

2017 SDG&E Grid Assessment Results

CAISO Stakeholder Meeting
September 22, 2017

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Expansion Plan Summary

Project #	Project Title	ISO Status	ISD	Cost (\$M)
Proposed Projects Requiring CAISO Approval				
2017-0074	Boulevard East (BUE) Phase Shifting Transformer	Pending	2020	\$13 - \$16
2017-0138	Mira Sorrento Reliability Project	Pending	2022	\$10 - \$13
2017-0086	Otay 69 kV Reconfiguration	Pending	2022	\$36 - \$47
2017-0093	Penasquitos Phase Shifting Transformer	Pending	2019	Pending
2017-0091/92	Miguel-Mission 230 kV lines Reconductor and Compensation	Pending	2020	Pending
2017-0094	Mission-San Luis Rey 230 kV lines Compensation	Pending	2019	Pending
Projects submitted in prior TPP's requiring CAISO approval				
P16XYZ	HVDC Conversion	Pending	TBD	Pending

Expansion Plan Summary

Boulevard East (BUE) Phase Shifting Transformer

- Driving Factor:**
- TL626 being removed from service as part of CNF scope.
 - Cost to keep TL626 is **\$62.6 Million**.
 - P2 of Loveland bus, P6 or P7 of TL625 & TL6957 will island the CNF load pocket.

- Scope:**
- Close in TL6931
 - RFS BK50 at BUE and replace with 100 MVA +/- 45 degree PST.
 - Upgrade all protection, jumpers and terminal equipment in CNF area to achieve a 136MVA continuous rating.
 - Use the removed BUE BK 50 to replace MS BK 50 which operates at 132kV. We can better manage VAR resources maintaining consistent 138kV bus.

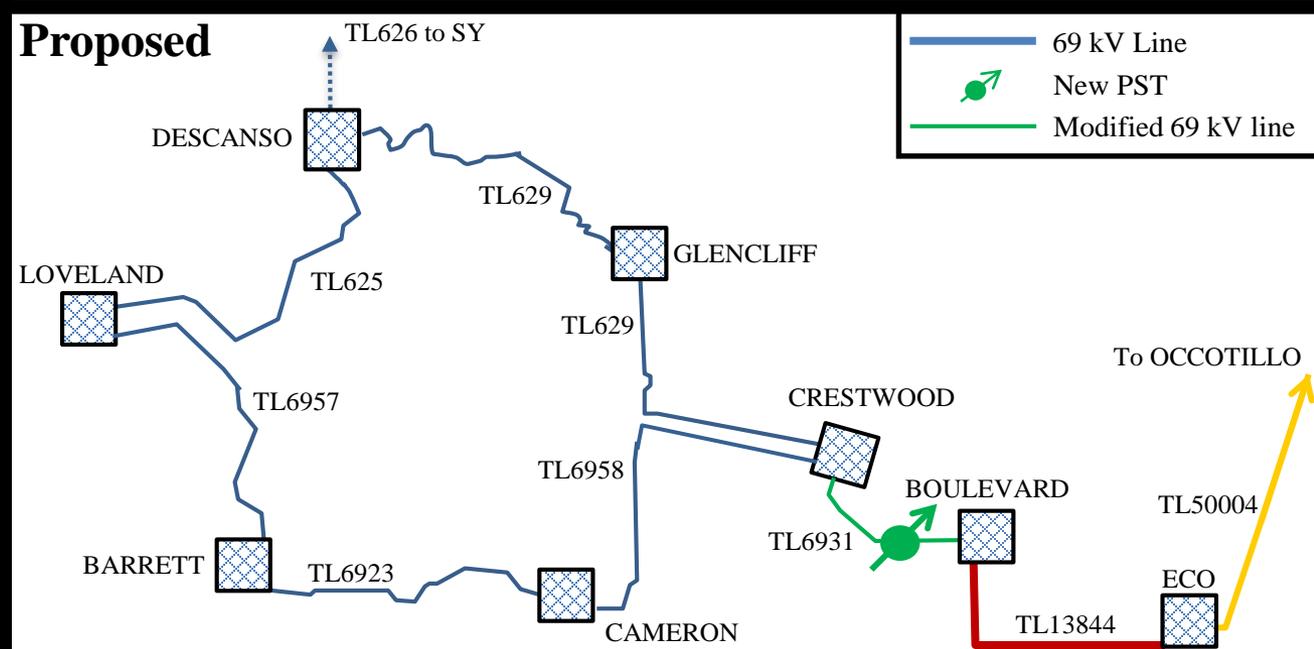
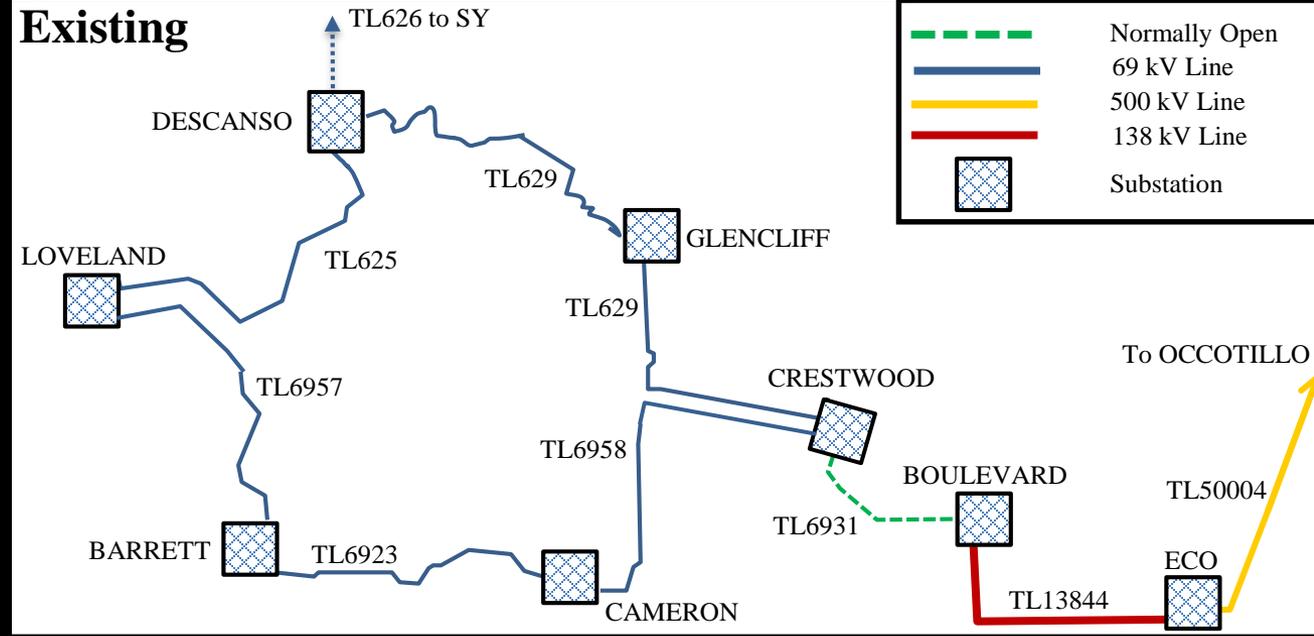
- Issues:**
- Need a second feed into the CNF load pocket.
 - The delay of Granite loop-in presents a need to control the flow along TL6931 to prevent TL631 NERC violations.
 - N-1 of TL50001 or TL50003 presents a need to control the flow along TL6931 to prevent NERC violations.

- Benefits:**
- Reliability – Two Feeds into CNF load pocket
 - Cost – Alternative to keeping TL626
 - RPS Goal – PST will provide a third outlet that will help reduce congestion caused by renewables at Miguel and Sycamore

Alternatives:

- PST Location moved to OLD BUE

Cost: Approximately **\$13 - \$16 Million**



Expansion Plan Summary

Mira Sorrento Reliability Project

Project Title: Mira Sorrento Reliability Project

District: Beach Cities

Need-Date: 2020

Driving Factor:

- P1 of TL662 (Penasquitos-Torrey Pines) and P7 combination of TL662 & TL6905 overload TL666 (Penasquitos – Doublet tap) above its continuous rating and TL666 (Penasquitos – Dunhill tap) above its emergency rating respectively
- Any P6 outage combination of TL6959 (Penasquitos-Mira Sorrento), TL 6905 (Penasquitos – Genesee) & TL6943 (UCM-Torrey Pines) will overload the remaining line above its emergency rating

Scope:

- Open TL661 (Eastgate-Penasquitos) & loop in to Mira Sorrento Substation (1 mile)

Benefits:

- Mitigates NERC violations
- Operational flexibility

Issues:

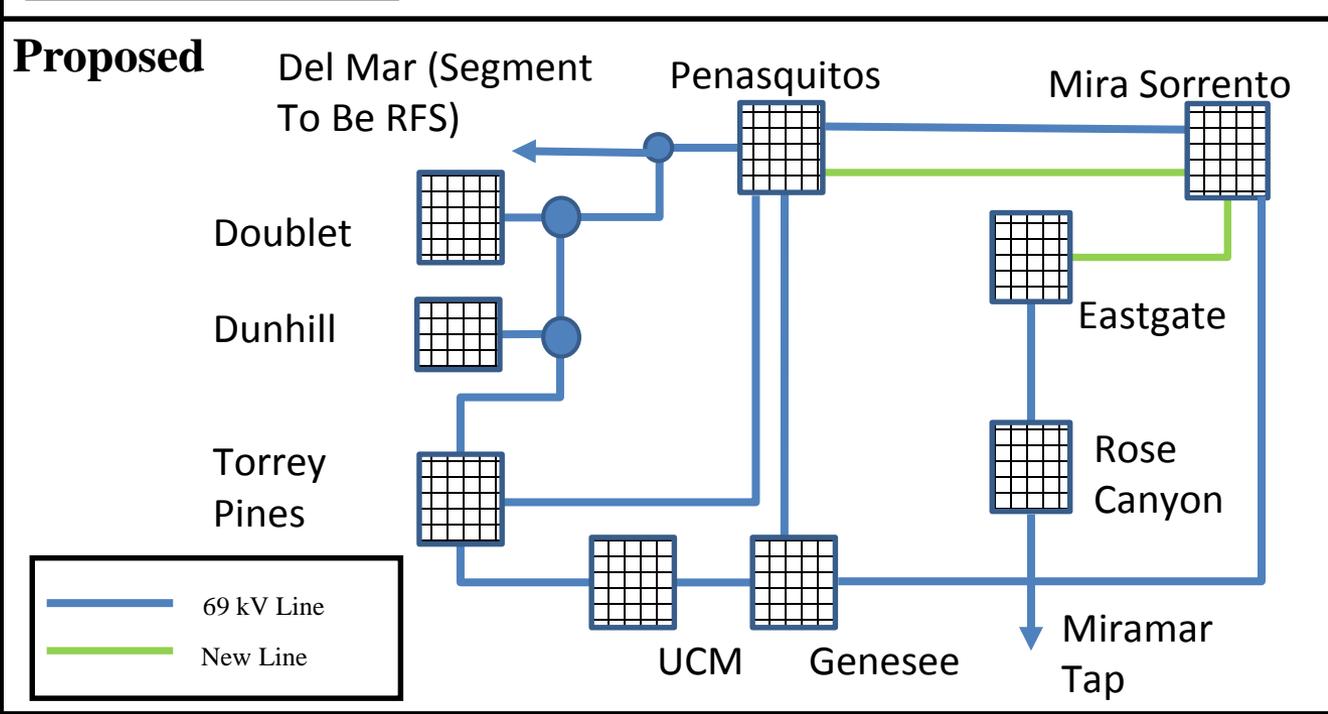
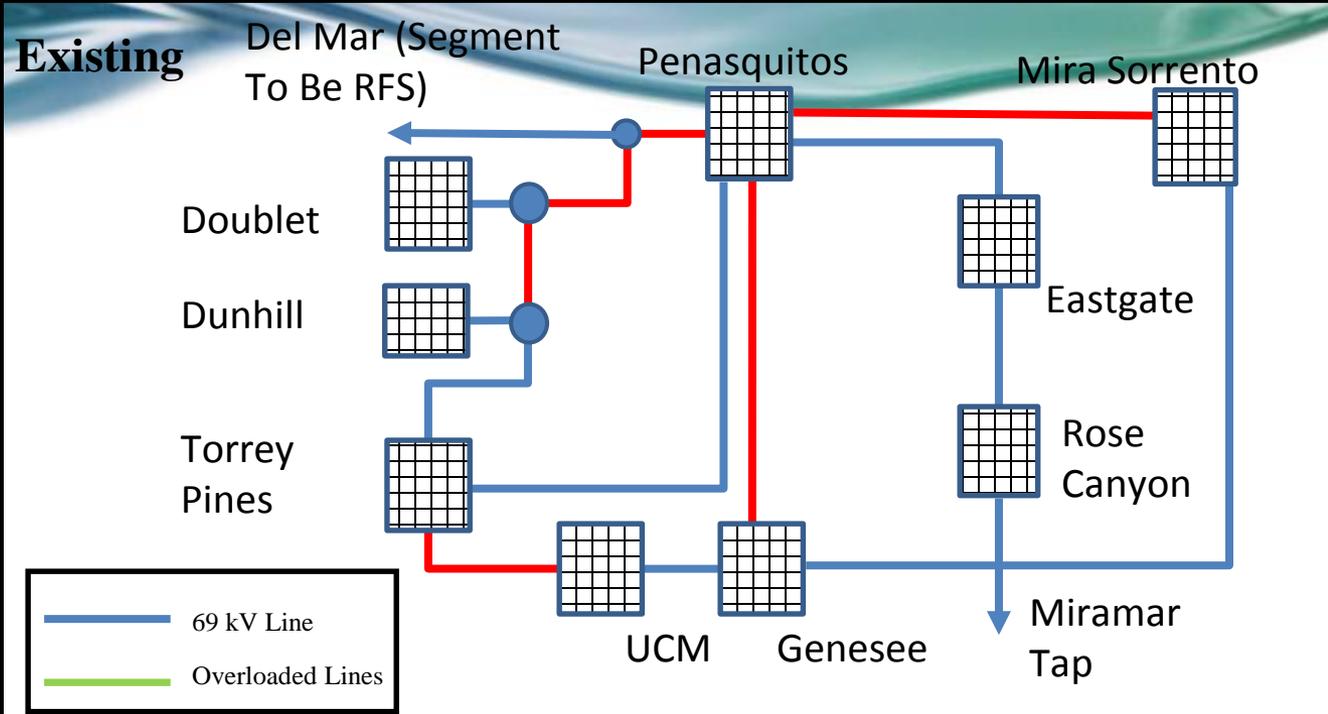
- No generation available in the load pocket to mitigate NERC violations

Costs:

- \$10 - \$13 M

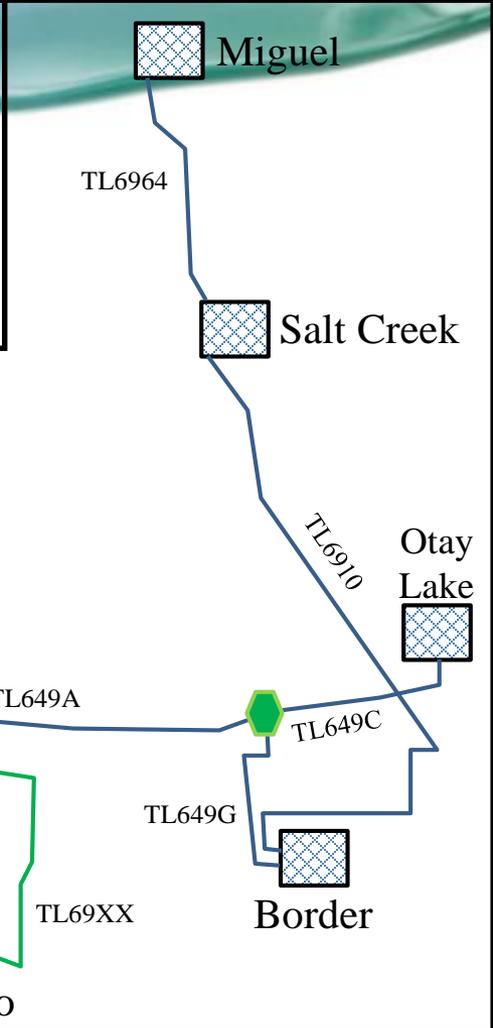
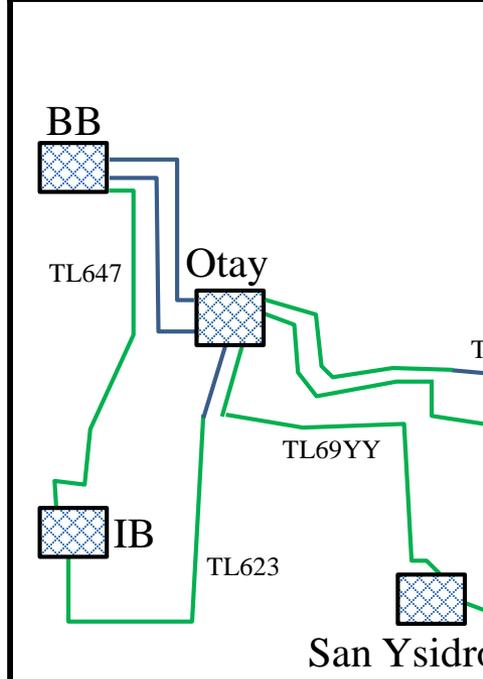
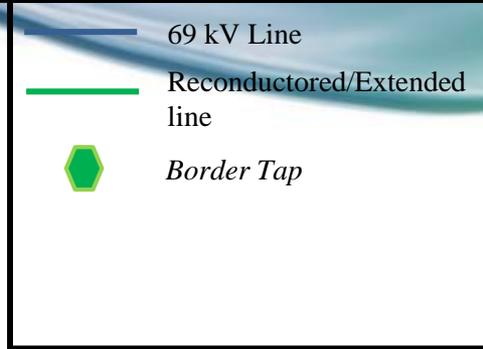
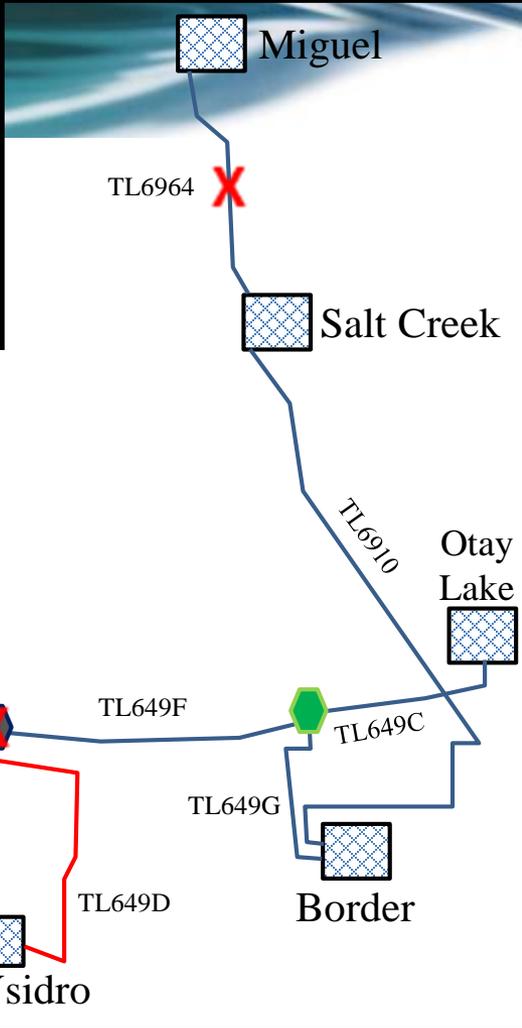
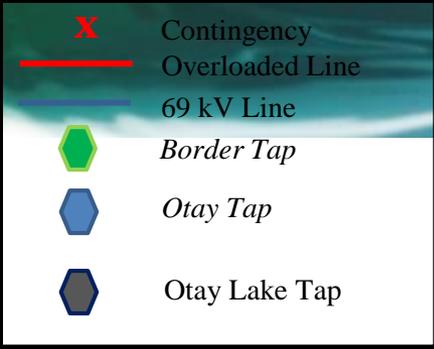
Alternatives:

- New line from Genesee to East Gate
- TL 6927 Loop-in at Genesee
- New line from Penasquitos to Genesee
- Tap TL 6927 at Genesee



Expansion Plan Summary

Otay 69 kV Reconfiguration



Driving Factor:

- Cat P1 & P6 violations

Issues:

- San Ysidro Non-Coincidental load projected to be approximately 50 MW by 2019.
- Imperial Beach Non-Coincidental load projected to be approximately 52 MW by 2019.
 - Cannot dispatch any generation to fix an overload to a radialized load (IB or SY).
- Beginning in 2019, an N-1 of TL6964 (Miguel – Salt Creek) loads TL649A (Otay – Otay Lake Tap) to 120% of its emergency rating.
- Beginning in 2019, an N-1 of TL623 (Otay Tap) loads TL649A (Otay – Otay Lake Tap) to 102% and TL649D (San Ysidro – Otay Lake Tap) to 100% of its emergency rating with PK load at San Ysidro.
- Beginning in 2019, an N-1 of TL649 (Otay Lake Tap) loads TL623C to 100% of its emergency rating.
- Beginning in 2019, an N-1-1 of TL645 & TL646 loads TL647 to 161% of its emergency rating and TL623B to 125% of its emergency rating.

Scope:

- Open Otay Lake Tap (TL649A/D/F).
- Combine TL649D (San Ysidro - Otay Lake Tap) and TL649A (Otay Lake Tap – Otay) to create a single TL69XX line (San Ysidro - Otay) and reconductor TL69XX to achieve a 97/136 MVA rating.
- Extend TL649F (Border Tap - Otay Lake Tap) 2 mi to Otay to create a new TL649A (Border Tap – Otay) with a 97/136 MVA rating.
- Open Otay Tap (TL623A/B/C)
- Combine TL623B (IB – Otay Tap) and TL623A (Otay – Otay Tap) to create a single TL623 and reconductor the portion of TL623B to achieve a 137 MVA continuous rating.
- Extend TL623C (SY – Otay Tap) 0.5 miles into Otay to create a new TL69YY line (SY-Otay) with a 102 MVA continuous rating.
- Reconductor TL647 (BB-IB) to achieve a 137 MVA continuous rating.

Cost:

- \$36-47 Million

Expansion Plan Summary

Mission-San Luis Rey 230 kV lines Compensation

Project Title:
MS-SA Series Compensation

District:
Bulk Power

Need-Date:
June 2019

Project:
P17XXX

Driving Factors:
Due to Heavy North Bound Flow

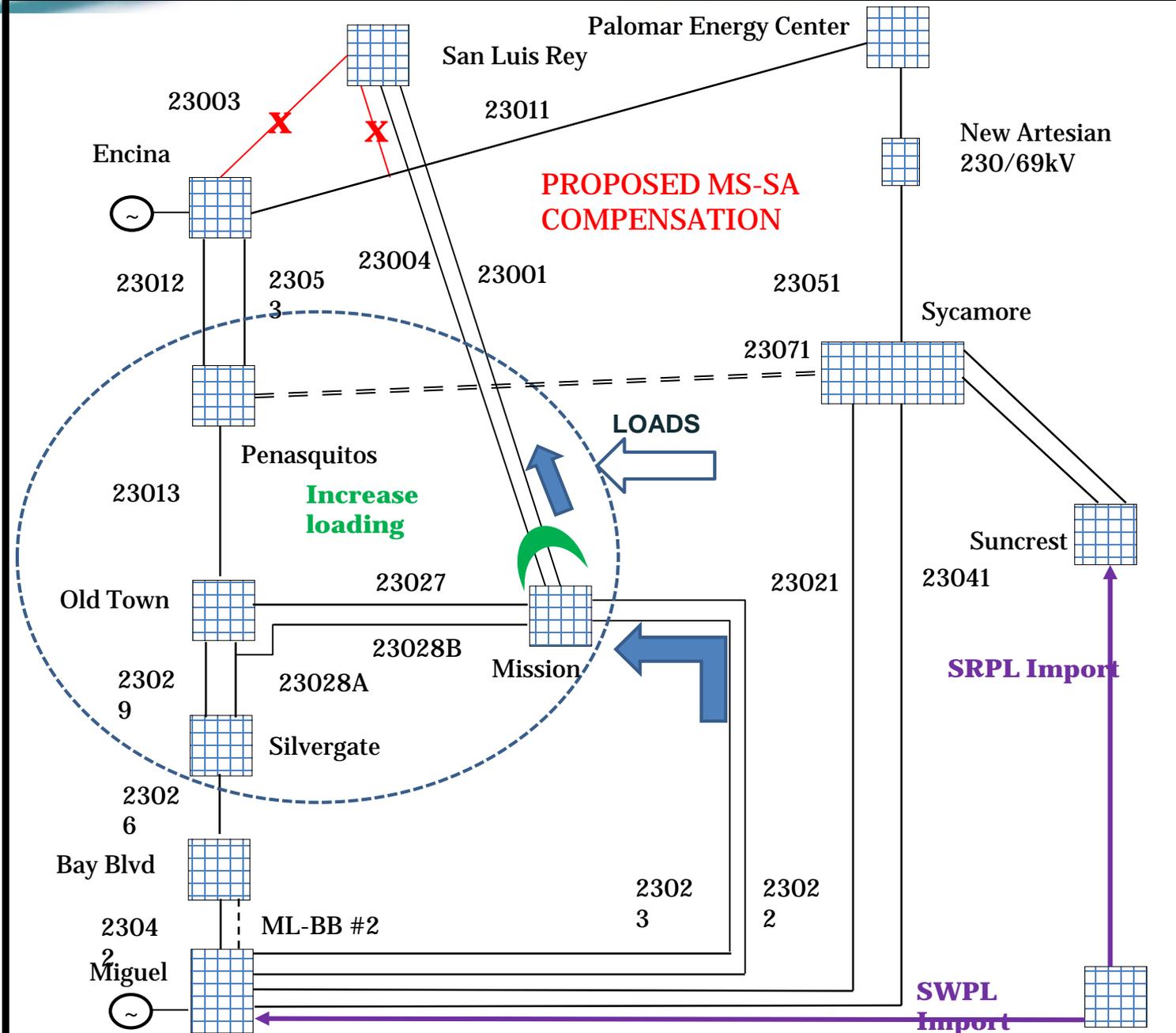
- P1 violation of TL 23011 overloads TL23003.
- P1 violation of TL 23003 overloads TL23011 (Encina Tap –San Luis Rey).

Mitigations:

- Build thyristor-controlled series compensation on the two MS-SA lines to balance the system impedances; push more northbound flow into SA via the two MS-SA lines

Alternatives:

- Install PST(s) at the two ML-SA lines
- Loop in TL 23011 at San Luis Rey (7.2 Miles)



Expansion Plan Summary

Miguel-Mission 230 kV lines Reconductor and Compensation

Scope:

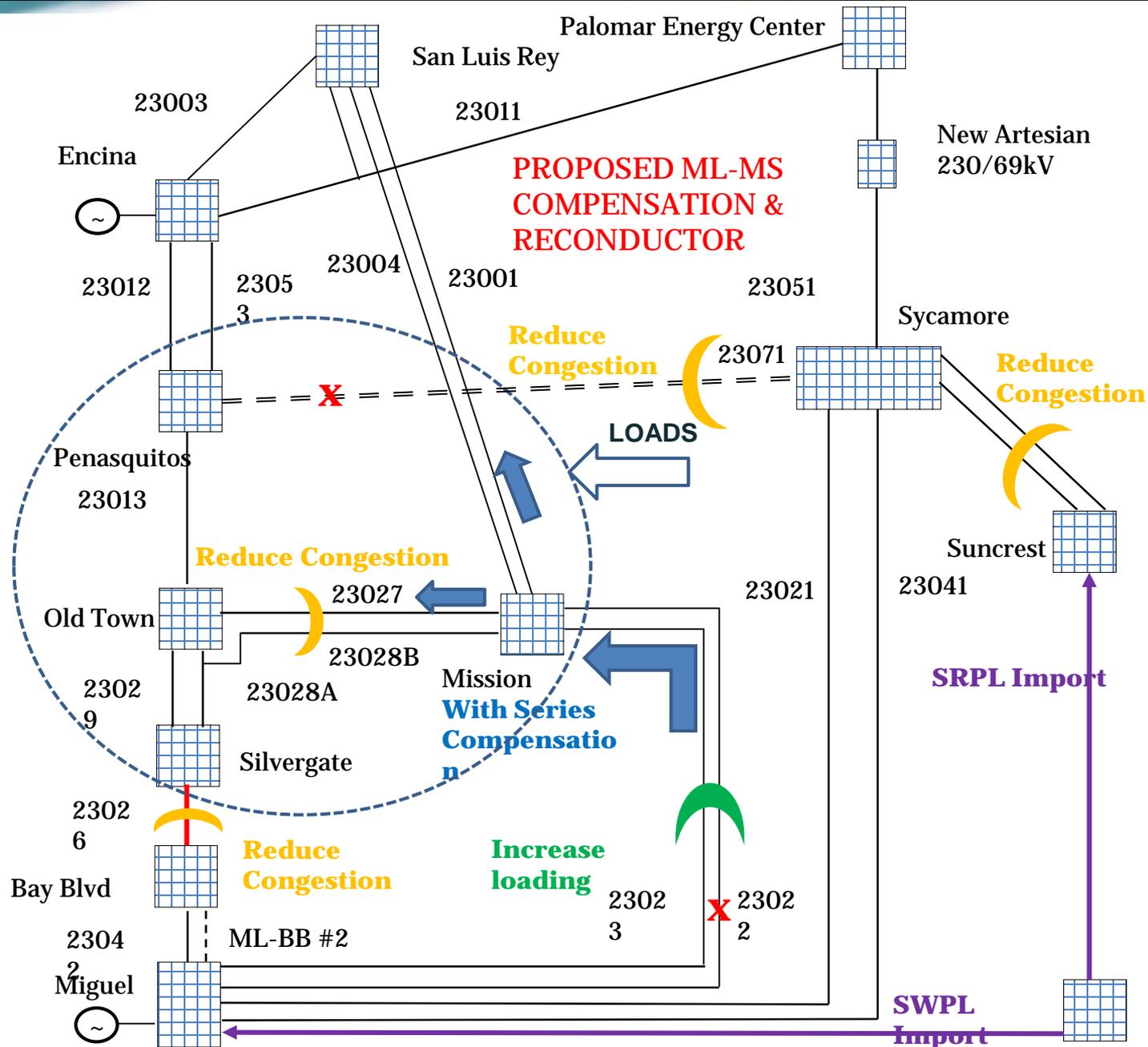
- Install 50-70% series compensation on ML-MS lines (TL23022/23).
- Reconductor TL23022 and TL23023 between Fanita Junction and MS

Benefits:

- Provide better outlet capability at ML therefore mitigate the overloads on the ML-BB-SG-OT path
- Reduce the congestion on SCR-SX lines and SX-PQ line
- Draw more northbound flows on the 2 ML-MS 230kV lines
- Create counter flows to offset the congestion on MS-OT 230kV lines
- Mitigate P6 overloads on TL23026 (BB-SG) for the loss of TL23071 (SX-PQ) followed by the loss of TL 23022 or TL23023

Alternatives:

- Install PST(s) on the two ML-MS lines
- Build 2nd BB-SG line
- Install series reactor on BB-SG line (TL23026)
- Limit generation dispatch at Otay Mesa



Expansion Plan Summary

Penasquitos Phase Shifting Transformer

Project Title:
230 kV PST at PQ

District:
Bulk Power

Need-Date:
June 2019

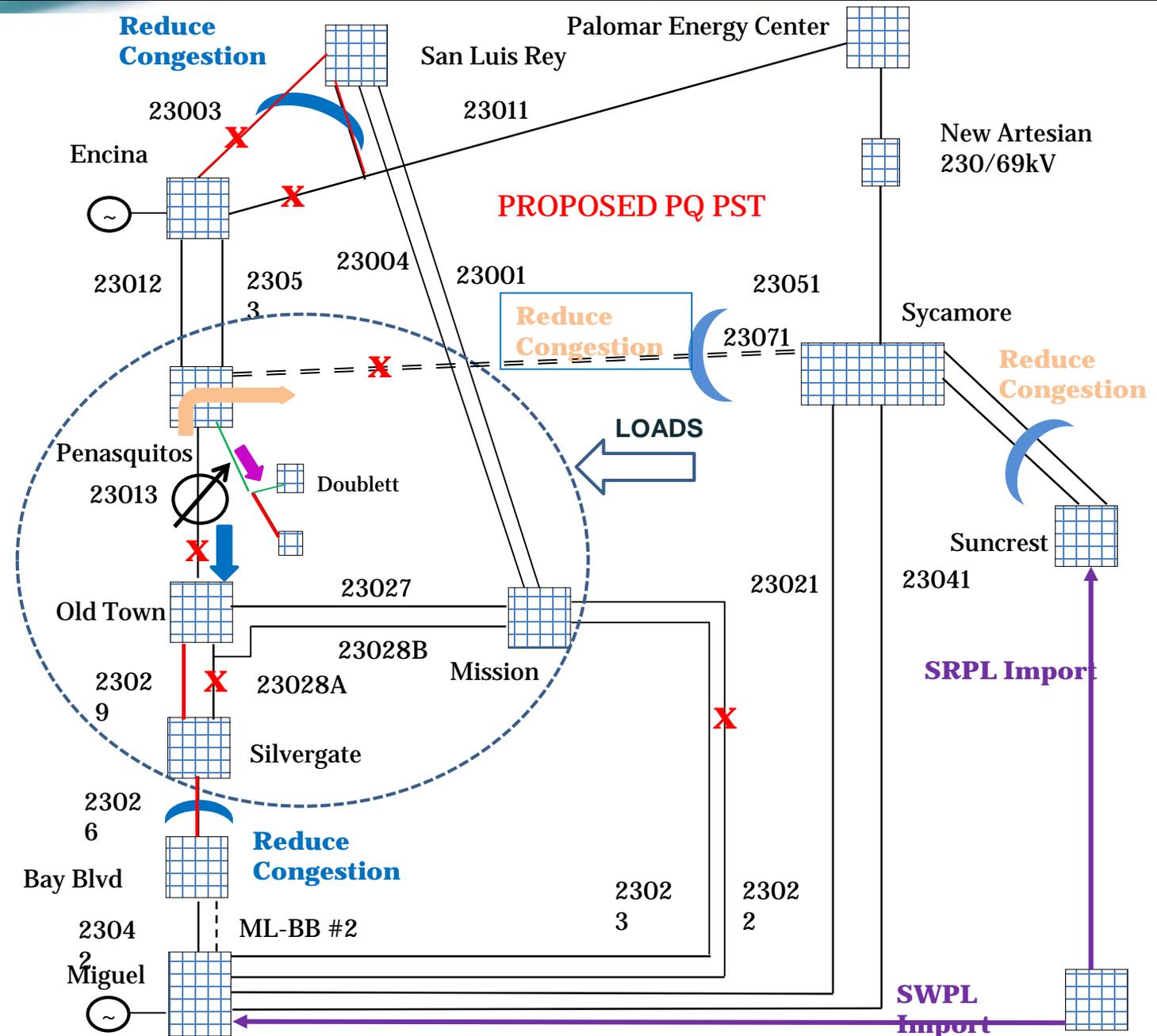
Project:
P17XXX

Scope:

- Install one 800 MVA PST +/- 30 degrees on the OT-PQ line segment to create:

Benefits:

- counter flow on SX-PQ (illustrated in Coca)
- counter flow on BB-SG (illustrated in Blue)
- off-set northbound flows that cause the congestions North of Encina (illustrated in Blue)
- Mitigates P2.1 of TL 23028 overloads TL23029 (SG-OT)
- Mitigates P1 of TL 23003 overloads TL23011 (Encina Tap –San Luis Rey) and vice versa
- Mitigates P6 of TL 23071 and TL 23022 overloads TL23026 (BB–SG)
- Mitigates P6 of TL 23071 and TL 23013 overloads TL13810 (Friars–Doublet Tap)



Install a Four-breaker scheme at PQ:

- With breaker configuration and operational procedures, switch the PST to be in series with the PQ 230/138kV bank post contingency and indirectly control the post contingency flow on the underlying 138kV system to mitigate the overload on TL13810 after the contingency loss of SX-PQ and OT-PQ.

Alternatives:

- Reconductor the Friars-Doublett Tap (TL13810)
- Build the previously approved project MS-PQ 230 kV

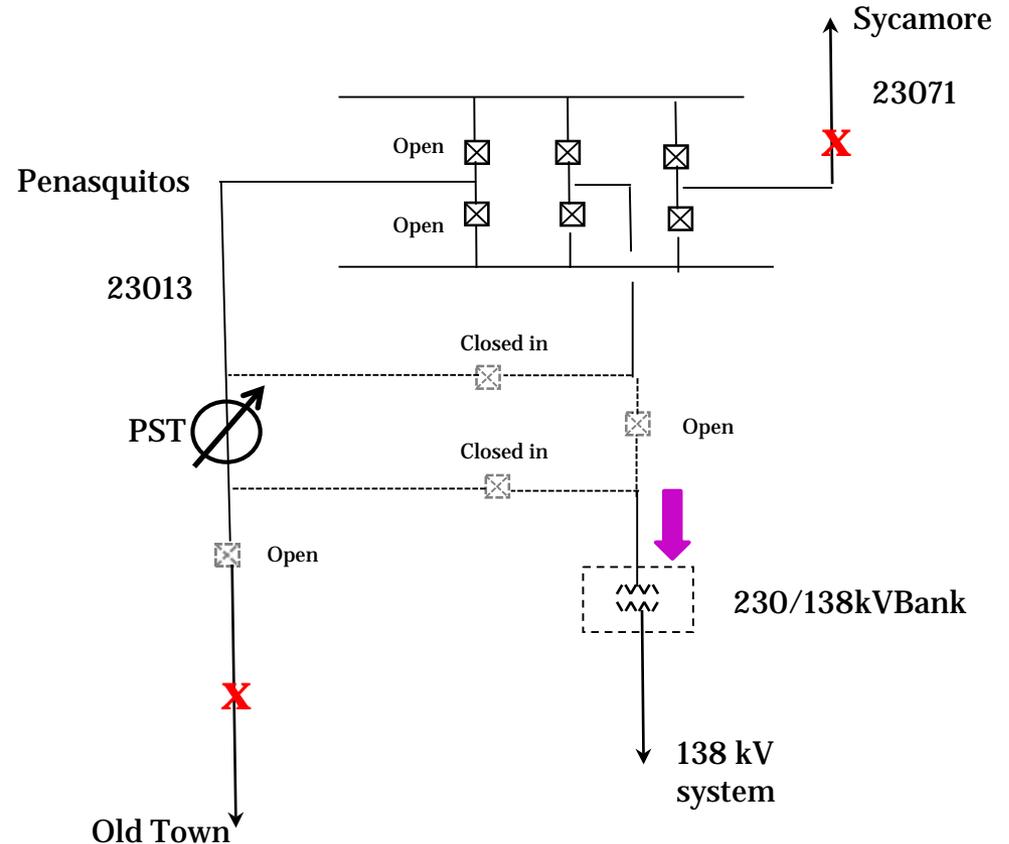
AND

- Build 2nd Line BB-SG
- Install series reactor on BB-SG
- Limit generation dispatch at Otay Mesa
- Shed load in dense urban load area
- Install series reactor on SX-PQ

AND

- Loop in TL 23011 at San Luis Rey (5.8 Miles)

Proposed PQ PST with Breaker Scheme
Post Contingency loss of SX-PQ & OT-PQ



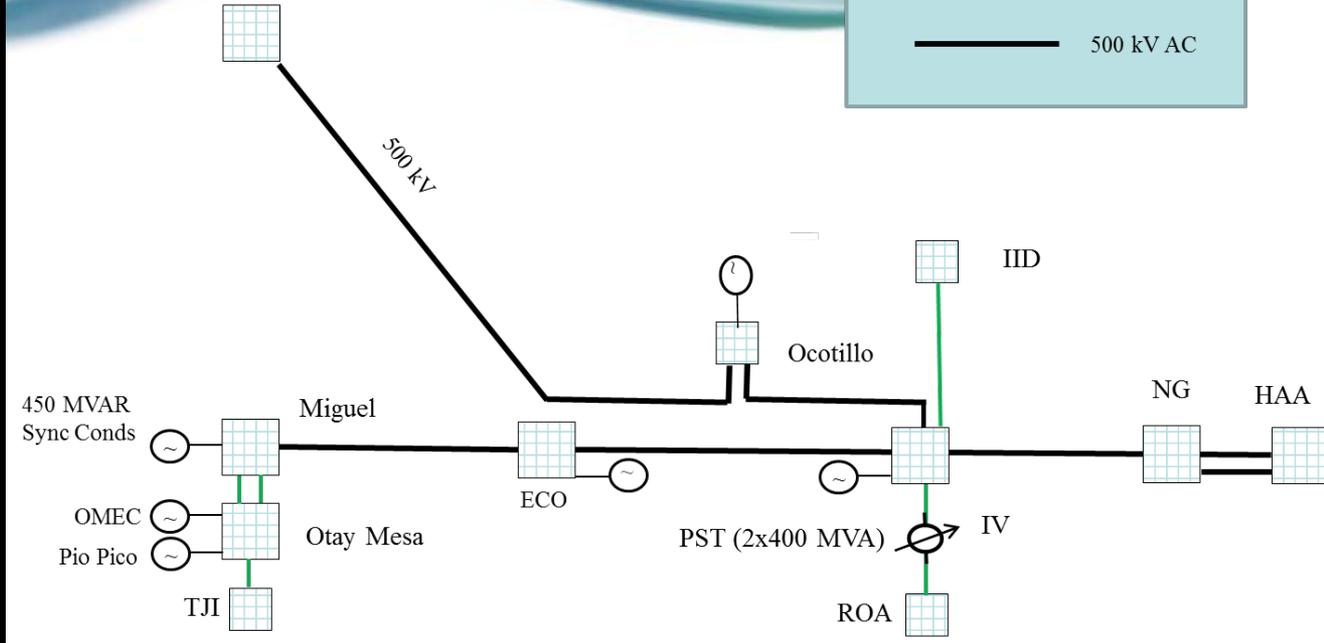
Expansion Plan Summary

HVDC Conversion

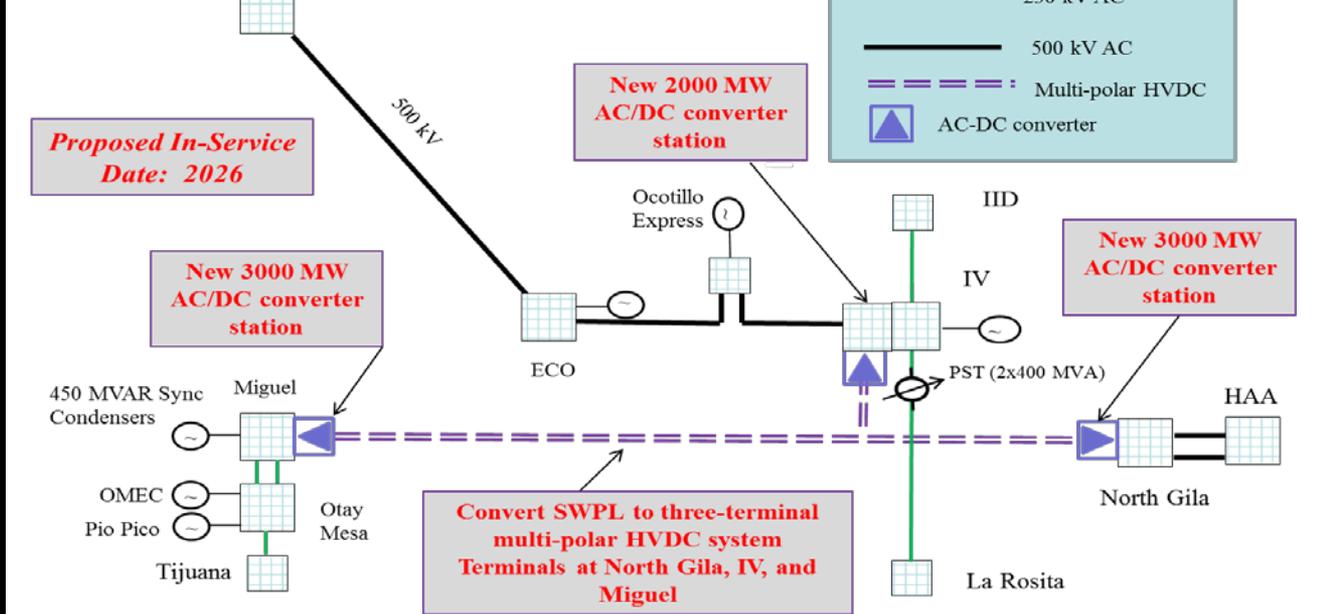
Scope:

- 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 under development.
- The estimated ISD is 2026

Existing



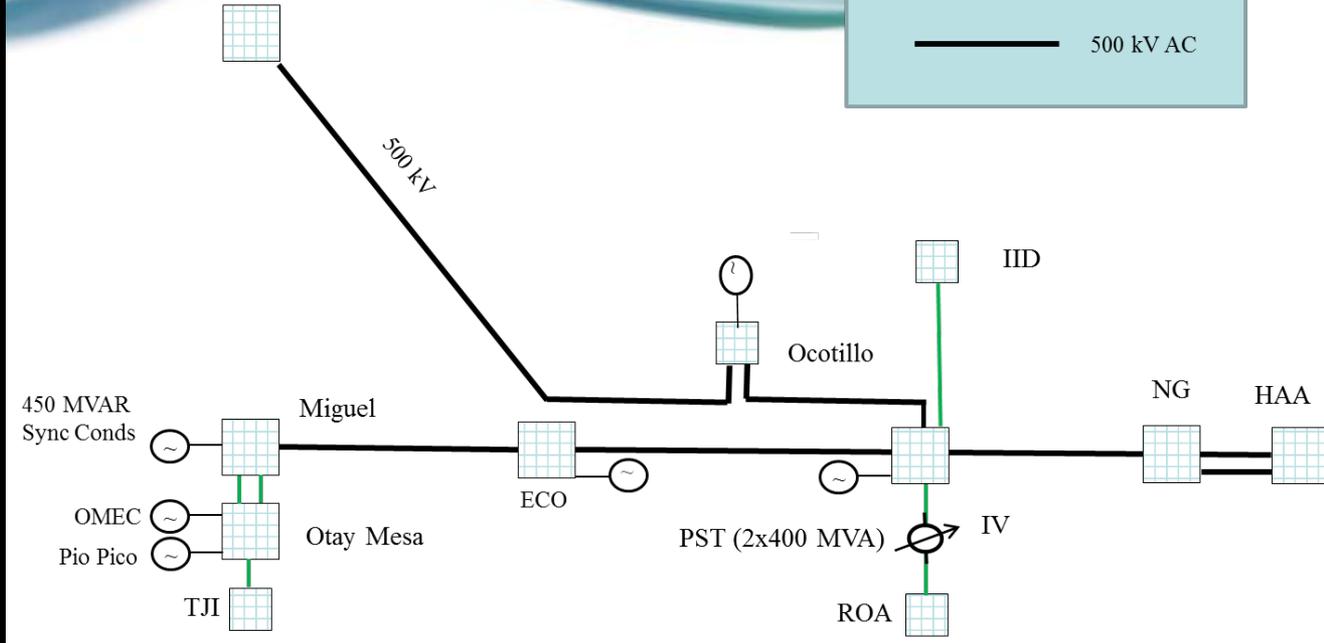
Proposed



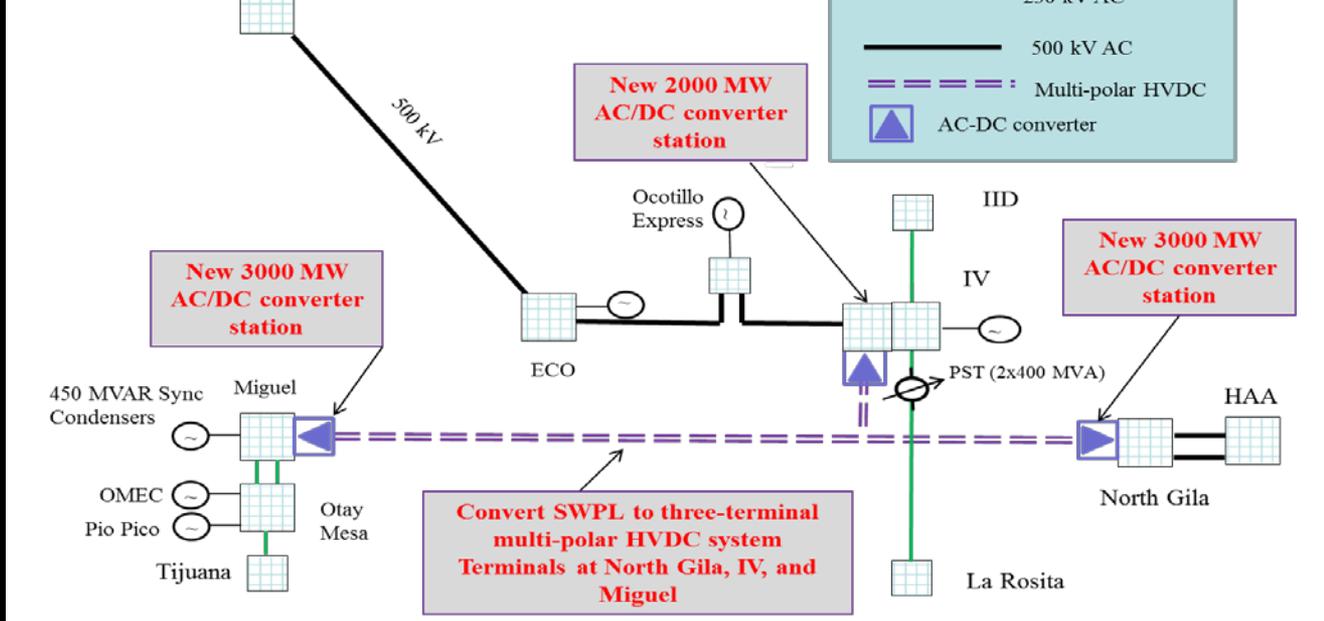
Benefits:

- Mitigate East of Miguel congestion.
- Increase San Diego import capability by 500-1000 MW
- Reduce Greater IV/San Diego area LCR by mitigating the worst limiting contingency (the G-1/N-1 combination of TDM generation and IV-NG 500 kV).
- Reduce San Diego sub-area LCR by mitigating the worst limiting contingency (the N-1-1 combination of ECO-Miguel and Ocotillo Express-Suncrest).
- Coordinate HVDC flow scheduling with PSTs to balance loading on IID's S-Line and CFE's La Rosita-Tijuana 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, to reduce GHG emissions and meet RPS goals
- Increase West or River (WOR) and East of River (EOR) path ratings

Existing



Proposed



Questions?

Send all questions, comments and concerns to:

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