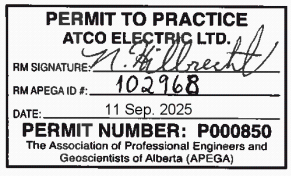
Distribution Deficiency Report

ATCO Poplar Hill Area Load New POD

11 Sep 2025
APEGA ID: 107245



Approvals	Signature	Date
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Revision History:

R0	Original Submission	Erin Young	June 19, 2019
R0	Minor Updates	Sharon Morganson	June 27, 2019
R0.1	Minor Corrections	Erin Young	July 9, 2019
R1	Updated to new template and updated with new loading information	Erin Young	Jan 10, 2023
R2	Updated with AESO comments	Erin Young	Aug 3, 2023
R3	Updated suggested location for POD in Transmission-Based Alternative 3. Updated load forecasts associated with Alternative 3.	Erin Young	Nov 28, 2023
R4	Updated for NID filing.	Erin Young	Aug 28, 2025

1 Executive Summary

ATCO Distribution Facility Owner (ATCO DFO) has received multiple load requests in the Poplar Hill 790S area totaling 30.6 MW. Poplar Hill 790S is located approximately 27 km northwest of the City of Grande Prairie in the Alberta Electric System Operator's (AESO) Northwest Planning Region. This Point of Delivery (POD) is equipped with one 25/33.3/41.7 MVA, 144/25 kV transformer and one 25/33/41.7 MVA, 144/25 kV transformer and serves predominately industrial type loads (96.2% industrial; 3.1% farm; 0.4% residential; 0.3% commercial based upon POD peak loading).

ATCO DFO has considered the following alternatives:

Distribution Alternative 1: Serve load from Poplar Hill 790S

Distribution Alternative 2: Offload Poplar Hill 790S to nearby PODs

Transmission Alternative 1: Install a new 25 kV breaker and feeder at Poplar Hill 790S and offload Poplar Hill 790S to surrounding PODs

Transmission Alternative 2: Increase Capacity at Poplar Hill 790S

Transmission Alternative 3: Construct a new POD

Due to the inability to serve the entirety of the customer load requests via the Distribution alternatives, ATCO DFO requests a transmission solution.

ATCO DFO's assessment of the transmission alternatives discounts transmission alternatives 1 and 2 due to the inability to expand Poplar Hill 790S or route new feeders into Poplar Hill 790S as identified in Appendix D.

ATCO DFO prefers transmission alternative 3. ATCO DFO suggests the new POD be developed near SE-27-73-8-W6 with the new transmission service requested by May 2026.

2 Introduction

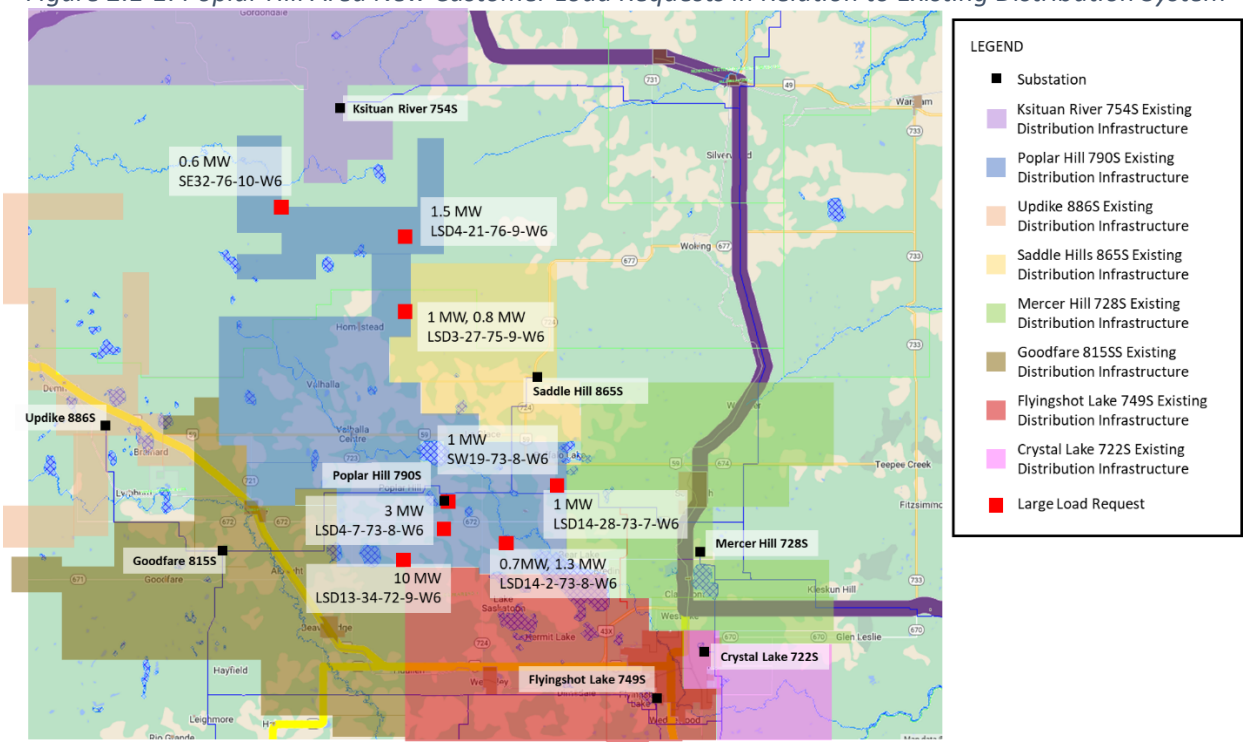
2.1 Customer Requests

ATCO DFO has received multiple large load requests in the Poplar Hill 790S area totaling approximately 20.9 MW; including various small load requests brings the total load requests for Poplar Hill 790S to 30.6 MW. Table 2.1-1 details the requested operating loads and requested ISDs. Load requests that are less than 0.5 MW were combined based on requested ISD and feeder. Figure 2.1-1 shows the load requests identified in Table 2.1-1 in relation to the existing ATCO distribution system. In addition to the requests in Table 2.1-1 there is a potential 20 MW load for a site expansion from an existing customer connected to Poplar Hill 790S; while this request is not considered in the Alternative Evaluations it does showcase the further load potential and active development in the Poplar Hill area.

Table 2.1-1: Poplar Hill Area New Customer Requests

Location	Load Type Characterization	Requested Operating Load (MW)	Requested ISD/Energization Date	Feeder	Status as of 2025
LSD3-27-75-9-W6	Industrial	1	Q1 2023	5L422 – 790S	Energized
LSD4-7-73-8-W6	Industrial	3	Q3 2023	5L320 – 790S	Energized
LSD14-28-73-7-W6	Industrial	1	Q2 2023	5L374 – 790S	Energized
LSD3-27-75-9-W6	Industrial	0.8	Q1 2024	5L422 – 790S	Energized
LSD13-34-72-9-W6	Industrial	10	Q3 2024	5L999 – 790S	Energized
14-2-73-8-W6	Industrial	1.3	Q1 2024	5L374 - 790S	Energized
SW-19-73-8-W6	Industrial	1	Q4 2023	5L375 - 790S	Energized
LSD14-2-73-8-W6	Industrial	0.7	Q3 2025	5L374 - 790S	Firm
SE32-76-10-W6	Industrial	0.6	Q3 2025	5L422 - 790S	Firm
LSD4-21-76-9-W6	Industrial	1.5	Q3 2025	5L422 - 790S	Firm
Total Large Load		**20.9**			
Various	Various	0.05	2023	5L320 – 790S	Energized
Various	Various	1.40	2023	5L374 – 790S	Energized
Various	Various	1.55	2023	5L422 – 790S	Energized
Various	Various	0.14	2024	5L320 - 790S	Energized
Various	Various	0.14	2024	5L374 - 790S	Energized
Various	Various	0.98	2024	5L422 - 790S	Energized
Various	Various	2.43	2025	5L374 - 790S	Firm
Various	Various	1.96	2025	5L422 - 790S	Firm
Total Load		**30.6**			

Figure 2.1-1: Poplar Hill Area New Customer Load Requests in Relation to Existing Distribution System



2.2 Existing System

The point-of-delivery's (PODs) with 25 kV service in the Poplar Hill Area are Poplar Hill 790S, Goodfare 815S, Saddle Hills 865S, Mercer Hill 728S, Ksituan River 754S, Updike 886S, Flyingshot Lake 749S, and Crystal Lake 722S as seen in Figure 2.2-1. The Poplar Hill area is northwest of the City of Grande Prairie and serves the area load using these eight existing PODs. Figure 2.2-1 shows the current Distribution System Configuration. Table 2.2-1 shows the breakdown of existing load type for the area PODs. Figure 2.2-2 shows the current Transmission System SLD.

Figure 2.2-1: Existing Distribution System Configuration

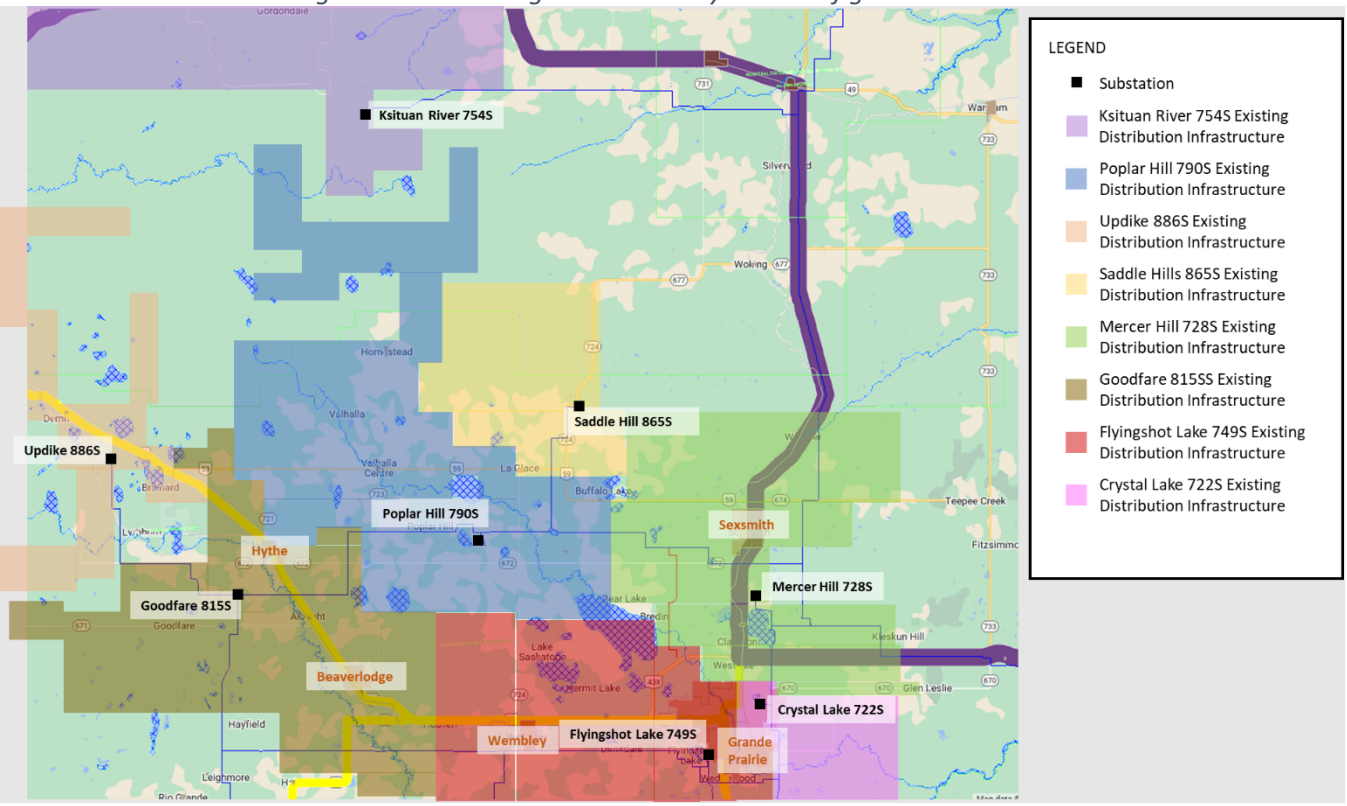
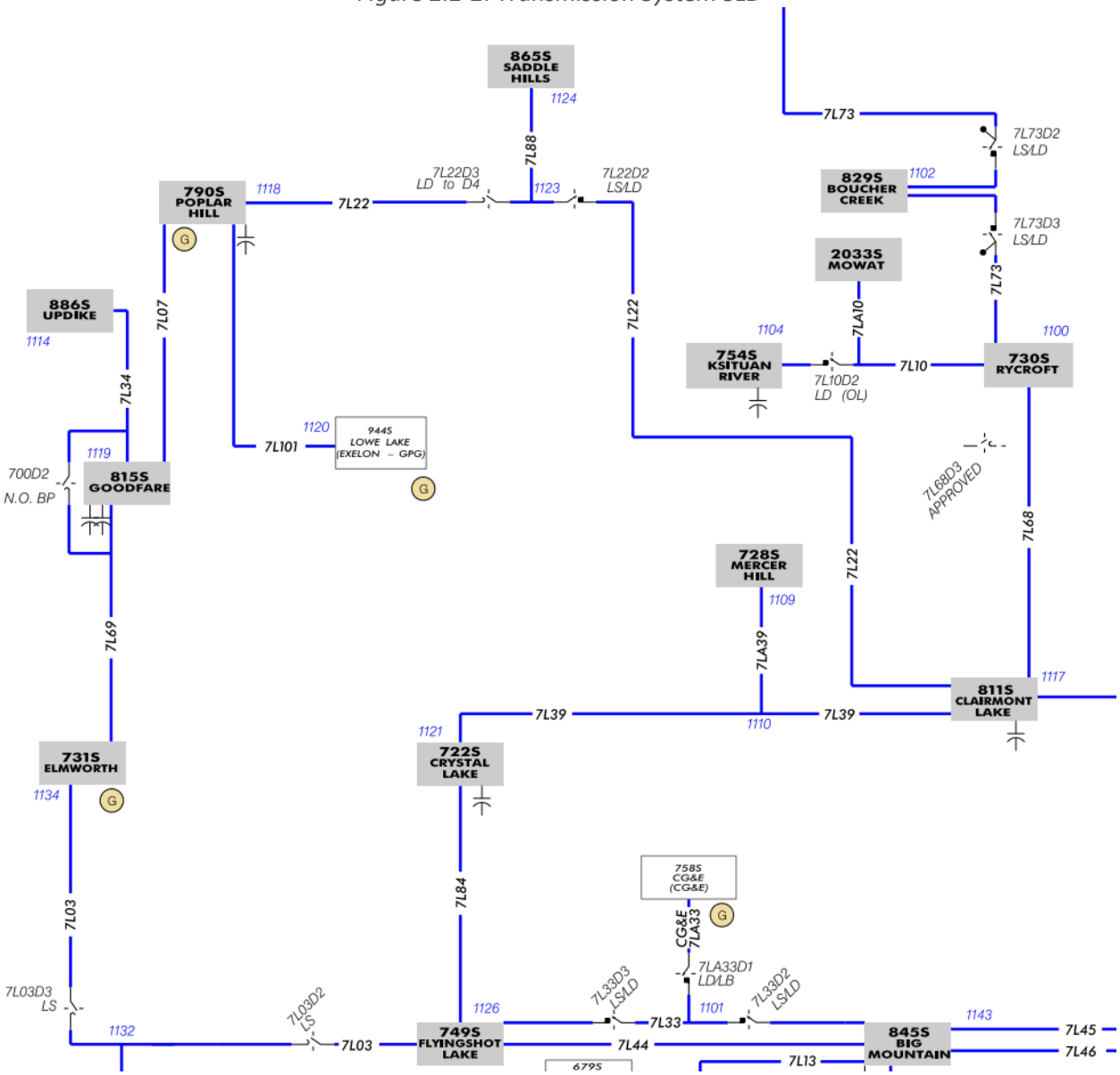


Table 2.2-1: POD Existing Load Type

POD	Existing Load Type (%)					DTS (MW)	STS (MW)
	Industrial	Farm	Residential	Commercial	Total		
Poplar Hill 790S	96.2	3.1	0.4	0.3	100	52.9	N/A
Goodfare 815S	59.2	9.9	12.1	18.8	100	21	N/A
Saddle Hills 865S	97.8	1	0.5	0.7	100	23	N/A
Mercer Hill 728S	33.7	7.8	13.9	44.6	100	26	N/A
Crystal Lake 722S	0.2	0.4	40.3	59.1	100	56	N/A
Flyingshot Lake 749S	1.7	2	33	63.3	100	52	N/A
Updike 886S	98.3	1.3	0.1	0.3	100	22	N/A
Ksituan River 754S	93.6	3.8	0.3	2.3	100	38	1.4

Figure 2.2-2: Transmission System SLD



2.2.1 Poplar Hill 790S

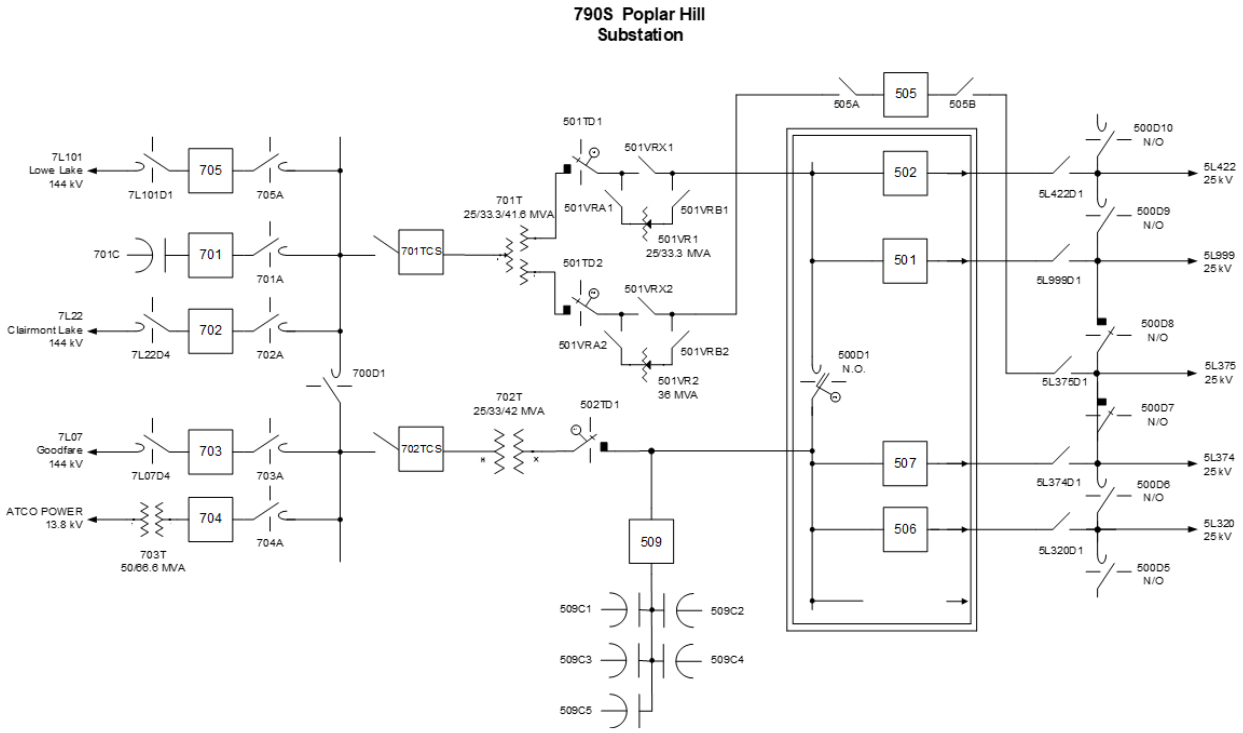
Poplar Hill 790S is located roughly 27 km northwest of the City of Grande Prairie. The legal land description of Poplar Hill 790S is NW19-73-8-W6.

Currently Poplar Hill 790S is equipped with one 25/33.3/41.7 MVA transformer (701T), one 25/33/41.7 MVA transformer (702T), one 25/33.3 MVA voltage regulator (501VR1), one 36 MVA voltage regulator (501VR2), and five 25 kV breakers. Figure 2.2-3 shows the single line diagram (SLD) for Poplar Hill 790S. The load forecast has load growth from existing customers built into all feeder forecasts except for feeder 5L375 as it serves primarily industrial loads (99.5%).

Table 5.1-1 in Appendix A shows the load forecast for Poplar Hill 790S without load requests.

There is a 13.1 MW synchronous DER on 5L375 and a 7.7 MW non-export synchronous DER on 5L999 for Poplar Hill 790S.

Figure 2.2-3: Poplar Hill 790S SLD



2.2.2 Goodfare 815S

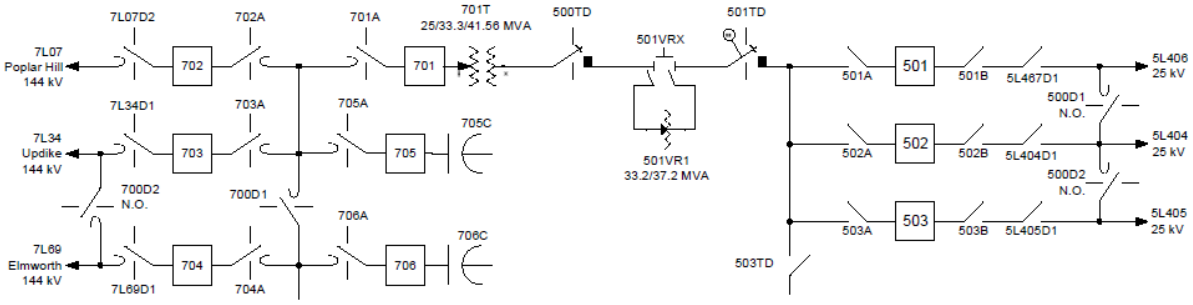
Goodfare 815S is located roughly 5.3 km southwest of the Village of Hythe. The legal land description of Goodfare 815S is NW34-72-11-W6.

Currently Goodfare 815S is equipped with one 25/33.3/41.56 MVA transformer (701T), one 33.2/37.2 MVA voltage regulator (501VR), and three 25 kV breakers. Figure 2.2-4 shows the SLD for Goodfare 815S.

Table 5.1-2 in Appendix A shows the load forecast for Goodfare 815S. The Goodfare 815S load forecast includes customer load requests that are not included in this DDR. The load forecast also has load growth from existing customers built into the forecast totals.

There is a 20 MW BESS DER on 5L405 for Goodfare 815S.

Figure 2.2-4: Goodfare 815S SLD



2.2.3 Saddle Hills 865S

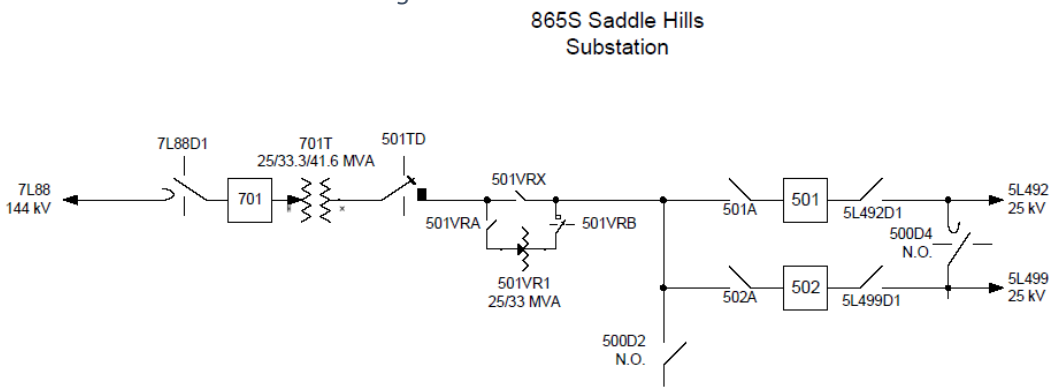
Saddle Hills 865S is located at the legal land description of NE31-74-7-W6.

Currently Saddle Hills 865S is equipped with one 25/33.3/41.6 MVA transformer (701T), one 25/33 MVA voltage regulator (501VR), and two 25 kV breakers. Figure 2.2-5 shows the SLD for Saddle Hills 865S.

Table 5.1-3 in Appendix A shows the load forecast for Saddle Hills 865S. The load forecast has load growth from existing customers built into the forecast totals.

There are no existing or planned distributed generators connected to Saddle Hills 865S.

Figure 2.2-5: Saddle Hills 865S SLD



2.2.4 Mercer Hill 728S

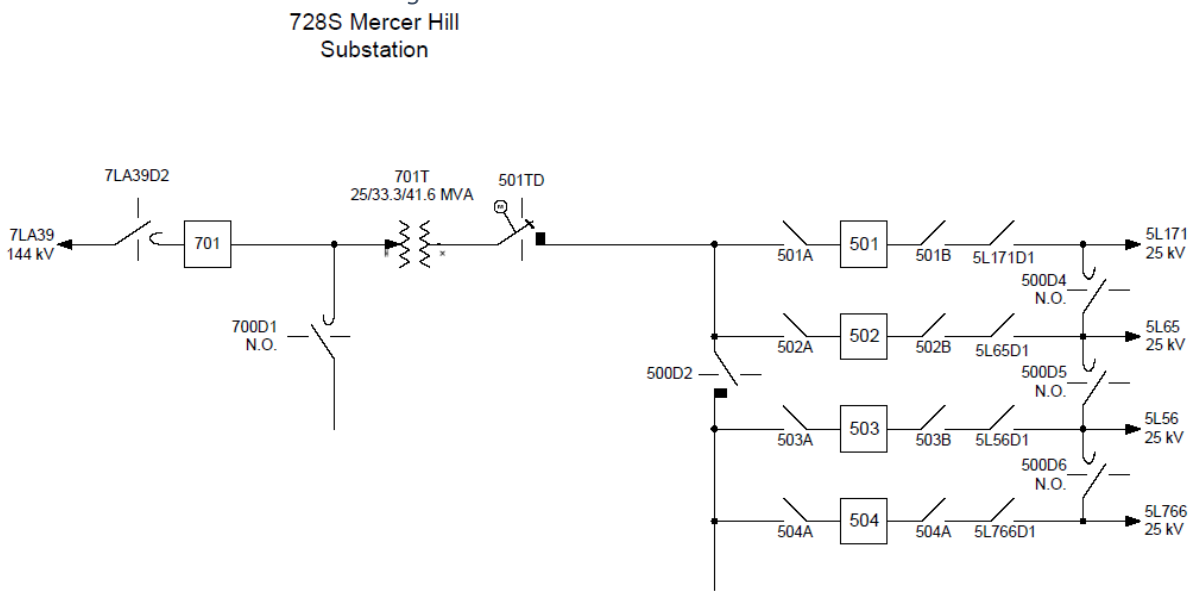
Mercer Hill 728S is located at the legal land description of SW6-73-5-W6.

Currently Mercer Hill 728S is equipped with one 25/33/41.6 MVA transformer (701T) and four 25 kV breakers. Figure 2.2-6 shows the SLD for Mercer Hill 728S.

Table 5.1-4 in Appendix A shows the load forecast for Mercer Hill 728S. The load forecast has no load growth from existing customers built into the forecast totals.

There is a 20 MW BESS DER on 5L56 for Mercer Hill 728S.

Figure 2.2-6: Mercer Hill 728S SLD



2.2.5 Crystal Lake 722S

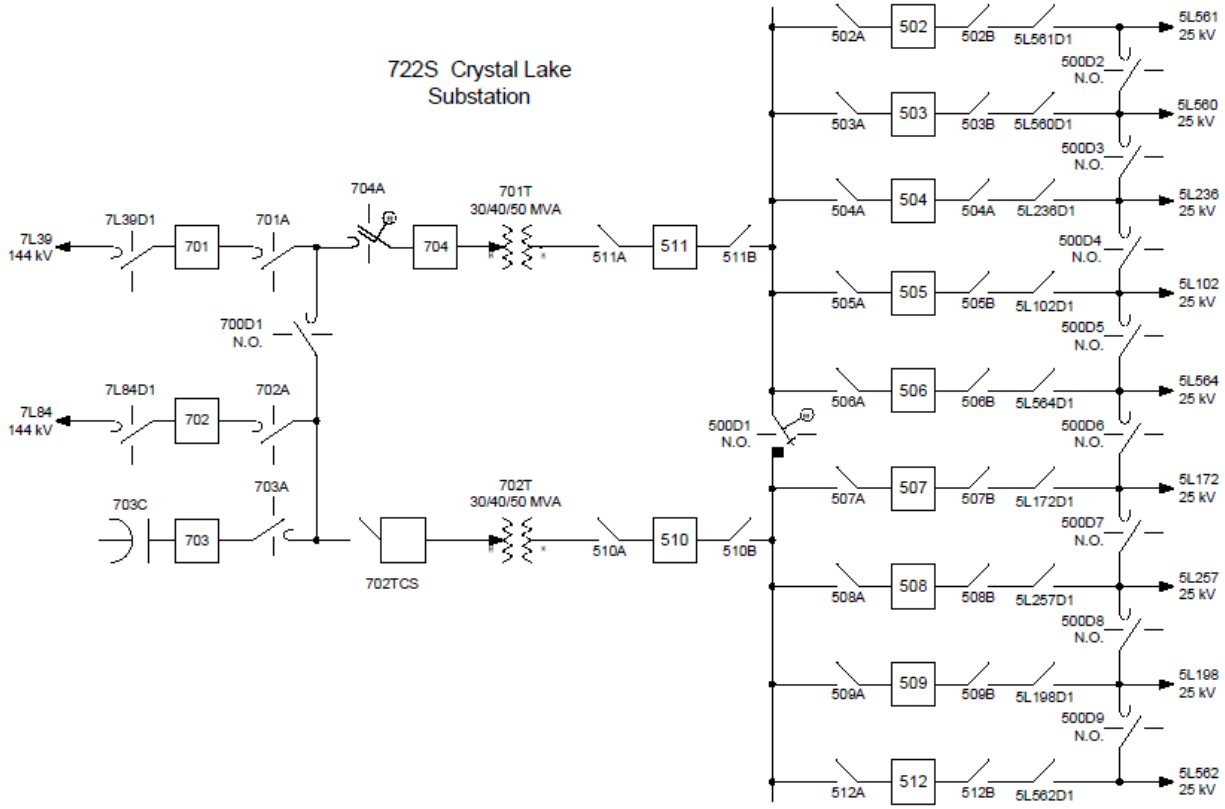
Crystal Lake 722S is located at the legal land description of NE30-71-5-W6 inside the City of Grande Prairie.

Crystal Lake 722S is equipped with two 30/40/50 MVA transformers (701T and 702T) and nine 25 kV breakers. Figure 2.2-7 shows the SLD for Crystal Lake 722S.

Table 5.1-5 in Appendix A shows the load forecast for Crystal Lake 722S. Eight of the Crystal Lake 722S 25 kV breakers are solely urban load for the City of Grande Prairie. The ninth 25 kV breaker 5L198 feeds rural load to the southeast of the City of Grande Prairie. The load forecast has load growth from existing customers built into the forecast totals.

There are no existing or planned distributed generators connected to Crystal Lake 722S.

Figure 2.2-7: Crystal Lake 722S SLD



2.2.6 Flyingshot Lake 749S

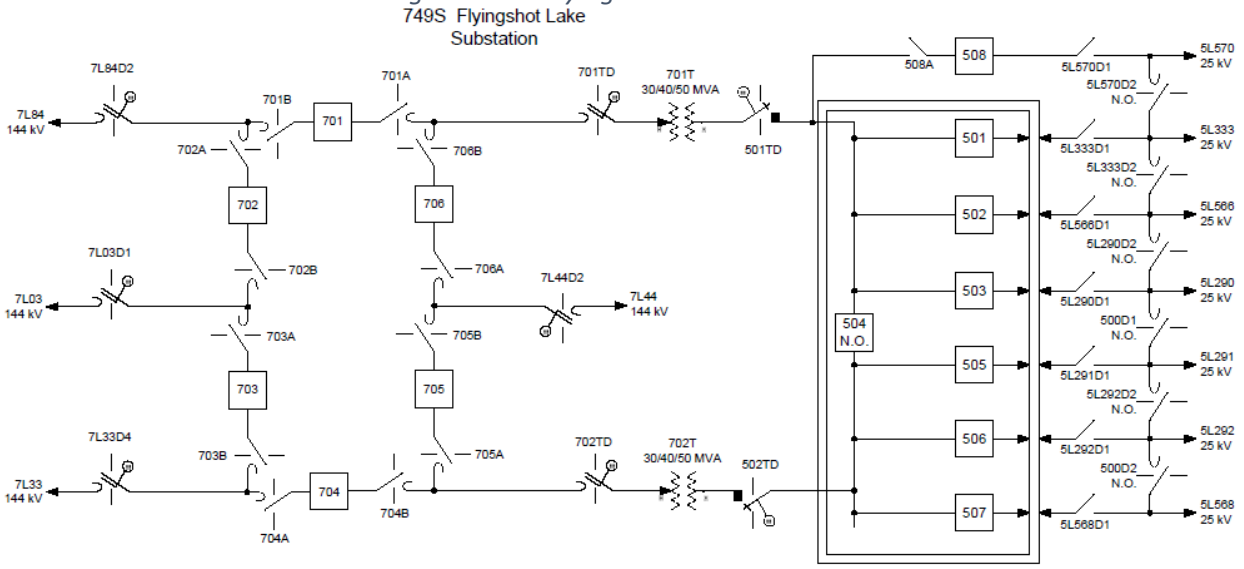
Flyingshot Lake 749S is located at the legal land description of SE9-72-6-W6 inside the City of Grande Prairie.

Flyingshot Lake 749S is equipped with two 30/40/50 MVA transformers (701T and 702T) and seven 25 kV breakers. Figure 2.2-8 shows the SLD for Flyingshot Lake 749S.

Table 5.1-6 in Appendix A shows the load forecast for Flyingshot Lake 749S. Five of the Flyingshot Lake 749S 25 kV breakers are solely urban load for the City of Grande Prairie. The sixth and seventh 25 kV breakers 5L291 and 5L333 feed rural load to the west of the City of Grande Prairie. The load forecast has load growth from existing customers built into the forecast totals.

There is an existing distributed generator connected to Flyingshot Lake 749S; a 4.275 MW synchronous generator connected to feeder 5L333.

Figure 2.2-8: Flyingshot Lake 749S SLD



2.2.7 Updike 886S

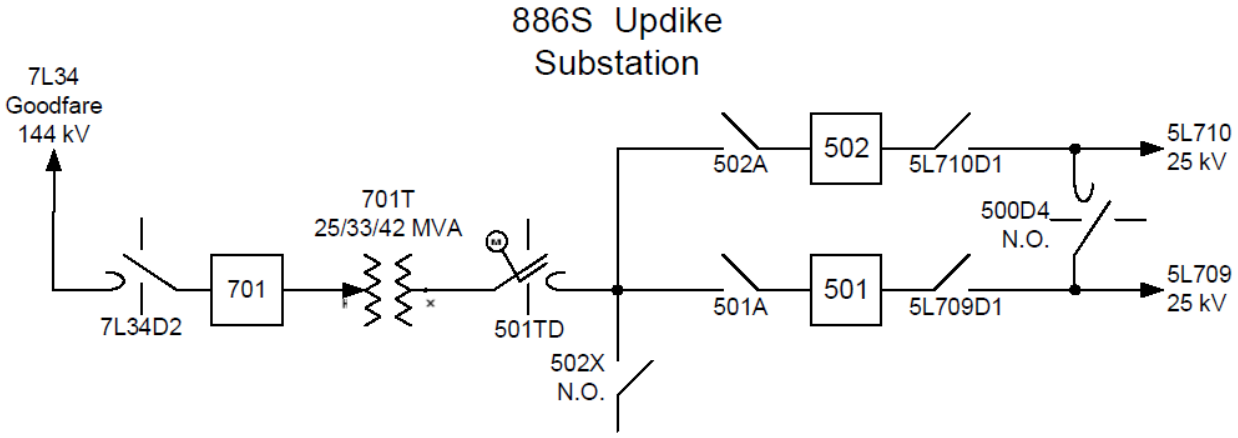
Updike 886S is located at the legal land description of SE18-74-12-W6.

Updike 886S is equipped with one 25/33/42 MVA transformer (701T) and two 25 kV breakers. Figure 2.2-9 shows the SLD for Updike 886S.

Table 5.1-7 in Appendix A shows the load forecast for Updike 886S. The Updike 886S load forecast includes customer load requests that are not included in this DDR. The load forecast has load growth from existing customers built into the forecast totals.

There is an existing distributed generator connected to Updike 886S; a 2.8 MW synchronous generator connected to feeder 5L709.

Figure 2.2-9: Updike 886S SLD



2.2.8 Ksituan River 754S

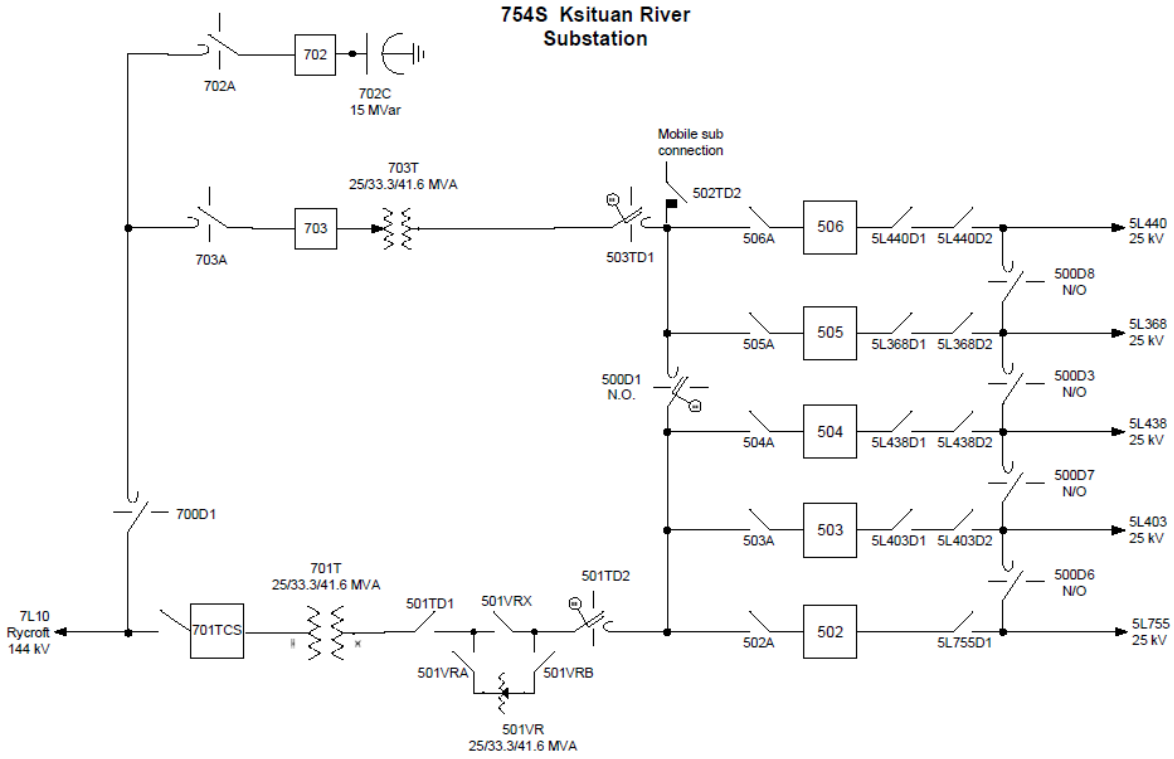
Ksituan River 754S is located at the legal land description of SE1-78-10-W6.

Ksituan River 754S is equipped with two 25/33.3/41.6 MVA transformers (701T and 703T), one 25/33.3/41.6 MVA voltage regulator (501VR), and five 25 kV breakers. Figure 2.2-10 shows the SLD for Ksituan River 754S.

Table 5.1-8 in Appendix A shows the load forecast for Ksituan River 754S. The Ksituan River 754S load forecast includes customer load requests that are not included in this DDR. The load forecast has load growth from existing customers built into the forecast totals.

There is an existing distributed generator connected to Ksituan River 754S; a 0.7 MW synchronous generator connected to feeder 5L755.

Figure 2.2-10: Ksituan River 754S SLD



2.2.9 ATCO's Load Forecast Methodology

ATCO DFO's load forecasting methodology considers a number of factors:

- Historical Trend Load Growth
    - Historical load growth for the area (in %) is reviewed and a conservative load growth factor is applied to future years. Generally ATCO applies an annual growth rate to all feeders based on historical area growth, except for dedicated industrial feeders which have a 0% load growth applied unless specific customer load requests have been received.
- Distributed Energy Resources (DERs)

- ATCO's load forecasts have the DERs' effects removed from the historical data, so DER contributions are not considered in the net load.

2.2.10 Historical Performance Information

As this DDR is driven by load growth, the SAIDI and SAIFI information was not considered to be a driver and will not be considered further.

2.2.11 Restoration Times

Critical load will be restored within 4 hours. Non-critical load will be restored within 24 hours.

As this DDR is driven by load growth, restoration time information was not considered to be a driver and will not be considered further.

3 Alternative Evaluation

3.1 Distribution-Only Alternatives

3.1.1 Distribution-Only Alternative 1: Serve Load from Poplar Hill 790S

As identified in Figure 2.1-1, Poplar Hill 790S distribution system is the closest distribution system to the customer load requests. Table 5.2-1 in Appendix A shows the Poplar Hill 790S forecast with the load requests identified in Table 2.1-1. Figure 6.1-1Figure 6.1-1 in Appendix B shows the load trend for Poplar Hill 790S in 2025.

With the total load requests, overloading at Poplar Hill 790S was identified.

- Looking at Appendix A Table 5.2-1:
  - In 2025:
    - Transformer 701T will be overloaded;
    - Three feeders will be exceeding the ATCO DFO Guideline for Feeder Capacity, shown in the ATCO DFO Distribution Planning Criteria (Appendix C);

Based on the 2025 overloads identified, a distribution-only solution to serve the new load requests from Poplar Hill 790S only is not feasible.

3.1.2 Distribution-Only Alternative 2: Offload Poplar Hill 790S to nearby PODs

Eliminating the capacity violations from Poplar Hill 790S would require offloading approximately 12.1 MVA in 2025. This was determined using the following rationale:

- 702T feeder loading is constrained by ATCO DFO "Rural Feeder Loading", see Appendix C; 5L320 and 5L374 are constrained to 15 MVA each.
  - Appendix A Table 5.2-1 2025: 5L320 requires 3.3 MVA of offload and 5L374 requires 5.5 MVA of offload; a total offloading of 8.8 MVA is required

- 701T loading is constrained by ATCO DFO "POD Capacity Planning – System Normal", see Appendix C: The maximum transformer loading is 95% of 41.7 MVA or 39.6 MVA.
    - Appendix A Table 5.2-1 2025: 701T requires 3.3 MVA offload

In 2025 Saddle Hills 865S and Mercer Hill 728S will be able to offload 4.8 MVA from Poplar Hill 790STable 3.1-1.

Table 3.1-1: Surrounding POD Offloading Capability and Distribution Cost Estimate +50/-30% in 2025$

POD	Offload from Poplar Hill 790S (MVA)	Distribution Cost Estimate ($M 2025)
Ksituan River 754S	0.0	0
Flyingshot Lake 749S	0.0	0
Mercer Hill 728S	0.4	1.33
Saddle Hills 865S	4.4	1.28
Goodfare 815S	0.0	0
Updike 886S	0.0	0
Crystal Lake 722S	0.0	0
TOTAL	**4.8**	**2.61**
Required 790S offloading	**12.1**	**-**
Distribution Capacity Shortfall	**7.3**	**-**

The distribution system offloading would require the following scope of work to be completed in 2025:

- Transferring 0.4 MVA from Poplar Hill 790S 5L374 to Mercer Hill 728S 5L171 in 2025
    - Salvage 7.5 km of distribution line
    - Install 7.6 km of distribution line
    - Distribution cost estimate: $1.33 +50/-30% in 2025$
- Transferring 4.4 MVA from Poplar Hill 790S 5L422 to Saddle Hills 865S 5L492 in 2025
    - Salvage 3.2 km of distribution line
    - Install 3.9 km of distribution line
    - Install two voltage regulators
    - Distribution cost estimate: $1.28 +50/-30% in 2025$

The total Distribution cost estimate for this alternative is $2.61 +50/-30% in 2025$ and is detailed in Table 3.1-1.

As there is not enough distribution system capacity from the surrounding PODs to prevent overloading at Poplar Hill 790S, this alternative to offload Poplar Hill 790S to the surrounding PODs is not a feasible solution and will not be investigated further.

3.2 Alternatives That Include Transmission

3.2.1 Transmission-Based Alternative 1: Install new 25 kV breaker and feeder at Poplar Hill 790S and Offload Poplar Hill 790S to the surrounding PODs

Transmission-Based Alternative 1 involves the following at Poplar Hill 790S:

- offloading Poplar Hill 790S to the surrounding PODs;
- install one new 25 kV switchgear breaker in the existing spare switchgear bay[1] which will be supplied via 702T.

Appendix D – ATCO TFO Information: Previous Letter on file with AESO Regarding Poplar Hill 790S indicates that it is not feasible to get new connections into Poplar Hill 790S, which precludes this Alternative's requirement of a new 25 kV breaker and feeder into the substation.

ATCO DFO has ruled out this alternative based on the inability to expand Poplar Hill 790S outlined above.

3.2.2 Transmission-Based Alternative 2: Increase Capacity at Poplar Hill 790S

Transmission-Based Alternative 2 involves the following at Poplar Hill 790S:

- Replace 701T and 702T with higher capacity transformers;
- Install four (4) new 25 kV breakers for four (4) new 25 kV feeders

Pipeline contraints near the Poplar Hill 790S substation preclude the installation of the additional distrbution feeders necessary for this alternative. Refer to Appendix D for area TFO previous notification to the AESO on constraints with the Poplar Hill 790S substation.

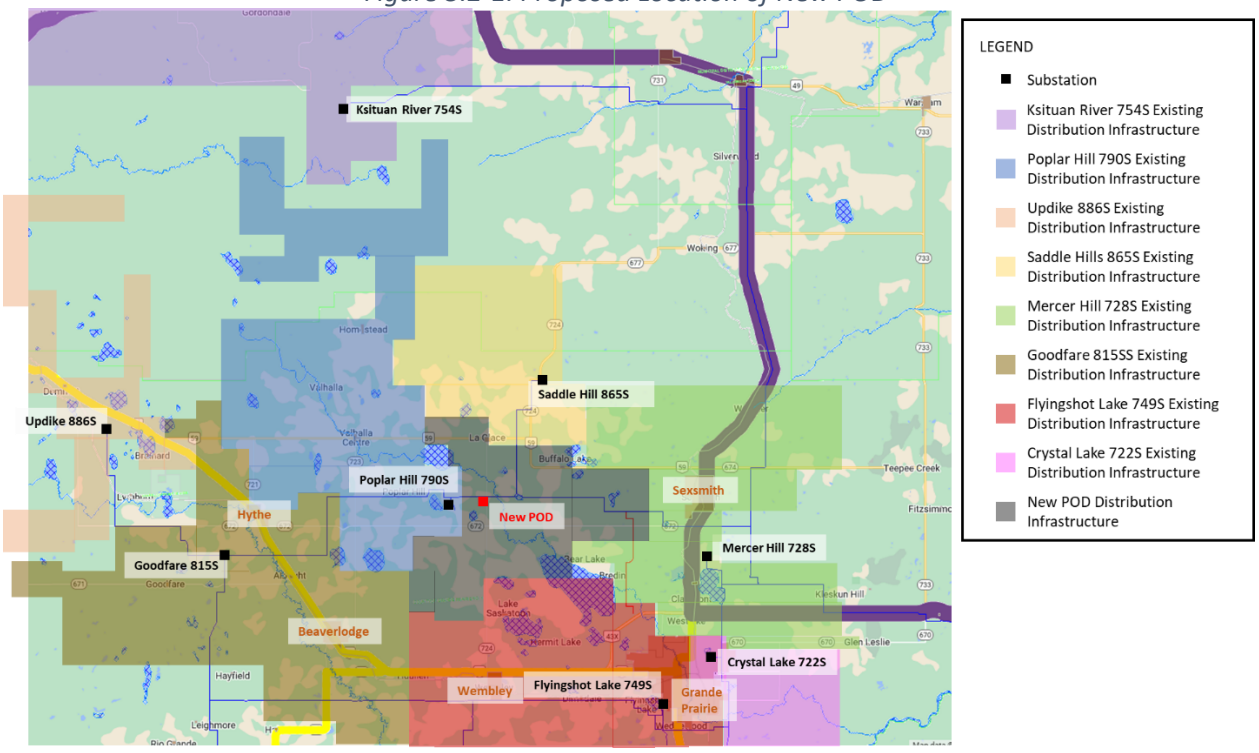
ATCO DFO has ruled out this alternative based on the inability to expand Poplar Hill 790S outlined above.

3.2.3 Transmission-Based Alternative 3: Construct a new POD

The assumed transmission development for this alternative involves constructing a new transmission connection and a new POD at NW-21-73-8-W6. Figure 3.2-1 shows the proposed location of the new POD.

[1] Area TFO has indicated that the switchgear required for this work is out of production.

Figure 3.2-1: Proposed Location of New POD



ATCO DFO requests the following equipment for the new POD:

- One transformer with a minimum capacity of 23.2 MVA (22.0 MVA plus 1.2 MVA of load growth room, as per ATCO DFO planning criteria "POD Capacity Planning – System Normal", see Appendix C); and
- Three 25 kV breakers and feeders.

Appendix A Section 5.3 shows the load forecasts for Transmission-Alternative 3.

The transmission service is requested by May 2026 for this alternative.

The total Distribution cost estimate for this transmission alternative is $4.525M +50/-30% in 2023$.

The transmission line connection from the new POD to the AIES will be assessed and determined by AESO and the area TFO.

3.3 Evaluation of Transmission Alternatives

ATCO DFO assessment of the transmission alternatives is provided below:

- Transmission-Based Alternative 1 is discounted due to ATCO DFO concerns with obtaining access to Poplar Hill 790S for the additional feeder due to the surrounding constraints as well as concerns with utilizing the existing spare breaker bay.
- Transmission-Based Alternative 2 will require four (4) new feeders to connect into Poplar Hill 790S. ATCO DFO is precluded from obtaining access to Poplar Hill 790S for the additional feeders due to the surrounding constraints. ATCO DFO has ruled out this alternative based on the inability to expand Poplar Hill 790S.

- Transmission-Based Alternative 3 is ATCO DFOs preferred transmission alternative. It allows development of the Poplar Hill area while facilitating serving other area customers from the existing Poplar Hill 790S substation.

Table 3.3-1: Transmission Alternatives Distribution Cost Estimates in 2019$ (+50/-30%)

Transmission Alternative		Distribution Cost Estimate ($M 2023)
#	Alternative Name/Description	
1	Install new 25 kV breaker and feeder at Poplar Hill 790S and Offload Poplar Hill 790S to the surrounding PODs	N/A[N1]
2	Increase Capacity at Poplar Hill 790S	N/A[N1]
3	Construct a New POD	4.525

N1: Costs were not provided for Transmission Alternatives 1 and 2 as they are not viable.

4 Conclusion

ATCO DFO prefers Transmission-Based Alternative 3 as it provides more capacity for the Poplar Hill area than Transmission-Based Alternatives 1 and 2, and these alternatives are not technically viable due to physical constraints that preclude expansion of the existing Poplar Hill 790S substation.

ATCO DFO suggests the new POD be developed near NW-21-73-8-W6. ATCO DFO requests the new transmission service by May 2026.

5 Appendix A – POD Load Forecast Tables

5.1 Existing Forecasts

Table 5.1-1: Poplar Hill 790S Load Forecast

					MVA LOADING - RECORDED						PREDICTED - Required Capacity									
				W	2020/2021	2021/2022	2022/2023	2023/2024	2024/2025		2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
SUB		CAPACITY		or	Peak	Peak	Peak	Peak	Peak		Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak
No	Feeder	T/R	MVA	S	MVA	MVA	MVA	MVA	MVA	PF	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA
790S	5L999	701T	41.7	W		4.1	4.6	3.7	14.3	91.7%	14.4	14.6	14.8	14.9	15.1	15.2	15.3	15.5	15.6	15.8
	5L375			W	15.6	16.0	16.0	16.5	16.3	87.9%	16.3	16.3	16.3	16.3	16.3	16.3	16.3	16.3	16.3	16.3
	5L422			W	7.8	9.2	9.2	9.9	11.3	91.4%	11.3	11.5	11.7	11.8	11.9	12.0	12.1	12.2	12.3	12.5
			701T Total		26.6	35.6	38.7	29.1	41.6		41.6	42.1	42.3	42.6	42.9	43.1	43.4	43.6	43.9	44.1
790S	5L320	702T	41.7	S	5.6	13.7	14.5	15.6	18.2	94.1%	18.3	18.6	18.8	19.0	19.1	19.3	19.5	19.7	19.9	20.1
	5L374			S	11.8	20.0	14.8	16.7	19.4	97.6%	19.4	19.8	20.0	20.2	20.4	20.6	20.8	21.0	21.1	21.3
			702T Total		12.7	17.6	18.8	31.7	33.9		34.0	34.6	35.0	35.3	35.6	36.0	36.3	36.7	37.0	37.3
			790S Total		37.9	52.0	53.8	60.6	74.1		74.2	75.3	75.9	76.5	77.0	77.6	78.2	78.8	79.4	80.0

Notes:
In 2020/2021 feeder 5L422 was moved from 702T to 701T
In 2023/2024 feeders 5L374 and 5L999 were swapped between 702T to 701T
A feeder coincidence factor of 0.991 was applied to 722S 701T feeders
A feeder coincidence factor of 0.902 was applied to 722S 702T feeders
A transformer coincidence factor of 0.981 was applied to 701T and 702T
Feeder 5L375 is an express industrial feeder

Load Transfers			
MVA	From	To	Year
2.9	5L374	5L406 - 815S	2025
1.0	5L405 - 815S	5L374	2024

Distribution Planning Criteria Violation
Transformer Overload
Transformer Exceeding 95% Nameplate

Table 5.1-2: Goodfare 815S Load Forecast

					MVA LOADING - RECORDED						PREDICTED - Required Capacity									
				W	2020/2021	2021/2022	2022/2023	2023/2024	2024/2025		2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
SUB		CAPACITY		or	Peak	Peak	Peak	Peak	Peak		Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak
No	Feeder	T/R	MVA	S	MVA	MVA	MVA	MVA	MVA	PF	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA
815S	5L404	701T	41.6	W	2.7	2.5	2.5	2.5	2.1	97.2%	2.1	2.2	2.2	2.2	2.2	2.2	2.3	2.3	2.3	2.3
	5L405			W	13.2	15.2	17.1	15.4	15.0	94.8%	17.0	17.2	16.0	16.2	16.3	16.5	16.6	16.8	16.9	17.1
	5L406			W	4.0	3.7	3.6	3.8	4.5	97.0%	13.3	13.3	13.4	13.4	13.5	13.5	13.6	13.6	13.6	13.7
			815S Total		19.0	21.0	22.4	21.0	19.7		29.5	29.8	28.8	29.0	29.2	29.4	29.6	29.8	30.0	30.2

Notes:
A feeder coincidence factor of 0.976 was applied to 815S 701T feeders

Load Transfers			
MVA	From	To	Year
2.9	5L374 - 790S	5L406	2025
1.3	5L405	5L333 - 749S	2026
1.0	5L405	5L374 - 790S	2024

Distribution Planning Criteria Violation

Table 5.1-3: Saddle Hills 865S Load Forecast

					MVA LOADING - RECORDED						PREDICTED - Required Capacity									
				W	2020/2021	2021/2022	2022/2023	2023/2024	2024/2025		2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
SUB		CAPACITY		or	Peak	Peak	Peak	Peak	Peak		Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak
No	Feeder	T/R	MVA	S	MVA	MVA	MVA	MVA	MVA	PF	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA
865S	5L492	701T	33.3	W	6.3	5.1	5.1	5.2	4.7	98.7%	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7
	5L499			W	22.9	22.6	23.1	22.5	22.9	93.8%	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9
			865S Total		27.0	26.4	28.2	27.7	24.9		24.9	24.9	24.9	24.9	24.9	24.9	24.9	24.9	24.9	24.9

Notes:
A feeder coincidence factor of 0.902 was applied to 865S 701T feeders
Since feeder 5L499 has 100% industrial loading it is not constrained by the rural feeder loading limit of 15 MVA.

Table 5.1-4: Mercer Hill 728S Load Forecast

					MVA LOADING - RECORDED						PREDICTED - Required Capacity									
				W	2020/2021	2021/2022	2022/2023	2023/2024	2024/2025		2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
SUB		CAPACITY		or	Peak	Peak	Peak	Peak	Peak		Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak
No	Feeder	T/R	MVA	S	MVA	MVA	MVA	MVA	MVA	PF	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA
728S	5L171	701T	41.6	W	7.9	7.5	10.4	8.2	7.8	99.7%	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8
	5L56			W	8.6	8.5	10.4	9.6	10.1	99.9%	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1
	5L65			W	5.4	4.8	9.4	8.4	8.5	99.9%	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5
	5L766			W	0.7	0.7	0.8	0.8	0.9	100.0%	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
			728S Total		21.6	19.5	29.0	25.2	25.6		25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6

Notes:
A feeder coincidence factor of 0.935 was applied to 728S 701T feeders

Table 5.1-5: Crystal Lake 722S Load Forecast

					MVA LOADING - RECORDED						PREDICTED - Required Capacity									
				W	2020/2021	2021/2022	2022/2023	2023/2024	2024/2025		2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
SUB		CAPACITY		or	Peak	Peak	Peak	Peak	Peak		Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak
No	Feeder	T/R	MVA	S	MVA	MVA	MVA	MVA	MVA	PF	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA
722S	5L102	701T	50	S	5.6	6.5	5.4	6.0	7.4	98.4%	7.4	7.6	7.7	7.7	7.8	7.9	8.0	8.0	8.1	8.2
	5L236			S	14.0	15.5	11.5	11.3	12.4	96.7%	12.4	12.7	12.8	12.9	13.0	13.2	13.3	13.4	13.5	13.7
	5L560			S	4.1	4.2	4.1	4.5	4.5	99.5%	4.5	4.6	4.6	4.7	4.7	4.8	4.8	4.9	4.9	5.0
	5L561			W	5.3	5.6	5.7	5.2	5.3	100.0%	5.3	5.4	5.4	5.5	5.5	5.6	5.6	5.7	5.7	5.8
	5L564			W	5.7	5.7	5.7	4.8	5.5	99.3%	5.5	5.6	5.6	5.7	5.7	5.8	5.8	5.9	6.0	6.0
			701T Total		33.5	35.6	31.8	28.3	33.1		33.1	33.8	34.1	34.5	34.8	35.1	35.5	35.8	36.1	36.4
722S	5L172	702T	50	S	5.2	5.5	4.6	4.4	5.5	98.5%	5.5	5.6	5.7	5.7	5.8	5.9	5.9	6.0	6.0	6.1
	5L198			S	6.6	5.8	5.7	5.4	5.6	99.3%	5.6	5.7	5.8	5.8	5.9	6.0	6.0	6.1	6.1	6.2
	5L257			S	9.6	10.8	10.2	11.6	10.7	96.5%	10.7	10.9	11.0	11.1	11.2	11.3	11.5	11.6	11.7	11.8
	5L562			S	2.9	3.4	2.4	3.0	3.3	93.7%	3.3	3.4	3.4	3.5	3.5	3.5	3.6	3.6	3.6	3.7
			702T Total		23.1	23.7	22.3	22.2	24.4		24.4	24.9	25.2	25.4	25.7	25.9	26.2	26.4	26.6	26.9
			722S Total		55.5	58.5	53.2	48.7	57.6		57.6	58.7	59.3	59.9	60.4	61.0	61.6	62.2	62.7	63.3

Notes:
A feeder coincidence factor of 0.945 was applied to 722S 701T feeders
A feeder coincidence factor of 0.971 was applied to 722S 702T feeders
A transformer coincidence factor of 0.9999 was applied to 701T and 702T

Distribution Planning Criteria Violation

Table 5.1-6: Flyingshot Lake 749S Load Forecast

					MVA LOADING - RECORDED						PREDICTED - Required Capacity									
				W	2020/2021	2021/2022	2022/2023	2023/2024	2024/2025		2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
SUB		CAPACITY		or	Peak	Peak	Peak	Peak	Peak		Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak
No	Feeder	T/R	MVA	S	MVA	MVA	MVA	MVA	MVA	PF	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA
749S	5L290	701T	50	S	3.7	4.0	4.0	4.2	4.0	96.1%	4.0	4.0	4.1	4.1	4.2	4.2	4.2	4.3	4.3	4.4
	5L333			W	10.5	11.7	11.4	12.2	11.2	99.1%	14.5	14.7	14.8	15.0	15.1	15.2	15.3	15.4	15.5	15.6
	5L566			W	7.4	8.1	10.2	7.4	7.6	98.9%	8.5	8.6	8.7	8.8	8.9	8.9	9.0	9.1	9.2	9.2
	5L570			W	7.7	7.6	7.7	7.6	7.5	97.3%	7.5	7.6	7.7	7.8	7.9	7.9	8.0	8.1	8.2	8.2
			701T Total		28.1	26.3	28.8	26.6	28.3		32.3	32.8	33.1	33.4	33.7	34.0	34.3	34.5	34.8	35.1
749S	5L291	702T	50	W	9.9	11.0	10.9	11.1	10.8	100.0%	10.8	11.0	11.1	11.2	11.3	11.4	11.5	11.6	11.7	11.9
	5L292			S	6.6	6.8	6.7	6.5	7.6	97.3%	14.4	14.5	14.6	14.7	14.7	14.8	14.9	15.0	15.1	15.1
	5L568			W	8.7	9.6	9.5	10.1	9.6	99.7%	9.6	9.8	9.9	10.0	10.1	10.2	10.3	10.3	10.4	10.5
			702T Total		25.9	25.5	26.9	27.6	27.1		33.6	34.1	34.4	34.7	34.9	35.2	35.5	35.8	36.0	36.3
			749S Total		52.8	47.6	54.5	48.8	53.6		63.7	64.7	65.3	65.8	66.4	66.9	67.4	68.0	68.5	69.0

Notes:
A feeder coincidence factor of 0.937 was applied to 749S 701T feeders
A feeder coincidence factor of 0.967 was applied to 749S 702T feeders
A transformer coincidence factor of 0.967 was applied to 701T and 702T

Load Transfers			
MVA	From	To	Year
1.3	5L405 - 815S	5L333	2025

Distribution Planning Criteria Violation

Table 5.1-7: Updike 886S Load Forecast

Updike 886S

					MVA LOADING - RECORDED						PREDICTED - Required Capacity									
				W	2020/2021	2021/2022	2022/2023	2023/2024	2024/2025		2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
SUB		CAPACITY		or	Peak	Peak	Peak	Peak	Peak		Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak
No	Feeder	T/R	MVA	S	MVA	MVA	MVA	MVA	MVA	PF	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA
886S	5L709	701T	42		5.2	11.1	12.2	11.6	11.5	95.4%	11.6	11.8	16.3	16.4	16.5	16.7	16.8	16.9	17.0	17.1
	5L710				18.7	18.2	18.9	17.9	18.3	87.1%	18.4	18.7	18.9	19.1	19.3	19.4	19.6	19.8	20.0	20.2
			701T Total		21.9	26.3	28.8	29.0	29.0		29.1	29.6	34.2	34.5	34.7	35.0	35.3	35.6	35.9	36.2
			886S Total		21.9	26.3	28.8	29.0	29.0		29.1	29.6	34.2	34.5	34.7	35.0	35.3	35.6	35.9	36.2

Notes:
A feeder coincidence factor of 0.970 was applied to 886S 701T feeders.

Distribution Planning Criteria Violation

Table 5.1-8: Ksituan River 754S Load Forecast

					MVA LOADING - RECORDED						PREDICTED - Required Capacity									
				W	2020/2021	2021/2022	2022/2023	2023/2024	2024/2025		2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
SUB		CAPACITY		or	Peak	Peak	Peak	Peak	Peak		Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak
No	Feeder	T/R	MVA	S	MVA	MVA	MVA	MVA	MVA	PF	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA
754S	5L403	701T	41.6	W	11.3	11.9	11.9	12.8	8.3	97.3%	5.5	5.9	6.0	6.1	6.2	6.2	6.3	6.4	6.5	6.6
	5L438			S	7.7	8.4	8.6	8.7	8.7	99.8%	8.7	8.6	8.6	8.7	8.8	8.9	9.0	9.1	9.2	9.3
	5L755			W	6.1	6.5	7.7	6.5	12.9	95.0%	13.0	21.5	21.6	21.7	21.9	22.0	22.1	22.2	22.4	22.5
			701T Total		22.8	24.3	26.1	25.9	28.4		25.7	34.1	34.3	34.6	34.9	35.2	35.5	35.8	36.0	36.3
754S	5L368	703T	41.6	W	14.3	15.0	15.5	16.1	17.3	88.3%	17.3	17.3	17.3	17.3	17.3	17.3	17.3	17.3	17.3	17.3
	5L440			W	6.4	4.9	6.3	5.1	4.7	98.1%	9.1	9.2	15.7	15.7	15.8	15.8	15.9	15.9	16.0	16.0
			703T Total		19.2	19.4	20.8	20.3	22.0		26.3	26.4	32.9	33.0	33.0	33.1	33.1	33.2	33.2	33.3
				754S Total	22.8	42.5	44.3	43.6	46.2		47.8	55.5	61.8	62.1	62.4	62.7	63.0	63.3	63.6	63.9

Notes:
A feeder coincidence factor of 0.948 was applied to 754S 701T feeders
A feeder coincidence factor of 0.999 was applied to 754S 703T feeders
A transformer coincidence factor of 0.918 was applied to 701T and 703T

Distribution Planning Criteria Violation

Load Transfers			
MVA	From	To	Year
4.0	5L403	5L776 - 2033S	2025
12.6	5L403	5L755	2025
9.1	5L440	5L776 - 2033S	2025
12.6	5L755	5L440	2025
1.7	5L438	5L755	2026

5.2 Distribution-Based Alternative 1

Table 5.2-1: Poplar Hill 790S Load Forecast with Load Requests

					MVA LOADING - RECORDED						PREDICTED - Required Capacity									
				W	2020/2021	2021/2022	2022/2023	2023/2024	2024/2025		2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
SUB		CAPACITY		or	Peak	Peak	Peak	Peak	Peak		Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak
No	Feeder	T/R	MVA	S	MVA	MVA	MVA	MVA	MVA	PF	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA
790S	5L999	701T	41.7	W		4.1	4.6	3.7	14.3	91.7%	14.4	14.6	14.8	14.9	15.1	15.2	15.3	15.5	15.6	15.8
	5L375			W	15.6	16.0	16.0	16.5	16.3	87.9%	16.3	16.3	16.3	16.3	16.3	16.3	16.3	16.3	16.3	16.3
	5L422			W	7.8	9.2	9.2	9.9	11.3	91.4%	12.6	12.8	12.9	13.1	13.2	13.3	13.4	13.5	13.6	13.7
			701T Total		26.6	35.6	38.7	29.1	41.6		42.9	43.4	43.6	43.9	44.1	44.4	44.6	44.9	45.2	45.4
790S	5L320	702T	41.7	S	5.6	13.7	14.5	15.6	18.2	94.1%	18.3	18.6	18.8	19.0	19.1	19.3	19.5	19.7	19.9	20.1
	5L374			S	11.8	20.0	14.8	16.7	19.4	97.6%	20.5	20.9	21.1	21.3	21.5	21.7	21.8	22.0	22.2	22.4
			702T Total		12.7	17.6	18.8	31.7	33.9		35.0	35.6	35.9	36.3	36.6	37.0	37.3	37.6	38.0	38.3
			790S Total		37.9	52.0	53.8	60.6	74.1		76.5	77.5	78.1	78.7	79.3	79.8	80.4	81.0	81.6	82.2

Notes:
In 2020/2021 feeder 5L422 was moved from 702T to 701T
In 2023/2024 feeders 5L374 and 5L999 were swapped between 702T to 701T
A feeder coincidence factor of 0.991 was applied to 722S 701T feeders
A feeder coincidence factor of 0.902 was applied to 722S 702T feeders
A transformer coincidence factor of 0.981 was applied to 701T and 702T
Feeder 5L375 is an express industrial feeder

Load Transfers			
MVA	From	To	Year
2.0	5L422	5L374	2025
2.9	5L374	5L406 - 815S	2025
1.0	5L405 - 815S	5L374	2024

Distribution Planning Criteria Violation
Transformer Overload
Transformer Exceeding 95% Nameplate

5.3 Transmission-Based Alternative 3

Table 5.3-1: Poplar Hill 790S Forecast for Transmission-Based Alternative 3

					MVA LOADING - RECORDED						PREDICTED - Required Capacity									
				W	2020/2021	2021/2022	2022/2023	2023/2024	2024/2025		2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
SUB		CAPACITY		or	Peak	Peak	Peak	Peak	Peak		Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak
No	Feeder	T/R	MVA	S	MVA	MVA	MVA	MVA	MVA	PF	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA
790S	5L999	701T	41.7	W		4.1	4.6	3.7	14.3	91.7%	14.4	9.9	10.1	10.3	10.5	10.7	10.8	11.0	11.2	11.4
	5L375			W	15.6	16.0	16.0	16.5	16.3	87.9%	16.3	16.3	16.3	16.3	16.3	16.3	16.3	16.3	16.3	16.3
	5L422			W	7.8	9.2	9.2	9.9	11.3	91.4%	12.6	10.4	10.5	10.7	10.8	10.9	11.0	11.1	11.2	11.3
			701T Total		26.6	35.6	38.7	29.1	41.6		42.9	36.3	36.6	36.9	37.2	37.5	37.8	38.1	38.4	38.7
790S	5L320	702T	41.7	S	5.6	13.7	14.5	15.6	18.2	94.1%	18.3	18.6	18.8	19.0	19.1	19.3	19.5	19.7	19.9	20.1
	5L374			S	11.8	20.0	14.8	16.7	19.4	97.6%	20.5	14.6	14.8	14.9	15.1	15.2	15.3	15.5	15.6	15.8
			702T Total		12.7	17.6	18.8	31.7	33.9		35.0	30.0	30.3	30.6	30.9	31.1	31.4	31.7	32.0	32.3
			790S Total		37.9	52.0	53.8	60.6	74.1		76.5	65.4	66.0	66.6	67.2	67.8	68.4	68.9	69.5	70.1

Notes:
In 2020/2021 feeder 5L422 was moved from 702T to 701T
In 2023/2024 feeders 5L374 and 5L999 were swapped between 702T to 701T
In 2026 feeders 5L374 and 5L999 were swapped between 702T and 701T
A feeder coincidence factor of 0.991 was applied to 722S 701T feeders
A feeder coincidence factor of 0.902 was applied to 722S 702T feeders
A transformer coincidence factor of 0.981 was applied to 701T and 702T
Feeder 5L375 is an express industrial feeder

Distribution Planning Criteria Violation
Transformer Overload
Transformer Exceeding 95% Nameplate

Load Transfers			
MVA	From	To	Year
2.0	5L422	5L374	2025
2.9	5L374	5L406 - 815S	2025
1.0	5L405 - 815S	5L374	2024
2.4	5L422	5LNEW1	2026
7.0	5L374	5LNEW2	2026
4.1	5L374	5LNEW3	2026
4.1	5L374	5LNEW3	2026

Table 5.3-2: New POD Forecast for Transmission-Based Alternative 3

					MVA LOADING - RECORDED						PREDICTED - Required Capacity									
				W	2020/2021	2021/2022	2022/2023	2023/2024	2024/2025		2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
SUB		CAPACITY		or	Peak	Peak	Peak	Peak	Peak		Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak
No	Feeder	T/R	MVA	S	MVA	MVA	MVA	MVA	MVA	PF	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA
New POD	5LNEW1	701T	50	W						90.0%		2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6
	5LNEW2			W						90.0%		14.9	14.9	14.9	14.9	14.9	14.9	14.9	14.9	14.9
	5LNEW3			W						90.0%		4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
			New POD Total									22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0

Notes:
A feeder coincidence factor of 1.0 was applied to New POD 701T feeders

Load Transfers			
MVA	From	To	Year
2.4	5L422	5LNEW1	2026
0.2	5L492	5LNEW1	2026
7.0	5L374	5LNEW2	2026
6.6	5L171	5LNEW2	2026
1.3	5L291	5LNEW2	2026
4.1	5L374	5LNEW3	2026
0.4	5L171	5LNEW3	2026

Table 5.3-3: Saddle Hills 865S Forecast for Transmission-Based Alternative 3

					MVA LOADING - RECORDED						PREDICTED - Required Capacity									
				W	2020/2021	2021/2022	2022/2023	2023/2024	2024/2025		2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
SUB		CAPACITY		or	Peak	Peak	Peak	Peak	Peak		Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak
No	Feeder	T/R	MVA	S	MVA	MVA	MVA	MVA	MVA	PF	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA
865S	5L492	701T	33.3	W	6.3	5.1	5.1	5.2	4.7	98.7%	4.7	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
	5L499			W	22.9	22.6	23.1	22.5	22.9	93.8%	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9	22.9
			865S Total		27.0	26.4	28.2	27.7	24.9		24.9	24.8	24.8	24.8	24.8	24.8	24.8	24.8	24.8	24.8

Notes:
A feeder coincidence factor of 0.902 was applied to 865S 701T feeders
Since feeder 5L499 has 100% industrial loading it is not constrained by the rural feeder loading limit of 15 MVA.

Load Transfers			
MVA	From	To	Year
0.2	5L492	5LNEW1	2026

Table 5.3-4: Mercer Hill 728S Forecast for Transmission-Based Alternative 3

					MVA LOADING - RECORDED						PREDICTED - Required Capacity									
				W	2020/2021	2021/2022	2022/2023	2023/2024	2024/2025		2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
SUB		CAPACITY		or	Peak	Peak	Peak	Peak	Peak		Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak
No	Feeder	T/R	MVA	S	MVA	MVA	MVA	MVA	MVA	PF	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA
728S	5L171	701T	41.6	W	7.9	7.5	10.4	8.2	7.8	99.7%	7.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
	5L56			W	8.6	8.5	10.4	9.6	10.1	99.9%	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1	10.1
	5L65			W	5.4	4.8	9.4	8.4	8.5	99.9%	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5
	5L766			W	0.7	0.7	0.8	0.8	0.9	100.0%	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
			728S Total		21.6	19.5	29.0	25.2	25.6		25.6	19.1	19.1	19.1	19.1	19.1	19.1	19.1	19.1	19.1

Notes:
A feeder coincidence factor of 0.935 was applied to 728S 701T feeders

Load Transfers			
MVA	From	To	Year
6.6	5L171	5LNEW2	2026
0.4	5L171	5LNEW3	2026

Table 5.3-5: Flyingshot 749S Forecast for Transmission-Based Alternative 3

					MVA LOADING - RECORDED						PREDICTED - Required Capacity									
				W	2020/2021	2021/2022	2022/2023	2023/2024	2024/2025		2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
SUB		CAPACITY		or	Peak	Peak	Peak	Peak	Peak		Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak
No	Feeder	T/R	MVA	S	MVA	MVA	MVA	MVA	MVA	PF	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA
749S	5L290	701T	50	S	3.7	4.0	4.0	4.2	4.0	96.1%	4.0	4.0	4.1	4.1	4.2	4.2	4.2	4.3	4.3	4.4
	5L333			W	10.5	11.7	11.4	12.2	11.2	99.1%	14.5	14.7	14.8	15.0	15.1	15.2	15.3	15.4	15.5	15.6
	5L566			W	7.4	8.1	10.2	7.4	7.6	98.9%	8.5	8.6	8.7	8.8	8.9	8.9	9.0	9.1	9.2	9.2
	5L570			W	7.7	7.6	7.7	7.6	7.5	97.3%	7.5	7.6	7.7	7.8	7.9	7.9	8.0	8.1	8.2	8.2
			701T Total		28.1	26.3	28.8	26.6	28.3		32.3	32.8	33.1	33.4	33.7	34.0	34.3	34.5	34.8	35.1
749S	5L291	702T	50	W	9.9	11.0	10.9	11.1	10.8	100.0%	10.8	9.7	9.8	9.9	10.0	10.1	10.2	10.3	10.4	10.6
	5L292			S	6.6	6.8	6.7	6.5	7.6	97.3%	14.4	14.5	14.6	14.7	14.7	14.8	14.9	15.0	15.1	15.1
	5L568			W	8.7	9.6	9.5	10.1	9.6	99.7%	9.6	9.8	9.9	10.0	10.1	10.2	10.3	10.3	10.4	10.5
			702T Total		25.9	25.5	26.9	27.6	27.1		33.6	32.9	33.1	33.4	33.7	34.0	34.2	34.5	34.8	35.0
			749S Total		52.8	47.6	54.5	48.8	53.6		63.7	63.5	64.1	64.6	65.1	65.7	66.2	66.7	67.3	67.8

Notes:
A feeder coincidence factor of 0.937 was applied to 749S 701T feeders
A feeder coincidence factor of 0.967 was applied to 749S 702T feeders
A transformer coincidence factor of 0.967 was applied to 701T and 702T

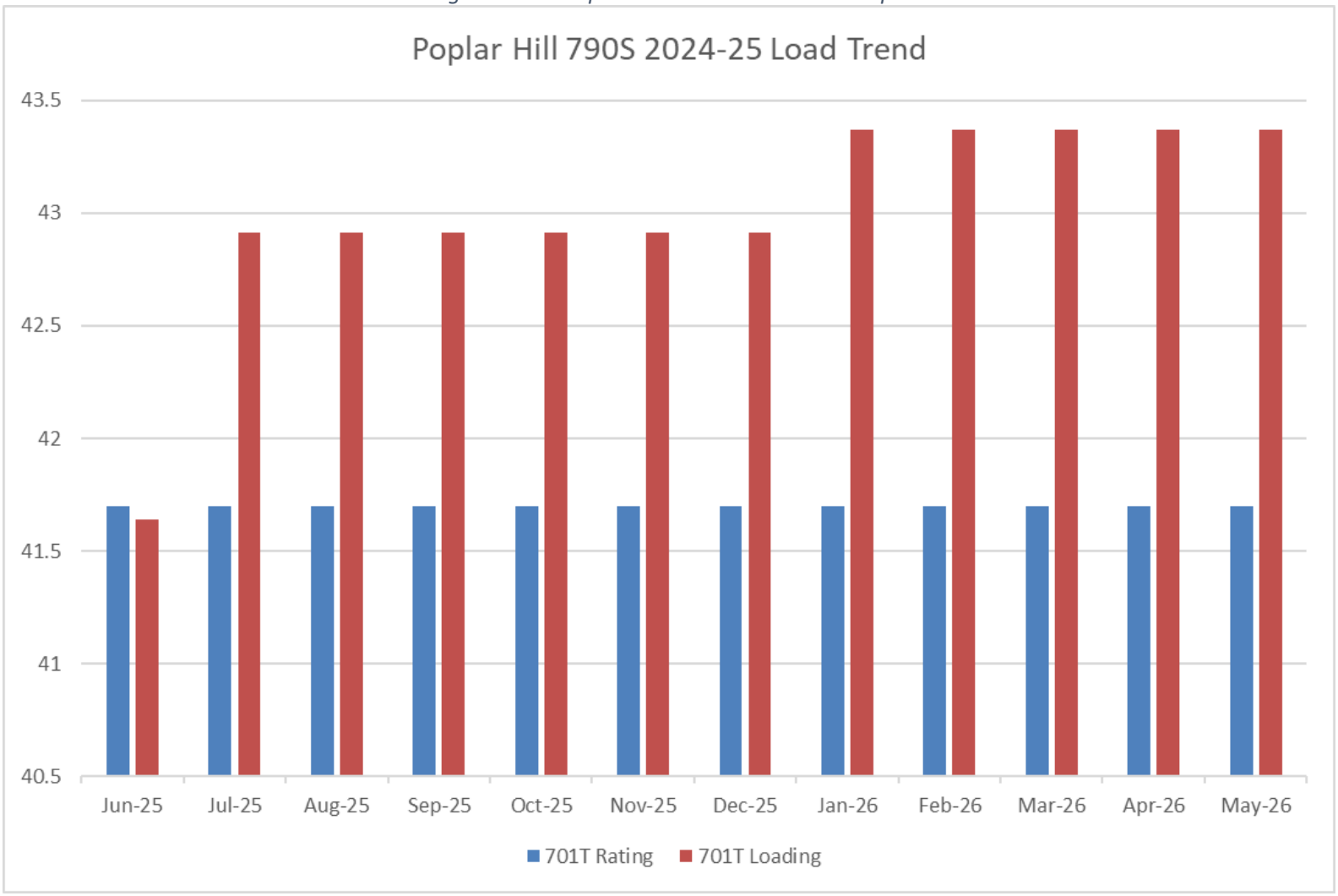
Distribution Planning Criteria Violation

Load Transfers			
MVA	From	To	Year
1.3	5L405 - 815S	5L333	2025
1.3	5L291	5LNEW2	2026

6 Appendix B – Load Trend Graphs

6.1 Poplar Hill 790S

Figure 6.1-1: Poplar Hill 790S Load Trend Graph



7 Appendix C – ATCO DFO Planning Criteria

ATCO DFO has developed planning criteria to ensure the safe and reliable connection and operation of loads to the distribution system. Criteria applicable in this report are highlighted below:

POD Capacity Planning – System Normal: Under system normal conditions, AE DFO must ensure sufficient substation transformer and voltage regulator capacity exists to carry all peak loads. In high growth areas, loading on substation transformers must remain below **95%** of the total nameplate rating of the POD transformers.

25 kV Voltage Levels: the voltage threshold on ATCO DFO's 25 kV systems, under normal conditions for urban residential transformers with multiple customer secondaries, and for loads greater than 1MVA, must remain above **0.97 Vpu** and below **1.04 Vpu**. For rural customers, the voltage must remain above 0.95 Vpu and below 1.04 Vpu.

Urban Feeder Loading: the maximum normal loading of 25 kV distribution feeders in a large urban area is **10.0 MVA**.

Rural Feeder Loading: the maximum normal loading of 25 kV distribution feeders in a rural area is **15.0 MVA**.

Urban 25 kV Bus Loading: the maximum normal loading of a 25 kV bus that serves a large urban area is **33 MVA**.

8 Appendix D – ATCO TFO Information: Previous Letter on file with AESO Regarding Poplar Hill 790S

ATCO Electric

May 24, 2016

Vladimir Lopez
Alberta Electric System Operator (AESO)
2500, 330 5 Ave SW
Calgary, AB T2P 0L4

Cc: Sami Abdulsalam, AESO

RE: Poplar Hill 790S: Inability to Expand 790S

Dear Mr. Lopez,

On May 5, 2016, the AESO informed ATCO Electric (AET) that the NID class estimate directions would be sent to AET in June 2016. Currently, the AESO Long Term Plan (LTP) has up to three future 144 kV lines being considered for termination into Poplar Hill 790S. To exclude these from consideration and ensure the correct topology development is in the NID estimate request, the AESO informed AET that a signed document with technical reasoning for the exclusion of these alternatives would need to be officially transmitted from AET to the AESO prior to May 26, 2016.

This letter is intended to provide sufficient technical evidence to ensure the limitations for terminations at Poplar Hill 790S are clear and considered in the development of the AESO LTP and following NID estimate requests.

Description of Constraints for the Expansion of Poplar Hill 790S and ROW Access

As provided in a previous memo to the AESO on December 4, 2014 during the P1551 Peace River-Valleyview-Grande Prairie Area Transmission Development, AET provided the following information:

10035 - 105 Street, Edmonton, Alberta, Canada T5J 2V6
Tel: 780-420-7310 Fax: 780-420-7400
www.atcoelectric.com

ATCO Electric

790S Poplar Hill Substation

The existing Poplar Hill Substation 790S is situated in the County of Grande Prairie, south of La Glace. The substation is located in LSD 1 NW 19-73-8 W6M. The surrounding land is primarily industrial and agricultural. ATCO Electric Ltd. leases the site from ATCO Power. The existing fenced area is approximate 150m to 176m by 113m to 169m.

Land Constraints:

North – Highly constrained by the Poplar Hill Generator and pipeline ROWs

East – Highly constrained by pipeline ROW's and a meter site

South – Highly constrained by pipeline ROW's

West – Highly constrained by access roads, transmission line ROWs and pipeline ROWs

Electrical Requirements:

The current control building is at capacity. Given the radial bus configuration, a 144 kV breaker failure event will result in all 144 kV breakers tripping at Poplar Hill.

Assessment Findings:

Due to the heavy constraints, expansion of Poplar Hill is unlikely, which will limit opportunities for capacity growth.

AET investigated the ability to expand the substation and concluded it was not feasible.

From strictly a substation viewpoint, AET has suggested to the AESO that if the Poplar Hill 144 kV capacitor could be removed or relocated to a different substation within the area, that the existing breaker and bay could be re-used for a new line termination given that a ROW for another line into Poplar Hill 790S can be obtained. This will be very challenging as identified above.

Subsequent discussions in 2016 with the AESO LTP team has indicated this suggestion may provide the ability to develop another substation east of Poplar Hill, re-terminating 7L22 plus another line between 790S and this new substation to assist in alleviating area concerns.

Please refer to Attachment A showing the inability to expand the substation as well as the challenges that will exist given the pipelines circling the existing 790S substation.

Conclusion

AET concludes that Poplar Hill 790S cannot be expanded. If the 144 kV capacitor is removed from Poplar Hill 790S, this breaker and bay could be used for a new line termination given that a ROW can be obtained to go east out of 790S.

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ATCO Electric

I trust the information presented here meets your requirements to provide sufficient technical reasoning why expansion of Poplar Hill 790S should be eliminated from future consideration. Should the termination of one more 144 kV line be required into 790S, the only alternative is to remove/relocate the existing 144 kV capacitor bank and use the existing breaker and bay for the line termination.

If you have any questions, please feel free to contact me at (780) 508-4761, or by email at Guillaume.Vachon@atco.com.

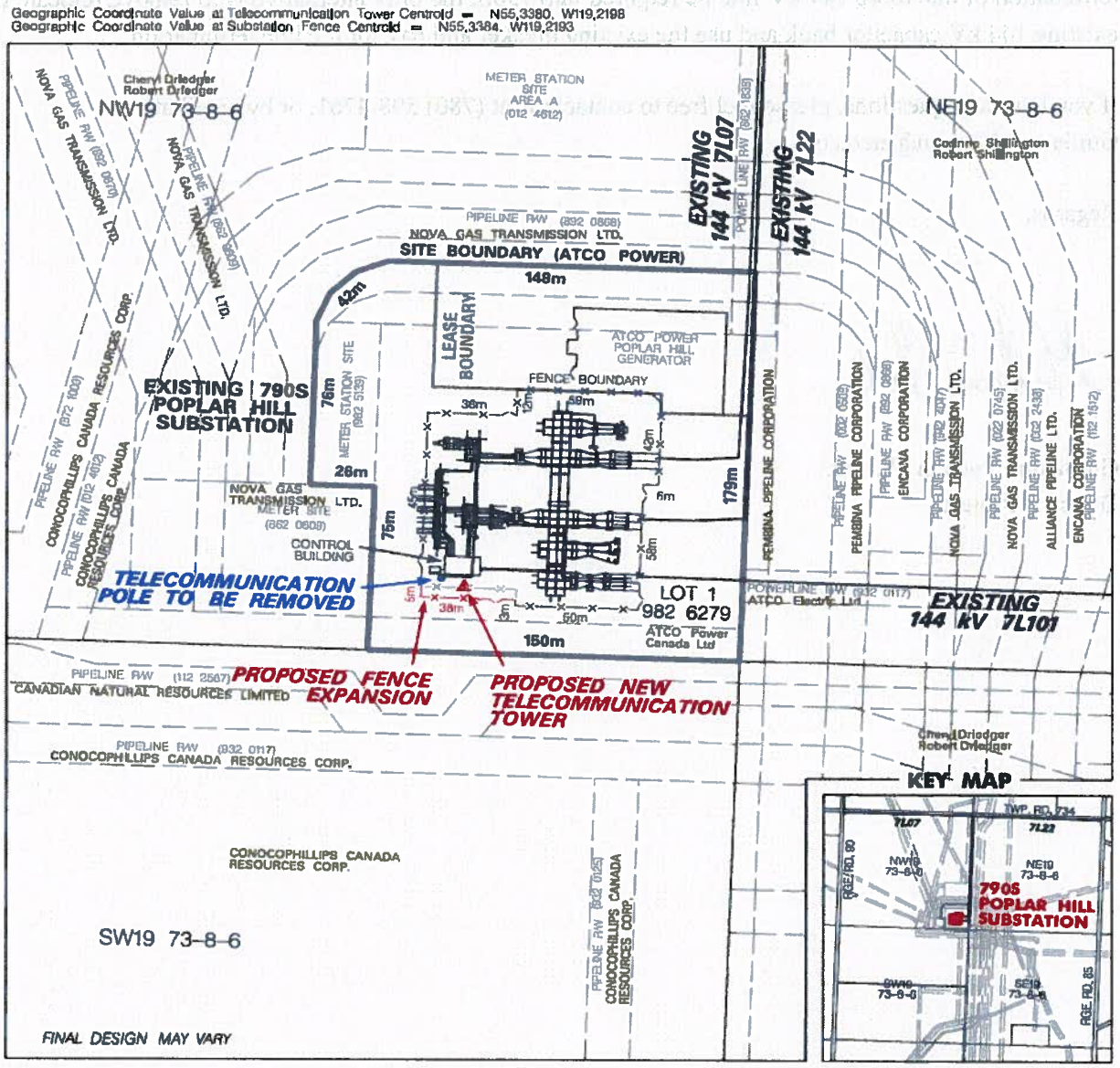
Regards,

Guillaume Vachon

Guillaume Vachon , P.Eng.
Director, Projects

10035 - 105 Street, Edmonton, Alberta, Canada T5J 2V6
Tel: 780-420-7310 Fax: 780-420-7400
www.atcoelectric.com

Attachment A: Poplar Hill 790S Site Plan – To provide visual information on the existing substation limitations and surrounding pipelines limiting ROW and access to 790S.



ATCO Electric

Poplar Hill Telecommunication Replacement Project

POPLAR HILL SUBSTATION 790S
PROPOSED SITE PLAN

CREDIT NOTES
Cadastral Alberta Data Partnerships Ltd. 2016, Electric System ATCO Electric 2016, Substation ATCO March 2016

Cartographer by: TO | Approved by: AB | March 2016 | DWG.NO. RS – 790S – A – 01

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