - P1-P7
- Selected Power Flow Results:

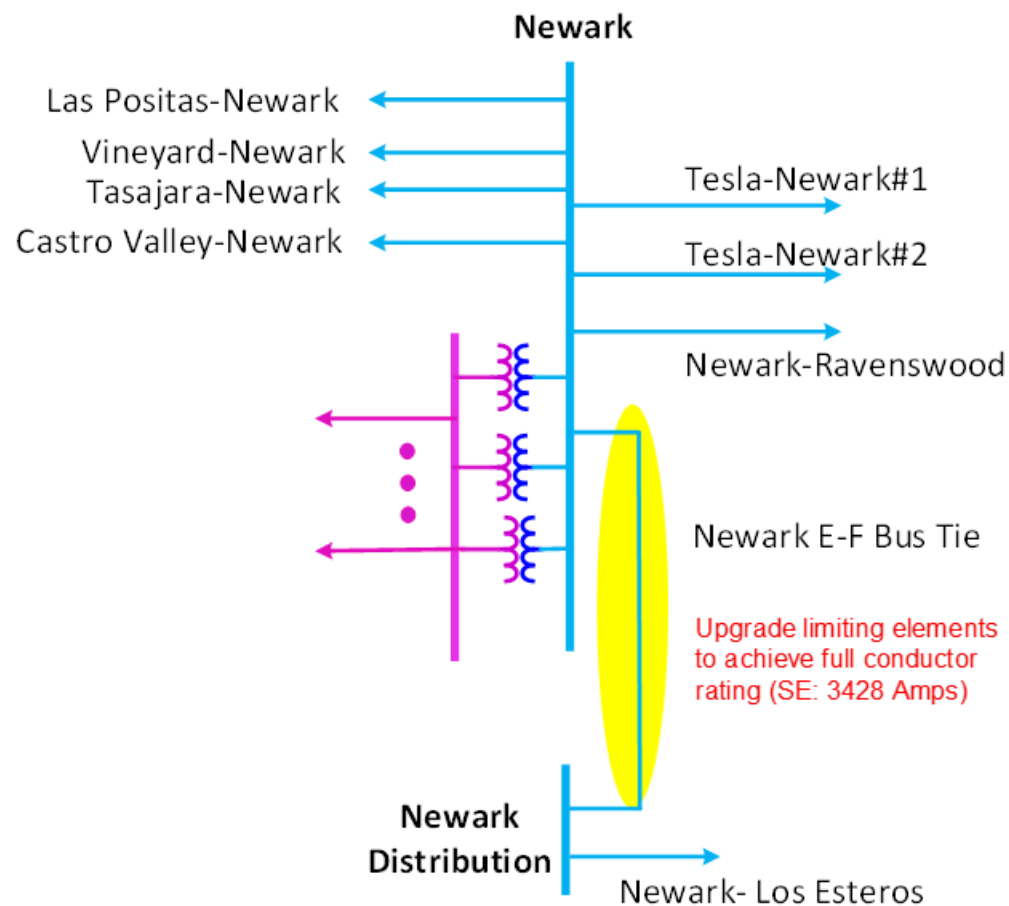
Monitored Facility		Pre-Project				Post-Project	Contingency	
Facility	Rating (A)	2028 (%)	2031 (%)	2036 (%)	2041 (%)	2041 (%)	Category	Contingency Name
Newark E-F Bus Tie 230kV	2339 (SE)	80.7	102.8	103	106.5	72.2	P1	LOS ESTEROS-METCALF 230kV
	2339 (SE)	95.8	115.7	116.3	119.8	79.3	P3	LOS ESTEROS Gen Units & LOS ESTEROS-METCALF 230kV
	2339 (SE)	105.2	135.2	109.2	114.5	77.8	P6	NEWARK D-NSJ-MIDPNTSS #1 230KV & LOS ESTEROS-METCALF 230kV
	2339 (SE)	93.5	125.5	122.9	127.3	78.8	P6	LOS ESTEROS-METCALF 230kV & METCALF 500KV-SAN JOSE B 230KV HVDC (GROVE-SKYLINE)

SE: Summer Emergency

Proposed Project

- **Project Objectives**
 - Address identified NERC TPL-001-5 P1, P3 and P6 P1-P7 thermal violations
- **Preferred Scope**
 - Upgrade the limiting terminal and substation equipment associated with the Newark E-F 230 kV Bus Tie to increase the facility rating from the existing summer emergency rating of 2,339 A to the full conductor capability of 3,486 A (1,388 MVA).
- **Proposed In-Service Date**
 - May 2032 or earlier
- **Estimated Cost**
 - \$30M - \$60M*

*AACE Level 5 quality estimates includes a +100% contingency



Proposed Single Line Diagram

CONTRA COSTA –NEWARK 230 kV CORRIDOR REINFORCEMENT PROJECT

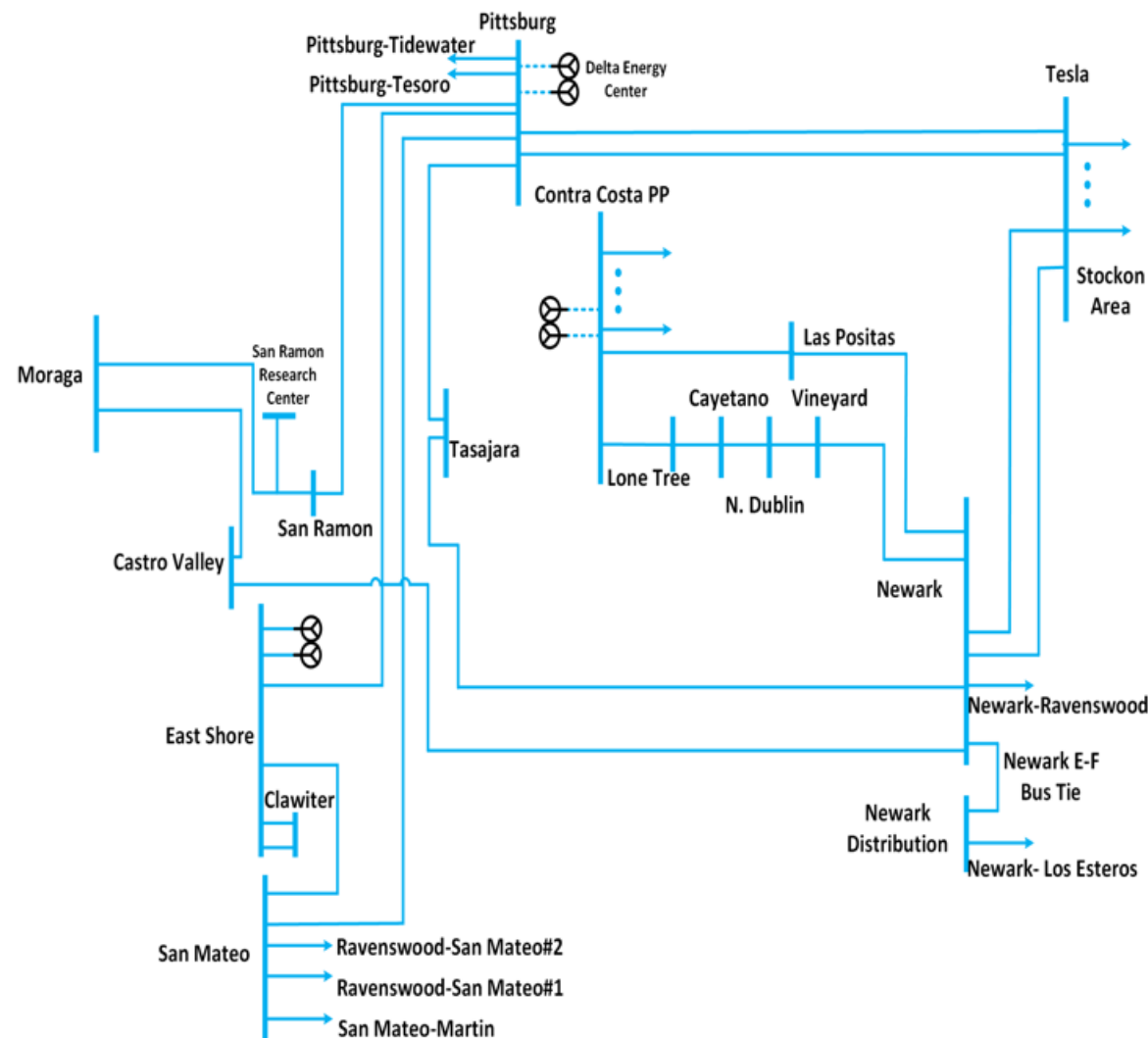
(CONCEPTUAL)



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Area Background

- Contra Costa PP 230 kV Substation serves as a 230 kV source for the local 115 kV system and surrounding 230 kV system, including Moraga, Newark, and Las Positas 230 kV substations. Gateway and Marsh Landing generating stations with a total generation of 1427 MW are connected at the Contra Costa PP 230 kV substation and supply power to the Greater Bay Area.
- Lone Tree – Cayetano – Newark Corridor Series Compensation Project was approved during 2022-2023 TPP cycle to mitigate the Cayetano–Lone Tree and Las Positas–Newark 230 kV corridor overload issues. It was put on hold by CAISO during 2025-2026 TPP cycle for further evaluation.
- The 2026 -2027 TPP assessment identified thermal limitations on the Lone Tree – Cayetano, Las Positas – Newark, and Vineyard – Newark 230 kV lines, requiring evaluation of long-term reinforcement strategies.



Existing System Single Line Diagram

Assessment Results

- **Contingency Description**
 - Thermal overloads are identified under normal conditions and multiple contingency categories , including P1, P6 , and P7.
- **Selected Power Flow Results**

		Pre-Project				Contingency	
Facility	Rating	2028 (%)	2031 (%)	2036 (%)	2041 (%)	Category	Contingency Name
Lone Tree-Cayetano 230 kV Line	885A (SN)	94.6	93.4	98.4	100.3	P0	Normal Condition
	1005A (SE)	99	100	103.3	105.5	P1	Contra Costa – Las Positas 230 kV line
	1005A (SE)	117.1	119.7	115.8	118.3	P6	Contra Costa – Las Positas 230 kV & Tesla – Newark 230 kV lines
	1005A (SE)	98.9	98.8	108.1	112	P7	Contra Costa – Moraga Nos. 1 & 2 230 kV lines
Las Positas –Newark 230 kV Line	849A (SE)	112.2	124.3	108.8	111.7	P6	Contra Costa – Lone Tree 230 kV & Tesla – Newark 230 kV lines

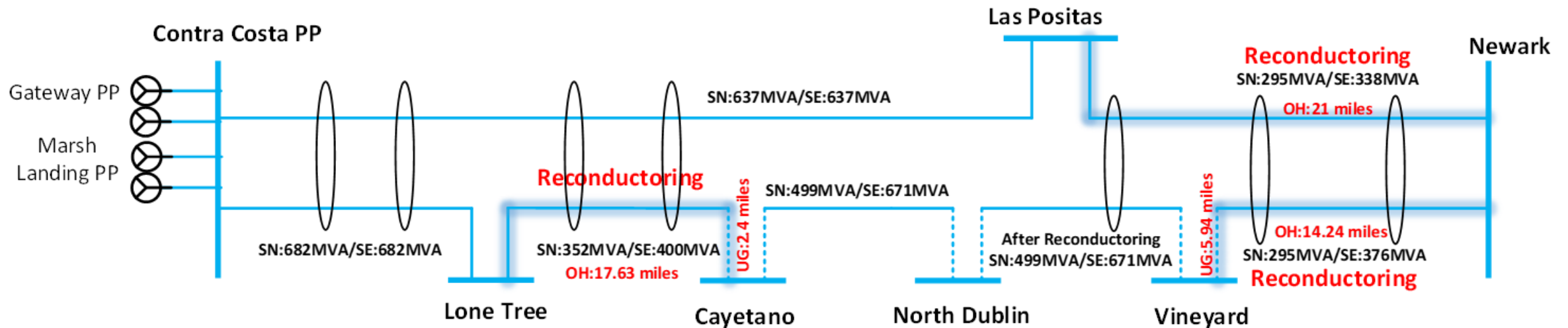
SN: Summer Normal; SE: Summer Emergency

The reliability need affects multiple facilities along the Contra Costa – Newark transfer corridor and requires evaluation of both corridor reinforcement and alternate power flow strategies.

Conceptual Alternative 1

Alternative 1: Reinforce the Existing Contra Costa – Newark Corridor

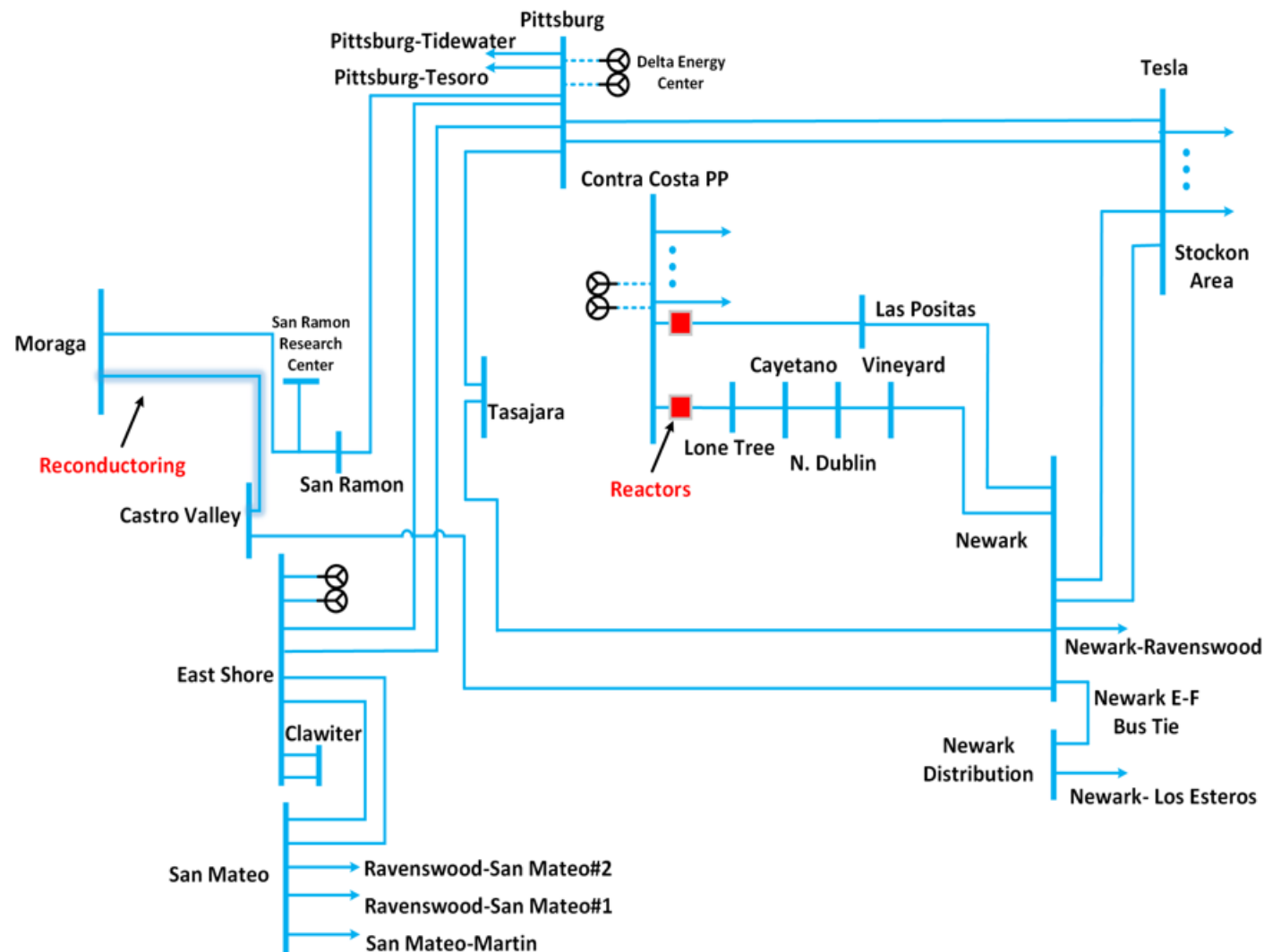
- Reconductor the entire Lone Tree–Cayetano 230 kV Line to achieve a minimum summer emergency rating of 1,686 A (671 MVA).
- Reconductor the entire Los Positas–Newark 230 kV Line to achieve a minimum summer emergency rating of 1,714 A (682 MVA).
- Reconductor the entire Vineyard–Newark 230 kV Line to achieve a minimum summer emergency rating of 1,686 A (671 MVA).
- Remove the limiting element on the Contra Costa–Las Positas 230 kV Line to enable utilization of the full conductor capability, with a summer emergency rating of approximately 682 MVA.



Conceptual Alternative 1 Single Line Diagram

Alternative 2: Redirect Power Flow Through the Moraga-Castro Valley Path

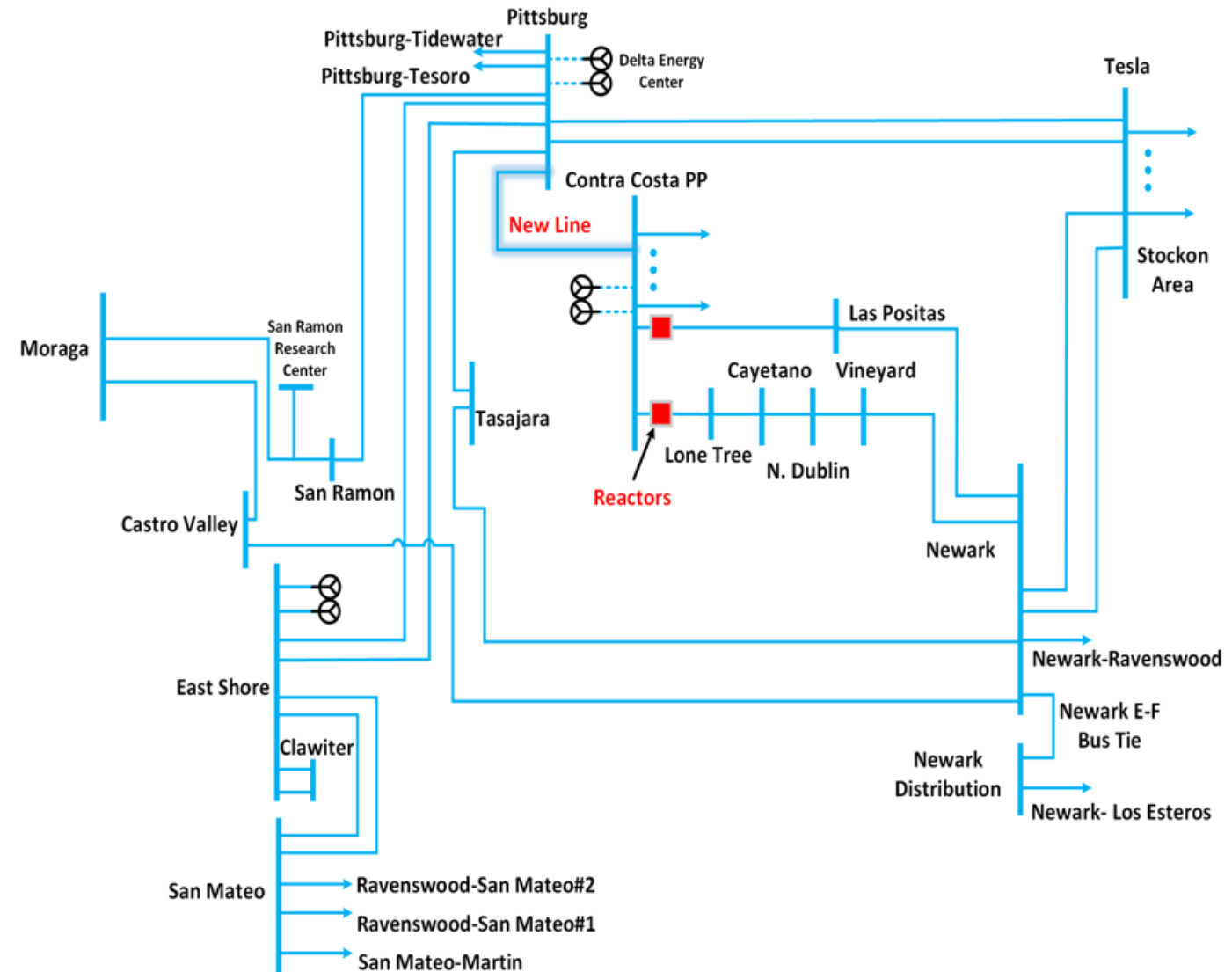
- Install a 15-ohm series reactor at Contra Costa – Newark 230 kV path lines to limit power flow from Contra Costa PP toward the Lone Tree and Las Positas 230 kV paths.
- Reconductor the entire Moraga–Castro Valley 230 kV Line to achieve a minimum summer emergency rating of 3,000 A (1,195 MVA).



Conceptual Alternative 2 Single Line Diagram

Alternative 3: Redirect Power Flow Toward Pittsburg and Establish a Future Reinforcement Path

- Install a 15-ohm series reactor at Contra Costa PP to limit power flow from Contra Costa PP toward the Lone Tree and Las Positas 230 kV paths.
- Construct a new 230 kV transmission line from Contra Costa PP to Pittsburg with a minimum summer emergency rating of 3,000 A (1,195 MVA).



Conceptual Alternative 3 Single Line Diagram

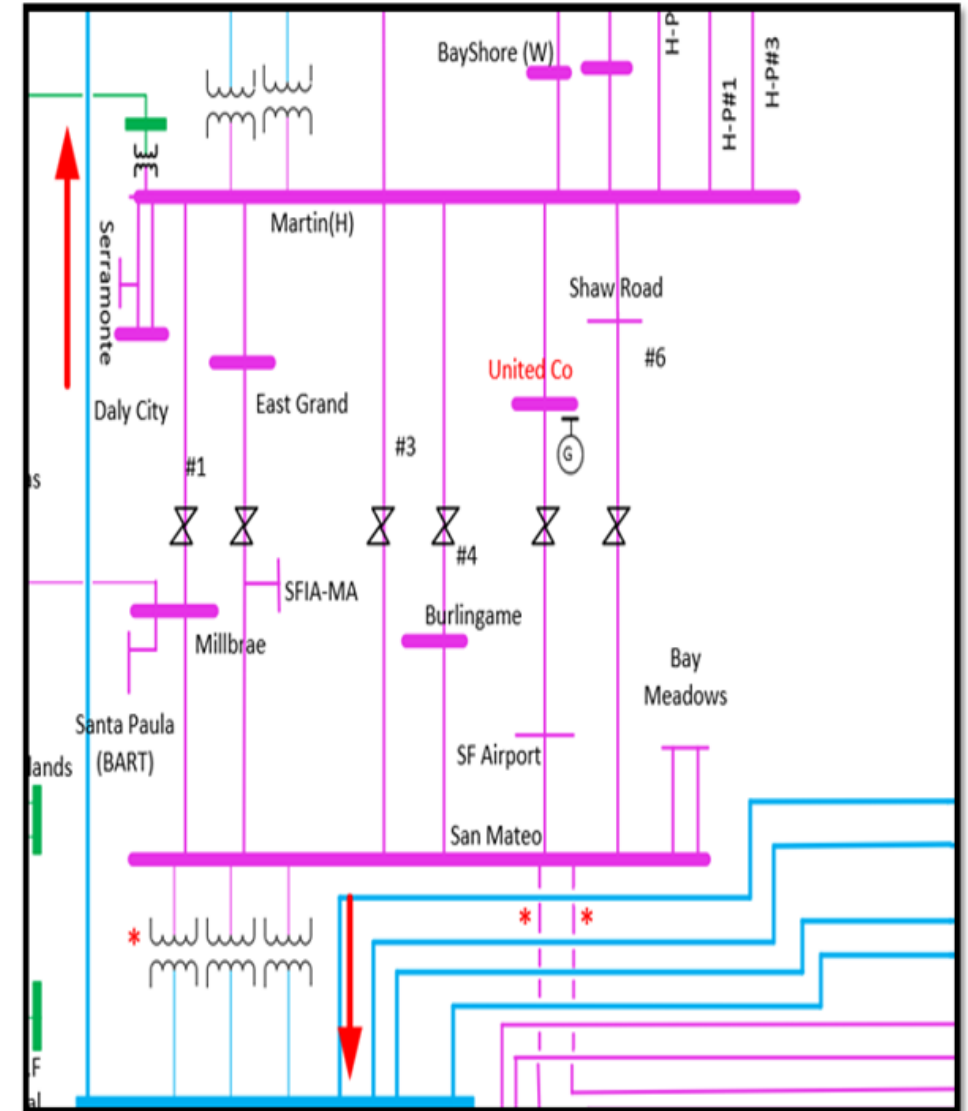
STATION M.A. REARRANGEMENT PROJECT



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Area Background

- The San Mateo – Martin 115 kV corridor is a key transmission path consisting of six 115 kV lines serving Peninsula and San Francisco area.
- Station M.A. is currently tapped from East Grand – San Mateo #2 115 kV line.
- The Martin–East Grand and East Grand–San Mateo 115 kV Line sections serve the East Grand and San Francisco International Airport substations. Forecasted load growth in these substations results in progressively higher loading on the East Grand–San Mateo 115 kV Line. The load forecast demonstrates significant growth in this area over the planning horizon.



Existing System Single Line Diagram



Assessment Results

- **Contingency Description:**
 - Thermal overloads are identified under P1 and P2 category contingencies.
- **Selected Power Flow Results**

Monitored Facility		Pre-Project				Post-Project	Contingency	
Facility	Rating (A)	2028	2031	2036	2041	2036	Category	Contingency Name
East Grand – San Mateo 115 kV	1144 A	83%	99.6%	120.5%	128.1%	96.6%	P1-2	Martin – East Grand 115 kV
	1144 A	83%	99.5%	120.9%	128.0%	96.3%	P2-3	MARTIN C 115KV - MIDDLE BREAKER BAY 5

Proposed Project

- **Project Objectives**

- Reduce loading on the East Grand – San Mateo 115 kV path and mitigate the identified reliability concerns

- **Preferred Scope**

- Reconfigure the Station MA 115 kV connection by relocating the existing Station MA tap from the East Grand–San Mateo 115 kV Line (#2) to a new tap on the San Mateo–Martin #3 115 kV Line.
- As part of the project:
 - San Mateo–Martin #3 115 kV Line would be re-rated using a 4 ft/sec wind-speed assumption

- **Proposed In-Service Date**

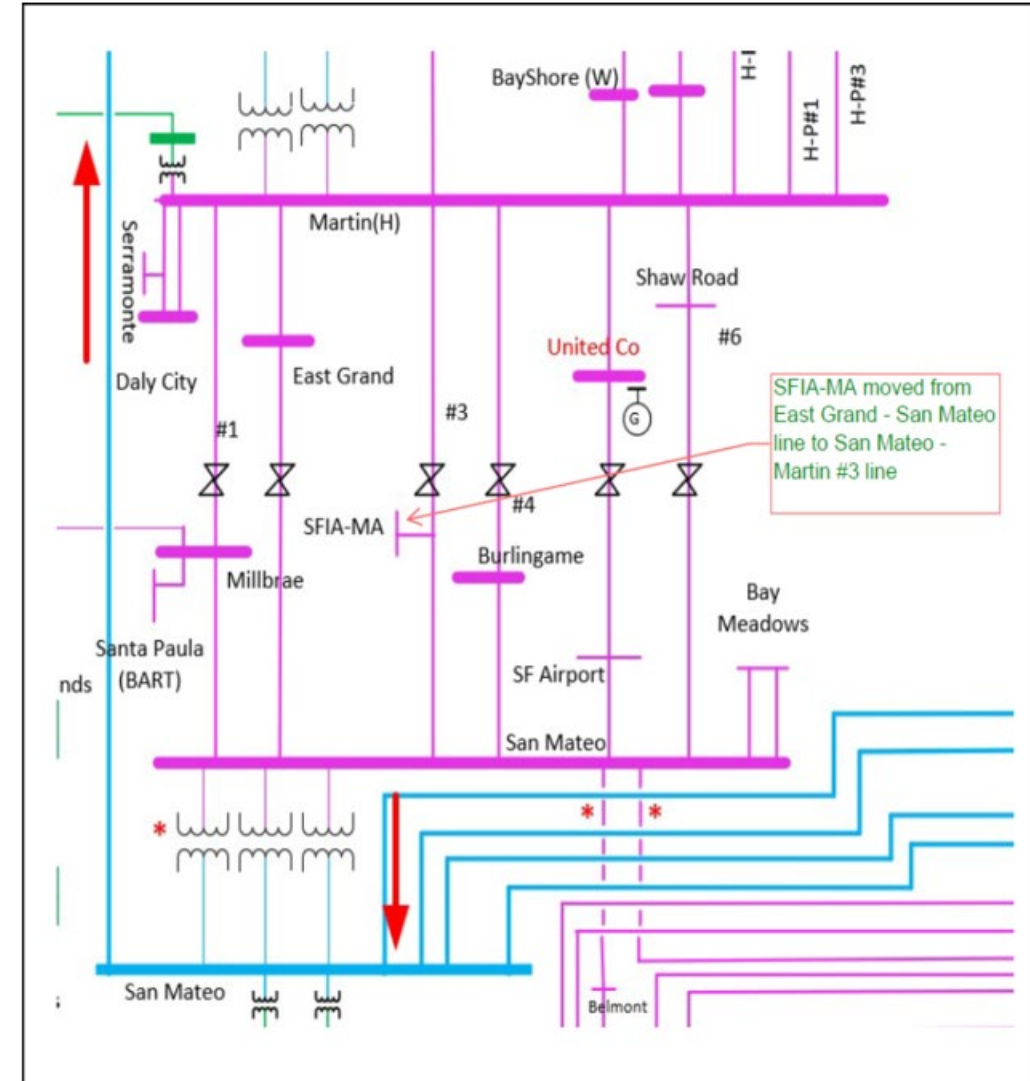
May 2031 or earlier

- **Estimated Cost**

\$1 M - \$2 M*

*AACE Level 5 quality estimates includes a +100% contingency

Internal



Proposed Single Line Diagram

MILLBRAE 230 KV ADDITION AND SYSTEM RECONFIGURATION PROJECT

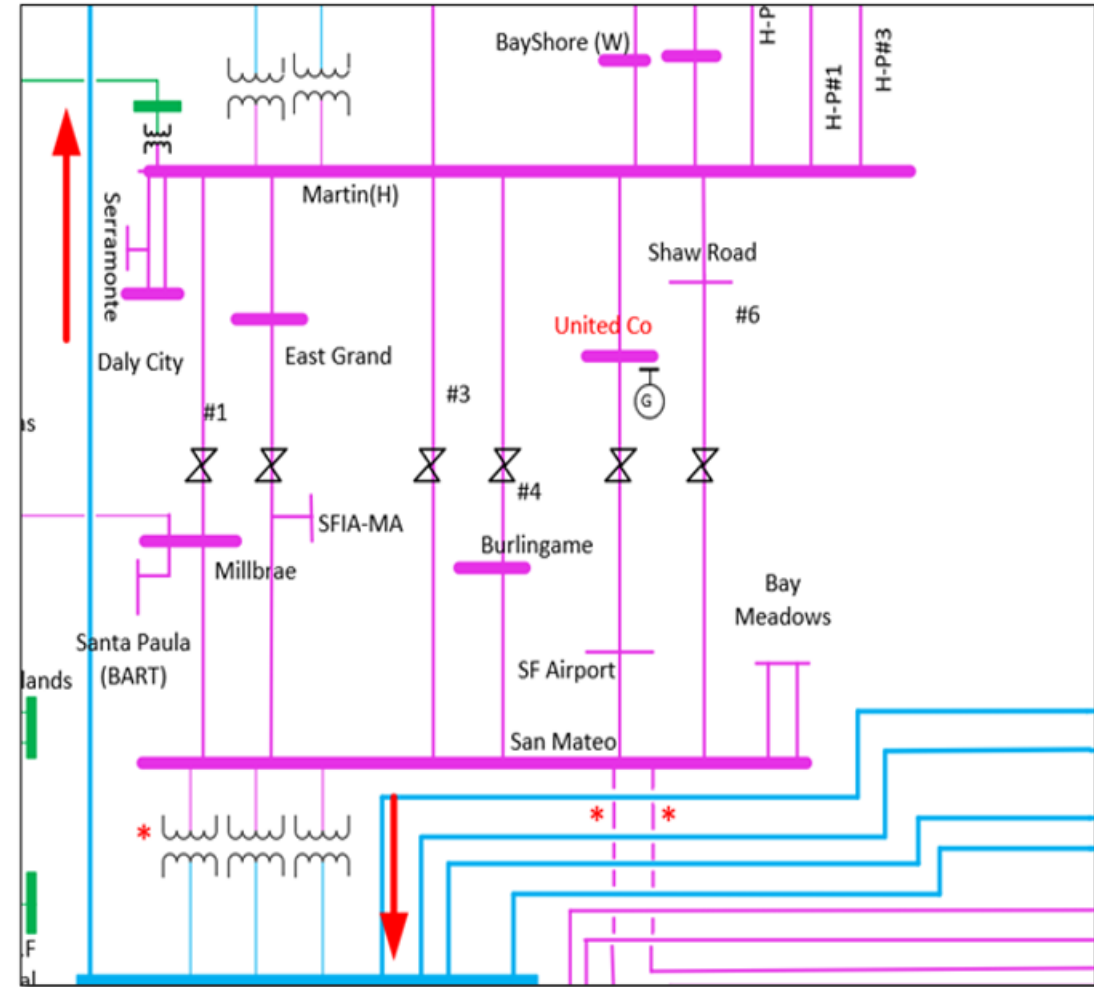
(CONCEPTUAL)



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Area Background

- San Mateo and Martin substations are in the Peninsula area with 115 kV and 230 kV voltage levels.
- Millbrae is presently a 115 kV substation, while the surrounding San Mateo – Martin system includes both 115 kV and 230 kV facilities.
- San Francisco and Peninsula load is forecasted to significantly increase over the planning horizon.
- The 2026 -2027 TPP assessment identified normal and multiple contingency categories thermal overloads on the San Mateo – Martin 115 kV corridor facilities.
- This conceptual project evaluates introducing a 230 kV source at Millbrae to relieve overloads on the 115 kV corridor and support the long-term import needs of the San Francisco/ Peninsula area.



Existing San Mateo – Martin Corridor Configuration

Assessment Results

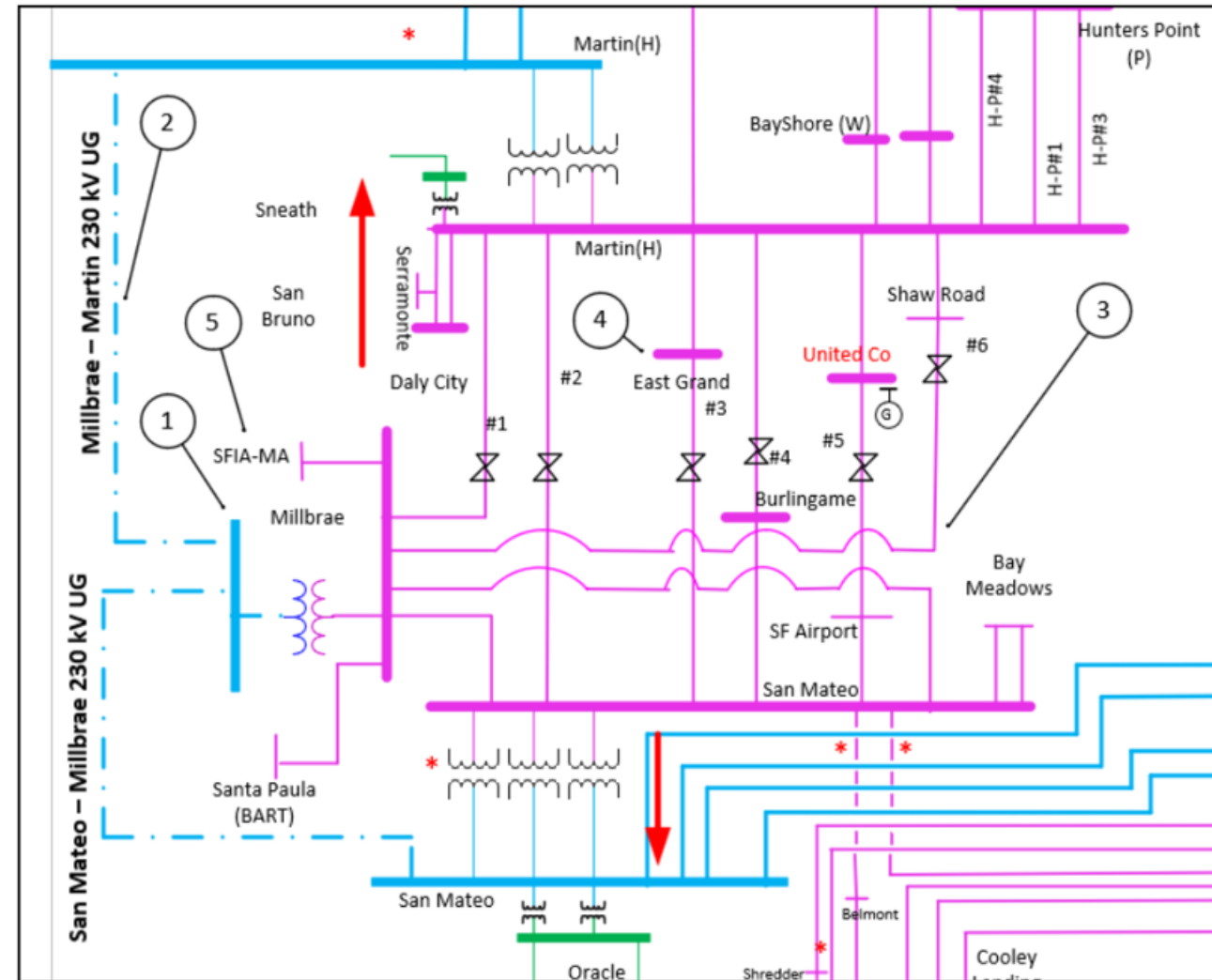
- **Contingency Description**
 - Thermal overloads are identified under P0, and P1- P7 category contingencies.
- **Selected Power Flow Results**

Monitored Facility		Pre-Project				Contingency	
Facility	Rating (A)	2028	2031	2036	2041	Category	Contingency Name
San Mateo – Martin #6 115 kV	635 A	78%	94%*	99.6%*	102	P0	Normal Configuration
East Grand – San Mateo 115 kV	1144 A	83%	99.6%	120.5%	128.1%	P1-2	Martin – East Grand 115 kV
East Grand – San Mateo 115 kV	1144 A	83%	99.5%	120.9%	128.0%	P2-3	MARTIN C 115KV - MIDDLE BREAKER BAY 5
Millbrae – San Mateo #1 115 kV	1142 A	<100%	<100%	110%	116.8%	P3	San Mateo – Martin 230 kV & BESS
Millbrae – San Mateo #1 115 kV	1142 A	<100%	98.8%	128.2%	135.9%	P6	JEFFERSON-EGBERT SS 230KV & SAN MATEO-MARTIN 230KV
EAST GRAND-SAN MATEO 115kV	1144 A	<100%	77.2%	98%	104.8%	P7-1	San Mateo-Martin No. 3 115 kV and SF Airport-San Mateo No. 5 115 kV lines

*Loading for SPOP and WP cases

Conceptual Alternative

- Construct a new 230 kV bus and a 230/115 kV 420 MVA transformer at Millbrae
- Loop the San Mateo-Martin 230 kV cable into new Millbrae 230 kV bus
- Loop San Mateo-Martin 115 kV line #6 into the Millbrae 115 kV bus
- Loop San Mateo-Martin 115 kV line #3 into the East Grand 115 kV bus
- Reconnect Station MA Substation to the Millbrae 115 kV bus from the East Grand-San Mateo 115 kV line via a short radial 115 kV line



Proposed Single Line Diagram

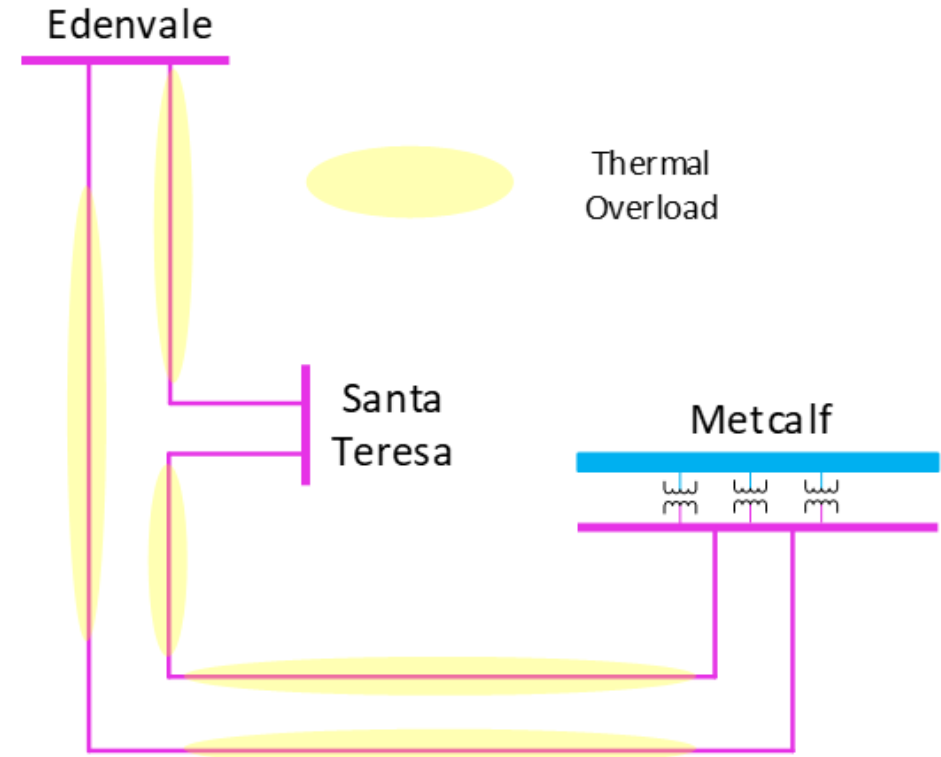
EDENVALE 115 kV AREA REINFORCEMENT PROJECT



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Area Background

- The Edenvale 115 kV area includes Edenvale and Santa Teresa Substations and is solely supplied from Metcalf substation
- This local 115 kV pocket is supplied through Metcalf – Santa Teresa and Metcalf – Edenvale #2 115 kV lines
- Due to the substantial load growth driven by both data centers and distribution customers, the 2026-2027 TPP identified NERC TPL-001-5 Category P0, P1 thermal overloads on the local 115 kV network



Existing System Single Line Diagram

Assessment Results

- **Contingency Description**
 - P0: Normal condition overloads develop on both Metcalf source lines as load grows.
 - P1: Loss of either Metcalf source lines results in overloads on the remaining supply path
- **Power Flow Results**

Monitored Facility		Pre-Project			Post-Project		Contingency	
Facility Name	SN/SE Rating (MVA)	2031 (%)	2036 (%)	2041 (%)	2036 (%)	2041 (%)	Category	Contingency Name
Metcalf – Santa Teresa 115 kV	239/239	99.3%	113.6%	116.4%	38.5%	39.4%	P0	P0: Normal Condition
Metcalf – Edenvale #2 115 kV	239/239	93.7%	107.1%	110%	37.3%	38.3%		
Metcalf – Santa Teresa 115 kV	239/239	196.5%	226.1%	232.2%	77.3%	79.4%	P1	P1: Metcalf – Edenvale #2 115 kV
Santa Teresa-Edenvale 115 kV	239/239	108.9%	116%	121.5%	43.5%	45.3%		
Metcalf – Edenvale #2 115 kV	239/239	98.7%	110.9%	111.5%	77.4%	79.5%	P1	P1: Metcalf – Santa Teresa 115 kV
Santa Teresa-Edenvale 115 kV	239/239	197%	226.8%	232.9%	37.8%	38.0%		

Proposed Project

- **Project Objectives**

- Mitigate the identified P0 and P1 thermal overloads and provide adequate load serving capability to serve the Edenvale/ Santa Teresa load growth.

- **Preferred Scope**

- Reconductor 4.53 circuit miles of Metcalf – Santa Teresa 115 kV Line to achieve at least 3400 Amps under Summer Emergency (SE) rating.
- Reconductor 0.68 circuit miles of Santa Teresa-Edenvale 115 kV Line to achieve at least 3400 Amps under SE conditions.
- Reconductor 4.72 circuit miles of Metcalf – Edenvale #2 115 kV Line to achieve at least 3400 Amps under SE conditions.

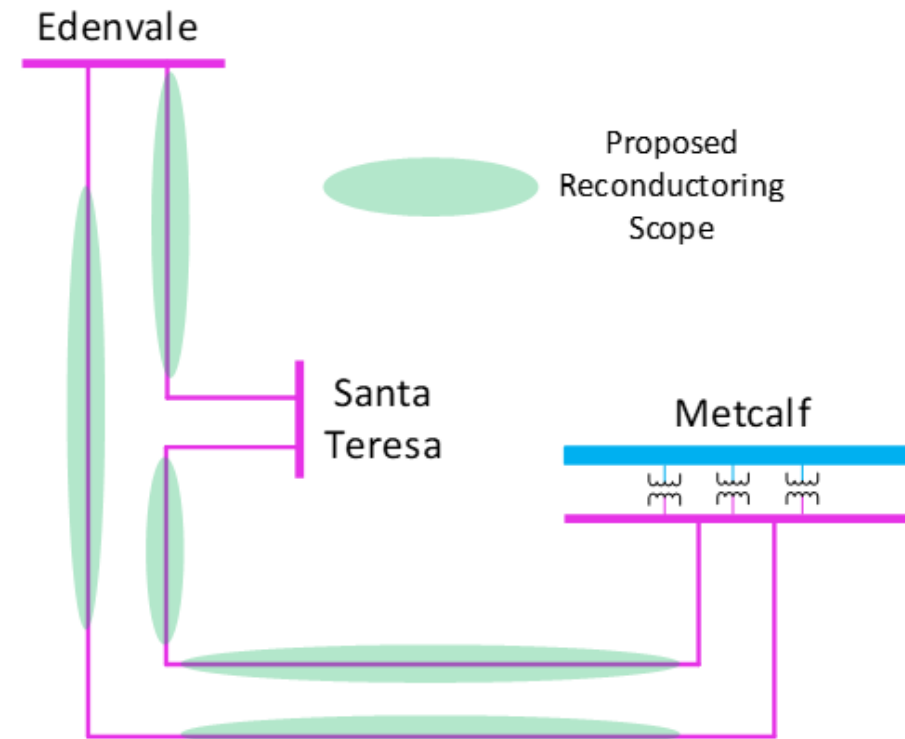
- **Proposed In-Service Date**

May 2034 or earlier

- **Estimated Cost**

\$65M - \$130M*

*AACE Level 5 quality estimates includes a +100% contingency



Proposed Single Line Diagram

METCALF AND EAST SAN JOSE RECONFIGURATION PROJECT

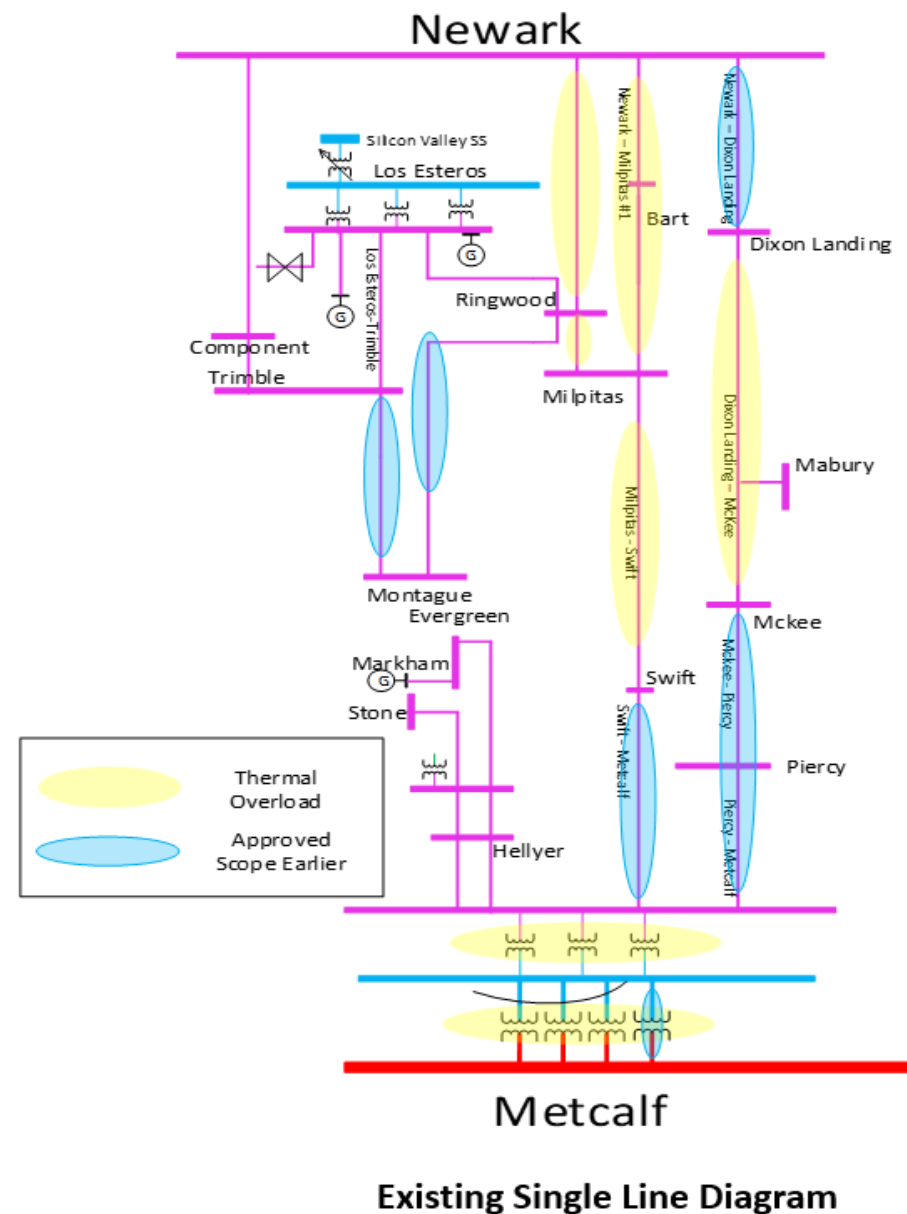
(CONCEPTUAL)



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Area Background

- The East San Jose 115 kV transmission pocket is supplied from the Newark substation to the north and Metcalf substation to the south.
- Several CAISO- approved projects are already planned in the area, including Metcalf Substation 500/230 kV Transformer Addition Project, South Bay 115 kV Area Reinforcement Project, and McKee – Piercy, Piercy – Metcalf, Swift – Metcalf, and Newark – Dixon Landing 115 kV Upgrade Project.
- Despite these approved upgrades, rapid regional load growth continues to create constraints on the Metcalf 500/230 kV banks, Metcalf 230/115 kV banks, and East San Jose 115 kV system.
- The 2026-2027 TPP assessment identified remaining P1, P2, P3, P6 and P7 thermal violations that require broader long-term reinforcement strategy.



- **Contingency Description**
 - Multiple P1, P2, P3, P6, and P7 contingencies result in thermal overloads across the Metcalf banks and East San Jose 115 kV Network.
- **Selected Power Flow Results**

		Pre-Project				Contingency	
Facility	Rating	2028 (%)	2031 (%)	2036 (%)	2041 (%)	Category	Contingency Name
METCALF 500/230 kV TRANSFORMER NO. 13	1122 MVA (SE)	110.4	131.7	132.2	139.7	P6	METCALF 500/230kV TB 11 & METCALF 500/230KV TB 12
METCALF 230/115 kV TRANSFORMER NO. 2	398 MVA (SE)	107.6	117.5	130.7	136.2	P6	METCALF2D 230/115kV TB 4 & METCALFF 230/115kV TB 3
NEWARK-MILPITAS #1 115kV	1310 A (SE)	127.2	132.3	160.5	173.8	P6	RINGWOODSWST-MILPITAS #1 115kV & SWIFT-METCALF 115kV

SE: Summer Emergency

The identified reliability needs span multiple voltage levels and facilities , requiring a coordinated regional solution rather than a single upgrade.

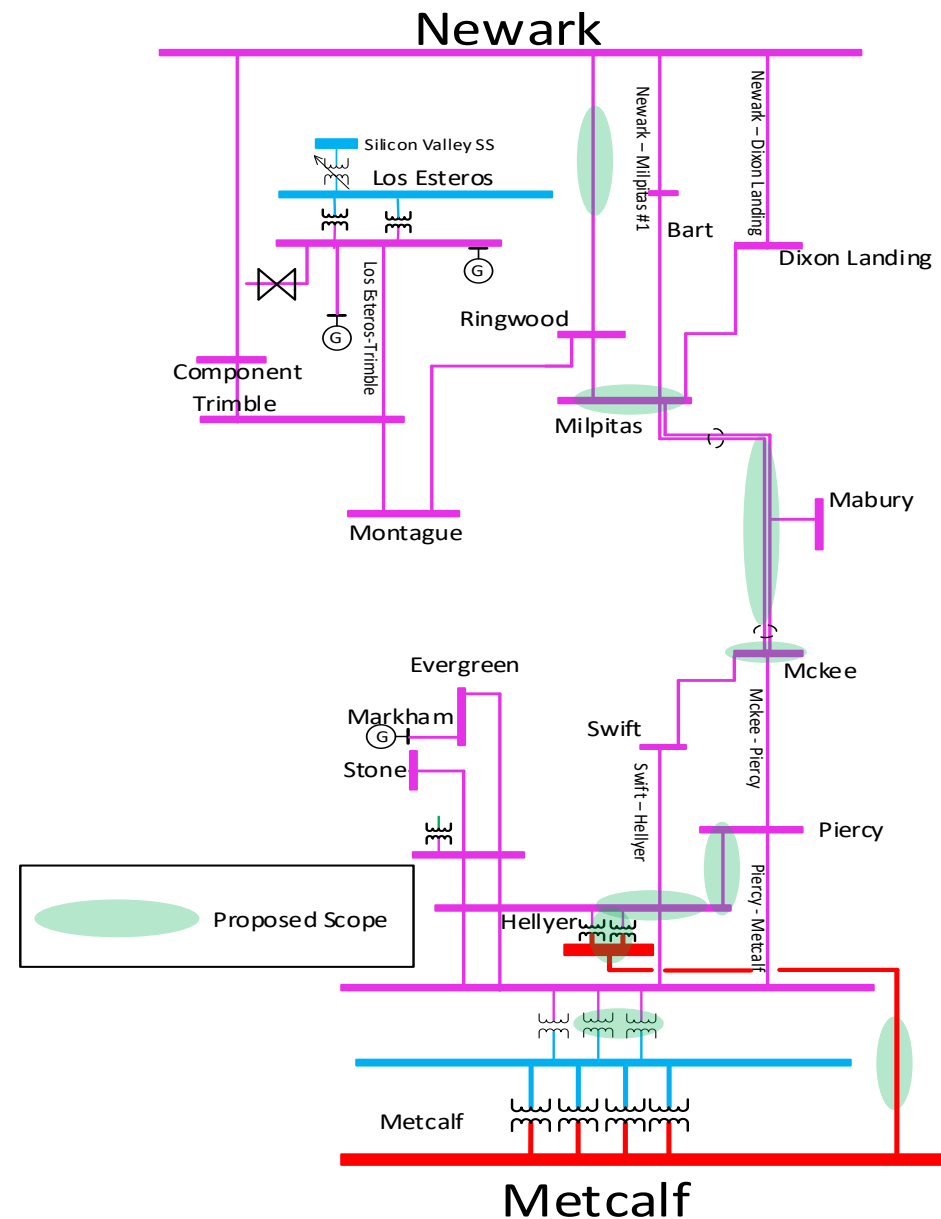
Alternative 1: New 500 kV Source at Hellyer 500 kV and East San Jose 115 kV Reconfiguration

Bulk System Reinforcement

- Establish a new 500 kV bus at future Hellyer substation
- Construct the new Metcalf-Hellyer 500 kV Line (3.5 miles)
- Install two new 500/115 kV transformer banks at Hellyer substation
- Add the new 500 kV bay position at Metcalf substation to host the new Metcalf-Hellyer 500 kV Line

East San Jose 115 kV Reconfiguration

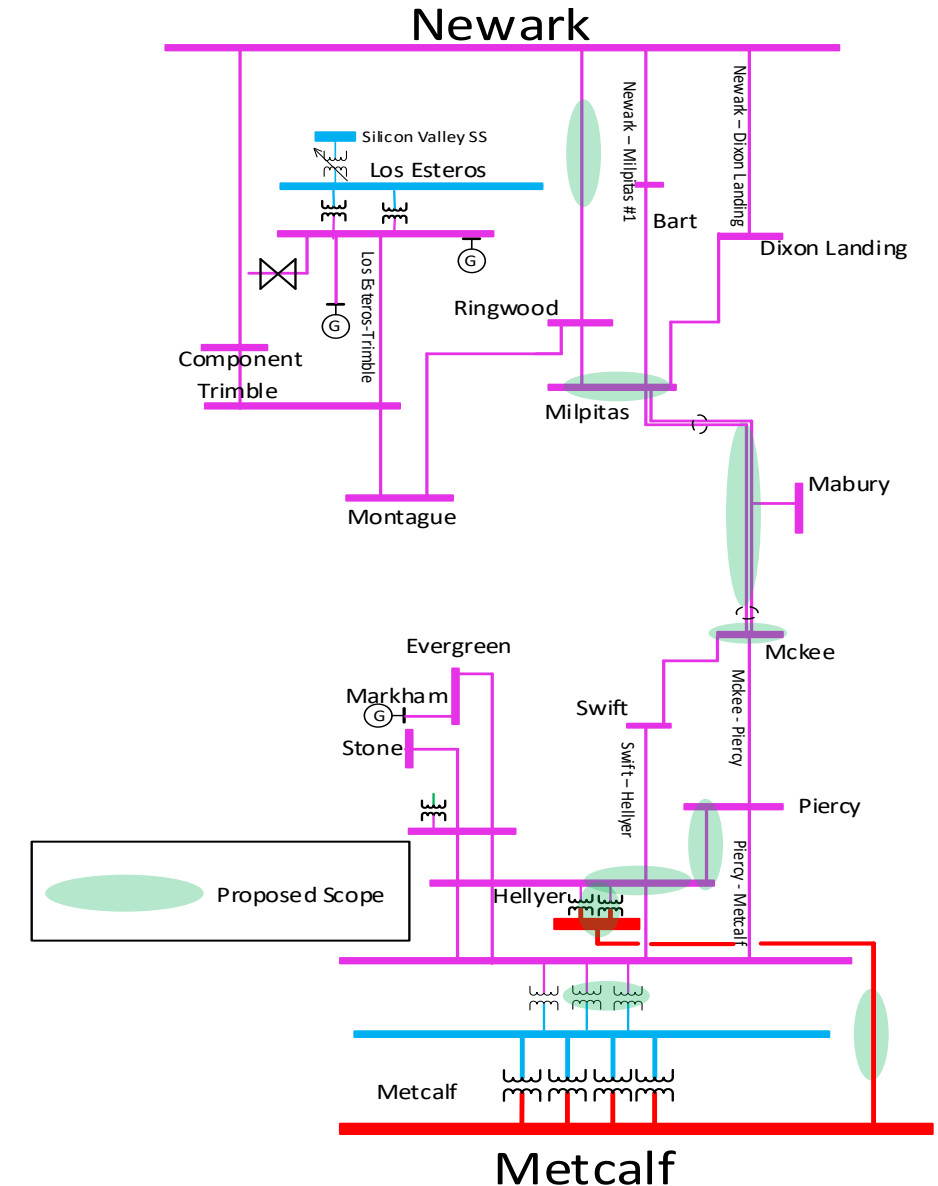
- Remove any substation limiting elements at Metcalf substation to achieve the Metcalf 230/115 kV Transformer Bank #2 and #3's full SE rating
- Loop Swift-Metcalf 115 kV Line into Hellyer substation to create the new Swift-Hellyer 115 kV Line and Hellyer-Metcalf 115 kV Line



Conceptual Alternative 1 (cont.)

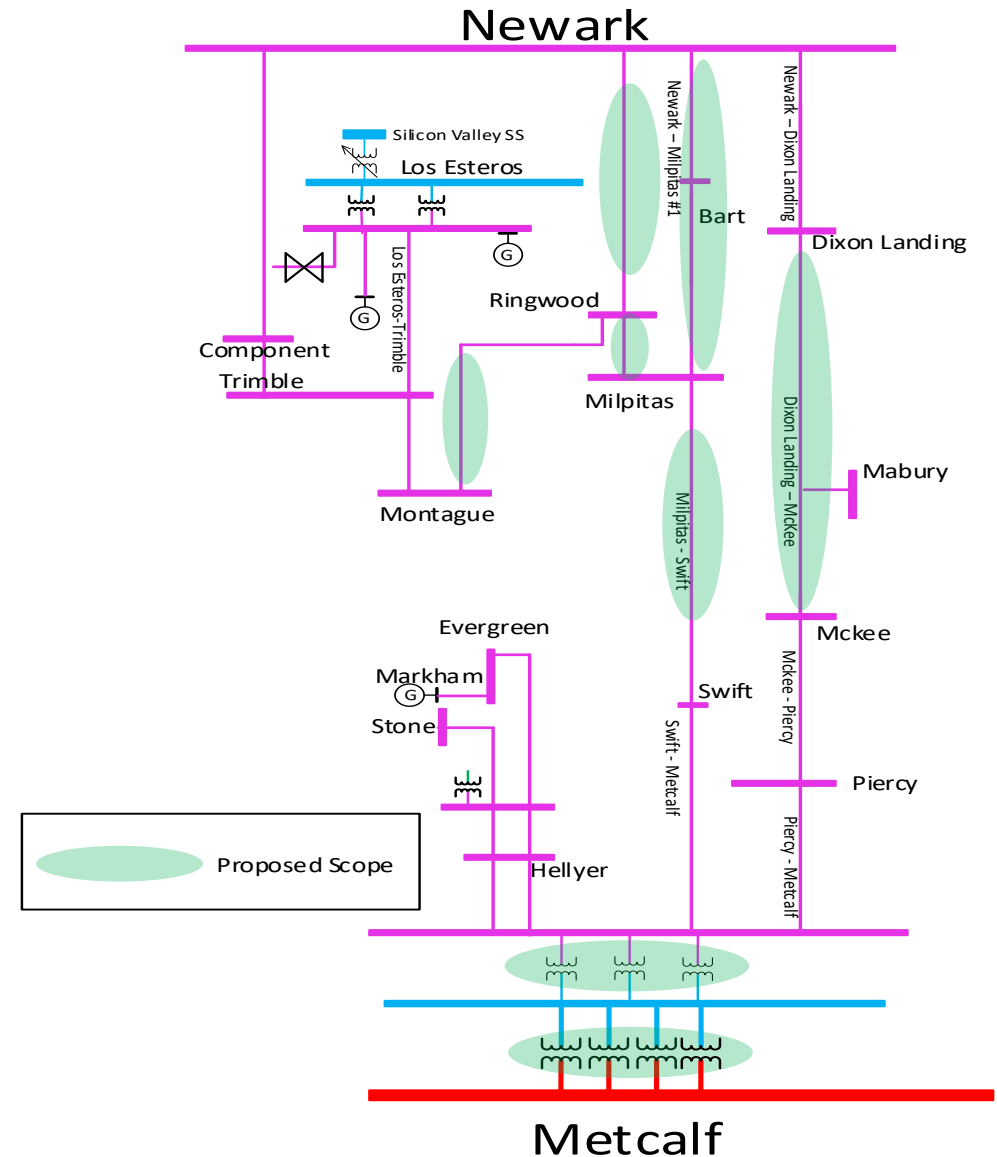
East San Jose 115 kV Reconfiguration

- Build the new Hellyer-Piercy 115 kV Line (0.7 miles)
- Reconductor the Newark-Ringwood 115 kV Line overhead section
- Terminate Dixon Landing- Mabury - McKee 115 kV Line at Milpitas substation to create the new Dixon Landing-Milpitas 115 kV Line
- Terminate Milpitas-Swift 115 kV Line at McKee substation to create the new McKee-Swift 115 kV Line
- Super-bundle the two parallel lines between Milpitas and McKee substation
- Update any substation components at Milpitas and McKee substation as needed



Alternative 2: Metcalf Transformer Replacements and East San Jose 115 kV Upgrades

- Upgrade all existing/future Metcalf 500/230 kV and 230/115kV transformer banks
- Add short circuit duty mitigation measures
- Reconductor the Newark-Ringwood 115 kV Line overhead section
- Reconductor the Ringwood-Milpitas 115 kV Line overhead section
- Redesign the Montague-Ringwood 115 kV UG Line
- Reconductor the Newark-Milpitas #1 115 kV Line
- Reconductor the Milpitas-Swift 115 kV Line
- Reconductor the Dixon Landing-Mabury-McKee 115 kV Line



NORTH SAN JOSE & DE ANZA 230 kV SYSTEM IMPORT REINFORCEMENT PROJECT

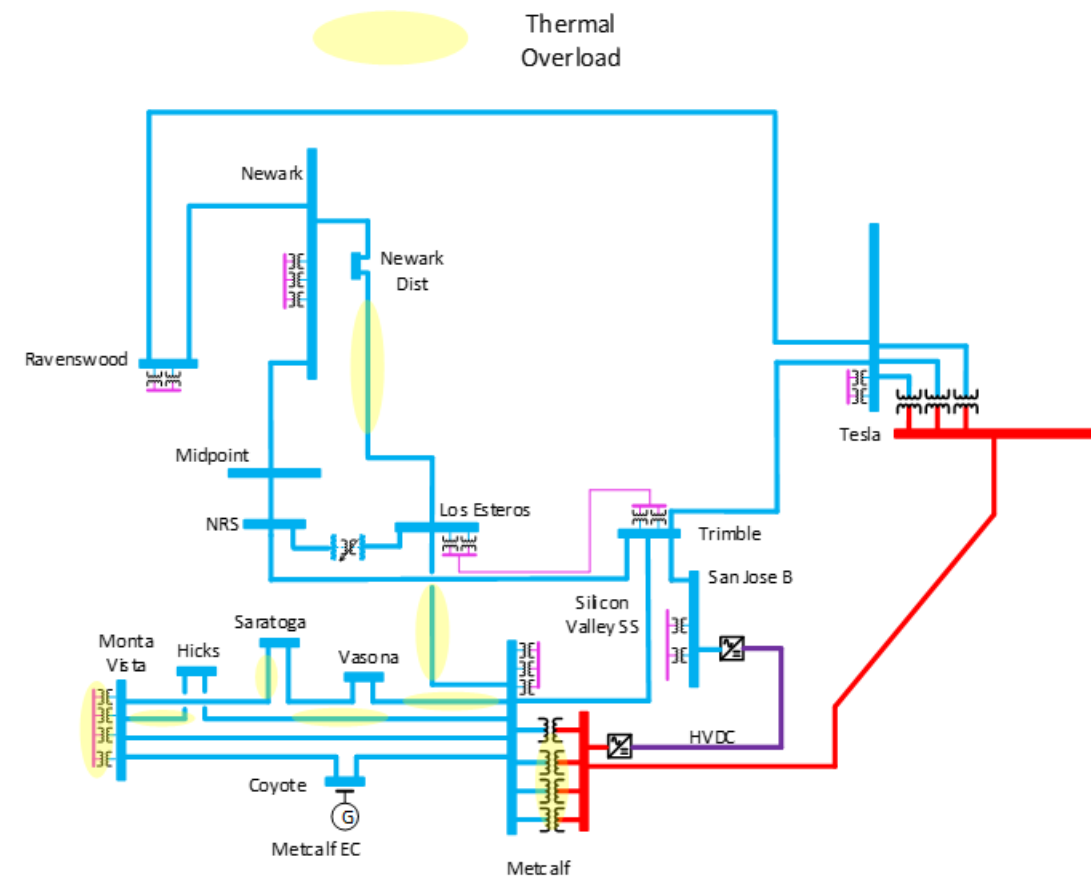
(CONCEPTUAL)



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Area Background

- The CAISO-approved New De Anza 115 kV Substation Project helps reinforce the local Newark-Monta Vista 115 kV network.
- Significant load growth within this 115 kV corridor and broader South Bay/Peninsula area creates additional stress on the Monta Vista 230/115 kV transformer banks, Metcalf–Monta Vista 230 kV corridor, and Metcalf 500/230 kV transformer banks.
- The 2026-2027 TPP assessment also identified overloads on the 230 kV import paths serving Los Esteros, Midpoint and North San Jose under multiple contingencies.
- The new Trimble 230 kV source provides an opportunity to evaluate long-term reinforcement strategies for this area.



Existing Single Line Diagram

Assessment Results

- **Contingency Description**
 - P1, P2, P3, P6 and P7 Category Events
- **Selected Power Flow Results**

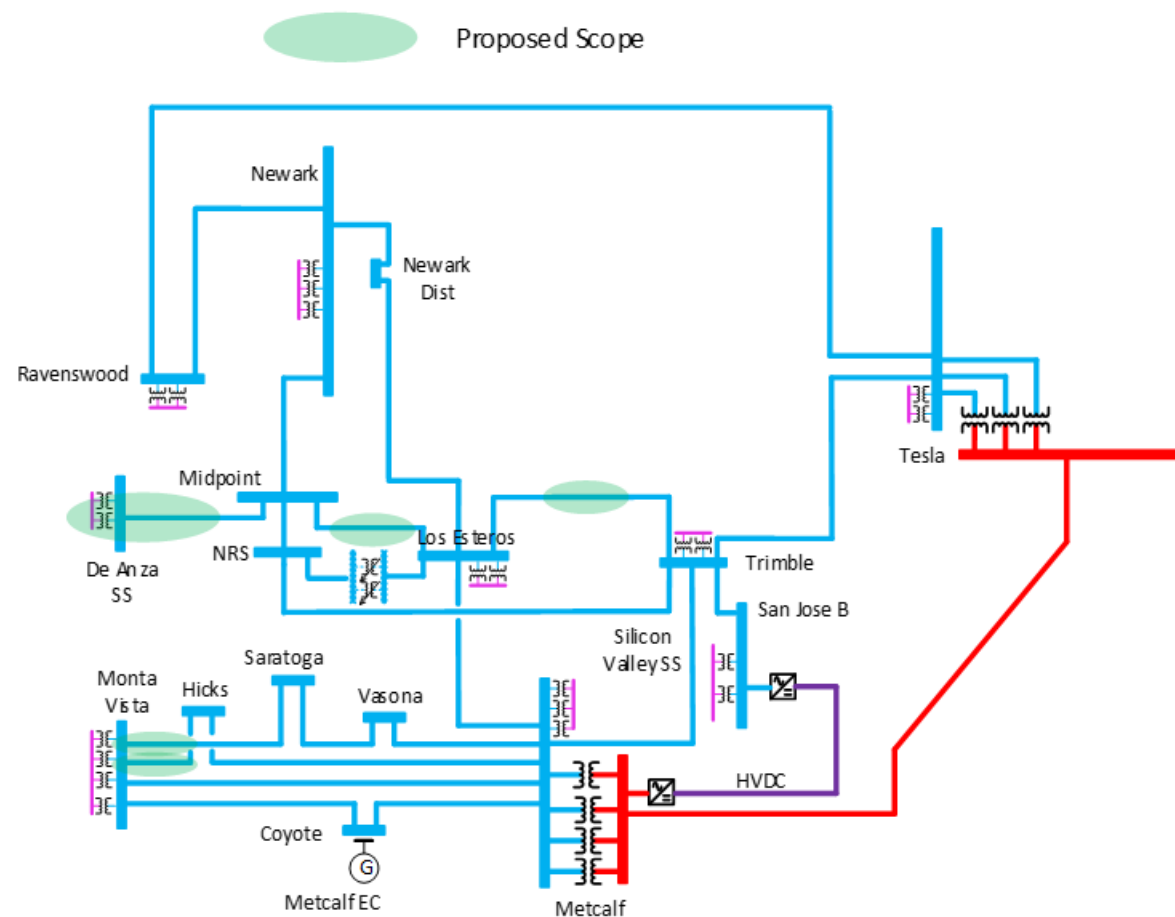
		Pre-Project				Contingency	
Facility	Rating	2028 (%)	2031 (%)	2036 (%)	2041 (%)	Category	Contingency Name
MONTA VISTA 230/115 kV TRANSFORMER NO. 4	462 MVA (SE)	NA	NA	106.1	111.7	P6	MONTAVIS 230/115kV TB 2 & MONTAVIS 230/115kV TB 1
MONTA VISTA-HICKS 230kV	1199 A (SE)	98.4	109	129.1	134.4	P6	VASONA-METCALF 230kV & MONTA VISTA-COYOTE SW STA 230kV
NEWARK-LOS ESTEROS 230kV	1997 A (SE)	NA	NA	107.8	111.3	P6	LOS ESTEROS-METCALF 230kV & TESLA F-TRIMBLE #1 230KV

SE: Summer Emergency

The identified reliability needs affect multiple 230 kV import paths and transformer banks, requiring evaluation of coordinated regional reinforcement strategies.

Alternative 1: Create North San Jose 230 kV Ring and Strengthen De Anza System

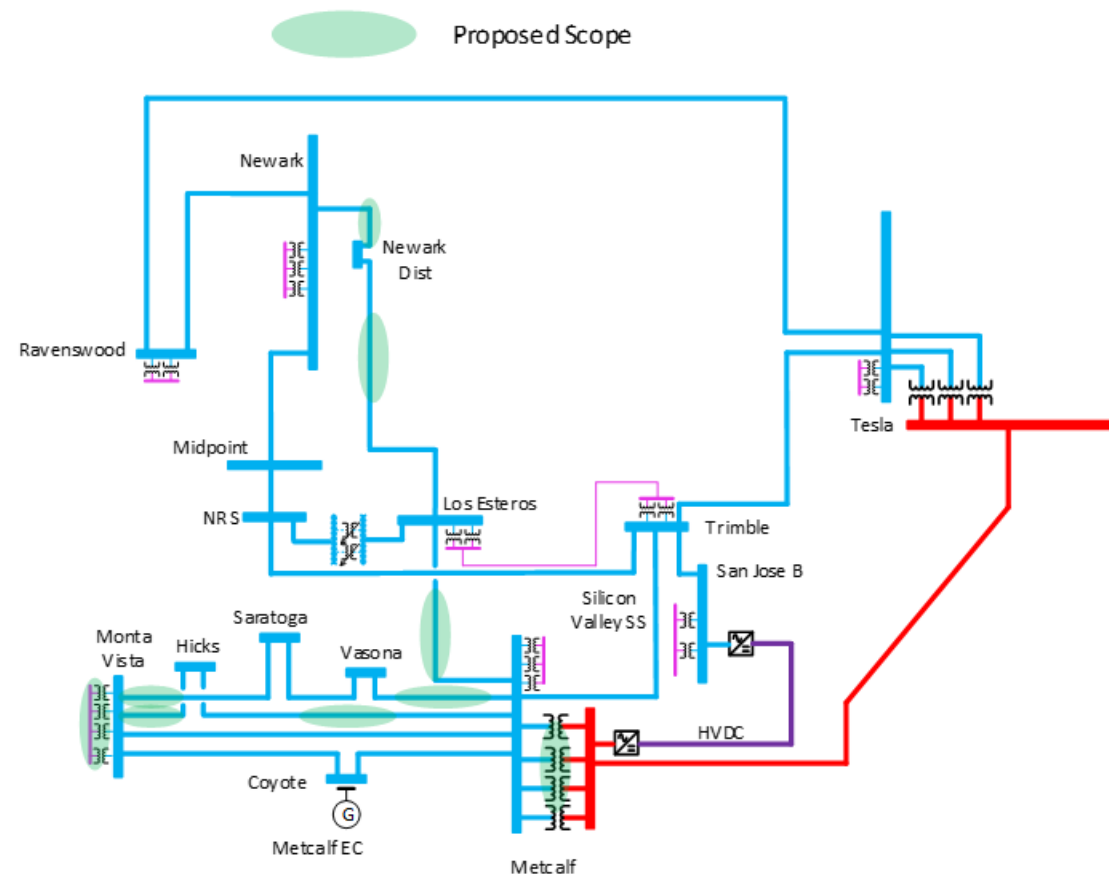
- Convert Los Esteros-Trimble 115 kV Line to Los Esteros-Trimble 230 kV Line
- Use the Los Esteros-Nortech 115 kV Line right-of-way to establish the new Los Esteros – NSJ Midpoint 230 kV path while retaining the 115 kV circuit
- Construct the new NSJ Midpoint-De Anza SS 230 kV Line and connect to the new 230/115 kV transformer at the future De Anza Substation
- Install switched series reactors at Monta Vista as required to manage flows on the Metcalf –Monta Vista 230 kV corridor



Conceptual Alternative 1 Single Line Diagram

Alternative 2: Upgrade Existing North San Jose Import and Metcalf-Monta Vista Lines

- Reconductor the Newark-Los Esteros 230 kV Line and Metcalf-Los Esteros 230 kV Lines (partially) to achieve at least 3400 Amps summer emergency rating
- Reconductor the Monta Vista-Hicks, Hicks-Metcalf, Monta Vista-Saratoga, and Vasona-Metcalf 230 kV Lines to achieve at least 3400 Amps under SE conditions
- Upgrade all existing Metcalf 500/230 kV transformer banks to the SN rating of 1500 MVA (500 MVA per phase) and rescope the planned 4th 500/230kV bank to the same rating
- Upgrade all the existing and future Monta Vista 230/115kV transformer banks to the SN rating of 560 MVA
- Add short circuit duty mitigation measures



Conceptual Alternative 2 Single Line Diagram

PG&E's Load Cluster and Serial Load Interconnection Studies



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Projects Seeking CAISO Concurrence -a total of 2 GW, 19 projects, were re-assessed/studied for permanent and interim capacity solutions:

1. San Jose *Serial Data Center Load Interconnection*

- **(3)** Load interconnection projects, 700 MW
- **(5)** Capacity Upgrades Projects

2. *Load Cluster 2025 (LC25)*

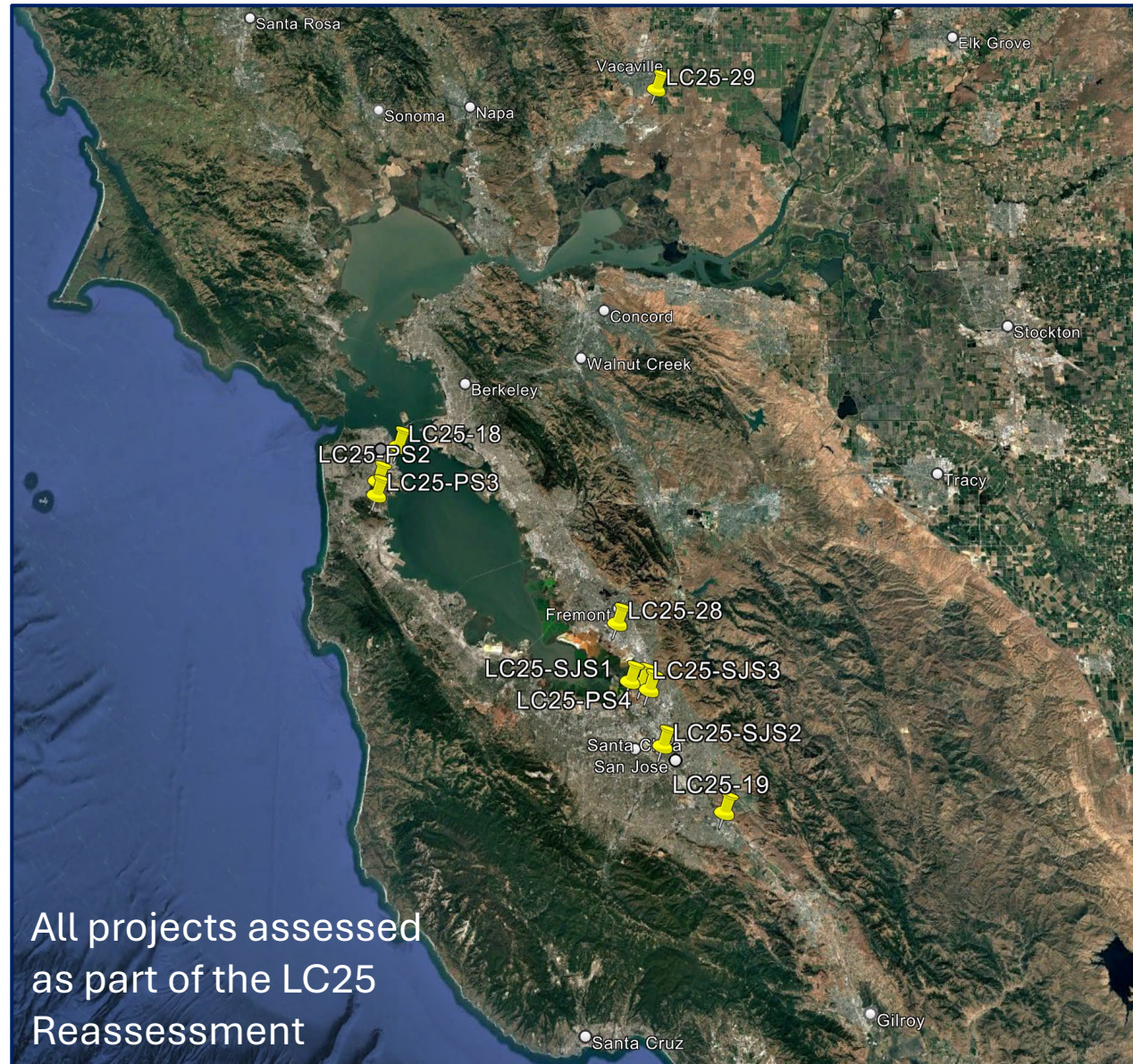
- **(16)** Load interconnection projects, 1300 MW
- **(10)** Capacity Upgrades Projects



PG&E Large Load Projects

No .	Project Name	Area	Presenter
1	Serial SJ-1	South Bay	Mengfei Wang
2	Serial SJ-2		
3	Serial SJ-3		
4	LC25-29	North Valley	Wenchun Zhu
5	LC25-14	Sacramento	Wenchun Zhu
6	LC25-PS1		
7	LC25-18	SF/Peninsula	Lizzy Miller
8	LC25-PS2		
9	LC25-PS3		
10	LC25-19	South Bay	Chenrui Jin
11	LC25-28		
12	LC25-PS5	South Bay	Mengfei Wang
13	LC25-PS6		

Serial Projects and LC25 Project Location



SAN JOSE SERIAL PROJECTS



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Serial Data Center Projects in San Jose Area

Project	POI	Requested ISD	MW	Region
Serial SJ-1	New 230 kV switching station “Midpoint” on Newark-NRS 230 kV Line	2029	250	GBAY
Serial SJ-2	New 115 kV switching station, "San Jose C", on San Jose A - B 115 kV Line	2029	200	GBAY
Serial SJ-3	Los Esteros 230 kV Substation	2029	250	GBAY



San Jose Serial- Capacity Upgrades

Name	Description	Estimated ISD	Cost \$M	Project Dependency
San Jose B–San Jose C #2 115 kV Capacity Upgrade	Construct a new approximately 0.3-mile 115 kV overhead line to create a second circuit between San Jose B and San Jose C substations, with a target rating of 3,000 A.	2028	25	SJ Serial-2
Reactive support at Trimble Substation	Install +/- 200 MVAR STATCOM at Trimble Expansion 115 kV bus	Q4 2033	90	SJ Serial-1, SJ Serial-2, SJ Serial-3
P5 contingency mitigation	Add a new DC Supply and Control Circuit project at Monta Vista 230-115kV substation to resolve P5-5 outage violations	2033	\$5	SJ Serial-1
Los Esteros-Midpoint 230 kV line	Construct approximately 2.5-mile Los Esteros-Midpoint 230 kV line, with a target rating of 3,000 A.	2034	57	SJ Serial-1
Newark–NRS #1 and #2 115 kV lines Capacity Balancing	Super-bundle the Newark-NRS #1 & #2 115kV lines and remove limiting components to achieve 2000 Amps.	2031	6	SJ Serial-1

Note 1: Interim solutions are being developed until long term capacity upgrades are in service

Serial Data Center #1 – POI: New Midpoint 230 kV/34.5 kV Sw. Station

Serial - Data Center Load #1

- 250 MW, requested ISD: 2029

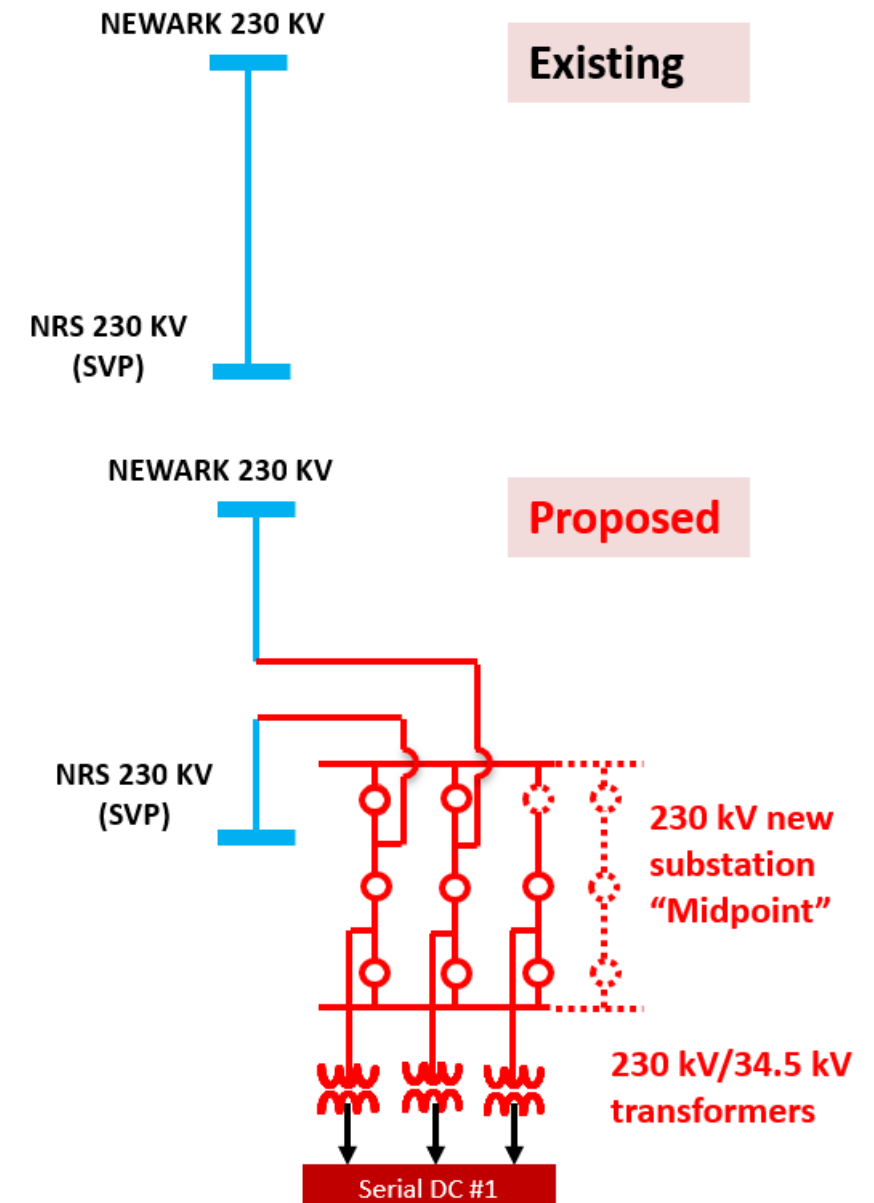
Proposed Scope

- **Interconnection (Estimated cost: \$64 M - \$137 M, ISD: 2029):**
 - New 230 kV substation looping in Newark – NRS 230 kV and associated 230/34.5 kV transformers, distribution service lines
- **Capacity Upgrades*:**
 - Construct approximately 2.5-mile Los Esteros-Midpoint 230 kV line, with a target rating of 3,000 A.
 - Super-bundle the Newark-NRS #1 & #2 115kV lines and remove limiting components to achieve 2000 Amps.
 - Install +/- 200 MVAR STATCOM at Trimble Expansion 115 kV bus
 - Add a new DC Supply and Control Circuit project at Monta Vista 230-115kV substation to resolve P5-5 outage violations
 - Interim solutions are being developed until long term capacity upgrades are in service

Alternatives Considered for Capacity Upgrades:

- Alternative 1: Status quo - Not recommended due to P5/P6 thermal violations
- Alternative 2: energy storage - Not recommended due to capacity constraints for charging

* Refer to San Jose Serial Capacity upgrades table for Estimated ISD and cost



Serial - Data Center Load #2

- 200 MW, requested ISD: 2029

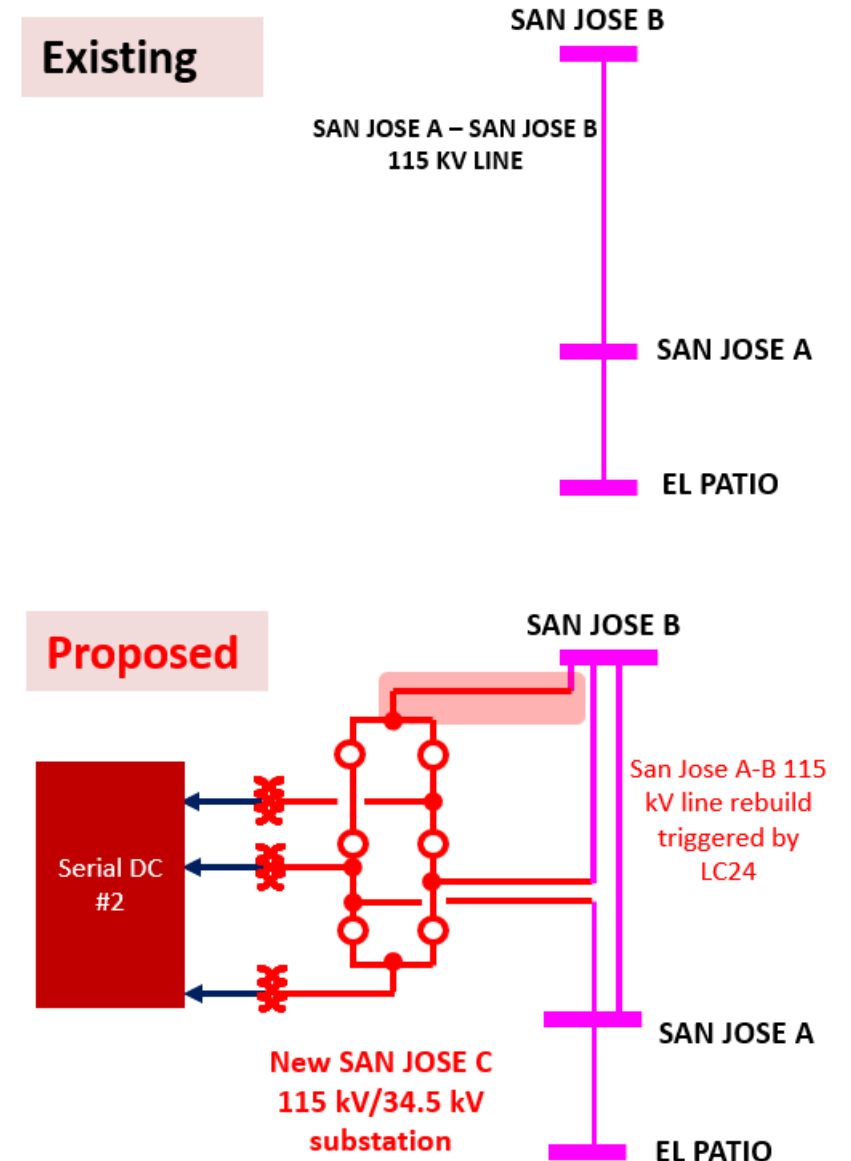
Proposed Scope

- **Interconnection (Estimated cost: \$66 M - \$141 M, ISD: 2029):**
 - New 115/34.5 kV substation looping in San Jose A – San Jose B #2 115 kV Line and associated 115/34.5 kV transformers, distribution service lines
- **Capacity Upgrade*:**
 - Construct a new approximately 0.3-mile 115 kV overhead line to create a second circuit between San Jose B and San Jose C substations, with a target rating of 3,000 A.
 - Install +/- 200 MVAR STATCOM at Trimble Expansion 115 kV bus
 - Interim solutions are being developed until long term capacity upgrades are in service

Alternatives Considered for Capacity Upgrades:

- Alternative 1: multiple 115 kV line upgrades San Jose A-El Patio 115 kV Line, El Patio-Metcalf 115 kV Lines, and reactive support.
 - Not recommended due to high cost and long duration to implement
- Alternative 2: energy storage - Not recommended due to capacity constraints for charging

* Refer to San Jose Serial Capacity upgrades table for Estimated ISD and cost



Serial - Data Center Load #3

- 250 MW, requested ISD: 2029

Proposed Scope

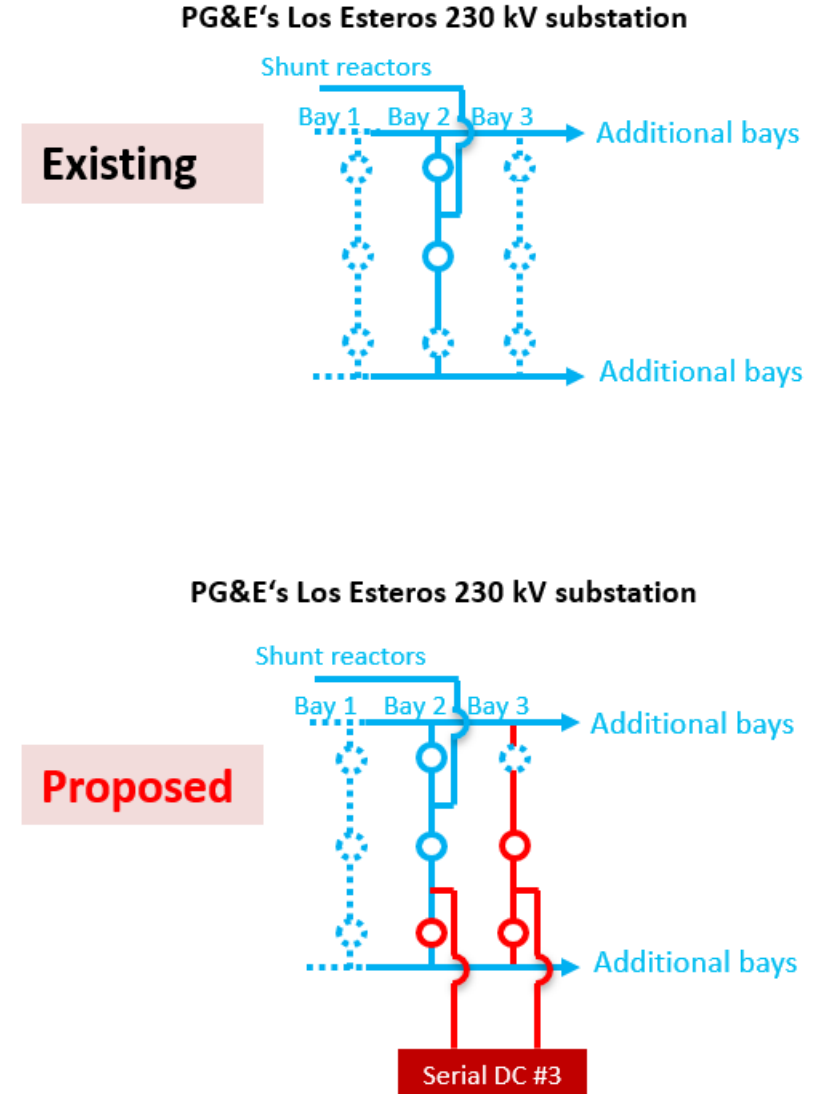
- **Interconnection:**
 - Connect to Los Esteros 230kV (note 1)
- **Capacity Upgrade*:**
 - Install +/- 200 MVAR STATCOM at Trimble Expansion 115 kV bus
 - Interim solutions are being developed until long term capacity upgrades are in service

Alternatives Considered for Capacity Upgrades:

- Alternative 1: Status quo - Not recommended due to P6 thermal overloads
- Alternative 2: energy storage - Not recommended due to capacity constraints for charging

Note 1: the detailed interconnection scope and cost is currently being assessed

** Refer to San Jose Serial Capacity upgrades table for Estimated ISD and cost*



LOAD CLUSTER 2025



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Projects studied

Project	POI	Requested ISD	MW	Region
LC25-8 <i>(Note 1)</i>	Midway (Elk Hills customer site)	2027	465	KERN
LC25-14	Existing Tap (Woodland-Davis 115KV Line)	2027	20	CVLY
LC25-18	Potrero 115 kV	2029	99	GBAY
LC25-19	Edenvale 115 kV	2031	100	GBAY
LC25-28	New SW STA (Newark-Fremont 115 KV Line)	2030	99	GBAY
LC25-29	New SW STA (Peabody-Birds Landing 230KV Line)	2029	150	CVLY
LC25-PS1	New SW STA (Tesla-Table Mtn 500KV Line)	2027	1500	CVLY
LC25-PS2	San Francisco H (Martin)	2027	99	GBAY
LC25-PS3	New SW STA (Martin-Daly City 115 KV Line)	2028	49.8	GBAY
LC25-PS4 <i>(Note 1)</i>	20 MW at Nortech and 17.4 MW from River Oaks (Agnew)	2027	37.4	GBAY
LC25-PS5	Trimble 115 kV	2030	99	GBAY
LC25-PS6	Facebook Jct	2027	30	GBAY
LC25-PS7 <i>(Note 1)</i>	AMERIGAS TAP-115kV Conductor	2026	13	Sacramento
LC25-PS8 <i>(Note 1)</i>	VIERRA-TESLA MOTORS-115kV Conductor	2026	7.8	CVLY
LC25-PS9 <i>(Note 1)</i>	Paramount Farms 70 kV connected to PG&E's 70 kV Twisselman Sub	2026	14	Kern
LC25-PS10 <i>(Note 1)</i>	Frito Lay 115kV	2026	10	Kern

Note 1: Projects identified with no new capacity upgrades

LC25- Capacity Upgrades

Name	Description	Estimated ISD	Cost (\$M)	Project Dependency
Upgrade Martin-Daly City #1 & #2 115kV line from Martin to new LC25-PS3 station	Upgrade 1.4 miles (2.8 miles total) of Martin-Daly City #1 & #2 115kV lines from Martin to new LC25-PS3 station from 397 AAC to 795 ACSS	Q3 2031	55	LC25-PS3
Loop Martin - Daly City #2 into new LC25-PS3 station	Looping in a second line to new LC25-PS3 station to protect against overloads caused by loss of parallel line.	Q3 2031	15	LC25-PS3
Upgrade Monta Vista-Hicks 230kV line	Monta Vista-Hicks 230 kV line limiting element removal for at least 1253 Amps	Q1 2029	0.5	LC25-PS3, LC25-PS2, LC25-PS6, LC25-18, LC25-28
Upgrade Cooley Landing-Palo Alto 115 kV line	Reconductor 2.72 miles of Cooley Landing-Palo Alto 115 kV Line	Q2 2032	23	LC25-PS6
Upgrade Ames-Whisman 115kV Line	Reconductor 3.55 miles of the Ames - Whisman 115kV line for at least 1200 Amps targeting 3000 Amps	Q4 2031	42	LC25-PS3, LC25-PS2, LC25-PS6, LC25-18, LC25-28
Replace Switches 543 at Metcalf 115kV bus	Replace Switches 543 at Metcalf 115kV bus and any other limiting factor for Metcalf 230/115kV Transformer #2 summer emergency ratings	2029	0.5	LC25-19, LC25-PS5
Upgrade Davis - Brighton 115 kV line	Reconductor the Davis-Brighton 115 kV line	Q2 2030	290	LC25-14
Upgrade Davis - Woodland 115 kV line	Reconductor the Davis-Woodland 115 kV line	Q2 2031	20.7	LC25-14
Reactive Support Requirement	0.99 power factor requirement and install a 22-Mvar shunt capacitor at LC25-14 POI.	2030	10	LC25-14
Reactive Support Requirement	0.99 pf requirement and a new 250 MVar STATCOM at the new SW STA	2030	100	LC25-PS1

Note 1: Interim solutions are being developed until long term capacity upgrades are in service

Solano County LC25-29

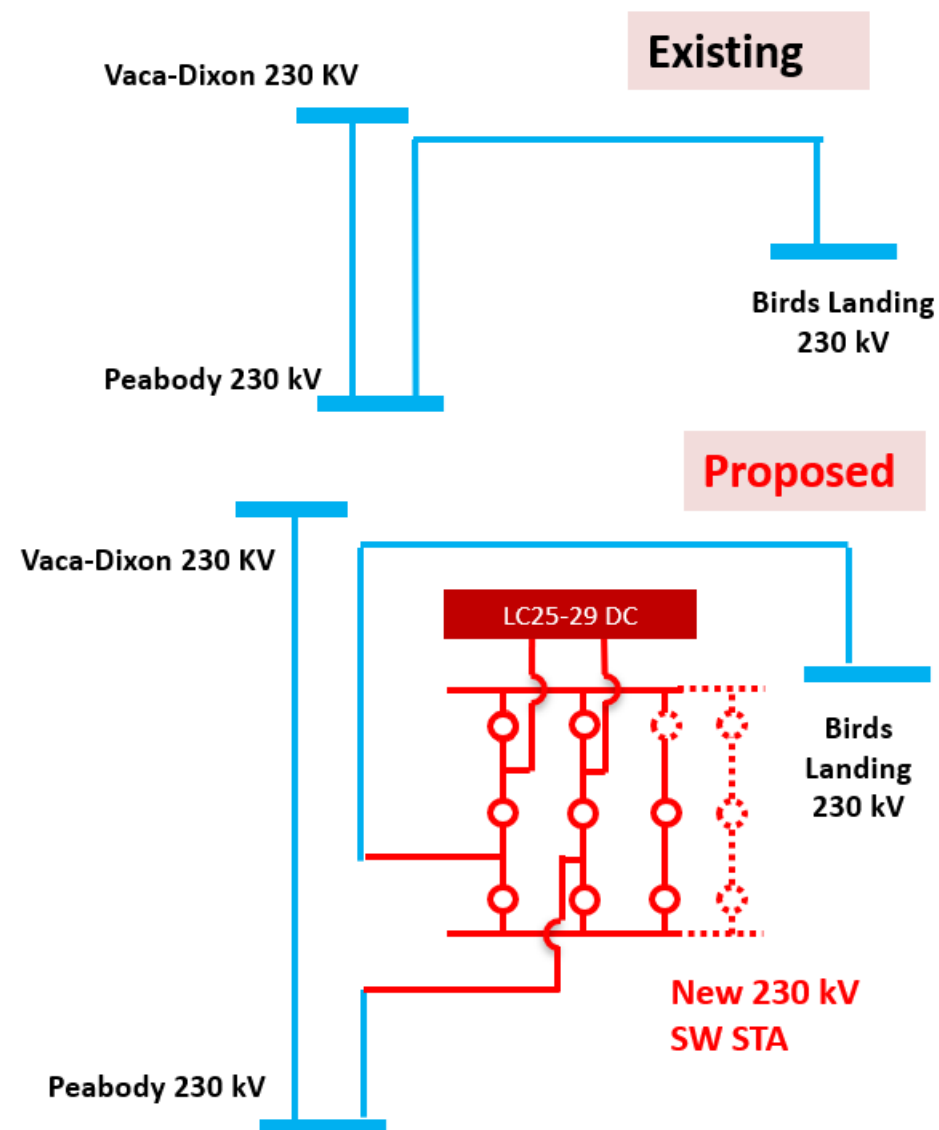
POI: Peabody-Birds 230KV Line

LC25-29

- 150 MW, requested ISD: 2027

Proposed Scope

- **Interconnection (Estimated cost: \$83.46 M, ISD: 2029):**
 - New 2-Bay BAAH (AIS) 230KV Switching Station - Expandable to 4-Bay looping the Peabody-Birds Landing 230KV Line
- **Capacity Upgrades**
 - No new capacity upgrades were identified



LC25-14

- 20 MW, requested ISD: 2026

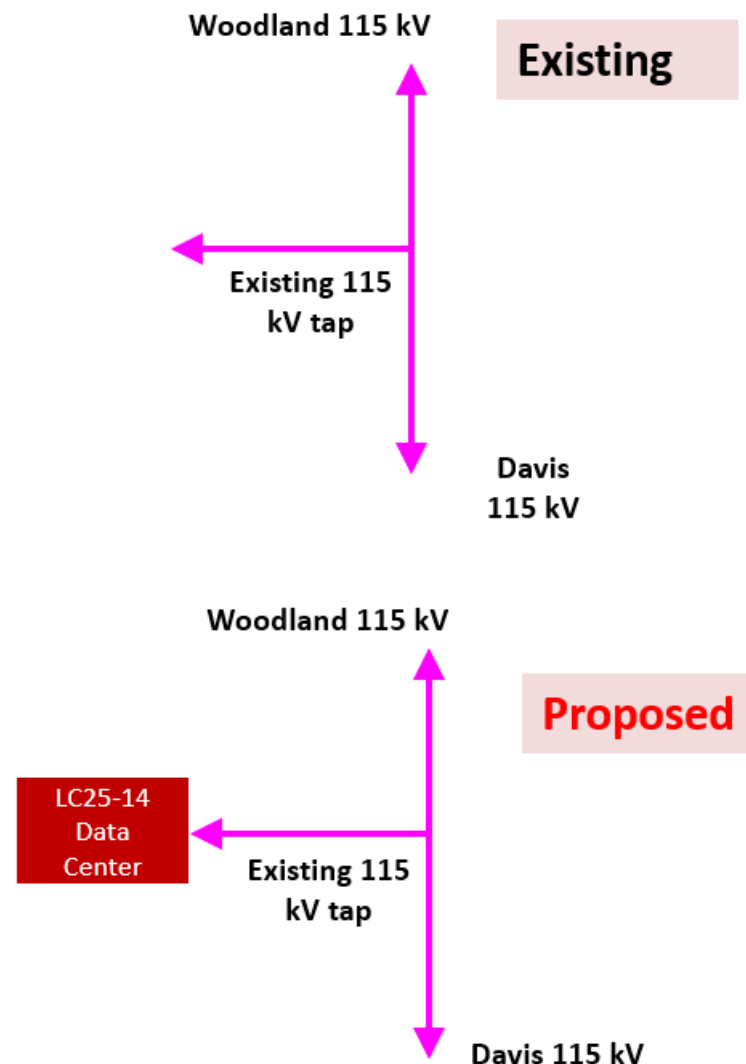
Proposed Scope

- **Interconnection (Estimated cost: \$3.03 M, ISD: 2028)**
 - Connecting the customer's substation to the existing 115 kV tap on Woodland-Davis 115 kV line outside of the customer's facility.
- **Capacity Upgrades***
 - Rebuild/Reconductor the Davis-Brighton 115 kV line, ~27 miles.
 - Reconductor the Davis-Woodland 115 kV line, for a small portion of the line.
 - 0.99 power factor requirement and install a 22-Mvar shunt capacitor at LC25-14 POI.

Alternatives Considered for Capacity Upgrades:

- Alternative 1: Status quo - Not recommended due to P1/P2/P3/P6 thermal and/or voltage violations
- Alternative 2: energy storage - Not recommended due to capacity constraints for charging

* Refer to LC25 Capacity upgrades table for Estimated ISD and cost



LC25-PS1

- 1500 MW, requested ISD: 2028

Proposed Scope

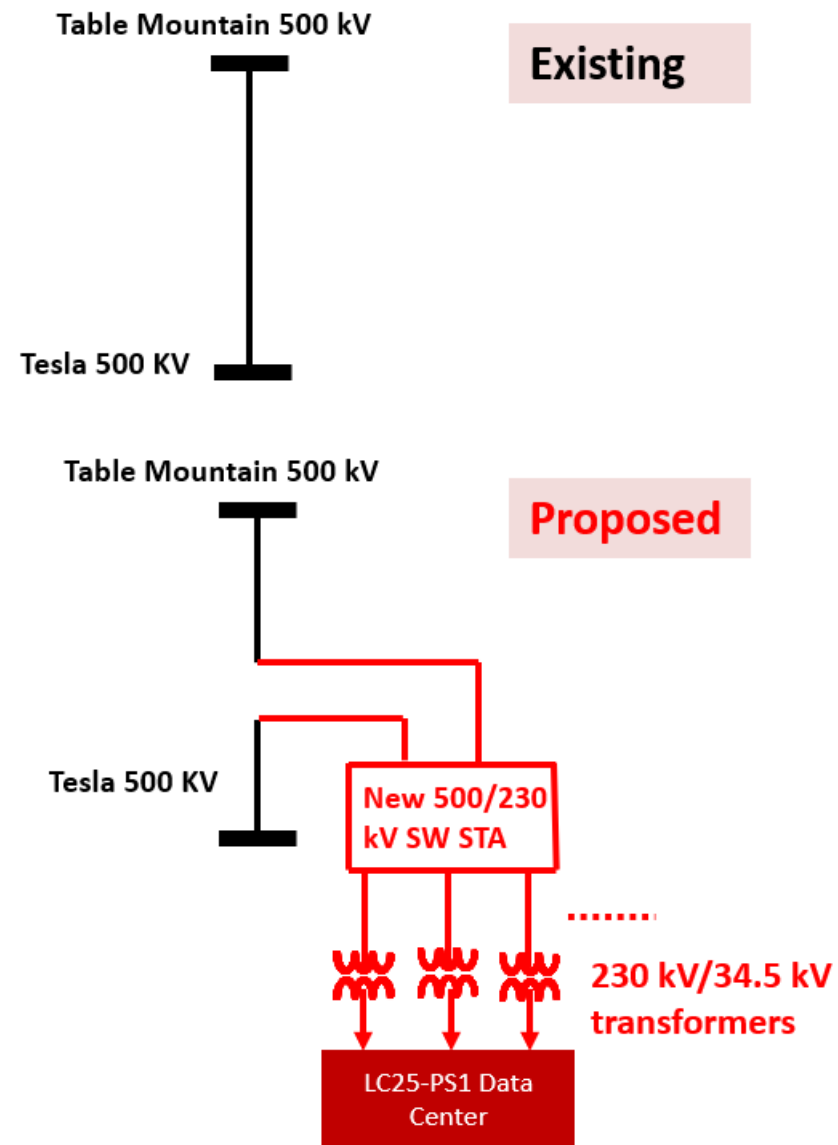
- **Interconnection (Estimated cost: \$1,148.4 M, ISD: 2030)**
 - New SW STA on Tesla-Table Mtn 500KV Line
- **Capacity Upgrades***
 - 0.99 pf requirement and a new 250 MVar STATCOM at the new SW STA (est cost: \$100 M)
 - COI affected system impact study: to be performed, necessary upgrade TBD
 - COI RAS restudy: to be performed, necessary upgrade TBD

Alternatives Considered for Capacity Upgrades:

- Alternative 1: Status quo - Not recommended due to P2/P3/P6 thermal and/or voltage violations
- Alternative 2: energy storage - Not recommended due to capacity constraints for charging

Temporary 115 kV interconnection

Temporary 115 kV interconnection alternatives are being studied.



San Francisco/Peninsula LC25-18, LC25-PS2

LC25-18

- 99 MW, requested ISD: 2029

Proposed Scope

- Interconnection (Estimated cost: \$20.65M, ISD: 2030):**
 - Add a new 115 kV BAAH (Breaker-And-A-Half) bay to the GIS (Gas Insulated Switchgear) at Potrero Substation and associated service line

LC25-PS2

- 99 MW, requested ISD: 2027

Proposed Scope

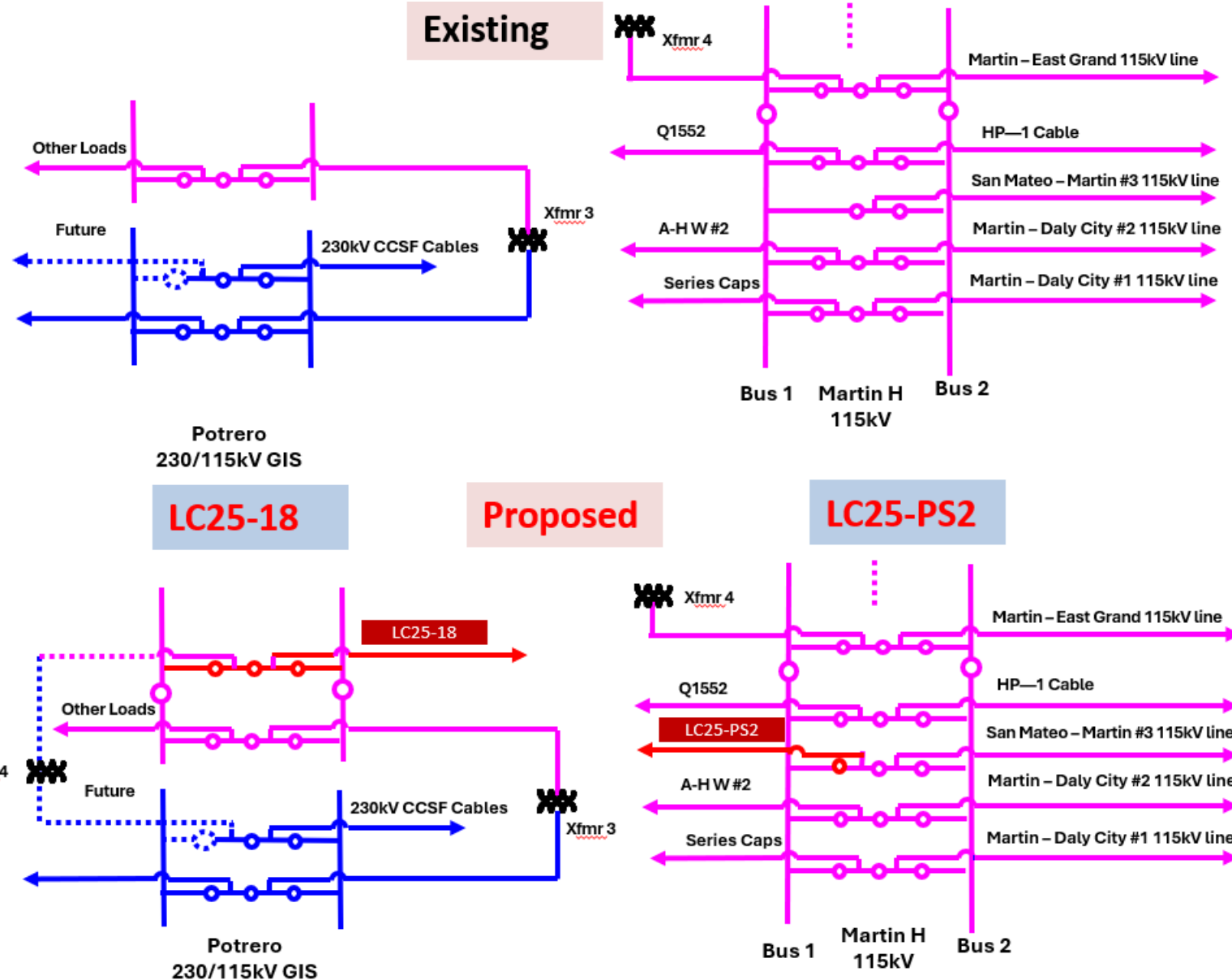
- Interconnection (Estimated cost: \$31.6M, ISD: 2030):**
 - Add a new 115 kV Breaker at Martin 115 kV Substation and associated service lines

Capacity Upgrades (Required by both LC25-18 and LC25-PS2)*:

- Remove limiting element from Monta Vista – Hicks 230 kV Line
- Reconductor 3.55 miles of the Ames – Whisman 115kV line
- Interim solutions are being developed until long term capacity upgrades are in service

Alternatives Considered for Capacity Upgrades:

- Alternative 1: energy storage- Not recommended due to capacity constraints for charging





San Francisco/Peninsula LC25-PS3

POI: Martin-Daly City 115 KV Line

LC25-PS3

- 49.8 MW, requested ISD: 2028

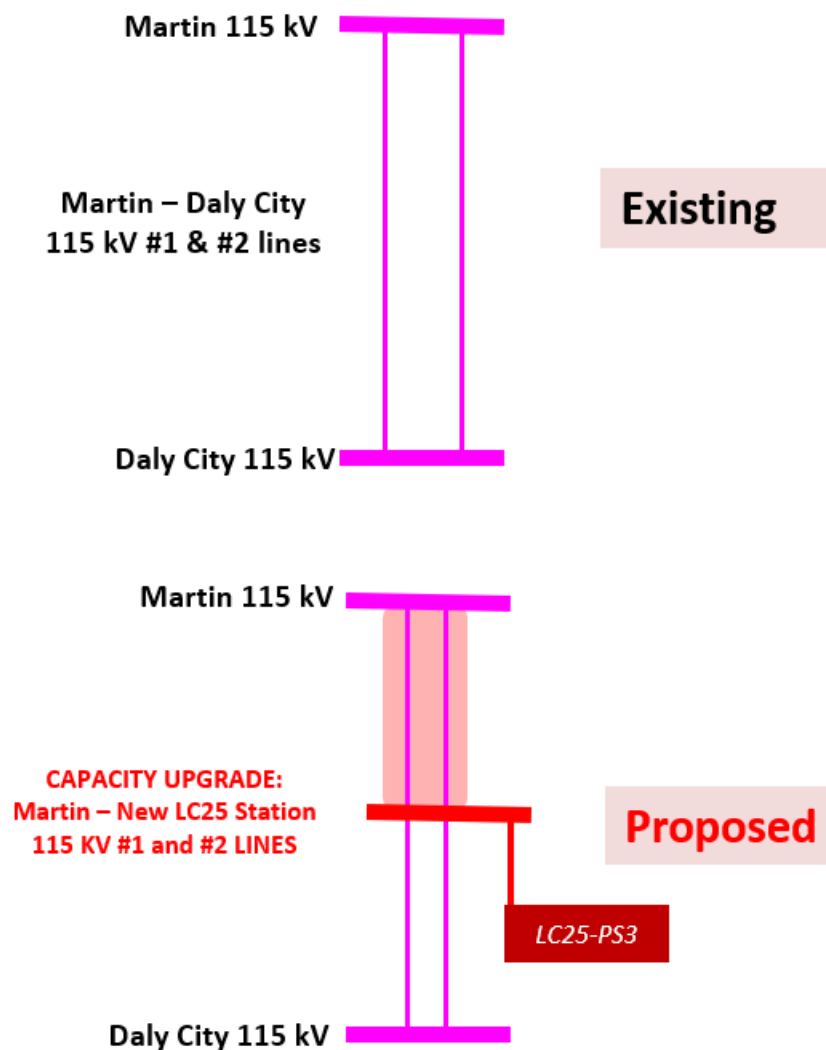
Proposed Scope

- **Interconnection (Estimated cost: \$58.65M, ISD: 2030):**
 - New 115 kV BAAH (AIS) Switching Station looping in the Martin – Daly City #1 Line and associated service lines
- **Capacity Upgrades*:**
 - Reconductor Martin – Daly City #1 and #2 line from Martin to new LC25-PS3 station
 - Loop Martin – Daly City #2 into new LC25-PS3 station
 - Interim solutions are being developed until long term capacity upgrades are in service

Alternatives Considered for Capacity Upgrades:

- Alternative 1: Reconductor all of Martin – Daly City #1 and #2 115 kV lines instead of looping in a second line to LC25-PS3 new station
 - Not recommended due to high cost and difficult terrain
- Alternative 2: energy storage- Not recommended due to capacity constraints for charging

* Refer to LC25 Capacity upgrades table for Estimated ISD and cost



South Bay LC25-19 – POI: Edenvale 115 kV

LC25-19:

- 99 MW, requested ISD: 2031

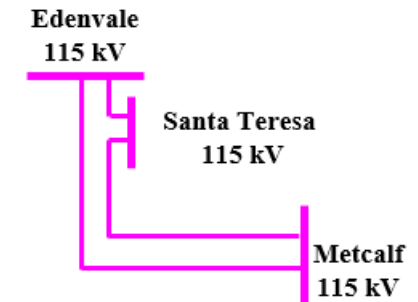
Proposed Scope

- **Interconnection (Estimated cost: \$140.7 M, ISD: 2031):**
 - Convert the existing Edenvale Substation to a Breaker-and-a-Half (BAAH), Gas-Insulated-Substation (GIS). The initial buildout will be a 4-bay BAAH. Work on associated service lines.
- **Capacity Upgrades*:**
 - Replace Switches 543 at Metcalf 115kV bus and any other limiting factor for Metcalf 230/115kV Transformer #2 summer emergency ratings
 - Interim solutions are being developed until long term capacity upgrades are in service

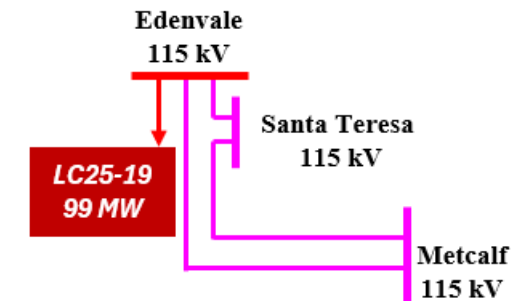
Alternatives Considered for Capacity Upgrades:

- Alternative 1: Status quo - Not recommended due to P5/P6 thermal violations
- Alternative 2: energy storage - Not recommended due to capacity constraints for charging

Existing



Proposed



* Refer to LC25 Capacity upgrades table for Estimated ISD and cost

South Bay LC25-28 – POI: Newark-Fremont 115

LC25-28:

- 99 MW, requested ISD: 2030

Proposed Scope

- **Interconnection (Estimated cost: \$64.81 M, ISD: 2030):**
 - New 2-bay BAAH (GIS) Switching Station looping in the Newark-Fremont 115 KV Line and associated service lines
- **Capacity Upgrades*:**
 - Monta Vista–Hicks 230 kV line limiting element removal to achieve at least 1253 Amps
 - Reconductor 3.55 miles of the Ames - Whisman 115kV line to achieve at least 1200 Amps targeting 3000 Amps
 - Interim solutions are being developed until long term capacity upgrades are in service

Alternatives Considered for Capacity Upgrades:

- Alternative 1: Status quo - Not recommended due to P5/P6 thermal violations
- Alternative 2: energy storage - Not recommended due to capacity constraints for charging

* Refer to LC25 Capacity upgrades table for Estimated ISD and cost

Existing

Newark
115 kV

Fremont
115 kV

Proposed

Newark
115 kV

LC25-28
99 MW

New 115 kV SW
STA

Fremont
115 kV

LC25-PS5

- 99 MW at Trimble 115 kV substation, requested ISD: 2030

Proposed Scope

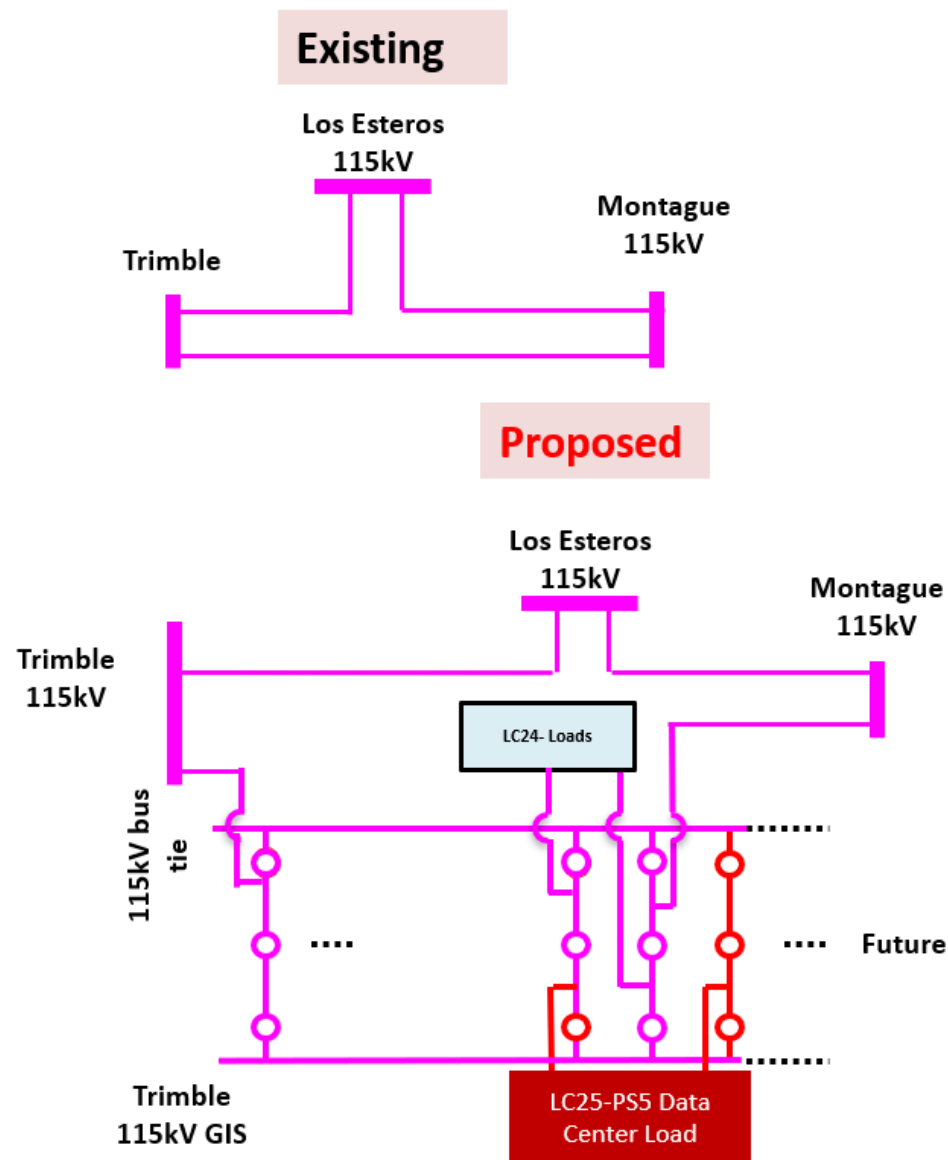
- **Interconnection**
 - Connect to Trimble 115kV GIS (*Note 1*)
- **Capacity Upgrades***
 - Replace Switches 543 at Metcalf 115kV bus and any other limiting factor for Metcalf 230/115kV Transformer #2 summer emergency ratings.
 - Interim solutions are being developed until long term capacity upgrades are in service

Alternatives Considered for Capacity Upgrades:

- Alternative 1: Status quo - Not recommended due to P1 thermal violations.
- Alternative 2: energy storage - Not recommended due to capacity constraints for charging

Note 1: the detailed interconnection scope and cost is currently being assessed

** Refer to San Jose Serial Capacity upgrades table for Estimated ISD and cost*



LC25-PS6

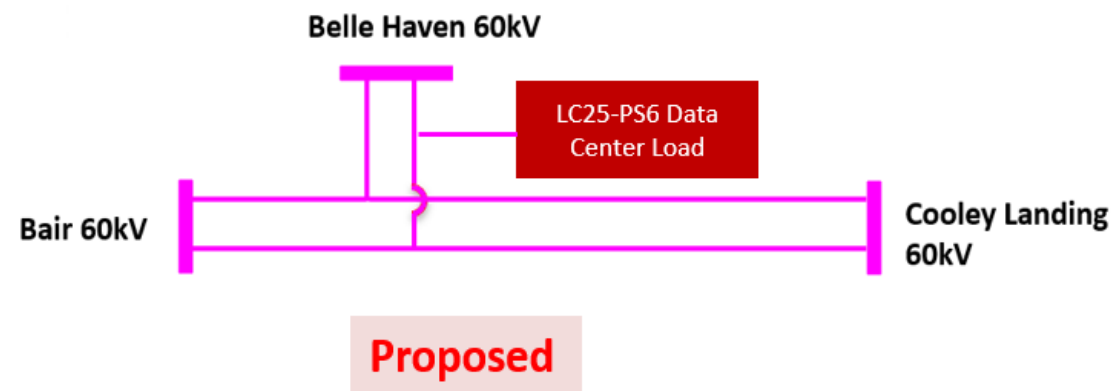
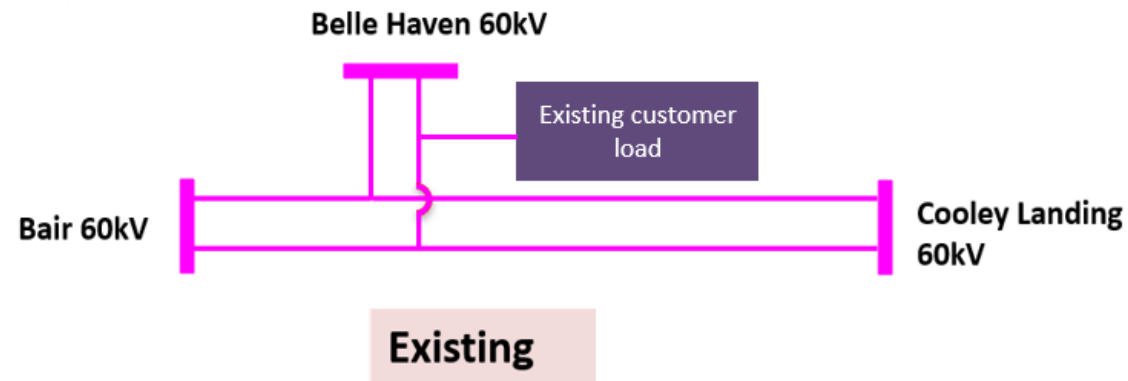
- Load Increase to 30 MW at the existing customer owned Facebook Junction 60 kV station. requested ISD: 2027

Proposed Scope

- **Interconnection**
 - No interconnection scope
- **Capacity Upgrades***
 - Upgrade Cooley Landing-Palo Alto 115 kV line, 2.72 miles
 - Upgrade Ames-Whisman 115kV Line, 3.55 miles.
 - Monta Vista–Hicks 230 kV line limiting element removal for at least 1253 Amps
 - Interim solutions are being developed until long term capacity upgrades are in service

Alternatives Considered for Capacity Upgrades:

- Alternative 1: Status quo - Not recommended due to P6/P7 thermal violations.
- Alternative 2: energy storage - Not recommended due to capacity constraints for charging



Thank you

