

2016 SDG&E Grid Assessment Results

CAISO Stakeholder Meeting
September 22, 2016

Matthew Belden
Engineer II | San Diego Gas & Electric
Email: MBelden@semprautilities.com



2016 Study Windows

- **One to Five-Year Window**
 - 2017 – 2021
- **Ten-Year Window**
 - 2026

Each of the years is tested in accordance with TPL-001-4, along with additional sensitivity cases to ensure we are testing for all possible scenarios.

Major Assumptions

- California Energy Commission Load Forecast 2016-2026 (Jan 27, 2016)
 - Mid Demand Baseline
 - Low Additional Achievable Energy Efficiency (AAEE)
- New Pio Pico Power Plant (309 MW) Added - ISD 2016
- Imperial Valley Phase Shifter Added – ISD 2017
- Encina Power Plant (787 MW) Removed - RFS 2018
- New Coastal Power Plant (527 MW) Added – ISD 2018
- New Sycamore Canyon (SX) to Penasquitos (PQ) 230 kV Line Added - ISD 2018
- New Mission (MS) to Penasquitos (PQ) 230 kV Line Added - ISD 2019
- New Artesian 230 kV Expansion Added - ISD 2020
- South Orange County Reliability Enhancement (SOCRE) – ISD 2021

Major Assumptions

- Two 225 Mvar Synchronous Condensers at Miguel 500 kV – ISD 2017
- 300 Mvar Static VAR Compensator at Suncrest 230 kV – ISD 2017
- 225 Mvar Synchronous Condenser at San Onofre 230 kV – ISD 2018
- Two 225 Mvar Synchronous Condensers at San Luis Rey 230 kV – ISD 2018

Objectives for 2016 Proposed Projects

- Provide a safe, reliable and affordable grid to our customers
- Assist the state in meeting the 50% RPS goal by 2030 as required by Senate Bill 350 (SB350)
- Adhere to NERC reliability planning standards
 - TPL-0001-4
 - Mitigate overloaded facilities

Expansion Plan Summary

Project #	Project Title	ISO Status	ISD	Cost Range
Proposed Projects Requiring CAISO Approval				
2016-0019	Add 2 nd 230/138 kV Transformer at Sycamore Canyon	Pending	2017	\$8 - \$10M
2016-0021	Otay Lake Tap Removal & Loop-in	Pending	2018	\$15 - \$20M
P16XYZ	TL23027 & TL23028B (OT-MS) Reconductor	Pending	2018	\$15 - \$20M
2016-0027	Pala 230 kV Loop-in	Pending	2019	\$20 - \$30M
P16XYZ	Renewable Energy Express	Pending	2021	\$900-\$1000M
Projects submitted in prior TPP's requiring CAISO approval				
P16XYZ	TL23022 & TL23023 (MS-ML) Reconductor	Pending	2018	\$23.3 - \$25.6M
2015-00020	Miramar GT 230 kV Loop-in	Pending	2018	\$23.6 - \$28.3M

Expansion Plan Summary

Addition of
2nd Sycamore Canyon
230/138 kV Transformer Bank

Project Title:
Add 2nd Sycamore Canyon 230/138 kV Transformer Bank

District:
Beach Cities

Need-Date:
June 2017

Driving Factor:

- 2017 Cat P0 criteria violation
- 2018 Cat P1 criteria violation (SX-PQ)

Scope:

- Add a second 230/138 kV transformer bank

Cost:

- \$8M – \$10M

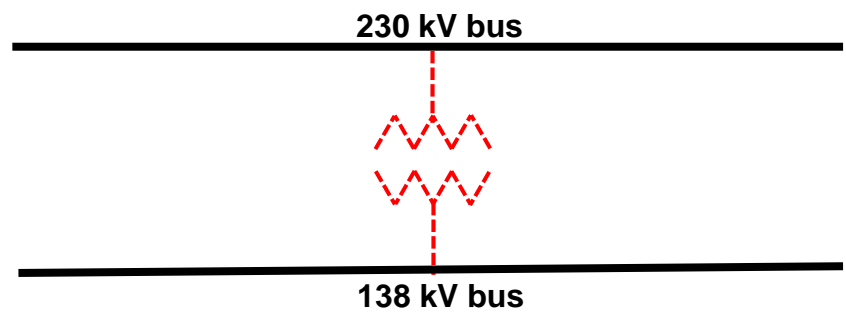
Alternative:

- Congestion management
- Limit imports

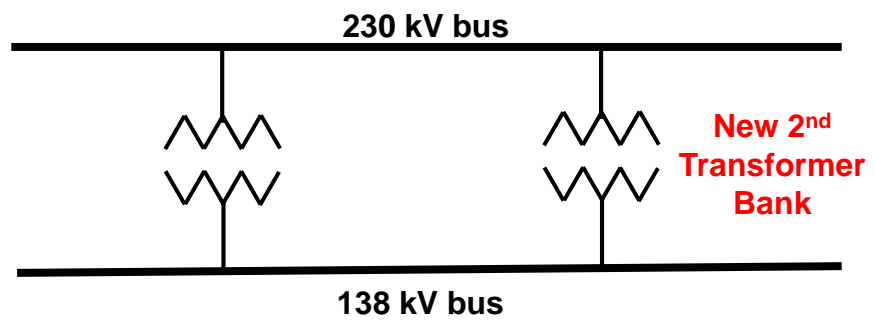
Benefits:

- Mitigate NERC violations
- Maintain import capability

EXISTING

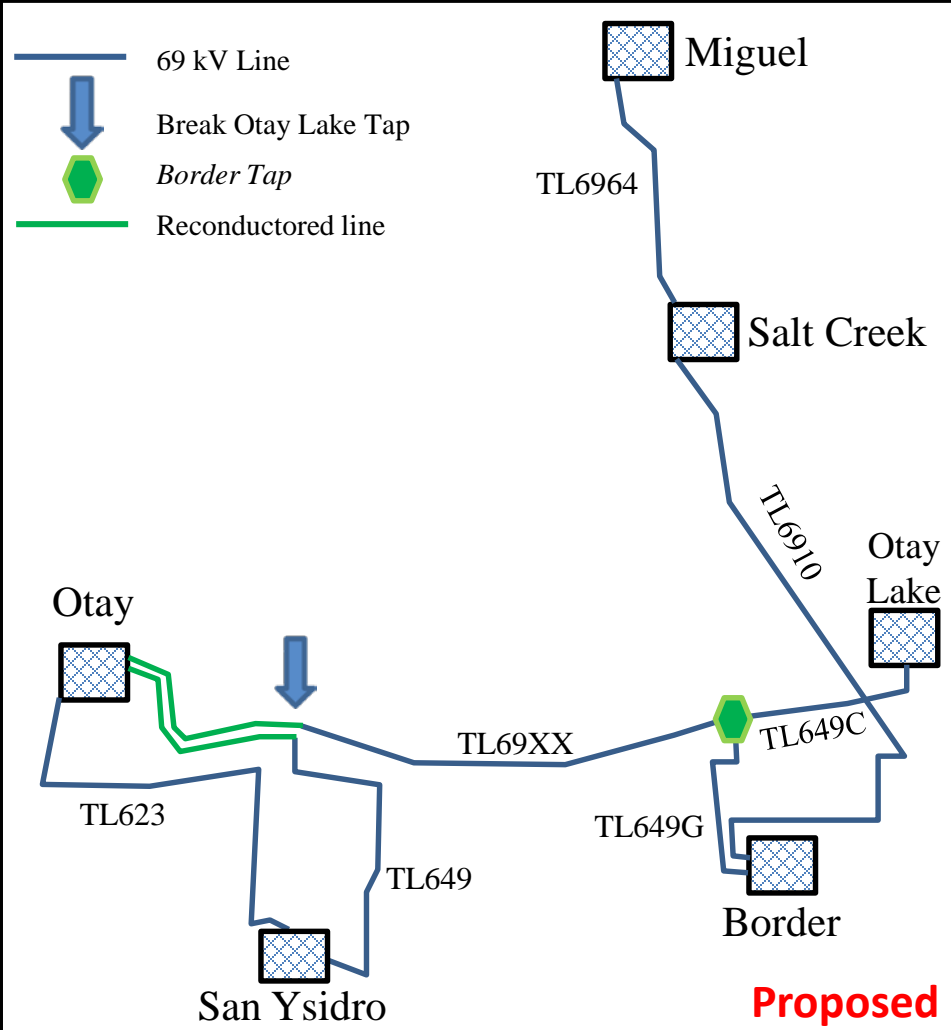
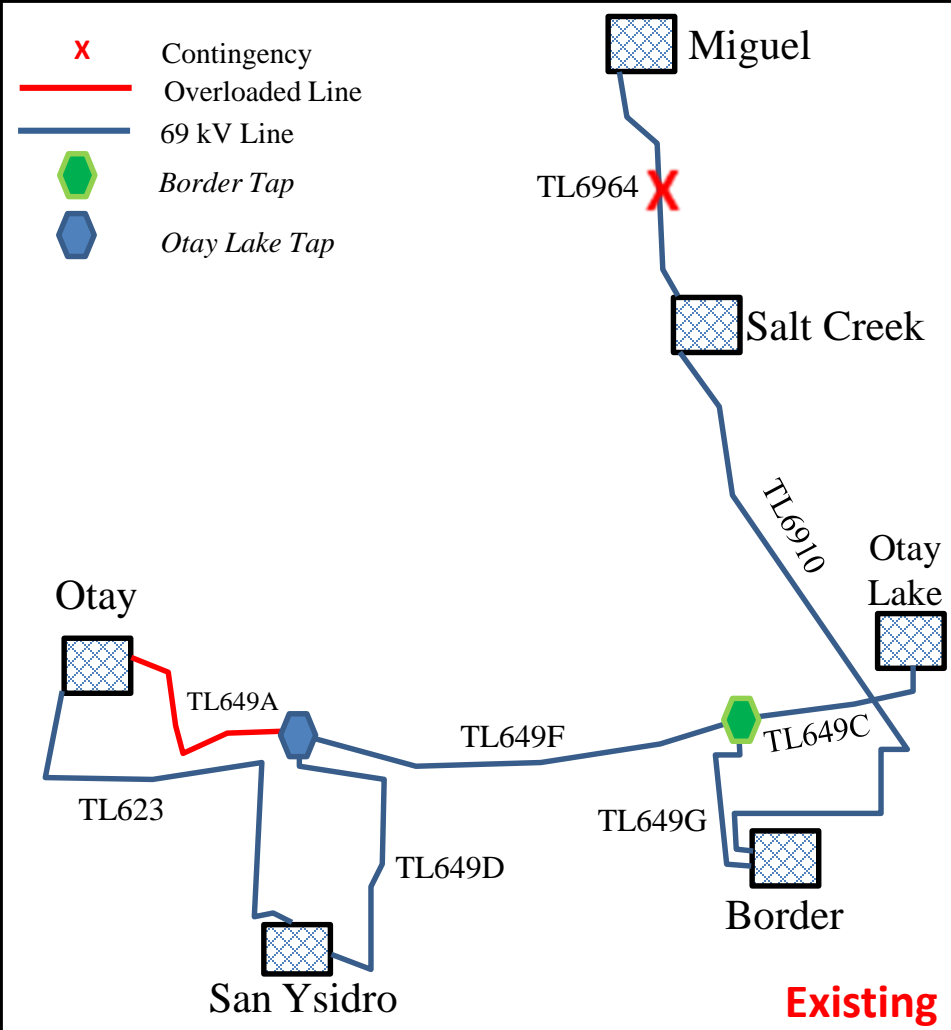


PROPOSED



Expansion Plan Summary

Otay Lake Tap Removal
with New Line Looped-In



Driving Factor:

- Cat P1 violation (N-1)

Scope:

- Break Otoy Lake Tap.
- Combine San Ysidro - Otoy Lake Tap (TL649D) and Otoy Lake Tap - Otay (TL649A) to create a single TL649 (San Ysidro - Otay).
- Extend Border Tap - Otoy Lake Tap (TL649F) 1 mi to Otay to create a new TL69XX (Border Tap – Otay, 97/136 MVA).

Issues:

- Beginning in 2018, an N-1 of TL6964 (Miguel – Salt Creek) loads the emergency rating of TL649A to 109%.

Alternatives:

- Reconductor TL649A

Cost:

- \$15M - \$20M

Expansion Plan Summary

TL23027 & TL23028B Reconductor

(Old Town - Mission)

Project Title:

Old Town - Mission 230 kV Lines Reconductor

In-Service Date:

June 2018

Driving Factor:

- NERC Cat P6 overload of 159.2% on TL23028B (MS-OTTP) caused by the N-1-1 of TL23042 and TL23027.
- NERC Cat P6 overload of 168.5% on TL23027 (MS-OT) caused by the N-1-1 of TL23042 and TL23028.
- Delay of SX – PQ 230 kV Line

Scope:

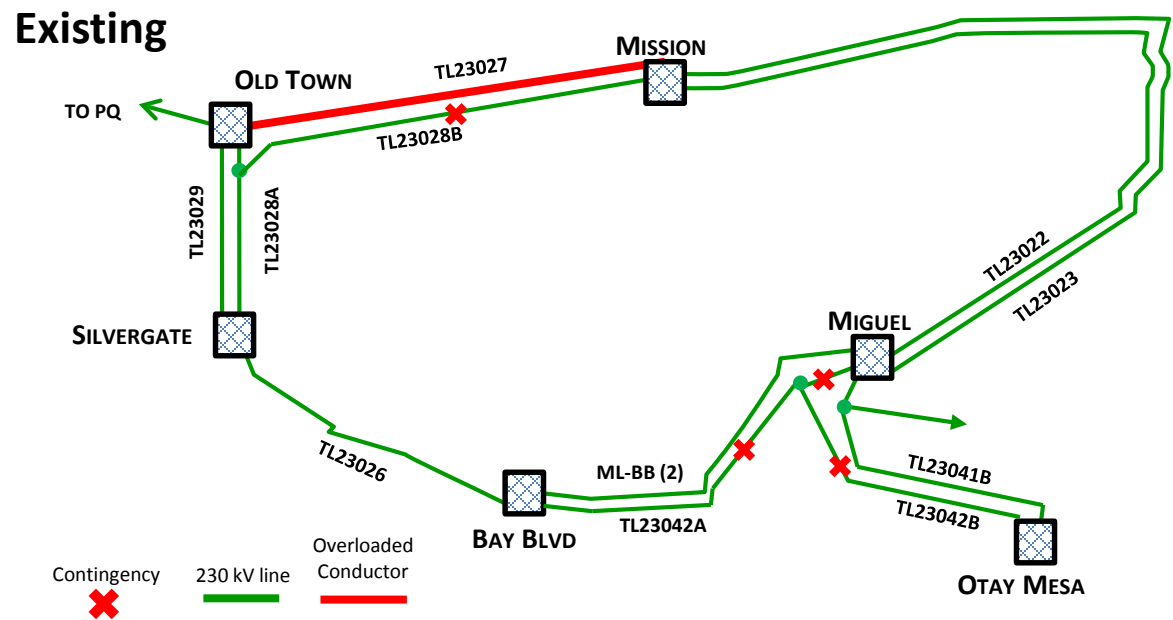
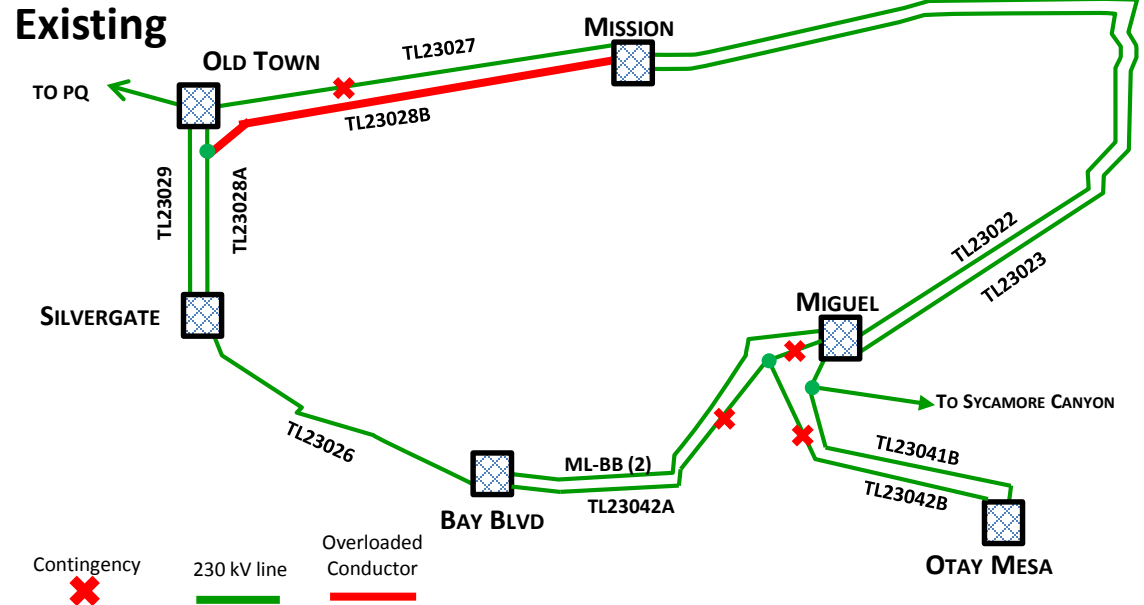
- Reconductor both TL23028B and TL23027 to achieve a minimum continuous rating of 912 MVA to mitigate the NERC thermal violation

Benefits:

- Support the existing 230 kV flow through SDG&E system into the LA Basin.
- Mitigate NERC thermal violation
- Reinforce southern 230 kV loop
- Increase operational flexibility

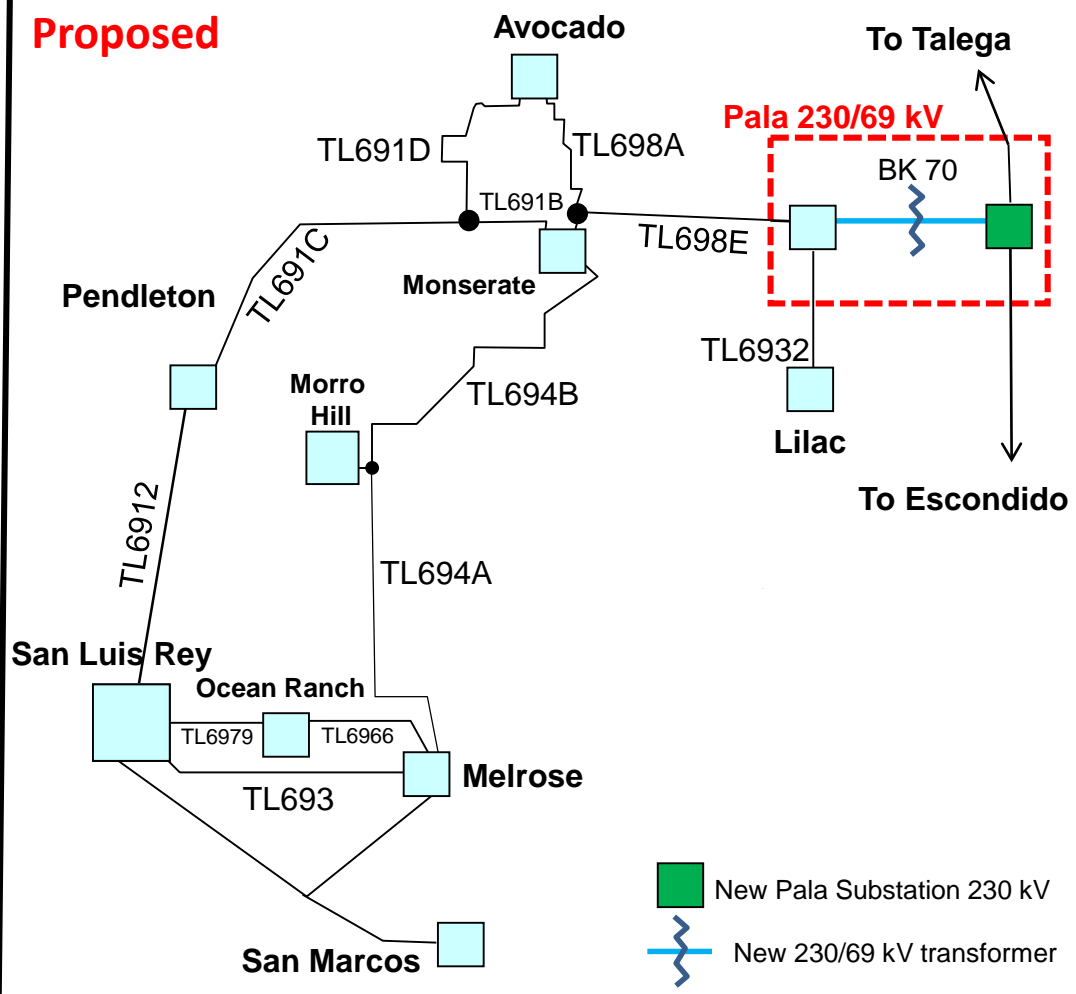
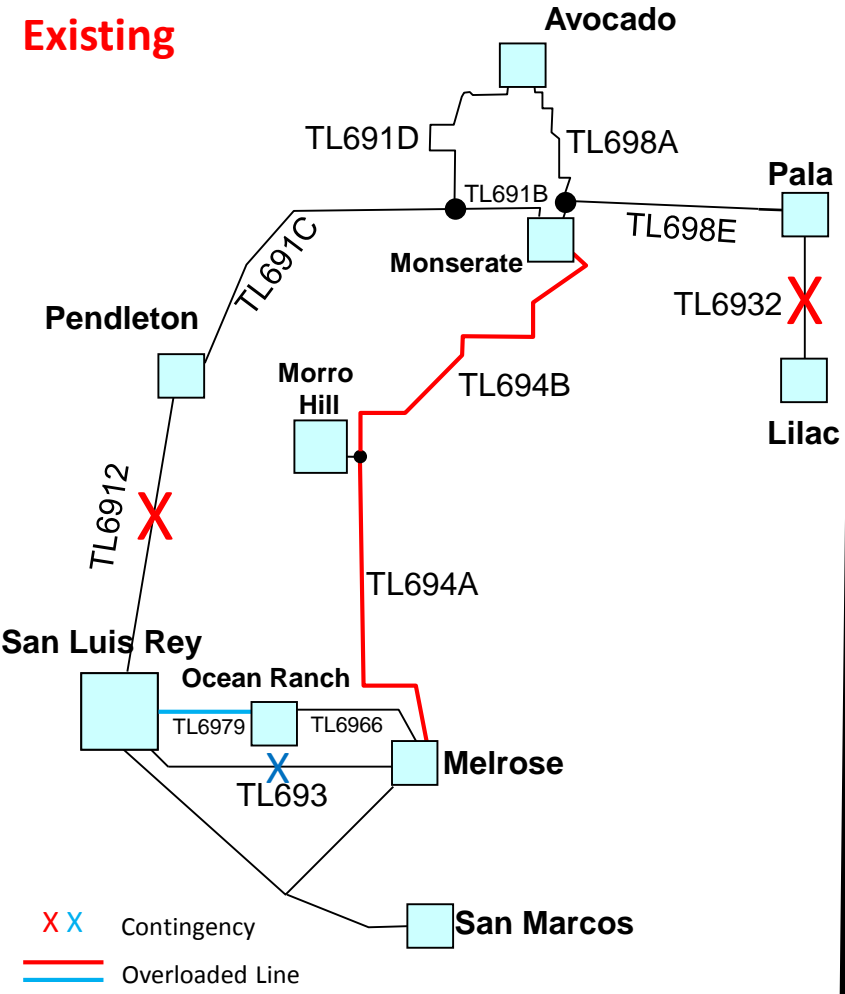
Cost:

- \$15M - \$20M



Expansion Plan Summary

New Pala 230 kV
Substation Loop-In



Issues:

- N-1-1 of TL6912 & TL6932, causes overload of TL694B & TL694A as high as 120%
- Post Ocean Ranch (ISD 2019) - NERC Cat P1 and P6 violations.
- LCR need identified for Pala sub area

Scope:

- Pala 230 kV Substation Expansion
- Loop-in TL23030 into Pala
- Add 230/69 kV transformer & equipment
- **Cost:** \$20M - \$30M

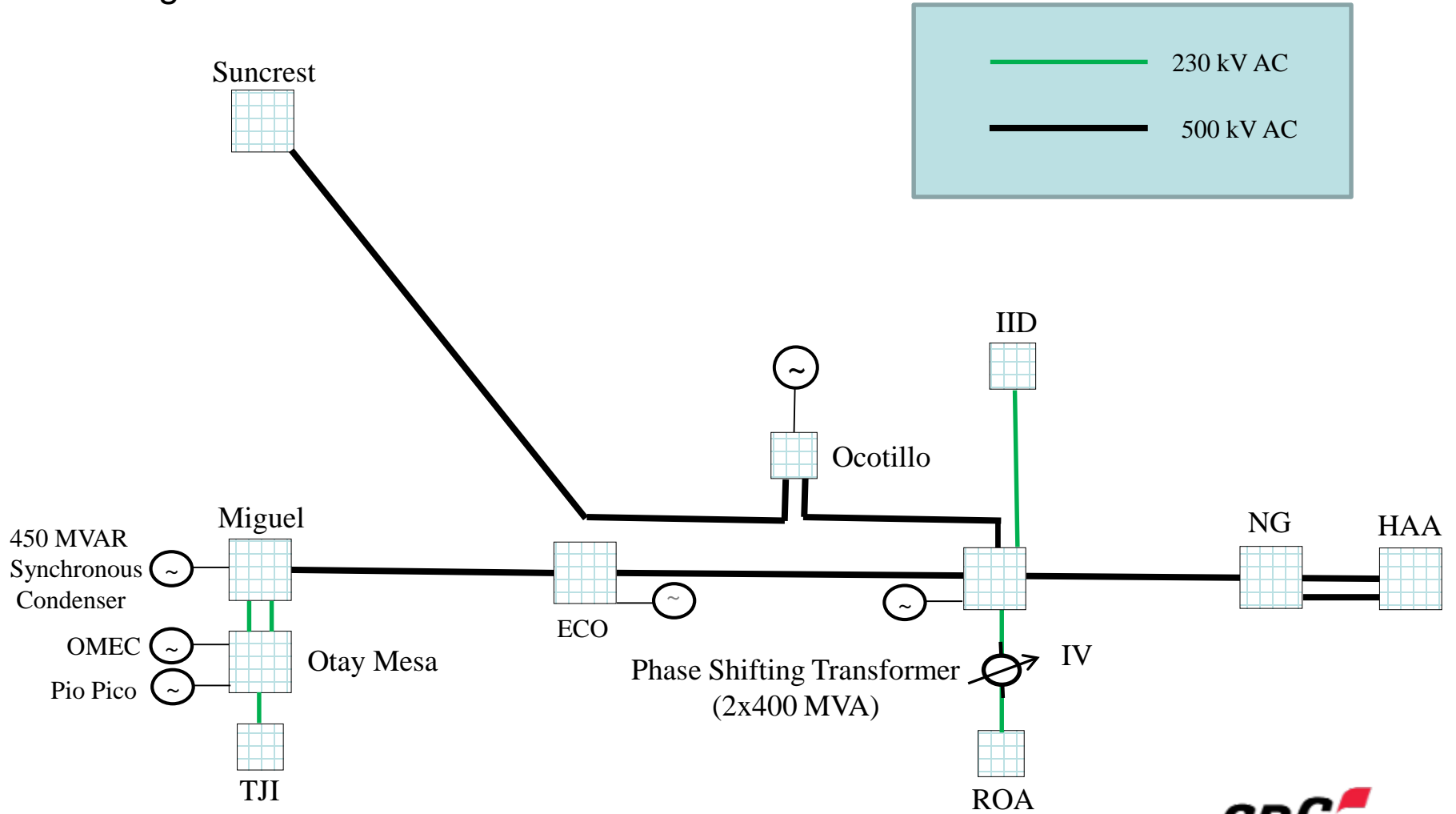
Benefits:

- Mitigate Local Capacity Requirement identified by CAISO
- Mitigate NERC Cat P1 and P6 NERC violations

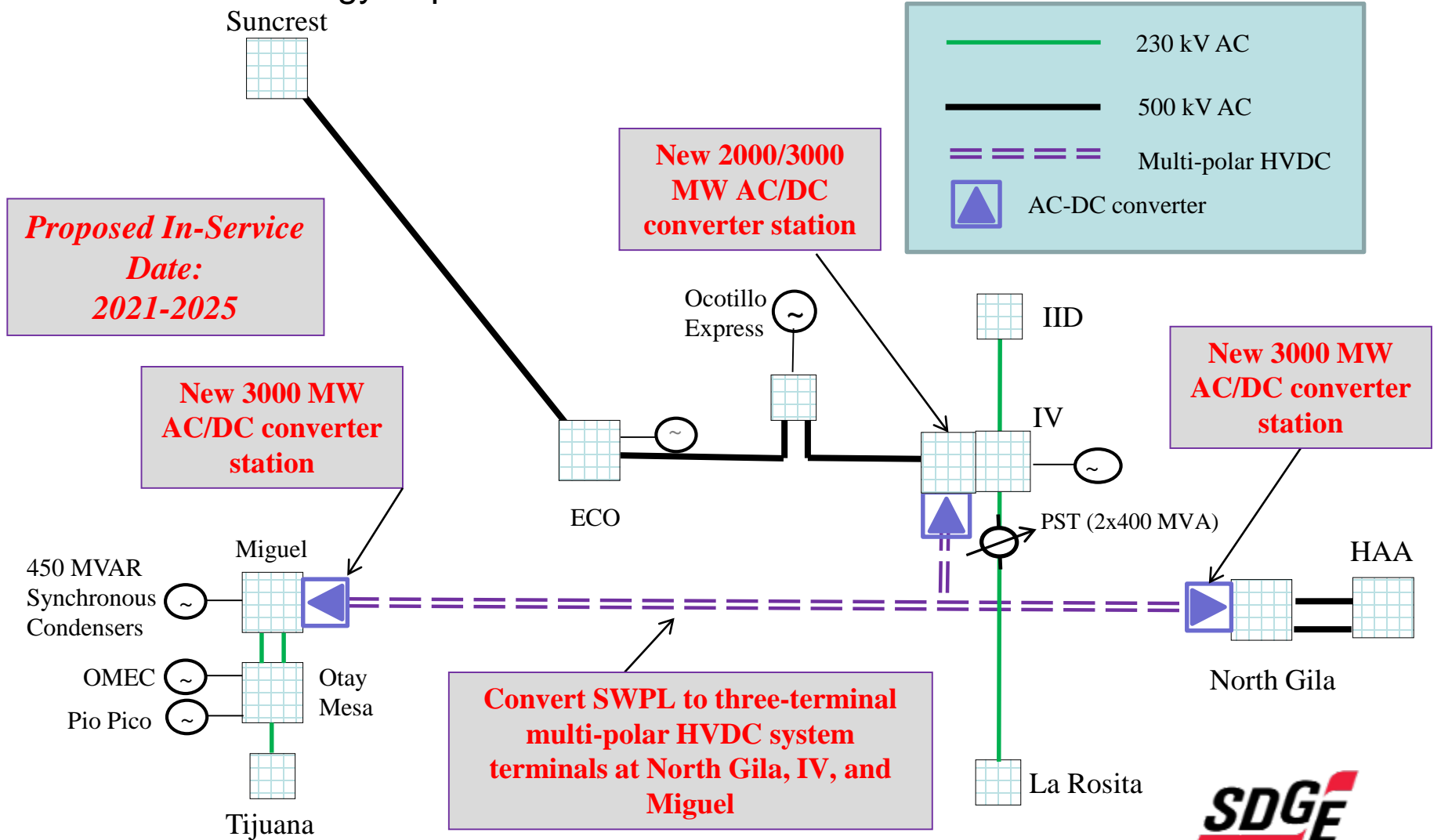
Expansion Plan Summary

Renewable Energy Express

Existing Southwest Powerlink



Renewable Energy Express



Scope

- Convert a portion of the 500 kV Southwest Powerlink (SWPL) to a three-terminal HVDC system with two fully independent poles.
- Install terminals at or adjacent to North Gila, Imperial Valley, and Miguel substations.
- Each pole will be capable of fully independent operation at its maximum rated capacity.
- The planned capacity of the proposed HVDC system is 2x1500 MW, bi-directional, for a total transfer capacity of 3000 MW.
- Replace existing loop-in of SWPL at ECO with Sunrise to replace AC connectivity.
- The estimated cost is \$900 million - \$1 billion.
- The estimated ISD is 2021-2025

Benefits

- Congestion management at Miguel and East of Miguel.
- Increase San Diego import capability by 500-1000 MW.
 - This will reduce the local generation need for Southern California by approximately the same amount.
 - By reducing the amount of local generation, we will reduce our dependence on gas fired generation and the potential impact of any gas curtailment in San Diego.
- Mitigate Southern California LCR needs and some of our worst contingencies.
 - LCR Needs at Imperial Valley, SCE and greater San Diego area
 - P3 - TDM generation and Imperial Valley to North Gila 500 kV line (G-1, N-1)
 - P6 – Eco to Miguel and Ocotillo to Suncrest 500 kV line (N-1-1)
- Reduce or eliminate reliance on the “Safety Net” load-shedding scheme.

Benefits

- Improve operational flexibility of the Imperial Valley Phase Shifter
 - Reduce the need to operate the PSTs at the extreme limits of their capability.
 - Coordination of the PST & the HVDC flow to balance potential loading issues with IID and CFE 230 kV system.
- Increase the ability to deliver both in- and out-of-state renewable resources (wind, solar, and geothermal) into the Southern California load centers.
 - This will reduce GHG emissions and meet the 50% RPS goal as required by Senate Bill 350 (SB350).
- Increase West of River (WOR) and East of River (EOR) path ratings
- *Note that the CAISO's generation interconnection Cluster 9 queue alone includes up to 1500 MW of renewable generation East of Miguel and at Hoodoo Wash. The deliverability of this generation into the Southern California load centers will be constrained by East of Miguel congestion, which this project addresses.*

Expansion Plan Summary

TL23022 & TL23023 Reconductor
(Mission - Miguel)

Project Title:
TL23022 & TL23023 (MS-ML) Reconductor

District:
Beach Cities

Need-Date:
June 2018

Project:
P16XYZ

Issues

- Delay of SX-PQ leading to NERC violations
- Generation at Otay Mesa is potentially trapped by a single outage of TL23042

Driving Factor (1):

- NERC Cat P6 (N-1-1) violation in 2018
 - The N-1 of TL23042 followed by the N-1 of either TL23022 or TL23023 will overload the emergency rating of the other remaining line to 123% and cannot be mitigated by generation redispatch.

Driving Factor (2):

- NERC Cat P1 (N-1) violation in 2018
 - In a scenario with flow going North on path 44 and high imports coming in from AZ these two lines will overload the continuous rating to 113%, this following the loss of TL23042 and cannot be mitigated by generation redispatch.

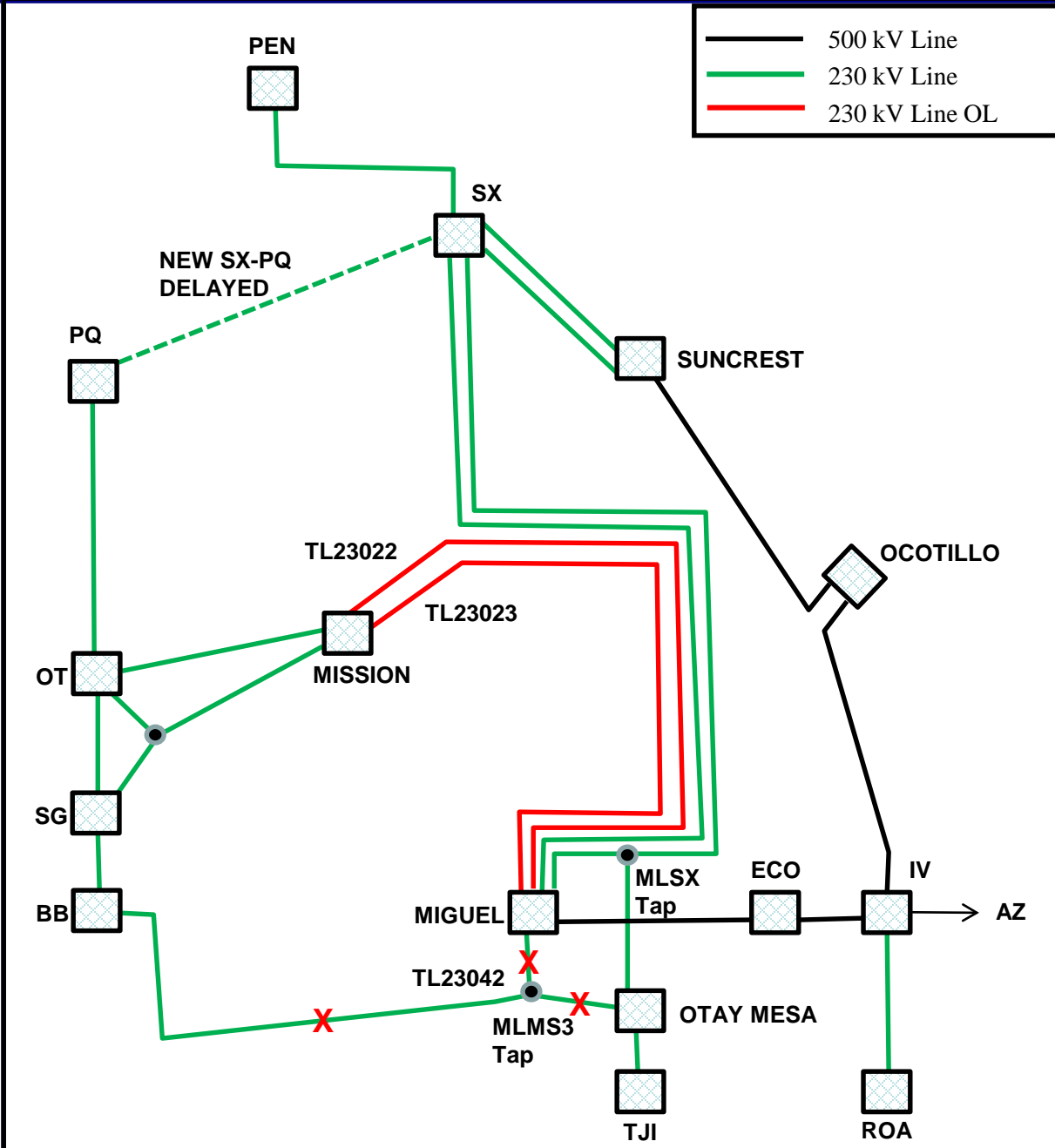
Driving Factor (3):

- NERC Cat P3 (G-1, N-1) violation in 2018
 - The G-1 of PEN followed by the N-1 of TL23042.
 - With PEN out, adjusting Otay Mesa generation can put us at an unnecessary reliability risk.

Scope:

Reconductor a portion of TL23022 and TL23023 to achieve a 912 MVA rating.

Cost: \$23.3M-\$25.6M

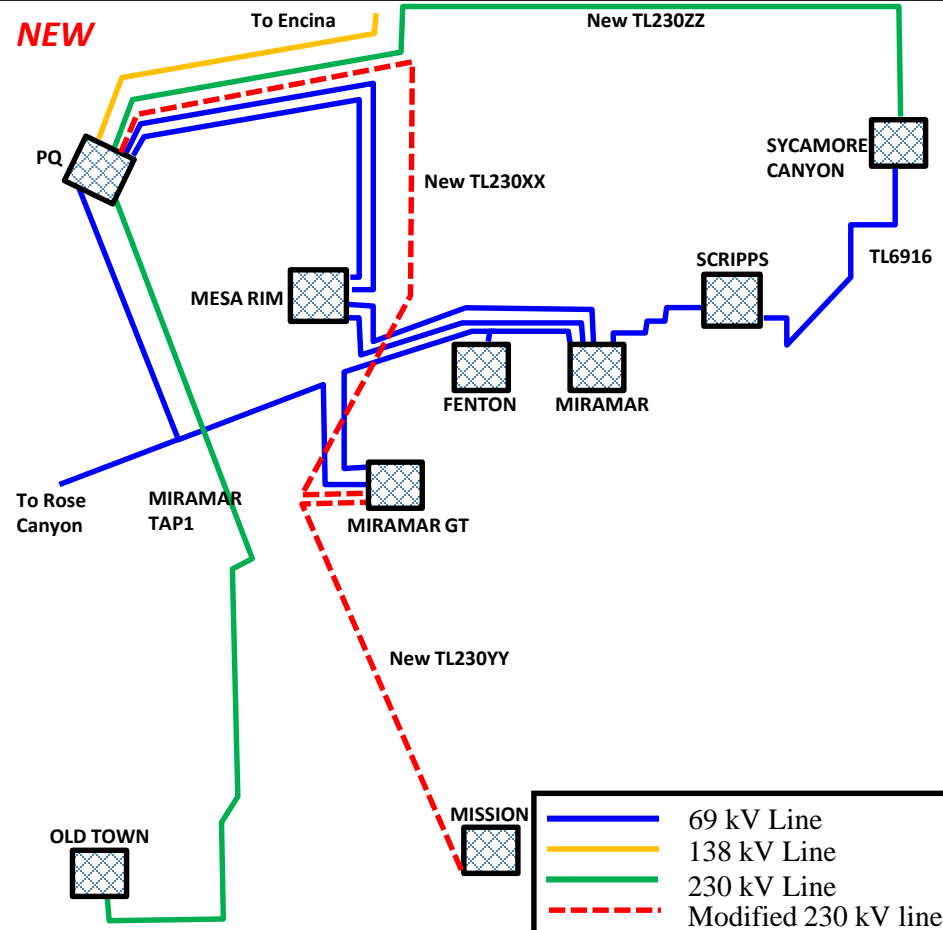
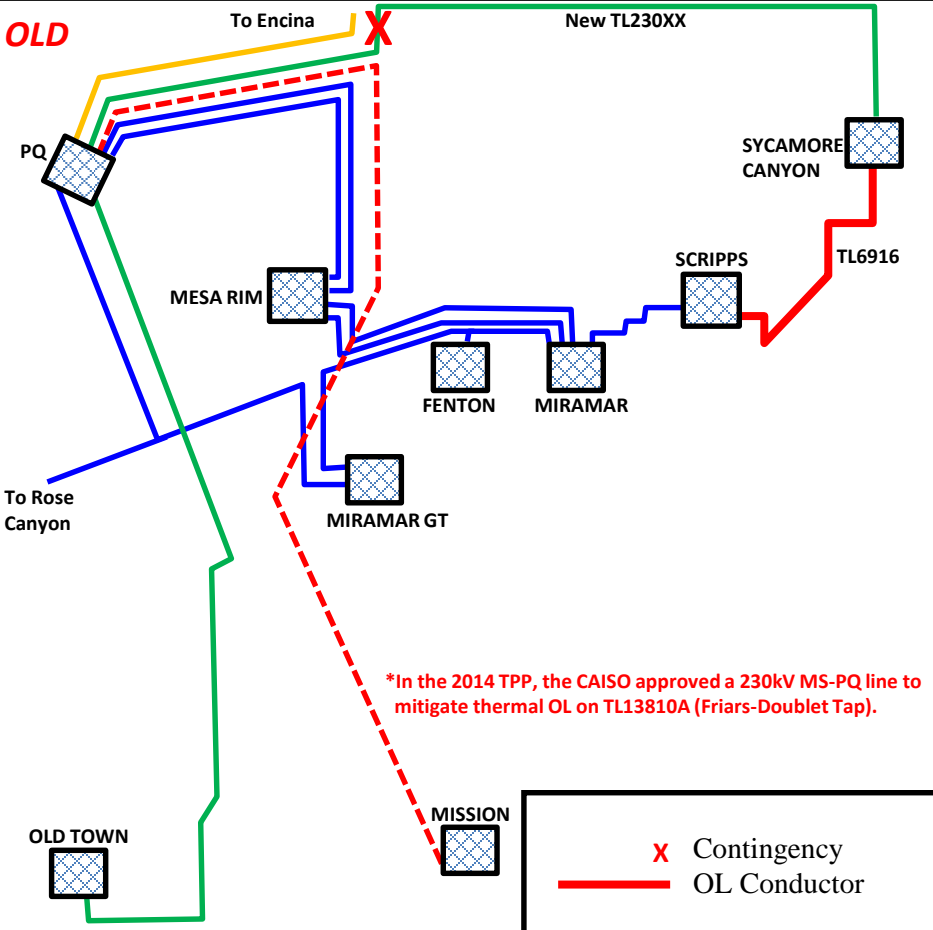


Expansion Plan Summary

New Miramar GT 230 kV
Substation Loop-In

Project Title:
Miramar GT 230 kV Loop-in

District: BC
Need-Date: June 2018
Project: 2016XYZ



Issues:

- NERC Cat P1 (N-1) of the new PQ-SX TL loads TL6916 to 110% of the continuous rating.
- The CAISO identified an LCR need of 68 MW in the Miramar sub area for this contingency violation.

Scope:

- The new MS-PQ line will be modified to create two separate lines entering Miramar GT. TL230XX (PQ-MRGT) & TL230YY (MS-MRGT). New lines into Miramar GT are approximately 1000 ft.
- Convert the existing Miramar GT to a 230/69 kV substation.
- RFS any remaining Cabrillo II CT equipment at Miramar GT sub and install a 230/69 kV bank.

Benefit

- Mitigate the ongoing thermal overload on TL6916.
- Mitigate the LCR need identified by CAISO.
- Eliminate maintenance on two CT units ~ \$1M/year/unit
- This option will mitigate the 138 kV OL originally identified by CAISO.
- Allow black start capability directly to the 230 kV system.

Alternatives:

- Second SX-Scripps line.

Cost:

- 23.6M – 28.3M

Questions?

Send all questions, comments and concerns to:

Enrique Romero
San Diego Gas & Electric
8316 Century Park Court, CP-52K
San Diego, CA 92123
Phone: (619) 699-1010
e-mail: JRomero2@semprautilities.com