

# PG&E's 2020 Request Window Proposals

CAISO 2020-2021 Transmission Planning Process

**September 24, 2020**



Together, Building  
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# Transmission Project Proposals Overview

## Five Projects Seeking CAISO Approval:

### **Stockton**

- Manteca #1 60 kV Line Section Reconductoring (Reliability Driven)
- Kasson-Kasson Junction #1 115kV Line Section Reconductoring (Reliability Driven)

### **North Valley**

- Palermo-Wyandotte 115kV Line Section Reconductoring (Reliability Driven)

### **Greater Bay Area**

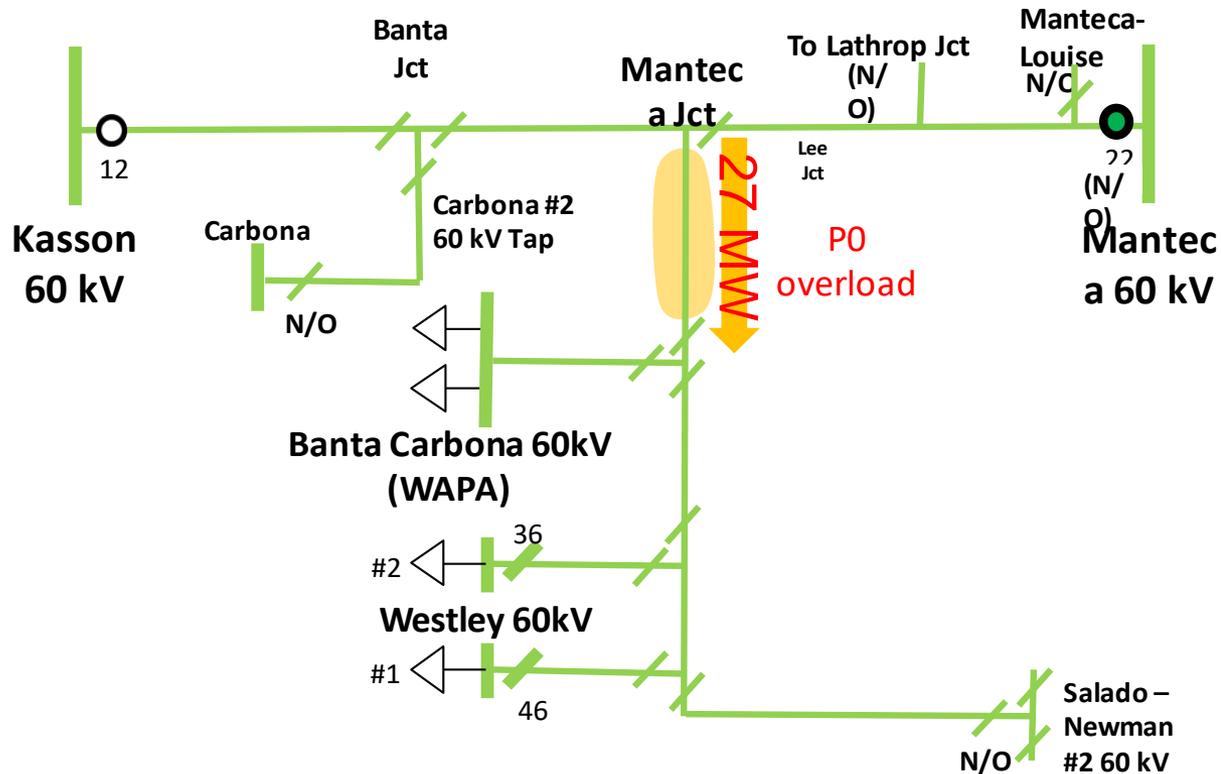
- Metcalf 500/230 kV Transformers Dynamic Series Reactor Project (Reliability and Economic Driven)
- Santa Teresa 115 kV Substation Project (Load Interconnection Driven)

# MANTECA #1 60 KV LINE SECTION RECONDUCTORING



# Area Background

- 26 MW load in this pocket served by radial transmission line, mostly at Westley Sub
- Kasson Sub is the primary source for summer
- Manteca Sub is one alternate source, and Salado – Newman #2 line is another





# Assessment Results

- Contingency Description:

- **P0:** Normal thermal overload on 1.13 miles of Manteca #1 60 kV Line (Manteca Jct. to Banta Carbona)

- Power Flow Results:

		Pre-Project			Post-Project	Contingency	
Facility	Rating* & Length	2022	2025	2030	2025	Category	Contingency Name
Manteca #1 60 kV Line From 009/147 Manteca Junction (MNTCA JT) To 010/158	297 Amps 0.80 mile	98.9%	97.8%	90.0%	66%	P0	None
Manteca #1 60 kV Line From 010/158 To 010/165 Banta Carbona Tap (BNTA CRB)	243 Amps 0.33 mile	120.8%	119.5%	108.1%			

\*Existing Summer Normal Rating



# Proposed Project

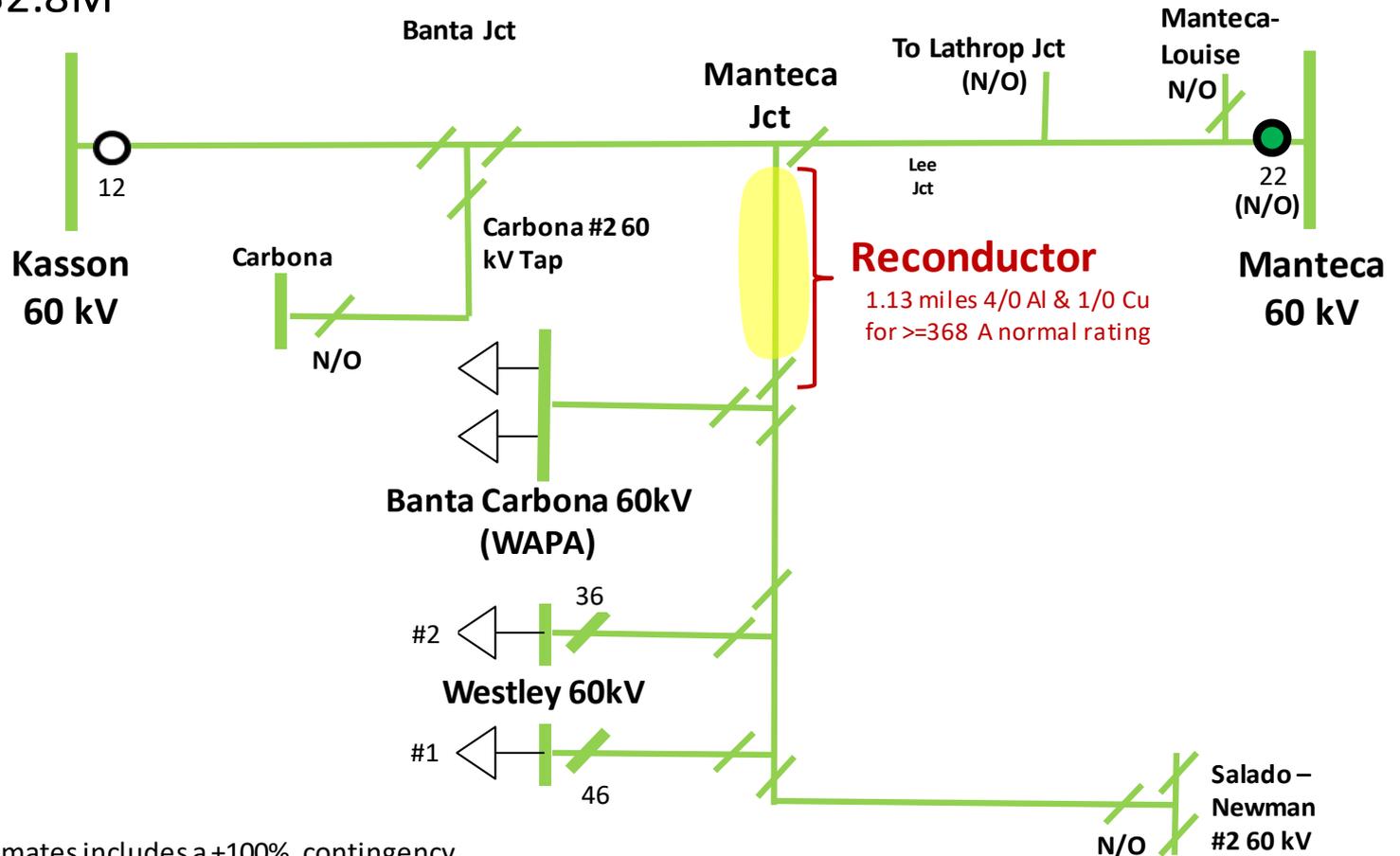
- **Project Objectives:** Increase Manteca #1 60 kV line capacity to address NERC TPL-001-4 P0 thermal overload issue
- **Preferred Scope**
  - Reconductor ~1.13 circuit miles between Manteca Jct (009/147) and Banta Carbona Tap (010/165) on the Manteca #1 60 kV Line with larger conductor to achieve at least 368 Amps of summer normal rating, as shown in the table below
  - Remove any limiting components as necessary to achieve full conductor capacity

Line Section	Conductor Type and Size	Length (miles)	Official Line Section Ratings (Amps, Summer Normal)	Minimum Required Normal Rating (Amps)
From 009/147 Manteca Junction (MNTCA JT) To 010/158	4/0 Al	0.80	297	368
From 010/158 To 010/165 Banta Carbona Tap (BNTA CRB)	1/0 Cu	0.33	243	



# Proposed Project (cont.)

- **Proposed In-Service Date**  
May 2024 or earlier
- **Estimated Cost**  
\$1.4M-\$2.8M\*

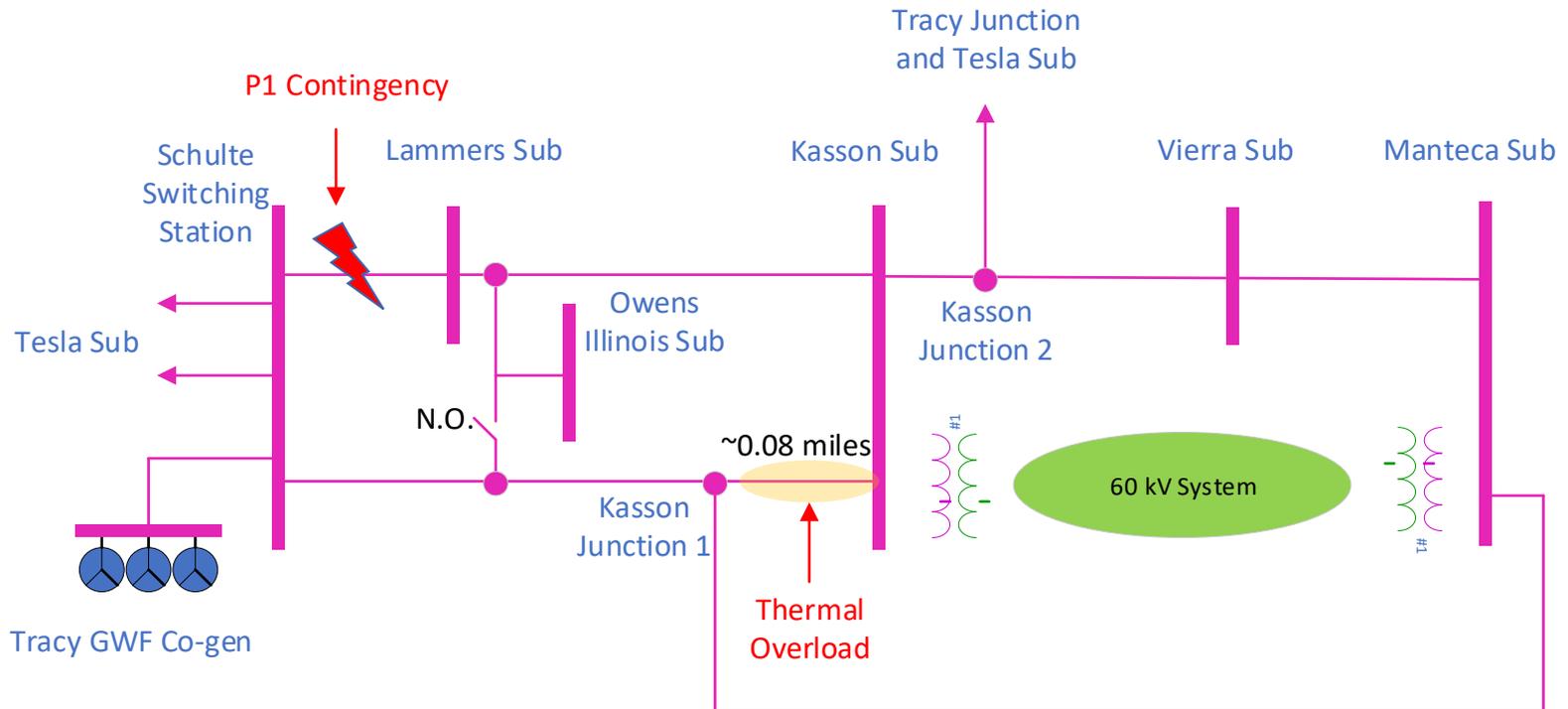


\*AACE Level 5 quality estimates includes a +100% contingency

- **Other Alternatives Considered**
  - Rerate: is not feasible per PG&E re-rate methodology as the line overloads can occur outside of the allowed rerate time period of 10 AM to 7 PM
  - 10 MVAR Capacitor Bank at Westley: attempts to improve the power factor at the Westley 60 kV bus, is not adequate to fully resolve the violation due to the magnitude of the overload
  - Energy storage:
    - is not feasible within the substation due to space limitation
    - is not as cost-effective as a short reconductoring project

# **KASSON-KASSON JUNCTION 1 115 KV LINE SECTION RECONDUCTORING**

- Two parallel 115 kV lines deliver power from Tesla Substation and Tracy GWF co-gen plant to supply the City of Tracy and City of Manteca areas
  - Schulte-Kasson-Manteca 115 kV line
  - Schulte-Lammers 115 kV line + Lammers-Kasson 115 kV line
- Other main sources that supply this area include the Tesla-Tracy 115 kV line, and generations east of Manteca





# Assessment Results

- **Contingency Description:**

- Under P1 contingency of Schulte-Lammers 115 kV line, overload of up to 127% is observed on the other parallel line between the Kasson to Kasson Junction 1 section (0.08 circuit mile)

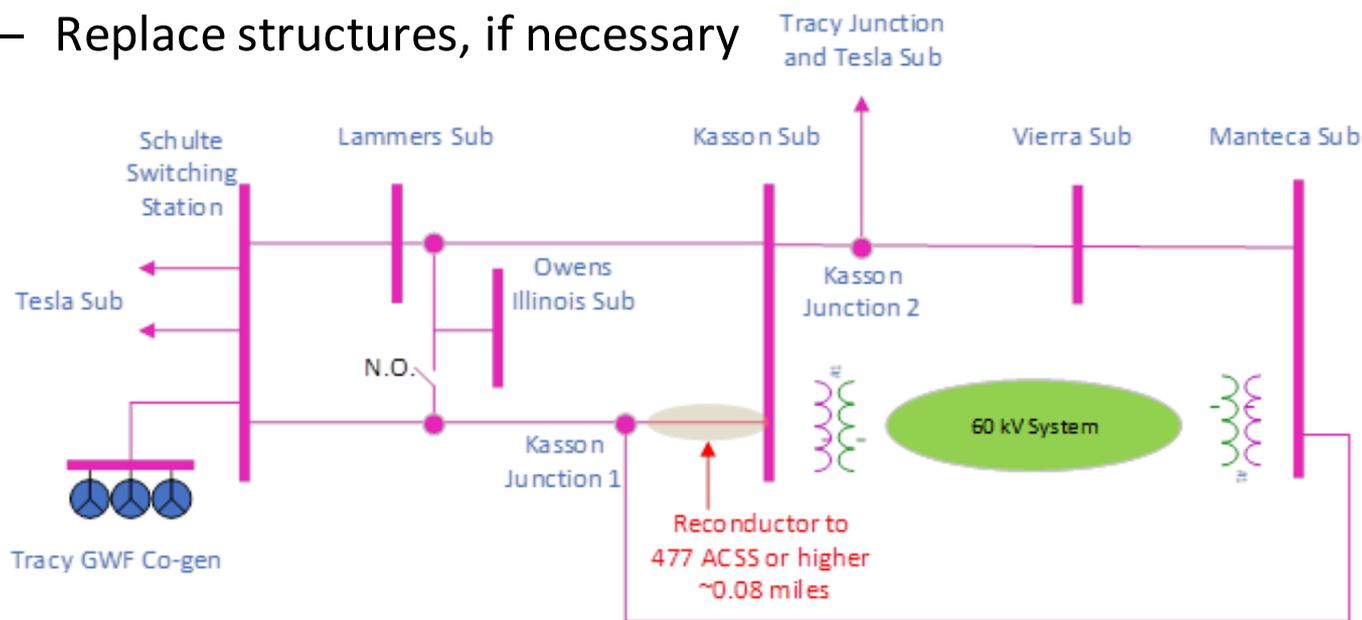
- **Power Flow Results**

- Vierra 115 kV Looping Project expansion project (expected in service 2023) will help reduce the overloads but won't eliminate them
- Marginal overload of up to 104% is observed on the upper stream section of this line from Schulte Switching Station to Kasson Junction 1. Recommended to monitor and re-evaluate in future cycles.

Stockton Peak		Pre-Project			Post-Project	Contingency	
Facility	Rating* (Amps)	2022	2025	2030	2030	Category	Contingency Name
Kasson-Kasson Junction 1	742	127%	103%	121%	80%	P1	Schulte-Lammers 115 kV

\*Existing Summer Emergency Rating

- **Project Objectives:** Increase Schulte-Kasson-Manteca 115 kV line capacity to address NERC TPL-001-4 P1 thermal overload issue
- **Preferred Scope:** meet planning criteria and reliability standard, and enhance operating flexibility
  - Reconductor the Kasson-Kasson Junction 1 section (approx. 0.08 circuit miles) to at minimum 477 ACSS that matches the remaining sections of this line
  - Replace structures, if necessary

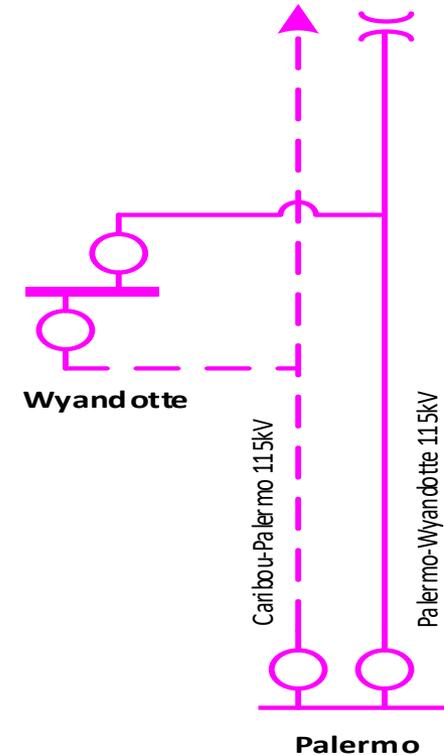


- **Proposed In-Service Date:**
  - May 2023 or earlier
- **Estimated Cost:**
  - \$250K-\$500K\*
- **Other Alternatives Considered**
  - Status Quo: does not mitigate the P1 issues
  - Rerate: is not feasible per PG&E re-rate methodology as the line overloads can occur outside of the allowed rerate time period of 10 AM to 7 PM

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

# **PALERMO-WYANDOTTE 115 KV LINE SECTION RECONDUCTORING**

- Wyandotte 115 kV substation is located in Butte County, North Valley division and serves about 16,300 customers
- The original design of the substation is a primary feed from Palermo-Wyandotte 115 kV line, with a backup feed from the Caribou-Palermo 115 kV line
- The Caribou-Palermo line has been de-energized since 2018
- Currently, Wyandotte substation is fed from a single transmission line (Palermo-Wyandotte 115 kV Line)





# Assessment Results

- **Contingency Description:**

P0: Normal Overload on 0.05 circuit miles between Pole 003/025 and Wyandotte Substation of the Palermo-Wyandotte 115 kV line

- **Power Flow Results:**

		Pre-Project			Post-Project	Contingency	
Facility	Rating* (Amps)	2022	2025	2030	2030	Category	Contingency Name
Palermo – Wyandotte 115 kV Line (003/025-Wyandotte)	325	106%	104%	108%	56%	P0	None

\*Existing Summer Normal Rating

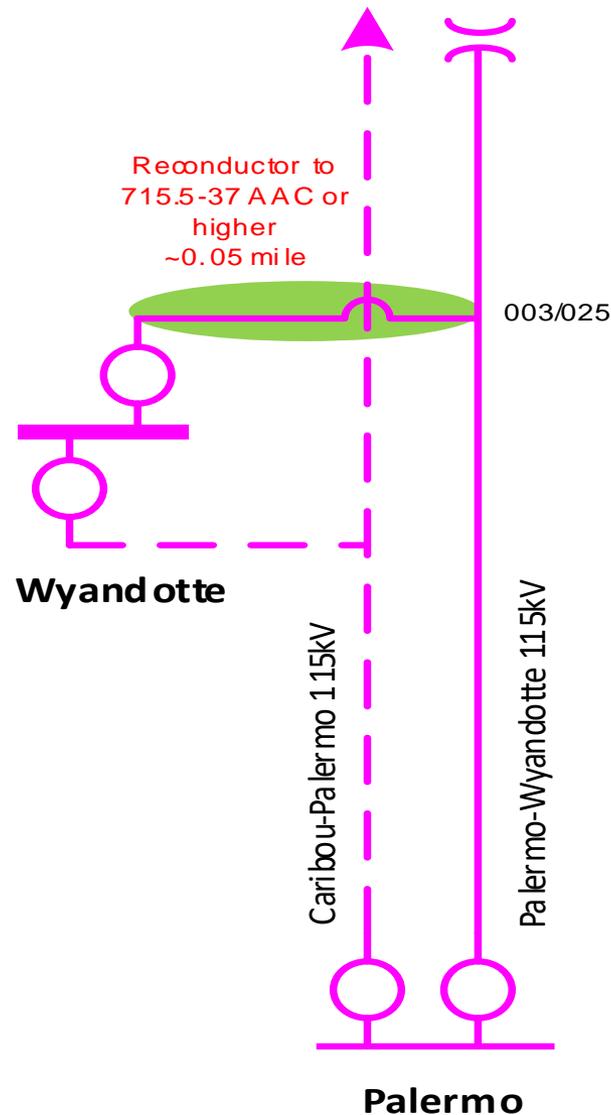


# Proposed Project

- **Project Objectives:** Increase Palermo-Wyandotte 115 kV line capacity to address NERC TPL-001-4 P0 thermal overload issue
- **Preferred Scope:**
  - Reconductor ~0.05 circuit miles between Pole 003/025 and Wyandotte Substation on the Palermo-Wyandotte 115 kV line with larger conductor to achieve at least 631 Amps of summer normal rating to match the remaining section of the line (preferably 715.5-37 AAC conductor)
  - Remove any limiting components to achieve the full conductor capacity

Line section	Conductor size and type	Length (miles)	Official line section ratings (Amps)	
			N	E
From Palermo To 001/011	715.5-37 AAC	1.64	631	742
FROM 001/011 TO 003/025	336.4-30/7 ACSR	1.77	449	512
FROM 003/025 TO Wyandotte	3/0-7 CU	0.05	325	377

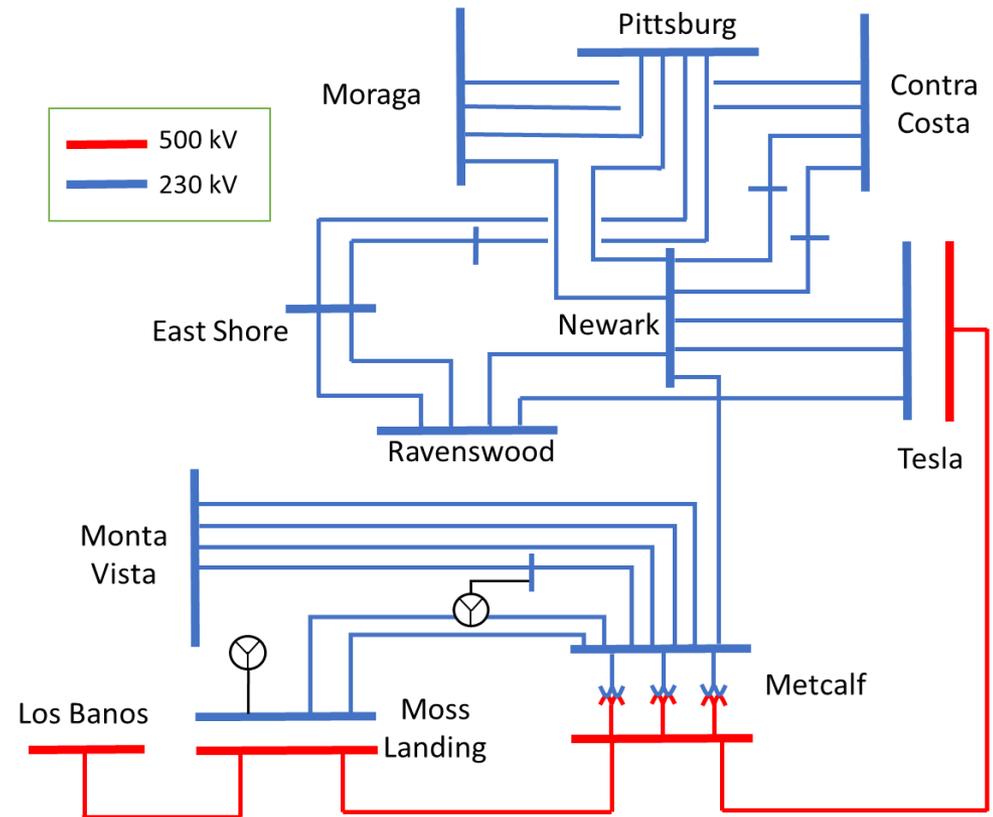
- **Proposed In-Service Date:**
  - May 2023 or earlier
- **Estimated Cost:**
  - \$125K-\$250K\*
- **Other Alternatives Considered:**
  - Status Quo: does not mitigate the P0 issues.
  - Rerate: is not feasible per PG&E re-rate methodology as the line overloads occur outside of the allowed re-rate time period of 10 AM to 7 PM



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

# **METCALF 500/230 KV TRANSFORMERS DYNAMIC SERIES REACTOR PROJECT**

- Metcalf Substation is in the City of San Jose in the Greater Bay Area (GBA)
- It serves as one of the major 500 kV sources of power supply to the GBA
- It connects to the bulk 500 kV system via the Tesla – Metcalf, Moss Landing – Metcalf, and Moss Landing – Los Banos 500 kV lines



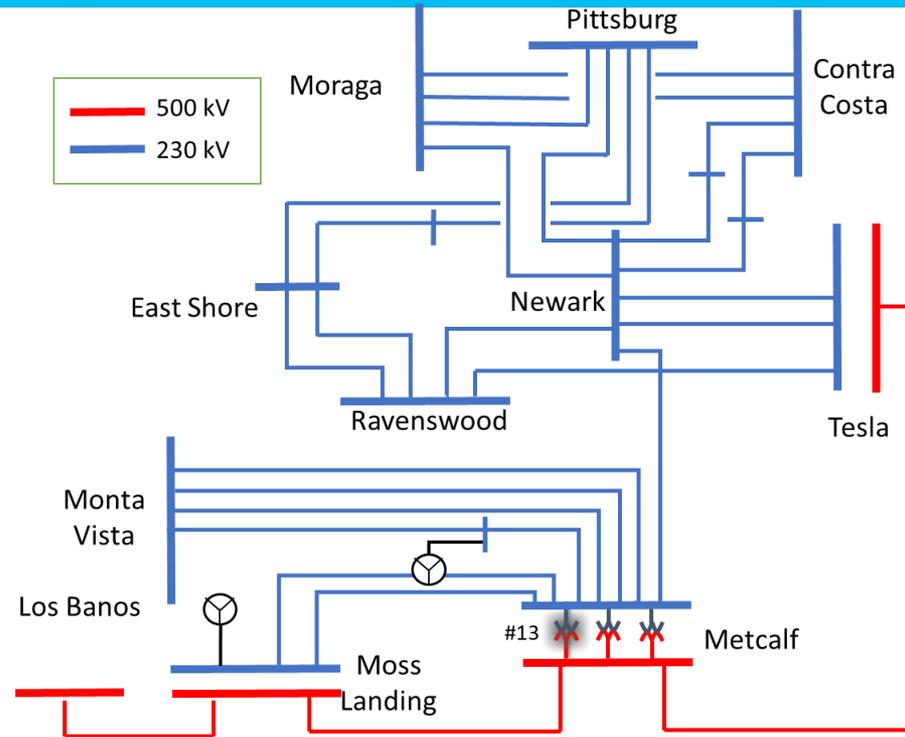
- Metcalf transfers power from bulk system to 230 kV system via three 500/230 kV transformers and serves majority of the South Bay area and Peninsula via 230kV and 115 kV lines

- Contingency Description:**

P6 T-1-1 Outage:

A loss of two of the three 500/230 kV transformers at Metcalf Substation will overload the third 500/230 kV transformer

- Power Flow Results:**

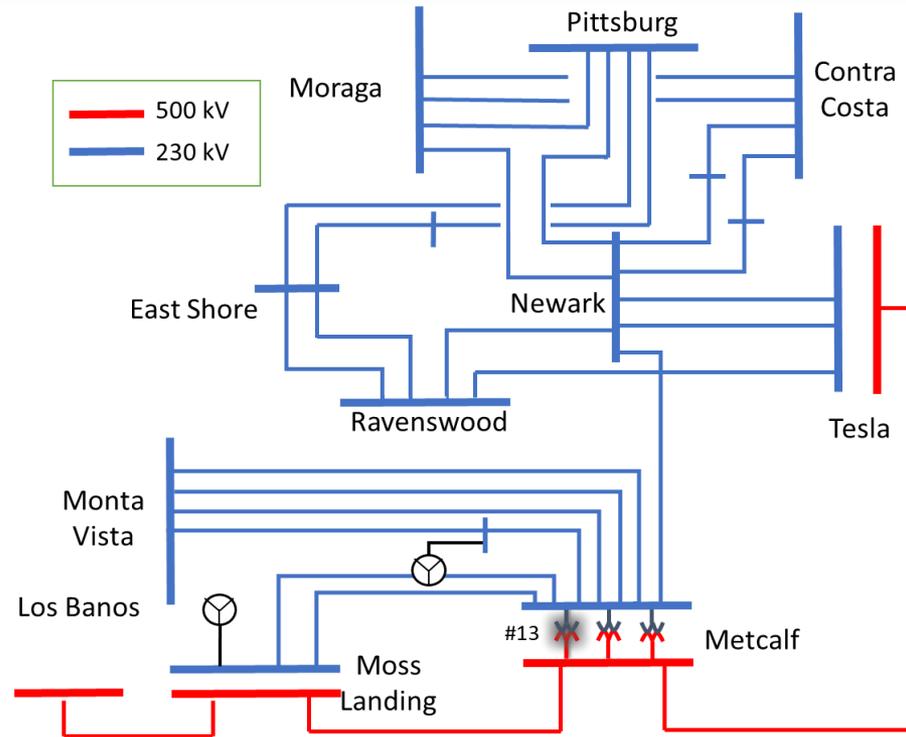


		Pre Project	Post Project	Contingency	
Facility	Facility Rating (MVA)	2022 Spring Off-Peak	2022 Spring Off-Peak	Category	Contingency Name
Metcalf 500/230 kV Transformer NO.13	1122 MVA	128.2%	94.9%*	P6	P6: Metcalf 500/230 kV Transformers No.11 and No. 12

\* With this project and generation dispatch

- Local Capacity Technical Study (LCT) Results:**

CAISO's 2021 LCT Study identified the GBA LCR need was driven by a T-1-1 limiting constraint, which is the loss of any two of the three 500/230 kV transformers at Metcalf Substation would trigger the overload on the remaining third transformer



Year	Category	Limiting Facility	Contingency	Final GBA LCR (MW)	
				Pre Project	Post Project
2021	P6	Metcalf 500/230 kV Transformer No. 13	P6: Metcalf 500/230 kV Transformer No. 11 & No. 12	6353	5100

- **Project Objectives:**

- Address identified P6 T-1-1 reliability concerns as well as to reduce reliance on local GBA generation

- **Preferred Scope:**

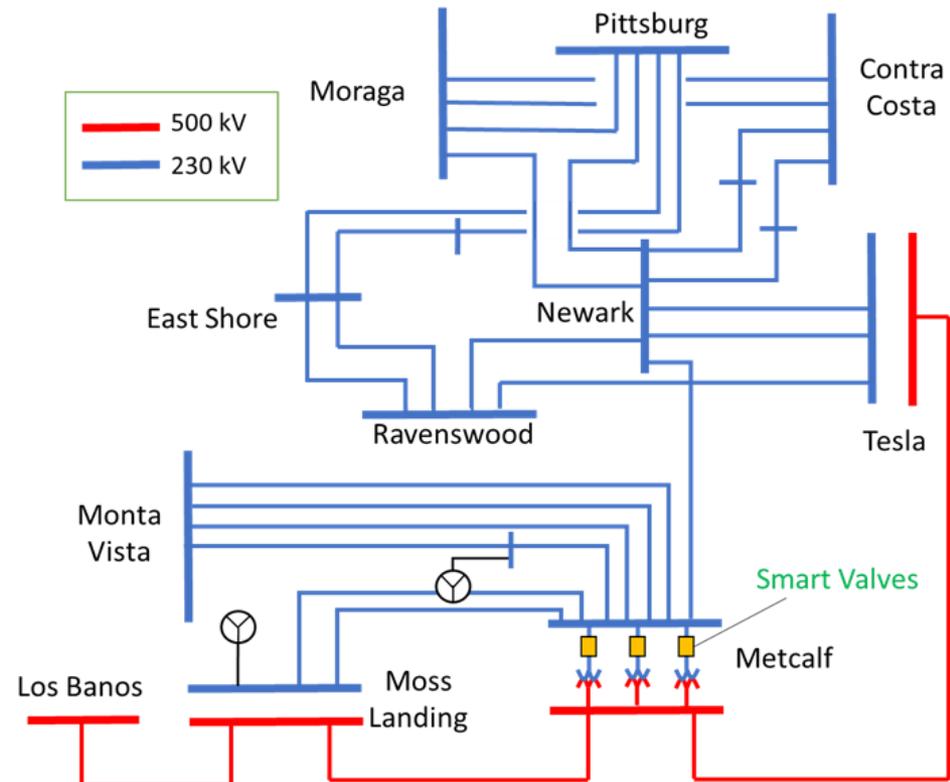
- Install Smart Valves in series with the three 500/230 kV transformers on the low voltage side at Metcalf Substation
- Install bypass circuits to the Smart Valves for maintenance

- **Proposed In Service Date:**

- May 2024 or earlier

- **Estimated Cost:**

- \$22M- \$32M\*



\*AACE Level 4 quality estimates includes a +50% contingency

- **Other Alternatives Considered:**

- Status Quo

*Not recommended due to the expected cost incurred by the additional generation procurement for GBA LCR*

- Install Series Reactors (2ohm per bank) on all Metcalf 500/230 kV banks and RAS

*Not recommended. More expensive. Total cost(AACE Class 4): \$42.8M*

- Install Smart Valves on Tesla-Metcalf 500 kV and Moss Landing – Metcalf 500 kV lines (13 ohm per line) and RAS

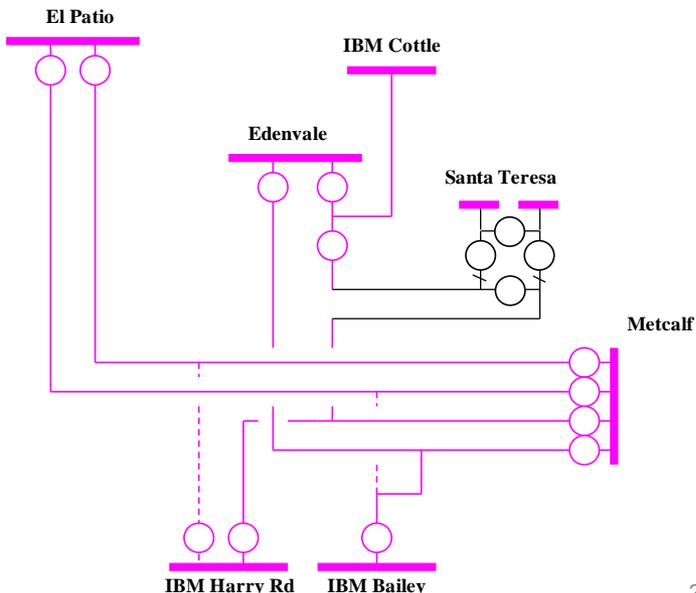
*Not recommended. Not enough space, less effective and much more expensive.*

- Install series reactors on Tesla-Metcalf 500 kV and Moss Landing – Metcalf 500 kV lines (13 ohm per line) and RAS

*Not recommended. Not enough space, less effective and much more expensive.*

# SANTA TERESA 115 KV SUBSTATION PROJECT

- Edenvale Substation is connected to the Metcalf-Edenvale 115 kV No.1 & No.2 Lines and serves over 38,000 industrial, commercial, data center and residential customers with 120 MW of load
- The need for Santa Teresa 115/21 kV Substation was driven by new data center loads requesting to be interconnected to PG&E's distribution system
- Santa Teresa Substation will be looped of the Metcalf-Edenvale No.1 115 kV line
- In 2021, when the new station becomes operational, the projected load served at Santa Teresa Substation is 25 MW





# Assessment Results

- Power flow results**

- No additional transmission upgrades were identified to accommodate the transfer of existing distribution connected customer load and planned data center load increase at Santa Teresa Substation
- Transmission system impacts to connect load increase of existing data center loads and large load additions at Santa Teresa Substation will be studied upon receiving the customer’s load application

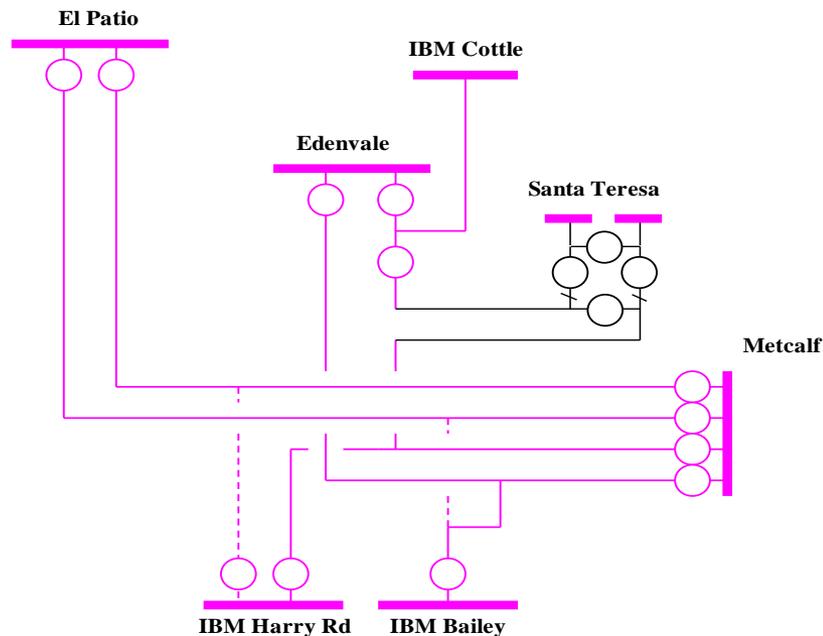
Monitored Facility Name	Facility Rating (Amps)	Pre-Project	Post Project	Contingency	
		2020	2021	Category	Contingency Name
Metcalf – Edenvale No.1 115 kV Line	1200	30%	33%	P0	None
Metcalf – Santa Teresa 115 kV Line	1400		33%		
Santa – Teresa – Edenvale 115 kV Line	1400		24%		
Metcalf – Edenvale No.2 115 kV Line	1200	33%	33%		

- Project Objectives:**

- New Santa Teresa Substation will provide the distribution capacity to serve existing and three new distribution data center load customers
- Additionally, the substation will improve service reliability and operating flexibility in the South San Jose area



Edenvale Service Center and the Santa Teresa Substation site





# Proposed Project (cont.)

- **Project Scope:** Located on PG&E property at Edenvale Service Center in San Jose
  - New four-element 115 kV ring bus
  - One 45 MVA 115/21 kV distribution bank,
  - Two 21 kV distribution circuits
  - Loop in Metcalf-Edenvale No.1 115 kV line into the Santa Teresa substation.
  - Ultimate - (3) 45 MVA Banks, 12 circuits
- **Proposed In-Service Date:**
  - June 2021
- **Estimated Cost:**
  - \$6M-\$9M (Transmission portion cost)

- **Other Alternatives Considered**

- At Edenvale 115 kV Substation – Install two new feeders and replace three 115/21 kV 45 MVA transformers 60 MVA transformers

*Not recommended. 60 MVA transformers are non-standard and there are no 60 MVA mobile transformers available in case of a transformer failure*