INFO-2025-1 Momentum Solar - Tundra Expansion Feasibility Study Report

Xcel Energy
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1.0 Executive Summary

Avangrid Renewables, LLC (Interconnection Customer) requested this Informational Interconnection Study, INFO-2025-1, to evaluate the expansion of the Tundra 345 kV switching station ("Tundra") to interconnect a 325 MW Photovoltaic (PV) Generating Facility (GF), Momentum Solar, with a Point of Interconnection (POI) at Tundra. The focus of this informational study was to evaluate the feasibility to expand Tundra to accommodate a future Generation Interconnection Request (GIR) beyond the current planned ultimate buildout for Tundra.

Public Service Company of Colorado (PSCo), the Transmission Provider, has evaluated four (4) alternatives to interconnect a future GIR at Tundra and determined the only feasible alternative is expansion of the current switching station to the west, adjacent to the existing electrical equipment enclosure for Tundra. It was determined that the switching station could be expanded into this area since there is adequate room to add another bay and relocate the existing drainage structures within the PSCo property that are currently located in this area, however at significant cost.

The total estimated cost of the required upgrades for a future GIR to interconnect at Tundra would be $20.504 million including:

- Cost of Transmission Provider's Interconnection Facilities (TPIF) is $4.875 million
- Cost of Station Network Upgrades is $15.629 million

While this report has indicated a feasible alternative to expand Tundra switching station, PSCo has testified to the Colorado Public Utility Commission (PUC) that this alternative was suboptimal and more expensive than connecting Colorado Power Pathway Segments 4 and 5 to a new switching station at Sandstone. There is a significant concern that the PUC may not grant a Certificate of Public Convenience and Necessity (CPCN) to expand Tundra due to the CPCN for the Sandstone 345 kV switching station ("Sandstone") being selected as an alternative to expanding Tundra.

2.0 Introduction

This Informational Interconnection Study report provides an evaluation to interconnect a 325 MW PV GF, Momentum Solar, for an Interconnection Customer with a POI at Tundra. The focus of this Informational Interconnection Study was to evaluate the expansion of Tundra to accommodate this GIR beyond the current planned Tundra ultimate buildout.

An Information Study Report for INFO-2024-2 was issued January 10, 2025, for this same Interconnection Customer and concluded that adding an interconnection position for the Momentum Solar project at Tundra was not feasible from a preliminary evaluation. The ultimate general arrangement for Tundra is a four (4) bay, breaker and a half configuration with eight positions available. All positions in the current planned Tundra switch yard are allocated for projects including double circuit transmission lines (two positions each) to the Comanche 345 kV substation, Daniels Park 345 kV substation, and Sandstone 345 kV switching station; an existing generation interconnection (one position), and reactive support for the transmission system (one position).

After the INFO-2024-2 Information Study Report was issued, the Interconnection Customer requested a more detailed evaluation for the expansion of Tundra. This Informational Interconnection Study INFO-2025-1 was conducted by the Transmission Provider based upon the information and study assumptions set forth in the revised INFO-2025-1 informational study request received on April 11, 2025, and the Scoping Meeting held on April 25, 2025 with the Interconnection Customer. The purpose of the study is to perform a detailed engineering evaluation to determine the feasibility to expand Tundra beyond its current ultimate general arrangement to interconnect the proposed 325 MW Momentum Solar project at Tundra. The below study scope of work, developed in coordination with the Interconnection Customer, was completed to assess the feasibility to expand Tundra to support the Momentum Solar interconnection facilities:

- Evaluation of interconnection alternatives:
    - Assessment of whether the Momentum Solar project can interconnect into any one of the five currently planned open positions (the one currently available, or into any of the two each planned east and west of the currently constructed bays).
    - Assessment of whether a new switchyard could be built on an existing parcel immediately north of Tundra.
    - Assessment of an expansion of the existing yard at Tundra given site constraints (adjacent T-lines, property boundaries, etc.). The following was considered:

        - Expansion to the east beyond currently planned expansion bay (including relocating the existing drainage).
        - Expansion immediately west and adjacent to the existing control enclosure.
- For any interconnection options determined to be feasible, the following information was prepared:
    - Preliminary civil grading, and drainage evaluation, just to include a desktop review based on information available from the original Tundra installation, no new survey was completed as part of this scope.
    - Development of a conceptual one-line drawing.
    - Development of a conceptual general arrangement drawing.
    - Indicative cost estimates and schedule for the interconnection facilities.

3.0 Study Results

This section provides a summary of the evaluation of alternatives to interconnect a future GIR at Tundra followed by a discussion with details of the alternative that was deemed feasible.

3.1 Evaluation of Interconnection Alternatives

As discussed in Section 2.0 above, four (4) alternatives were evaluated to interconnect a future GIR at Tundra. Figure 1 at the end of this section shows a site plan for Tundra with current and planned facilities interconnecting at Tundra and the alternative areas being evaluated for potential expansion.

The Transmission Provider evaluated whether the Momentum Solar project could interconnect into any one of the eight (8) positions in the ultimate buildout of Tundra. Currently four (4) positions are built out with four (4) new positions being planned. It was determined that none of these positions are available for a future GIR. All eight (8) positions in the current planned switching station are allocated for projects including double circuit transmission lines (two positions each) to the Comanche 345 kV substation, Daniels Park 345 kV substation, and Sandstone 345 kV switching station; an existing generation interconnection (one position), and reactive support for the transmission system (one position). Figure 1 shows the locations of these facilities.

The Transmission Provider evaluated whether the current switching station could be extended, or a new switching station could be built on an existing parcel immediately north of the current Tundra in the area shown on Figure 1 (Alternative Expansion Area 1). It was determined that this alternative was not feasible. With the current and planned transmission lines routing into the switching station in this area, there is not adequate space to extend Tundra or build a new switching station. In addition, there is a large volume of soil stockpiled in this area that would require removal, which would be cost prohibitive.

The Transmission Provider evaluated expansion of the current switching station to the east beyond the currently planned expansion bay and relocating the existing drainage features in the area shown on Figure 1 (Alternative Expansion Area 2). It was determined that this alternative was not feasible as there was not adequate space or land available to the east to build out an additional bay and relocate a drainage structure in the area. The area to the east is limited due to the facilities associated with an existing GF.

The Transmission Provider evaluated expansion of the current switching station to the west, adjacent to the existing electrical equipment enclosure for Tundra in the area shown on Figure 1 (Alternative Expansion Area 3). It was determined that the switching station could be expanded into this area since there is adequate room to add another bay and relocate the existing drainage structures within the Transmission Provider's property. Additional details for this alternative are provided in the following section.

3.2 Tundra Yard Expansion to West

This section provides details for the expansion of Tundra to the west of the current yard to provide an interconnection position for a future GIR. The primary constraint to expand the yard to the west is the existing grades and room available for storm water control facilities. The area for the yard expansion would require utilizing a portion of the area that is currently a storm water basin, cutting the existing grade to extend the existing yard to the west and adding new storm water control facilities. Figure 2 shows the area where the grading would occur for the yard expansion and the new storm water control features. Figure 3 depicts a cross section of the yard with the area of cut for the yard expansion and stormwater diversion ditch. Based on this preliminary evaluation, the following approximate preliminary civil construction quantities were estimated:

- Existing soil cut and removed from expansion area (assumed to be moved to the current stockpile area on the Transmission Provider's property to the north) - 85,000 cubic yards (CY)
- Imported aggregate base material - 3,700 CY
- Imported Stone Surfacing = 1,200 CY
- Fence removal - 790 linear feet (LF)
- Fence replacement - 1,032 LF

The following assumptions were considered for the evaluation to expand Tundra to the west:

- The original geotechnical report for the site indicated that existing site soils are not suitable for reuse as general fill, so the grading was designed to minimize the amount of general fill below the aggregate base material, which would require imported material.
- The existing storm water basin will require re-design and will need to be located in the south corner of the property given existing grades.
- Initial station build was approximately 7.3 acres

- Station currently planned to be expanded approximately 2.4 acres for the Colorado Power Pathway interconnections.
- The Tundra expansion required for this GIR would be approximately 2.3 acres.

There are risks associated with this yard expansion to the west that cannot be fully evaluated until a formal interconnection request is submitted or interconnection agreement is executed. The Colorado PUC granted a CPCN to construct the Sandstone 345 kV (Sandstone) switching station (Proceeding No. 24A-0131E) as a more cost-effective alternative to interconnect to Tundra, originally approved as part of the Colorado's Power Pathway 345 kV Transmission Project. Part of the rationale supporting the development of Sandstone was the greater number of interconnection opportunities at Sandstone due to available land area for expansion versus Tundra's limited area and the technical challenges and associated high cost to expand Tundra. Transmission Provider would need to attain PUC approval for the expansion of Tundra through a Rule 3206 filing as "Normal Course of Business" or through a CPCN.

Transmission Provider would also need to obtain a permit for the expansion of Tundra from Pueblo County. The revised stormwater plan and facilities associated with the expansion would be a significant component of the permit and would require detailed design to fully develop a final grading plan with stormwater control facilities.

Beyond the Tundra yard expansion earthwork, standard civil, physical, and control work would be completed to add a new bay with an interconnection position for a GIR. These upgrades are depicted on the conceptual one-line drawing (Figure 4) and the conceptual general arrangement drawing (Figure 5). Additional details of the upgrades are provided in the following section along with estimated costs.

3.3 Cost Estimates

The total estimated cost of the required upgrades for a GIR to interconnect at Tundra would be $20.504 million including:

- Cost of Transmission Provider's Interconnection Facilities (TPIF) is $4.875 million (Table 1)
- Cost of Station Network Upgrades is $15.629 million (Table 2)

The list of upgrades required to accommodate a future GIR at Tundra are presented in Table 1 and Table 2.

Table 1 - Transmission Provider's Interconnection Facilities

Element	Description	Cost Est. (Million)
Tundra 345 kV switching station	Interconnection of Momentum Solar at the Tundra 345 kV switching station. The new equipment includes: • (1) 345 kV single bay dead end structure • (1) 345 kV 3-phase arrester • (1) 345 kV 3000 A line disconnect switch • (3) 345 kV 1-phase CTs for metering • (3) 345 kV 1-phase CCVTs • Dual fiber communication equipment • Associated electrical equipment, bus, wiring and grounding • Associated foundations and structures • Associated transmission line communications, fiber, relaying and testing • Testing and Commissioning	$4.025
Tundra 345 kV switching station	Transmission Provider's dead-end structure at the Point of Change of Ownership (PCO) outside the switching station fence line and transmission line into switching station from the PCO. Single span, dead end structure, 3 conductors, insulators, hardware, jumpers and labor.	$0.850
Total Cost Estimate for Interconnection Customer-Funded, Transmission Provider Owned Interconnection Facilities		**$4.875**

Table 2 - Station Network Upgrades

Element	Description	Cost Est. (Million)
Tundra 345 kV switching station	Interconnection of Momentum Solar at the Tundra 345 kV switching station. The new equipment includes: • (2) 345 kV dead end structure • (2) 345 kV 3000 A SF6 circuit breakers • (4) 345 kV 3000 A disconnect switches • Associated electrical equipment, bus, wiring and grounding • Associated foundations and structures • Yard expansion including site grading, yard preparation, surfacing, fence removal, new fencing, storm water drainage structures	$14.879
Tundra 345 kV switching station	Install required communication in the EEE at the Tundra 345 kV switching station	$0.650
Tundra 345 kV switching station	Siting and Land Rights permitting, no land purchase costs included	$0.100
Total Cost Estimate for Transmission Provider Funded, Transmission Provider Owned Interconnection Facilities		**$15.629**

PSCo has developed these indicative cost estimates for TPIF and Station Network Upgrades required for the interconnection of a GIR at Tundra. The estimated costs provided in this report are based upon the following assumptions:

- The estimated costs are in 2025 dollars with escalation and contingencies applied.
- The estimated costs include all applicable labor and overheads associated with the siting, engineering, design, and construction of these new Transmission Provider facilities.
- The estimated costs do not include the cost for any Interconnection Customer owned equipment and associated design and engineering.
- Labor is estimated for straight time only—no overtime included.
- Transmission Provider (or its Contractor) will perform all construction, wiring, testing, and commissioning for Transmission Provider owned and maintained facilities.
- Additional costs associated with System Network Upgrades could be assigned to a GIR at Tundra dependent upon the results of a future interconnection study.

3.4 Schedule

The schedule to interconnect a GIR at Tundra would be dependent upon delivery times for major equipment required to build out the interconnection facilities. The Transmission Provider is currently experiencing continued increases to material lead times which could impact the schedule. The likely critical path for the schedule would be the procurement and delivery of 345 kV circuit breakers, current lead time is approximately 180 weeks. With this lead time for circuit breakers, the Transmission Provider estimates approximately 48 months from execution of an agreement to provide back feed to the Interconnection Customer. If the circuit breaker lead time was not a constraint, the Transmission Provider estimates approximately 24 months from execution of an agreement to provide back feed to the Interconnection Customer assuming no other material procurement or outage constraints.

3.5 Customer Requirements for Interconnection

The Interconnection Customer requirements include:

- Interconnection Customer will be responsible for the design, permitting and construction of the generation tie line from their GF to the PCO structure at Tundra.
- Based upon the location of the proposed GF west of the transmission line corridor, the Interconnection Customer would be responsible for the crossing of that corridor and would need to pursue that through PSCo's encroachment process independent from the generation interconnection process. The Interconnection Customer could face considerable constraints attaining an encroachment through this major transmission line corridor and would be responsible for any costs associated with modifications associated with that encroachment.
- Interconnection Customer will install two (2) redundant fiber optic circuits (one primary circuit with a redundant backup) into the Transmission Provider's switching station as part of its interconnection facilities construction scope.
- Power Quality Metering (PQM) will be required on the Customer's generation tie-line terminating into the POI.
- The Customer will be required to design, procure, install, own, operate and maintain a Remote Terminal Unit (RTU) at their Interconnection Customer substation. Transmission Provider will be provided with indications, readings and data from the RTU.
- The Interconnection Customer will comply with the most current version of the *Interconnection Guidelines for Transmission Interconnected Producer-Owned*

Generation Greater Than 20 MW, as amended from time to time, and available at: Interconnection | Transmission | Corporate | Xcel Energy

Figure 1 - Tundra 345 kV Switching Station Site Plan

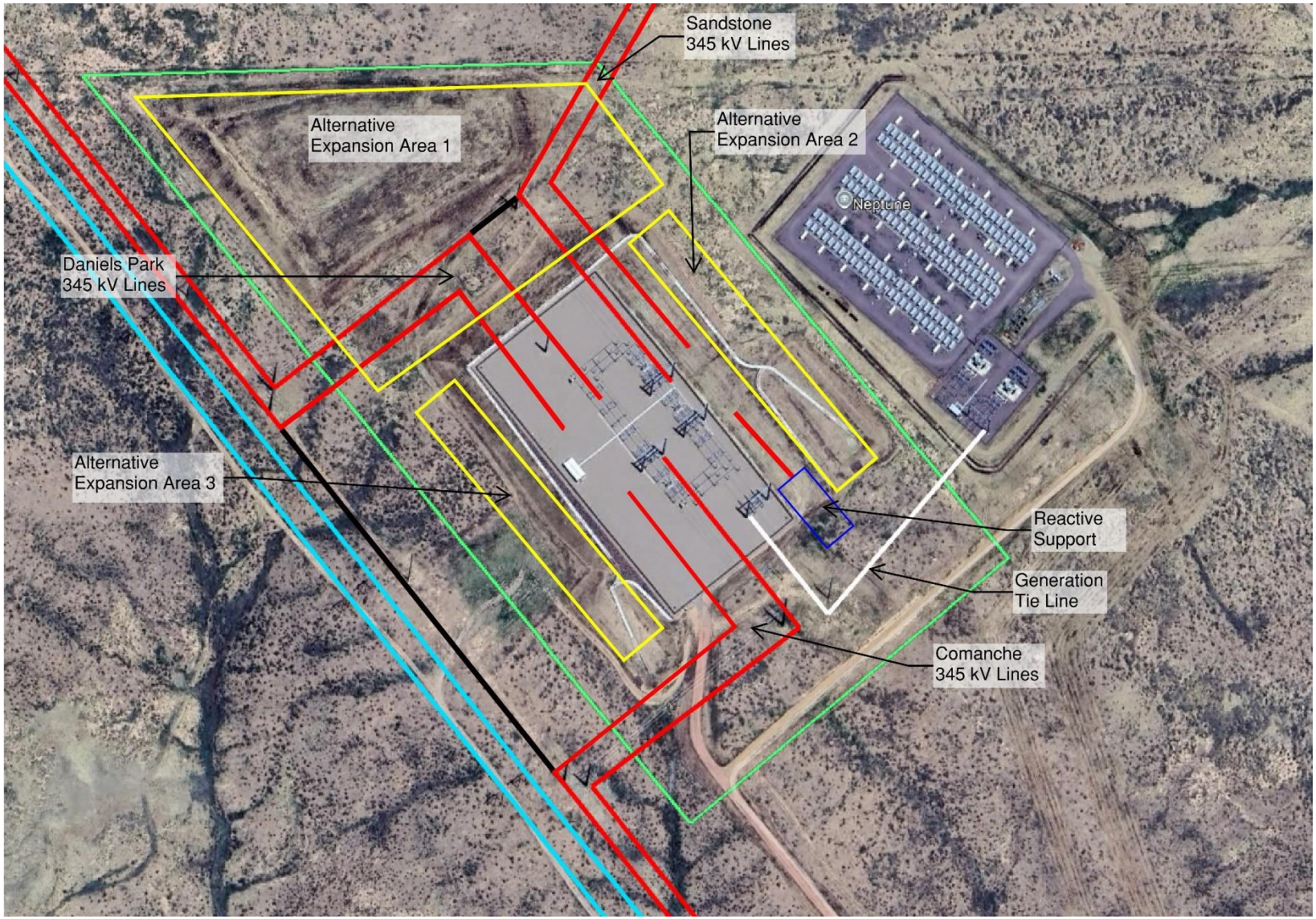

Figure 2 – Conceptual Tundra 345 kV Expansion Area Plan

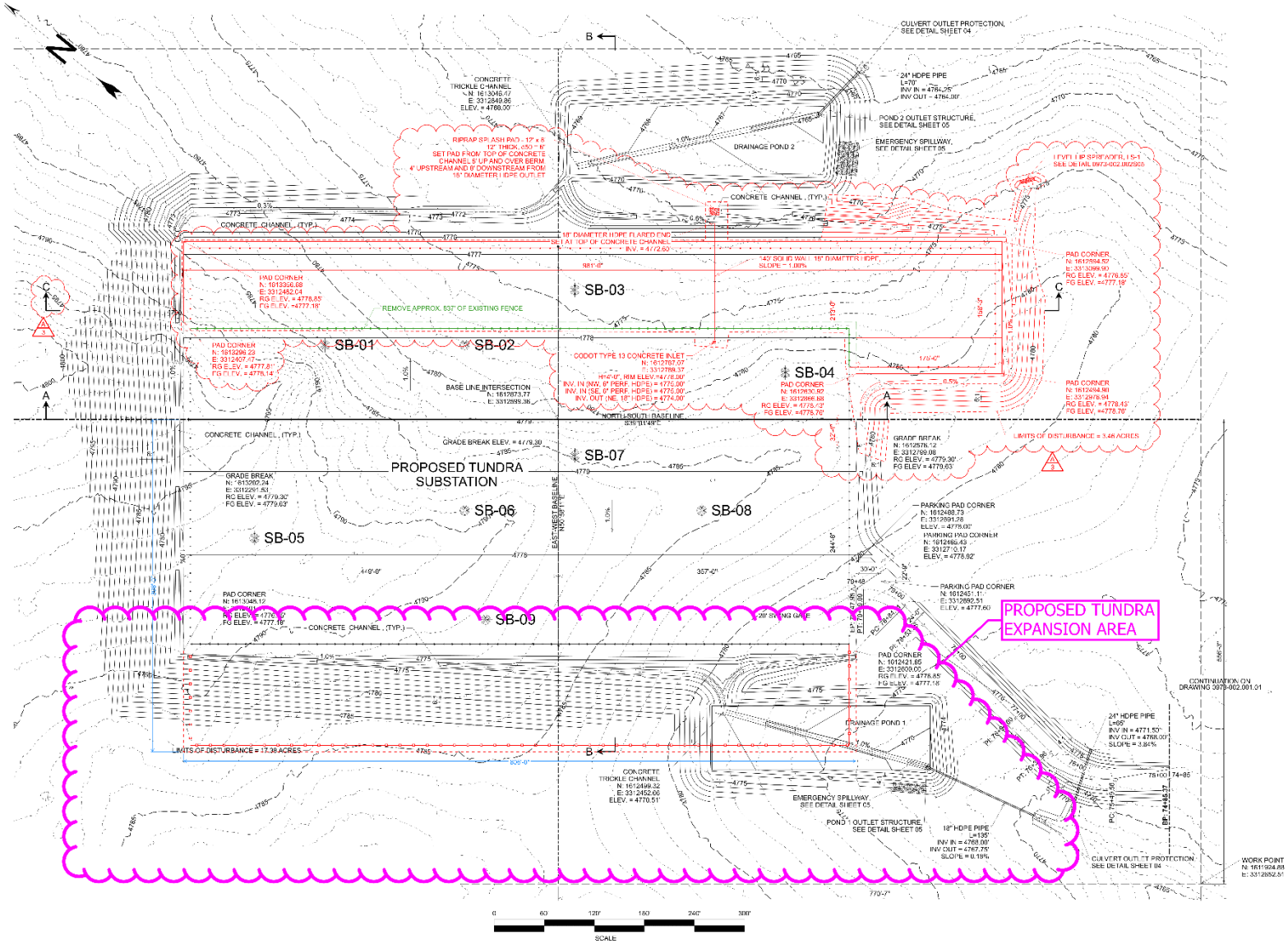

Figure 3 - Conceptual Tundra 345 kV Expansion Area Cross Section

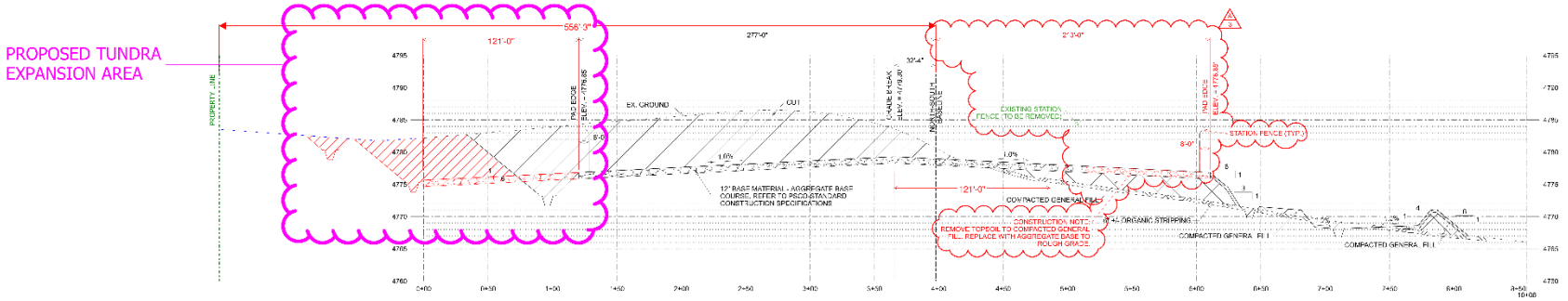

Figure 4 – Conceptual Tundra 345 kV Expansion One-Line

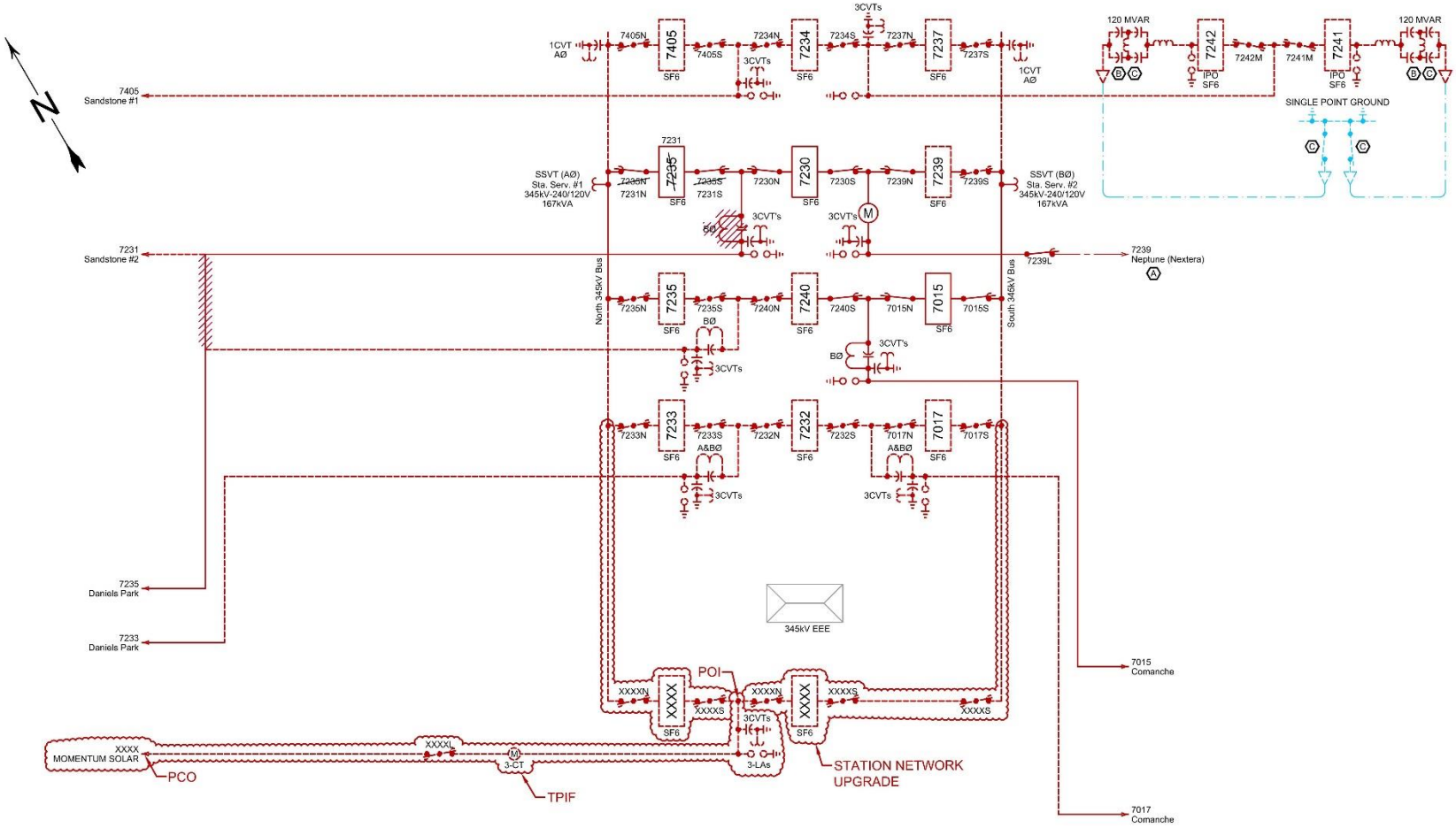

Figure 5 - Conceptual Tundra 345 kV Expansion General Arrangement