APPENDIX I: Description and Functional Specifications for Transmission Facilities Eligible for Competitive Solicitation

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Overview

The ISO has recommended the following reliability-driven projects for approval that are eligible for competitive solicitation:

- Manning – Metcalf 500 kV Line
- Northern Receiving Station (NRS) – San Jose B 230 kV Line

More information on these projects are provided in Chapter 2 and Appendix B of the draft 2024-2025 Transmission Plan.

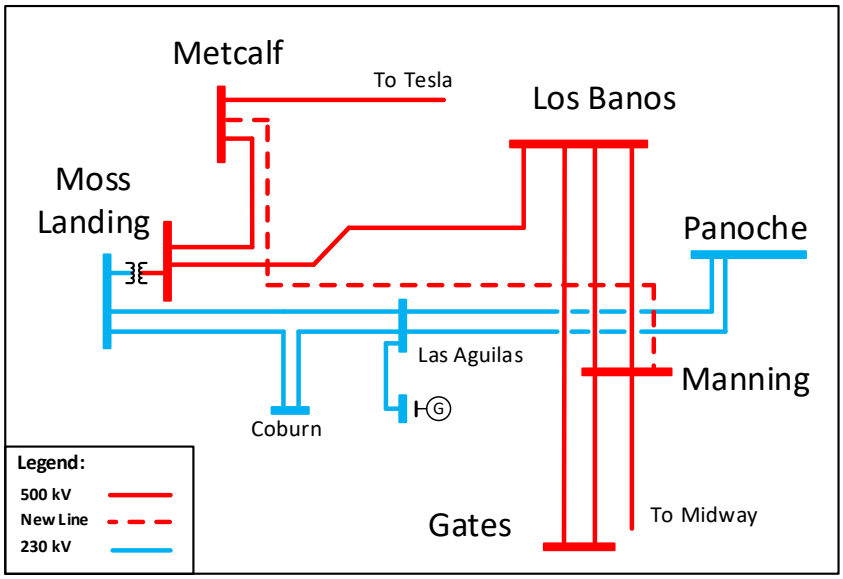
The following sections contain detailed descriptions and functional specifications for these two projects.

I.1 Description and Functional Specifications for Proposed Reliability-Driven Manning – Metcalf 500 kV Line Project

I.1.1 Description

In the 2024-2025 Transmission Plan, the ISO has identified a reliability-driven need for the Manning – Metcalf 500 kV Line. Figure I.1-1 provides a schematic diagram of the transmission system in the area. The project scope includes an approximately 100 mile 500 kV AC transmission lines between Manning and Metcalf 500 kV substations with 70% series compensation.

Figure I.1-1: Schematic Diagram of the Manning – Metcalf 500 kV Line project



The ISO estimates that the proposed project will approximately cost $500 - $700 million. The ISO recognizes there may be some uncertainty regarding routing and siting of the 500 kV AC transmission line during the siting and permitting process for this project. As such, the ISO will seek cost and risk mitigation strategies from project sponsors' in their bid applications in the competitive solicitation process along with potential alternatives and mitigation measures. The required in-service date for the project is June 1st, 2034.

Beginning with the 2023-2024 Transmission Planning Process, CAISO is now requiring all project sponsors to propose an In Service Date that matches the CAISO requested In Service Date. CAISO will not attribute any value to an In Service Date earlier than the Requested In Service Date.

Figure I.1-2 provides a high level diagram of line terminations and interconnection to the future Manning 500/230 kV substation.

Figure I.1-3: Interconnection to Manning 500 kV Substations

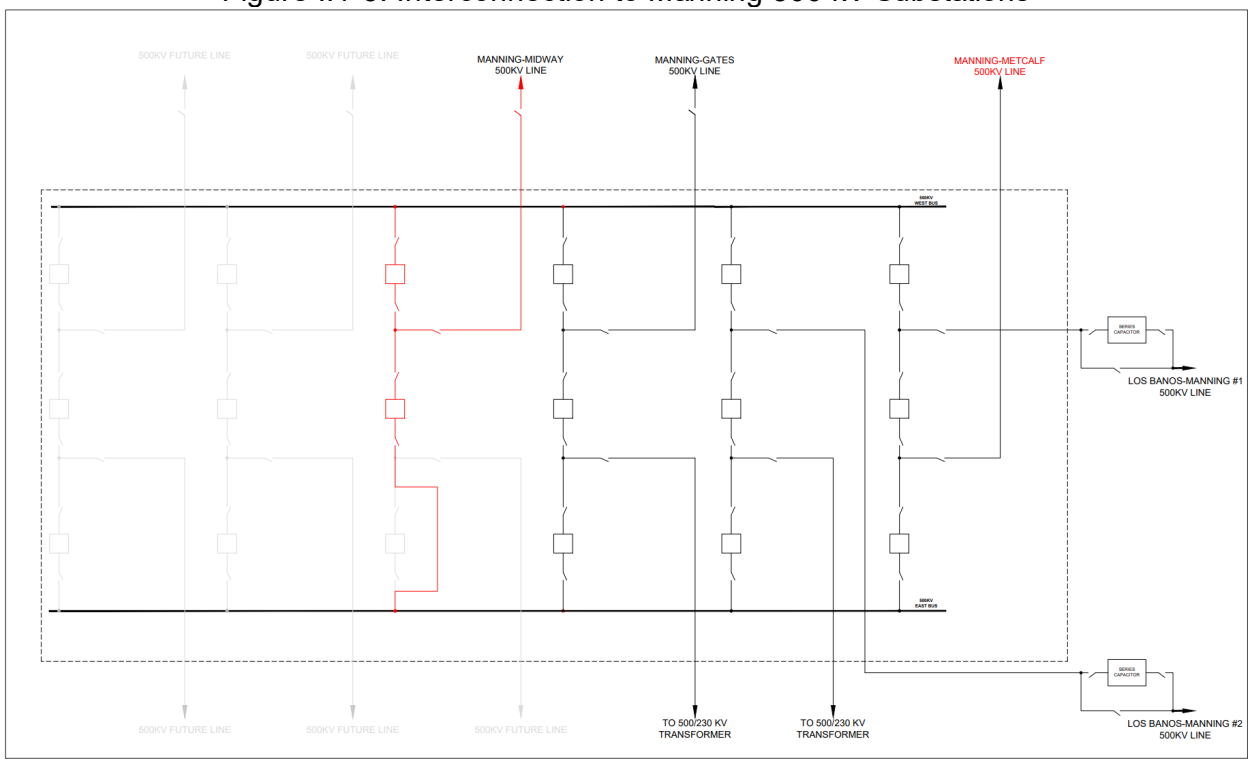
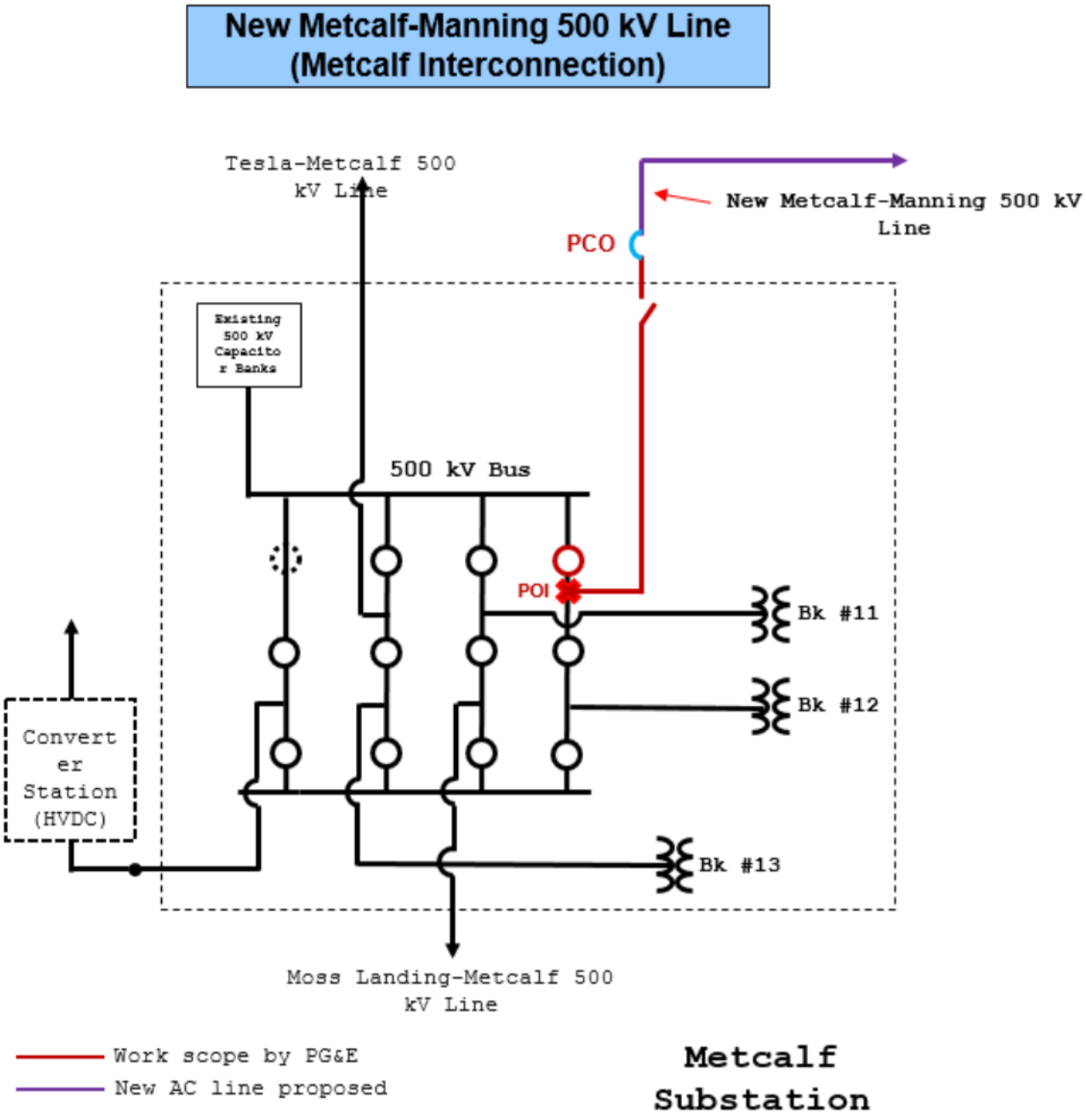


Figure I.1-4 provides a high level diagram of line terminations and interconnection to the Metcalf 500/230 kV substation.

Figure I.1-3: Interconnection to Metcalf 500 kV Substations



The facilities in the Manning – Metcalf 500 kV Line project that are eligible for competitive solicitation are

- The new approximately 100-mile 500 kV AC line from the planned Manning 500 kV/230 kV substation to PG&E's Metcalf 500/230 kV Substation.
- The required 500 kV series capacitors and line reactors

For the interconnection of the Manning – Metcalf 500 kV Line project to Manning substation, the incumbent PTO (LSPGC) will be responsible for installing the new transmission line segment

from the Manning 500 kV bus up to a point within 100 feet of the Manning substation property line. The new line segment will terminate on a dead end structure, to be owned by LSPGC. The approved project sponsor will be responsible for (and will own and maintain) the facilities from this last dead end structure(s) back to the Metcalf 500 kV Substation.

For the interconnection of the Manning – Metcalf 500 kV Line project to Metcalf substation, the incumbent PTO (PG&E) will be responsible for installing the new transmission line segment from the Metcalf 500 kV bus up to a point within 100 feet of the Manning substation property line. The new line segment will terminate on a dead end structure, to be owned by PG&E. The approved project sponsor will be responsible for (and will own and maintain) the facilities from this last dead end structure(s) back to the Manning 500 kV Substation.

The approved project sponsor will coordinate with LSPGC and PG&E regarding the specifications and the details of the associated line protection (*e.g*. current differential, directional comparison) etc. and will work with LSPGC and PG&E to develop relay logic and detailed relay settings.

The project sponsor shall design and route the proposed transmission line in a manner that avoids configurations that could lead to the new line and any adjacent existing or planned 500 kV transmission line being considered an always credible multiple-contingency in operational planning studies. The line design shall incorporate appropriate physical separation, structural independence, and other mitigations to reduce the likelihood of common mode failures with adjacent existing or planned 500 kV transmission lines. The project sponsor shall coordinate with the owner of the adjacent existing or planned 500 kV transmission lines to evaluate and document the proposed line's configuration to demonstrate compliance with this requirement.

As the project includes building new transmission facility with voltage level over 200 kV, the approved project sponsor will be responsible for completing the WECC Progress Report and other processes required for this project.

I.1.2 Functional Specification for the Manning – Metcalf 500 kV Line Project

Overhead Line Construction

Line Terminus 1: Manning Substation 500 kV Bus

Line Terminus 2: Metcalf Substation 500 kV Bus

Nominal Phase to Phase Voltage: 525 kV

Minimum Line Continuous Ampacity - Summer: 3800 Amps

Minimum Line Continuous Ampacity – Winter: 3800 Amps

Minimum Line 4 Hour Emergency Ampacity – Summer: 4400 Amps

Minimum Line 4 Hour Emergency Ampacity – Winter: 4400 Amps

Minimum Line 30 Minute Emergency Ampacity: 5130 Amps

Minimum Series Capacitor Continuous Ampacity - Summer: 3800 Amps

Minimum Series Capacitor Continuous Ampacity – Winter: 3800 Amps

Minimum Series Capacitor 4 Hour Continuous Ampacity - Summer: 4400 Amps

Minimum Series Capacitor 4 Hour Continuous Ampacity – Winter: 4400 Amps

Minimum Series Capacitor 30 Minute Emergency Ampacity: 5130 Amps

Approximate Line Impedance: 0.00000728 + j0.000264 pu/mile (500 kV, 100 MVA base), ±20%.

Approximate level of series compensation required: 70%

Approximate Line Length: 100 miles

Requested In Service Date: June 1st, 2034

Support Structures: Single circuit structure

Shield Wire Required: Optical ground wire (minimum 24 pairs of fibers)

Failure Containment Loading Mitigation (anti-cascade structures, etc.): Per applicable codes

Shield Wire Ground Fault Withstand Ampacity: Coordinate with interconnecting entities

Aeolian Vibration Control (Conductor and Shield Wire): Vibration dampers must be installed on all conductors and overhead shield wires, with the exception of slack spans.

Transmission Line Minimum BIL: 1800 kV for 500 kV, with solidly grounded systems

Minimum ROW Width: Per applicable codes

Governing Design and Construction Standards: (GO 95, Known Local Conditions to be compliant with GO 95's High Fire-Threat District maps, facilities that traverse the HFTD will require a Wildfire Mitigation Plan under PUC code 8386, NESC Code, applicable municipal codes)

Design Temperature: 50°C

Location of Series Compensation and Line Reactors:

The project sponsor shall specify the locations of the line reactors. Each line reactor shall be at least 50 Mvar. The series compensation at each end of the line shall be 35% of the line. At each location, the series capacitor shall be in two equal blocks and each block shall have a bypass breaker so that the operator can bypass the block. The cost of the series compensation and line reactors are within the scope of this project and will be the responsibility of the approved project sponsor.

I.2 Description and Functional Specifications of Proposed Reliability-Driven NRS – San Jose B 230 kV Line Project

I.1.1 Description

In the 2024-2025 Transmission Plan, the ISO has identified a reliability-driven need for the NRS – San Jose B 230 kV Line project to serve the high load forecast in the San Jose area. Figure I.2-1 provides a schematic diagram of the transmission system in the area. In the initial configuration of the project, as shown in Figure I.2-1, the project scope includes the NRS – San Jose B 230 kV line, estimated at 7-10 miles depending on the routing. To reliably interconnect and serve the forecast load in the area, PG&E is planning a future 115 kV load interconnection switching station within the area shown by the red circle in Figure I.2-2. As shown in the ultimate configuration in Figure I.2-1, the long term plan for the area is to have the new NRS – San Jose B 230 kV line looped into this future load interconnection switching station with PG&E expanding it to a 230 kV substation. The project sponsor shall locate a splice box, a larger pull box, or a dead end structure within the area shown in Figure I.2-2 for interconnection to future PG&E 230/115 kV substation.

Figure I.2-1: Schematic Diagram of the NRS – San Jose B 230 kV Line Project

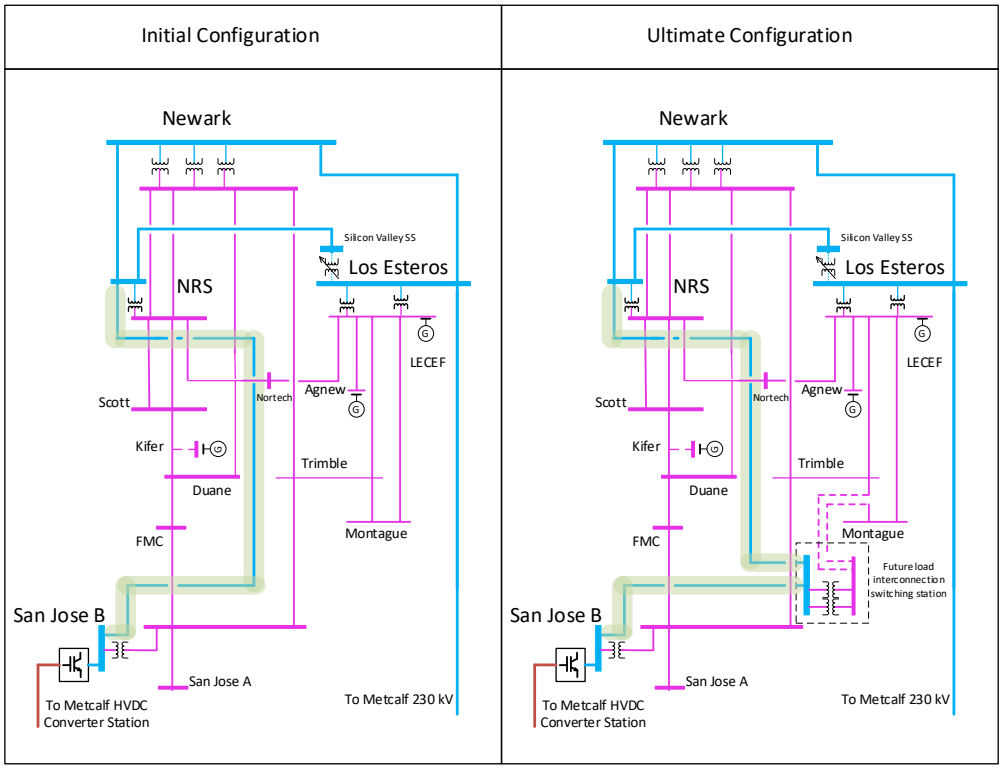
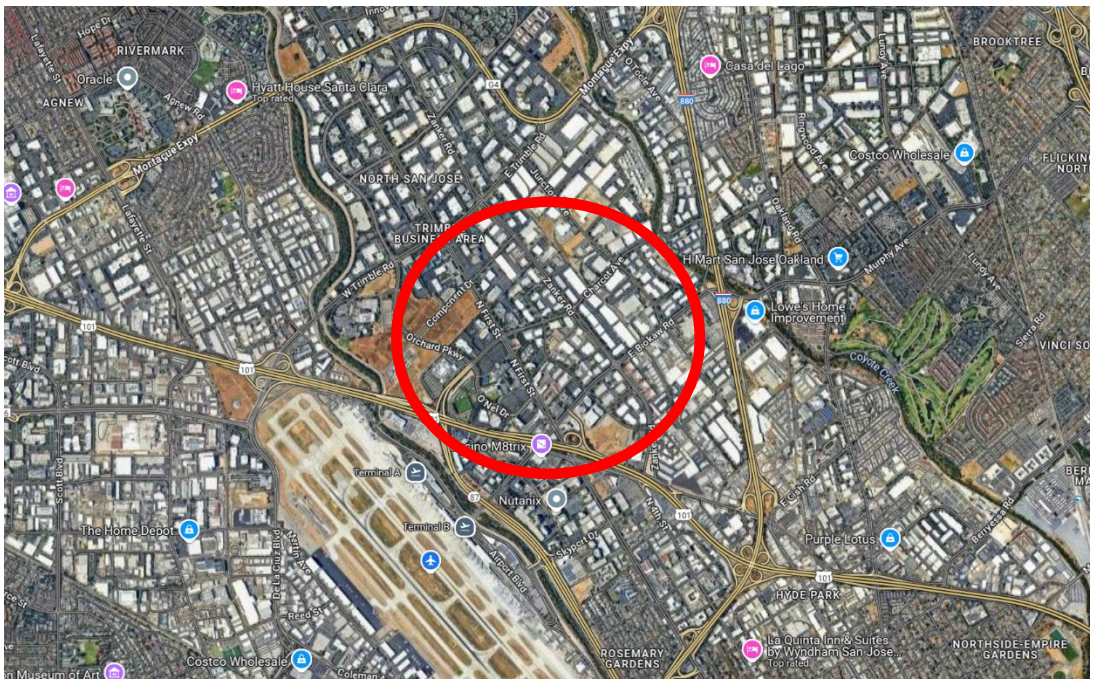


Figure I.2-2: Potential Location for Future PG&E 230/115 kV Substation

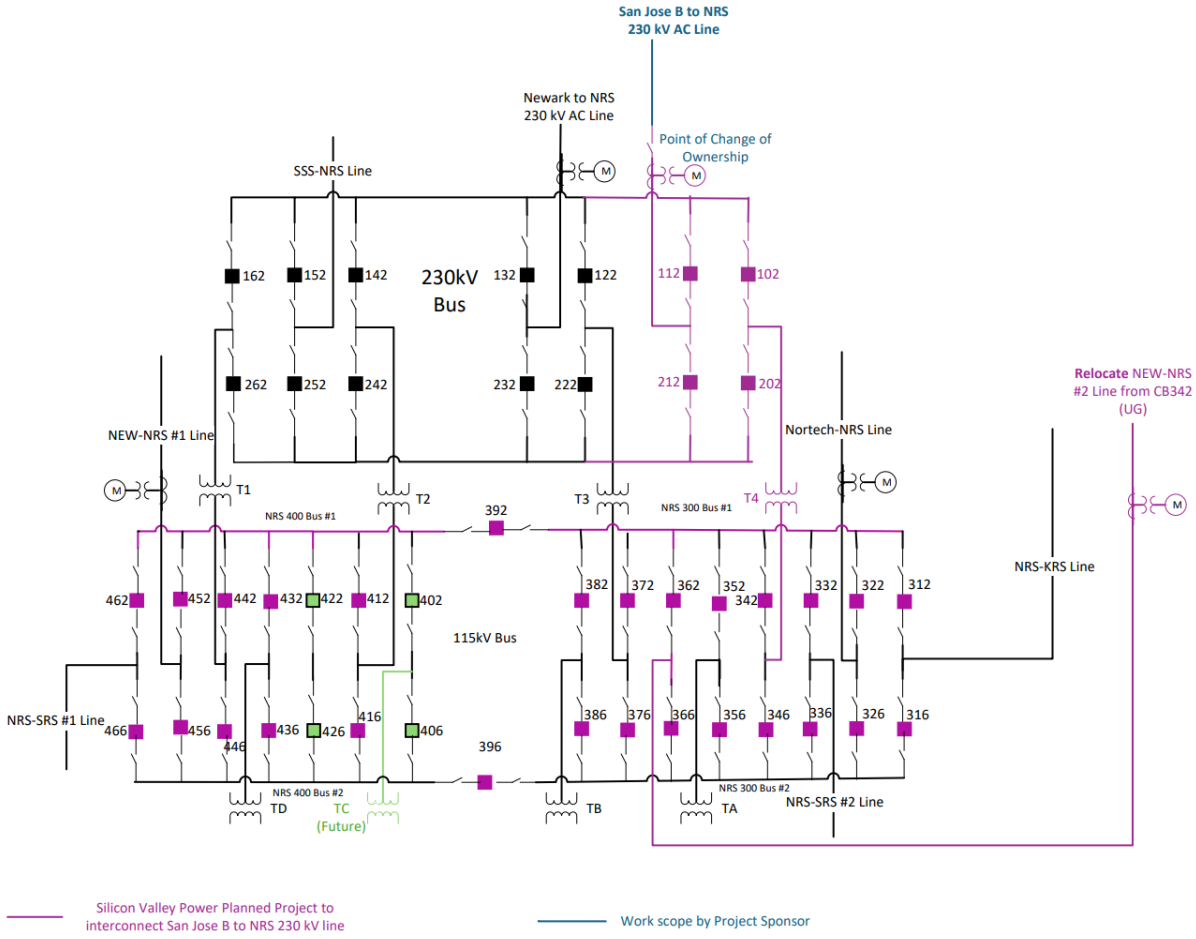


The ISO estimates that the proposed project will approximately cost $150 - $200 million.. The requested in-service date is June 1, 2030

Beginning with the 2023-2024 Transmission Planning Process, CAISO is now requiring all project sponsors to propose an In Service Date that matches the CAISO requested In Service Date. CAISO will not attribute any value to an In Service Date earlier than the Requested in Service Date.

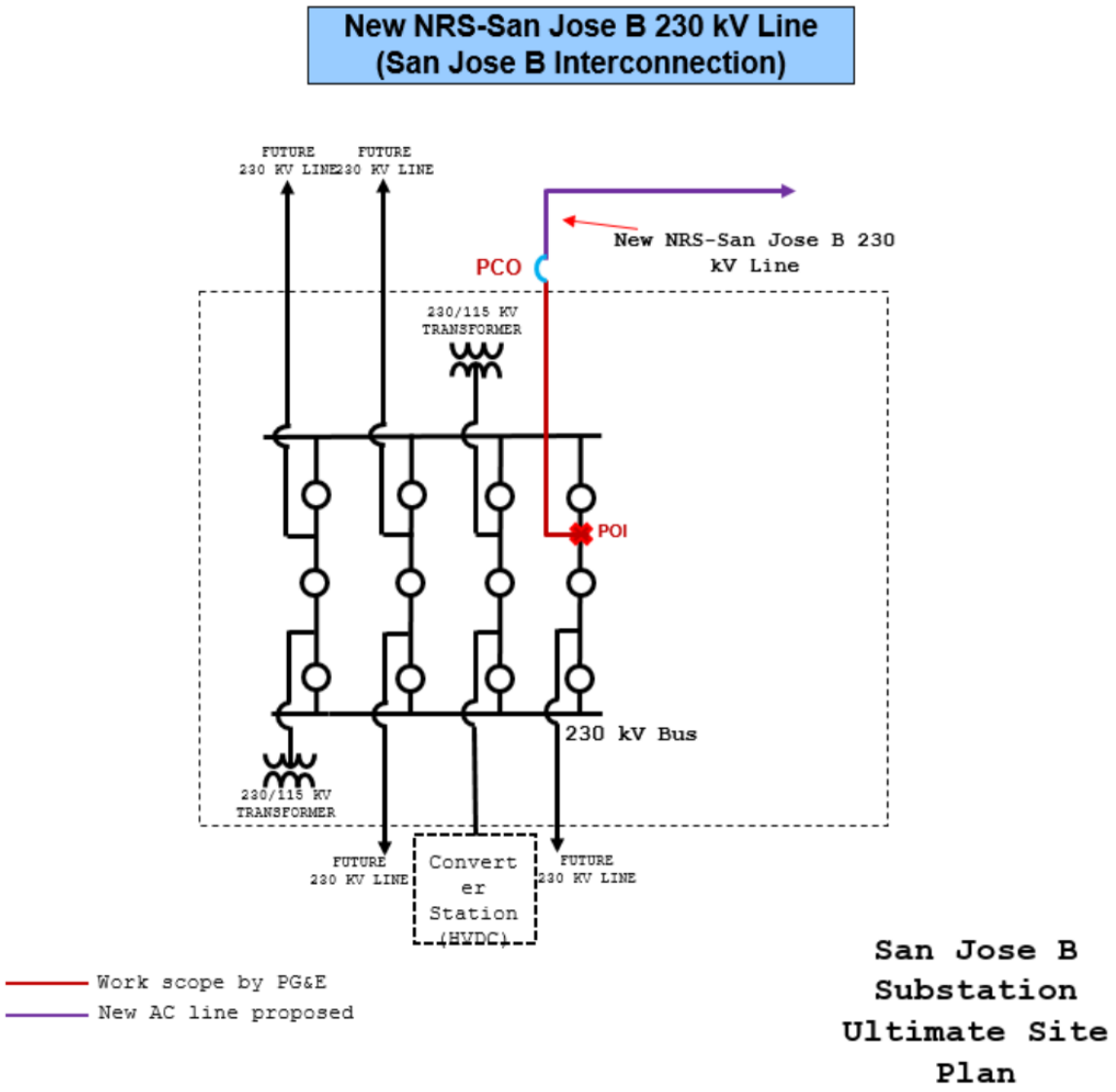
Figure I.2-3 and Figure I.2-4 provide high level diagrams of line terminations and interconnection to the NRS 230 kV substation and San Jose B 230 kV substation.

Figure I.2-3: Interconnection to NRS 230 kV Substations



NRS 230 kV Substation Expansion

Figure I.2-4: Interconnection to San Jose B 230 kV Substation



For the interconnection of the NRS – San Jose B 230 kV Line at NRS 230 kV substation, the incumbent PTO (Silicon Valley Power (SVP)) will be responsible for installing the new transmission line segments from the NRS 230 kV bus up to a point within 100 feet of the NRS 230 kV substation property line. The new line segment will terminate on a deadend structure, to be owned by SVP. The approved project sponsor will be responsible for (and will own and maintain) the facilities from this last deadend structure back to the San Jose B 230 kV Substation.

For the interconnection of the NRS – San Jose B 230 kV Line at San Jose B 230 kV substation, the incumbent PTO (PG&E) will be responsible for installing the new transmission line segments from the San Jose B 230 kV bus up to a point within 100 feet of the San Jose 230 kV substation property line. The new line segment will terminate on a cable riser structure, to be owned by

PG&E. The approved project sponsor will be responsible for (and will own and maintain) the facilities from this last deadend structure back to the NRS 230 kV Substation.

The approved project sponsor will coordinate with SVP and PG&E regarding the specifications and the details of the associated line protection (*e.g.* current differential, directional comparison) etc. and will work with SVP and PG&E to develop relay logic and detailed relay settings.

As the project includes building new transmission facility with voltage level over 200 kV, the approved project sponsor will be responsible for completing the WECC Progress Report and other processes required for this project.

I2.1 Functional Specification for the NRS – San Jose B 230 kV Line Project

230 kV Transmission Line Functional Specifications - Newark – NRS 230 kV Line

Line Terminus 1: Northern Receiving Station (NRS) 230 kV Bus

Line Terminus 2: San Jose 230 kV Bus

Nominal Phase to Phase Voltage: 230 kV

Minimum Line Continuous Ampacity - Summer: 2500 Amps per circuit

Minimum Line Continuous Ampacity – Winter: 2500 Amps per circuit

Minimum Line 4 Hour Emergency Ampacity – Summer: 2500 Amps per circuit

Minimum Line 4 Hour Emergency Ampacity – Winter: 2500 Amps per circuit

Approximate Line Impedance: 0.000018 + j0.00029 pu/mile (100 MVA base) ±20% for the cable sections and 0.00012 + j0.0011 pu/mile (100 MVA base) ±20% for the overhead sections of the line.

Approximate Line Length: 7-10 miles depending on the routing of the line

Requested In Service Date: June 1st 2030.