Distribution Deficiency Report

ATCO Wapiti Area New POD

PERMIT TO PRACTICE
ATCO ELECTRIC LTD.

RM SIGNATURE: _____

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The Association of Professional Engineers and Geoscientists of Alberta (APEGA)

Approvals	Signature	Date
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Revision History:

R0	Original Submission	Matthew Chang	May 30, 2023
R1	Update Load Forecast Tables	Erin Young	Aug 15, 2023
R2	Update Load request and ISD	Matthew Chang	May 1, 2024
R3	Update POD Load Forecast	Matthew Chang	July 02, 2025
R4	Update Load Request and ISD	Matthew Chang	Dec 15, 2025
R5	Load Request Status Update	Matthew Chang	May 22, 2026
R6	Signatory Date Update	Matthew Chang	June 05, 2026
R7	Load Forecast and Cost Estimate Classification Update	Matthew Chang	Aug 13, 2026
R8	Load Forecast correction and Cost Estimate base year Update	Matthew Chang	Aug 27, 2026
R9	Correct Typing Errors	Matthew Chang	Sept 10, 2026

1 Executive Summary

ATCO Electric Distribution Division (ATCO DFO) is requesting system access service to mitigate the distribution deficiencies in the Wapiti 823S area due to future load requests of 55.25 MW. Wapiti 823S is located approximately 35 km southwest of the City of Grande Prairie in the Alberta Electric System Operator's (AESO) Northwest Planning Region. Wapiti 823S is currently equipped with one 30/40/50 MVA, 144/25 kV transformer. It is forecast that Wapiti 823S substation will violate ATCO DFO's planning criteria for transformer capacity in 2028.

To address the forecast capacity deficiency at Wapiti 823S with the identified loads in the area, ATCO DFO has considered the following distribution-only alternatives:

Distribution Alternative 1: Serve loads from Wapiti 823S

Distribution Alternative 2: Offload Wapiti 823S to nearby PODs

A distribution only alternative is not technically viable as neither alternative could facilitate the 2028 load request without capacity criteria violations at Wapiti 823S. Due to the inability to serve the entirety of the customer load request via distribution-only alternatives, ATCO DFO requests a transmission solution to be investigated.

Transmission Alternative 1: Increase Wapiti 823S POD Capacity

Transmission Alternative 2: Construct a new POD

Transmission alternative 2 is ATCO DFO's recommended solution as it places a new POD closest to the unserved load request. This alternative will meet the customer needs now and the future in the area while also meeting ATCO DFO planning criteria. The requested Rate Demand Transmission Service (DTS) for the new POD is 28 MW with a requested in-service date of April 1, 2028. ATCO also anticipates a need to increase the DTS at Wapiti 823S substation to meet the requested load (#1 -#9) in Table 2-1. The Wapiti 823S DTS increase will be requested in a separate application.

The requested date for transmission service is April 1, 2028.

2 Introduction

2.1 Customer Requests

ATCO DFO has received multiple load requests in the Wapiti 823S area totaling 55.25 MW. Table 2-1 details the requested operating loads and requested ISDs. These projects are progressing through ATCO's Distribution Project Process. Figure 2-1 shows the load requests identified in Table 2-1 in relation to the existing ATCO Distribution System.

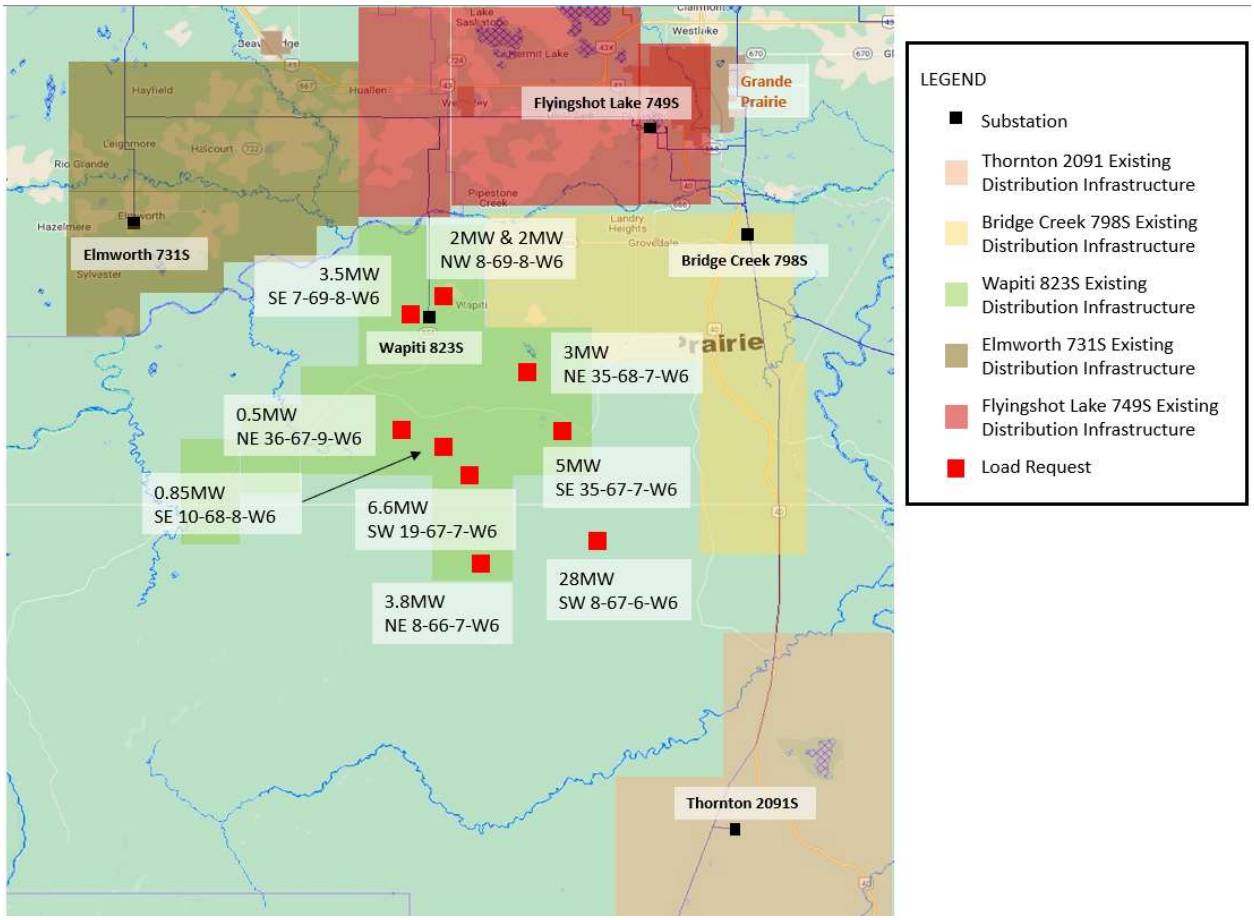
Table 2-1: Wapiti Area New Customer Requests

Load Request	Load Type Characterization	Load Location	Requested Operating Load (MW)	Requested ISD/Energization Date	Q3 2026 Status Update
#1	Existing Industrial Site Expansion	NE 36-67-9-W6	0.5	Q2 2023	Constructed[2]
#2	BESS DCG[1]	NW 8-69-8-W6	2	Q4 2023	Constructed[2]
#3	BESS DCG[1]	NW 8-69-8-W6	2	Q4 2023	Constructed[2]
#4	Existing Industrial Site Expansion	NE 8-66-7-W6	3.8	Q1 2024	Constructed[2]
#5	Industrial	SE 7-69-8-W6	3.5	Q1 2024	Constructed[2]
#6	Industrial	SE 10-68-8-W6	0.85	Q2 2024	Constructed[2]
#7	Industrial	SW 19-67-7-W6	6.6	Q3 2024	Constructed[2]
#8	Existing Industrial Site Expansion	SE 35-67-7-W6	5	Q2 2025	Constructed[2]
#9	Industrial	NE 35-68-7-W6	3	Q1 2026	Constructed[2]
#10	Industrial	SW 8-67-6-W6	28	Q2 2028	Committed
Total Load			**55.25**		

[1] Load requests #2 and #3 represent battery charging loads for DCG's under AESO project P2560.

[2] Customer connected to the distribution network with load ramping up as per the load forecast Table 6-1 in Appendix A.

Figure 2-1: Wapiti Area New Customer Load Requests in Relation to Existing Distribution System



As Figure 2-1 shows, Load Requests #1 to #9 are located within the existing Wapiti distribution system and best served by Wapiti 823S. However, there are 3 PODs from which we can possibly serve the load centre in SW 8-67-6-W6; they are Wapiti 823S, Bridge Creek 798S, and Thornton 2091S.

2.2 Existing System

The point-of-delivery's (PODs) with 25 kV service closest to the requested load centre (SW 8-67-6-W6) in the Wapiti area are Wapiti 823S, Bridge Creek 798S, and Thornton 2091S. The Wapiti area is southwest of the City of Grande Prairie and the area loads are served by these three existing PODs. Elmworth 731S and Flyingshot Lake 749S are not considered because an acceptable 25 kV voltage level at the load centre (SW 8-67-6-W6) cannot be maintained due to the distance. Figure 2-2 shows the current Distribution System Configuration. Table 2-2 shows the breakdown of existing load type for the area PODs. Figure 2-3 shows the current Transmission System SLD.

Figure 2-2: Existing Distribution System Configuration

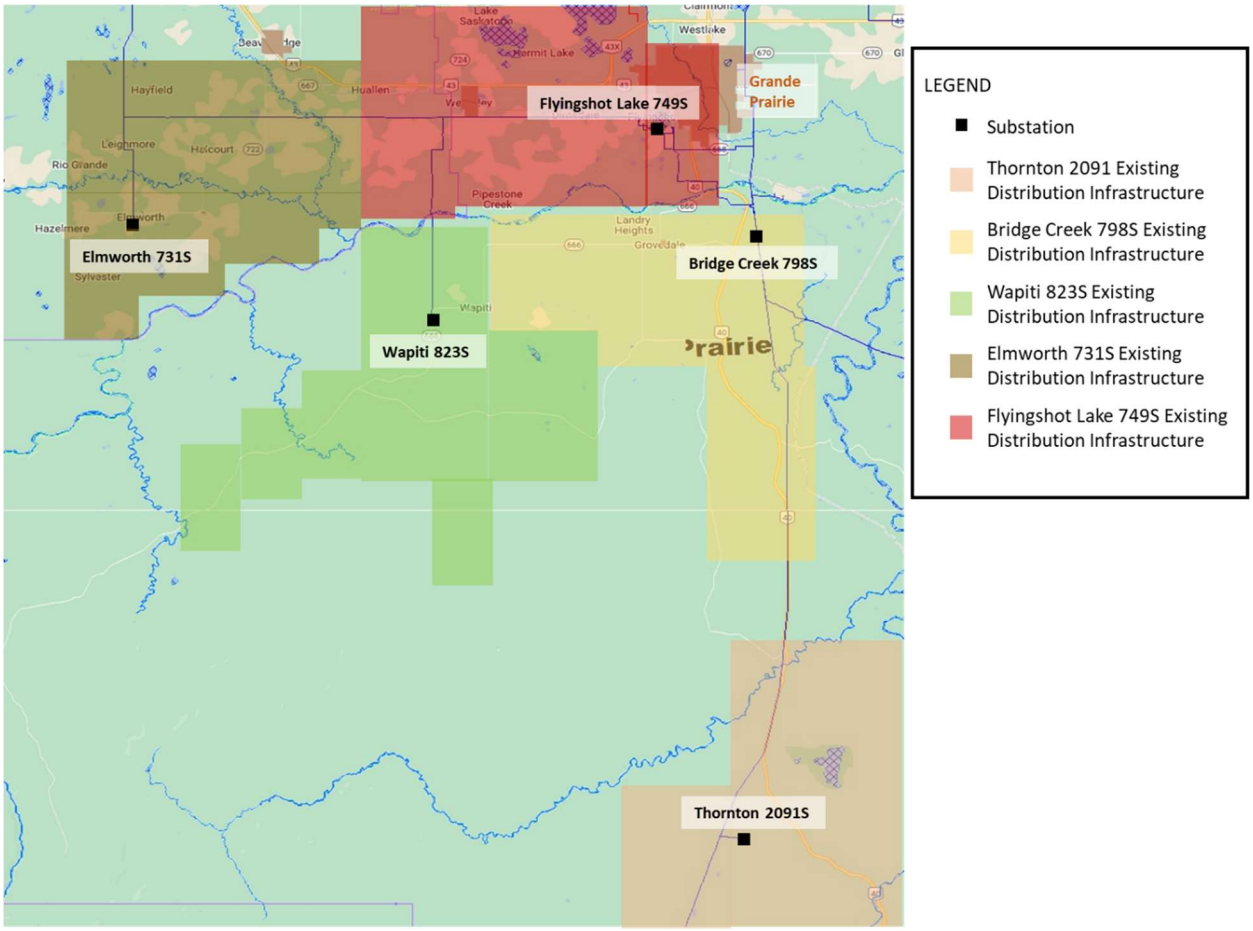
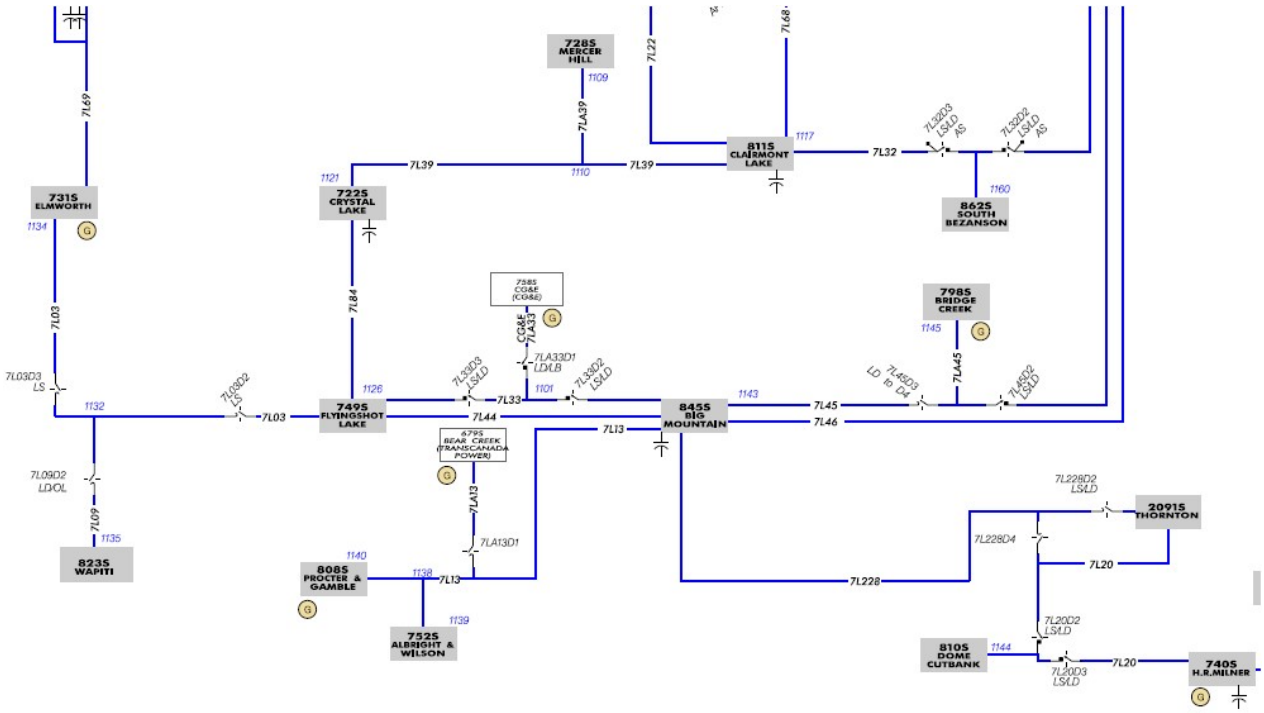


Table 2-2: POD Existing Load Type

POD	Existing Load Type (%)					DTS (MW)	STS (MW)
	Industrial	Farm	Residential	Commercial	Total		
Wapiti 823S	98	0	0	2	100	21	32.8
Bridge Creek 798S	93	2	2	3	100	22.5	N/A
Thornton 2091S	90	0	0	10	100	25	N/A

Figure 2-3: Transmission System SLD



2.2.1 Wapiti 823S

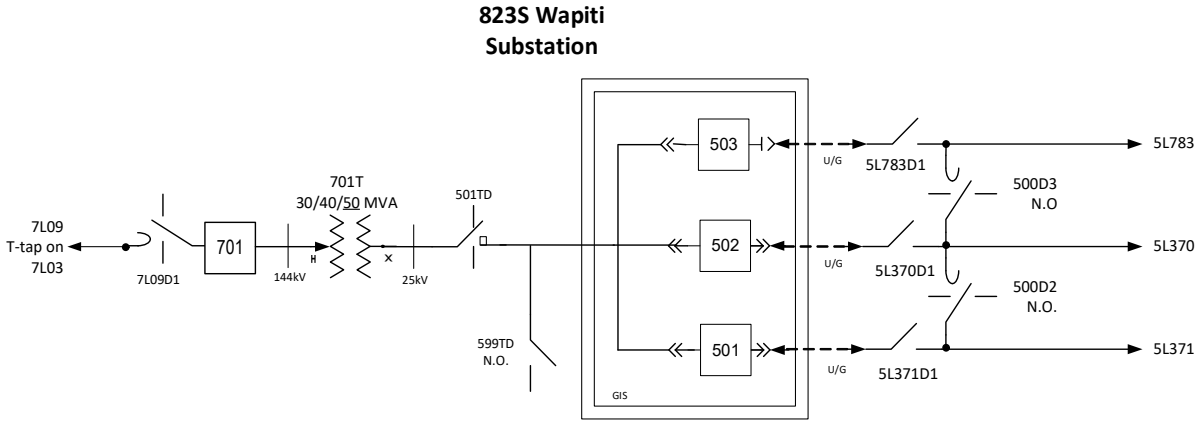
Wapiti 823S is the closest POD to the largest load request in SW 8-67-6-W6 at approximately 38 km away. This POD is located roughly 35 km southwest of the City of Grande Prairie. The legal land description of Wapiti 823S is LSD-5-8-69-8-W6.

Wapiti 823S in 2024 is serving 26.6 MVA of load and is equipped with one 30/40/50 MVA 144/25 kV transformer (701T) and three 25 kV breaker-feeders. Figure 2-4 shows the single line diagram (SLD) for Wapiti 823S.

Table 6-1 in Appendix A shows the existing load forecast for Wapiti 823S, excluding load requests in SW 8-67-6-W6. This POD serves primarily industrial type loads.

There are two 20MW distribution BESS connections for Wapiti 823S.

Figure 2-4 : Wapiti 823S SLD



2.2.2 Bridge Creek 798S

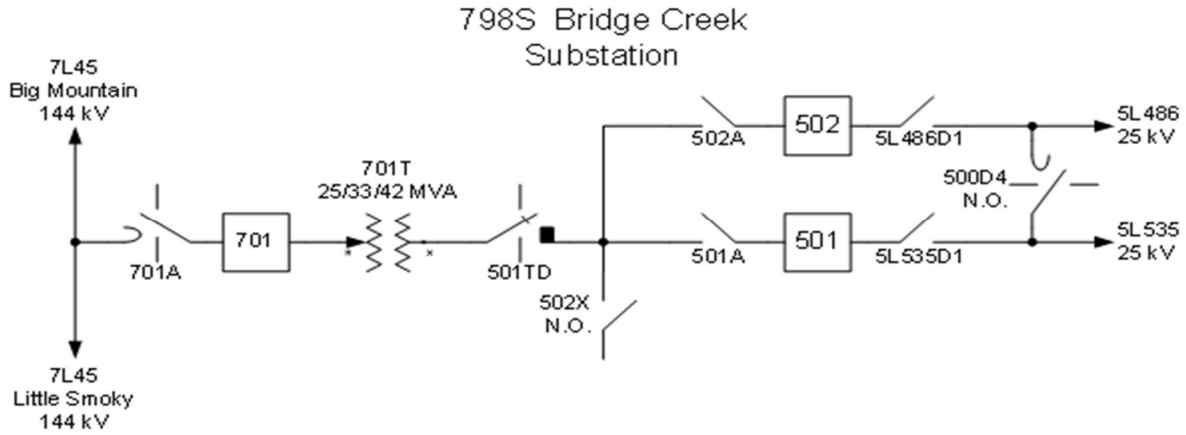
Bridge Creek 798S is approximately 30 km from the largest load request in SW 8-67-6-W6. The legal land description of Bridge Creek 798S is LSD-7-5-70-5-W6.

Bridge Creek 798S in 2024 is serving 25.6 MVA of load and is equipped with a 25/33/42 MVA 144/25 kV transformer (701T) and two 25 kV breaker-feeders. Figure 2-5 shows the SLD for Bridge Creek 798S.

Table 6-2 in Appendix A shows the load forecast for Bridge Creek 798S. Currently, the load composition for the POD is largely industrial.

There are no existing or planned distributed generators connected to Bridge Creek 798S.

Figure 2-5: Bridge Creek 798S SLD



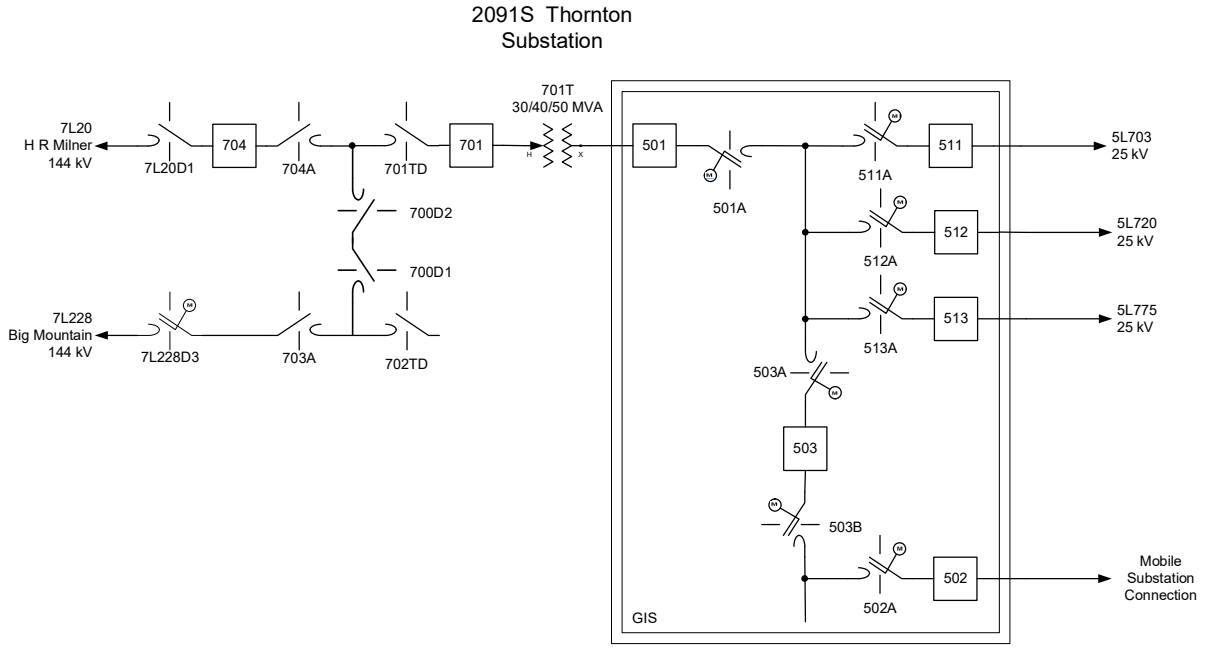
2.2.3 Thornton 2091S

Thornton 2091S is approximately 36 km away from the largest load request (SW 8-67-6-W6), in the land location LSD 3-30-63-5-W6. This POD is located roughly 80 km south of the City of Grande Prairie.

Thornton 2091S in 2024 is serving 21.7 MVA of load and is equipped with a 30/40/50 MVA 144/25 kV transformer (701T) and three 25 kV breaker-feeders. Figure 2-6 shows the SLD for Thornton 2091S.

Table 6-3 in Appendix A shows the load forecast for Thornton 2091S. The load composition for the POD is mostly industrial and transportation.

Figure 2-6: Thornton 2091S SLD



2.2.4 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 conservative load growth is applied to future years. For example, generally ATCO applies an annual growth rate, except for dedicated industrial feeders which have a 0% load growth as load is expected to be steady. In the case of Wapiti 823S, conservative load growth of 0% is applied due to these loads being predominantly industrial and less subject to organic growth.

- 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.

2.2.5 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.

2.2.6 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, the restoration time information was not considered to be a driver and will not be considered further.

3 Distribution Deficiencies and Planning Violations

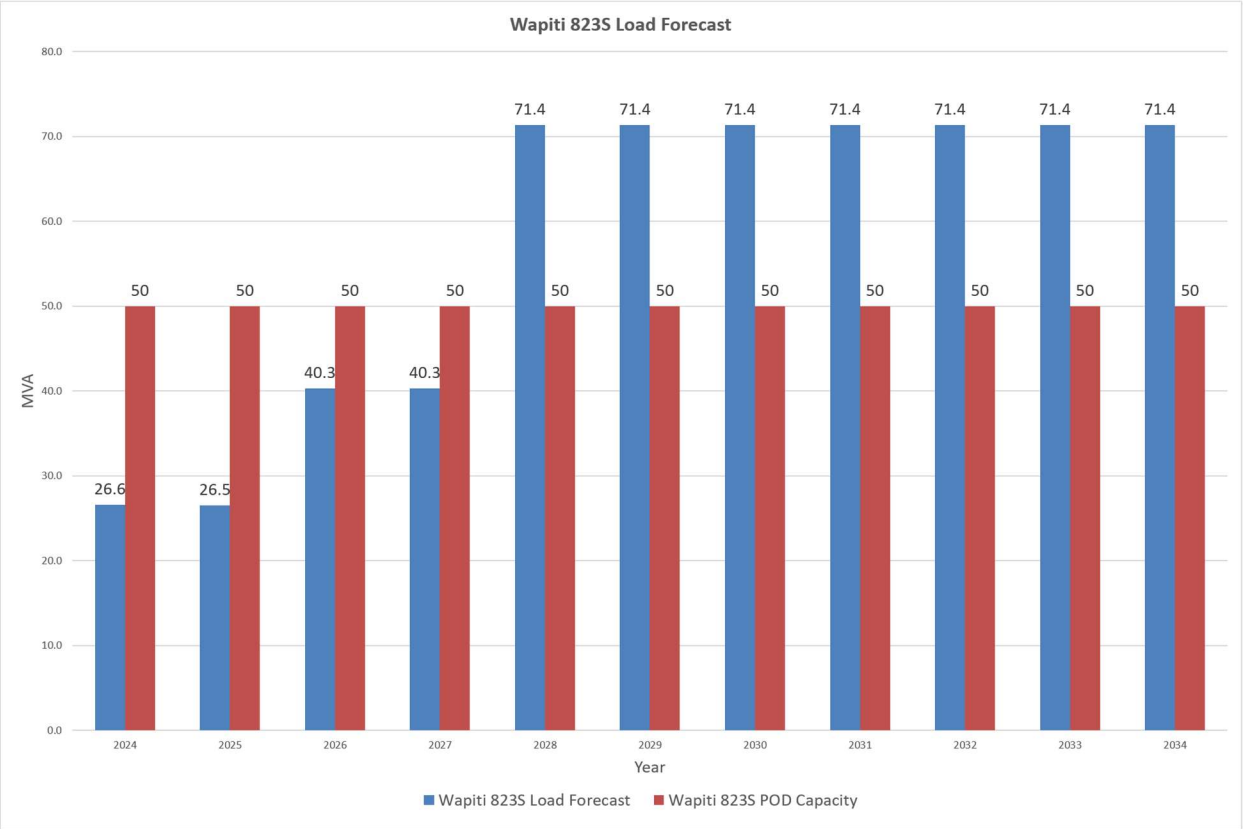
As Table 2-1 and Figure 2-1 show, ATCO DFO has received multiple load requests totaling 55.25 MW in the Wapiti 823S area.

All the load requests, excluding the request in SW 8-67-6-W6, are located within 1 km of existing distribution infrastructure out of Wapiti 823S. There are no concerns about connecting the first 9 load requests listed in Table 2-1 and maintaining reasonable site voltage levels.

However, after the 3 MW load in NE 35-68-7-W6 is connected to Wapiti 823S in 2026, one of the three feeders out of Wapiti 823S will exceed distribution rural feeder loading capacity of 15 MVA. The estimated loading of Wapiti substation transformer 701T in 2028 without load addition from SW 8-67-6-W6 will also arrive at 40.3 MVA or 80.6% of its rated capacity, as shown in Table 6-1 in Appendix A. Therefore, there will not be enough capacity left in Wapiti 823S to serve the request in SW 8-67-6-W6. Table 6-4 in Appendix A shows the Wapiti 823S Load Forecast with all the load requests.

Figure 3-1 illustrates the 10-year load forecast in Wapiti 823S. The recorded and forecast numbers represent yearly peak winter demand loads.

Figure 3-1: Wapiti 823S Load Forecast



As Table 6-2 in Appendix A indicates, Bridge Creek 798S transformer 701T will not have enough remaining capacity to connect the requested load in SW 8-67-6-W6.

While adequate capacity is available at Thornton 2091S with the proposed new POD transformer, an acceptable 25 kV voltage level cannot be achieved at the customer site because of the feeder length and its distance from the substation.

Note that the requested operating loads #1 to #9 in Table 2-1 have a 0.9 coincidence factor applied and an assumed power factor of 0.9 when added into the load forecast. Because load request #10 requires industrial expressed feeders, only a power factor of 0.9 is applied to it in the forecast table.

Since the connected DCGs at Wapiti 823S cannot be dispatched by the DFO, they were not considered in the distribution analysis.

Table 3-1 summarizes the deficiencies and violations to serve the requested load in SW 8-67-6-W6 from nearby PODs in 2028.

Table 3-1 : POD Deficiencies and Violations in 2028

POD	Requested Load Location	Load Type	Requested Operating Load (MW)	Deficiency / Violation
Wapiti 823S	SW 8-67-6-W6	Industrial	28	POD Capacity
Bridge Creek 798S	SW 8-67-6-W6	Industrial	28	POD Capacity
Thornton 2091S	SW 8-67-6-W6	Industrial	28	25 kV Voltage Level

4 Alternative Evaluation

4.1 Distribution-Only Alternatives

4.1.1 Distribution-Only Alternative 1: Serve Load from Wapiti 823S

As identified in Figure 2-1, Wapiti 823S distribution system is the closest distribution system to the load centre in SW 8-67-6-W6.

With the load request of 28 MW, Wapiti 823S total POD capacity will be exceeded in 2028.

- As shown in Table 6-4 in Appendix A:
    - In 2028:
        - Transformer 823S - 701T will be overloaded;
        - Two feeders out of Wapiti 823S will be exceeding the ATCO DFO Guideline for Feeder Capacity, shown in Appendix B - Distribution Planning Criteria;

Based on the 2028 overloads identified, a distribution only solution to serve the new load request in SW 8-67-6-W6 from Wapiti 823S is not feasible.

4.1.2 Distribution-Only Alternative 2: Offload Wapiti 823S to nearby PODs

To Eliminate the capacity violations in Wapiti 823S, Wapiti POD transformer 701T would require offloading 23.9 MVA in 2028. This was determined using the following rationale:

- 701T loading is constrained by ATCO DFO “POD Capacity Planning – System Normal”, see Appendix B: The maximum transformer loading is 95% of 50 MVA or 47.5 MVA.
- Each feeder loading is constrained by ATCO DFO “Rural Feeder Loading”, see Appendix B.

In 2028, Elmworth 731S and Thornton 2091S will be able to offload a total of 12.9 MVA from Wapiti 823S, see Table 4-1. Figure 4-1 shows the offloading areas in Wapiti 823S distribution system. Flyingshot Lake 749S cannot support any remaining Wapiti 823S distribution loads while maintaining acceptable 25 kV voltage levels. Table 4-2 summarizes Wapiti 823S POD capacity shortfall in 2028 after the proposed load transfers.

Table 4-1 : Surrounding POD Offloading Capability

POD	2028 Offload from Wapiti 823S (MVA)	Limiting Factor
Elmworth 731S	6.2	25 kV Voltage Level
Bridge Creek 798S	0[3]	Feeder & POD Capacity
Thornton 2091S	6.7	25 kV Voltage Level
Flyingshot Lake 749S	0	25 kV Voltage Level
TOTAL	**12.9**	

[3] According to Table 6.2 in Appendix A, Bridge Creek 798S is projected to reach 103% of its POD capacity by 2027, driven by recent firm load requests that are not reflected in Table 2-1. As a result, Bridge Creek 798S has no available offloading capability.

Figure 4-1: Wapiti 823S Distribution Load Transfers

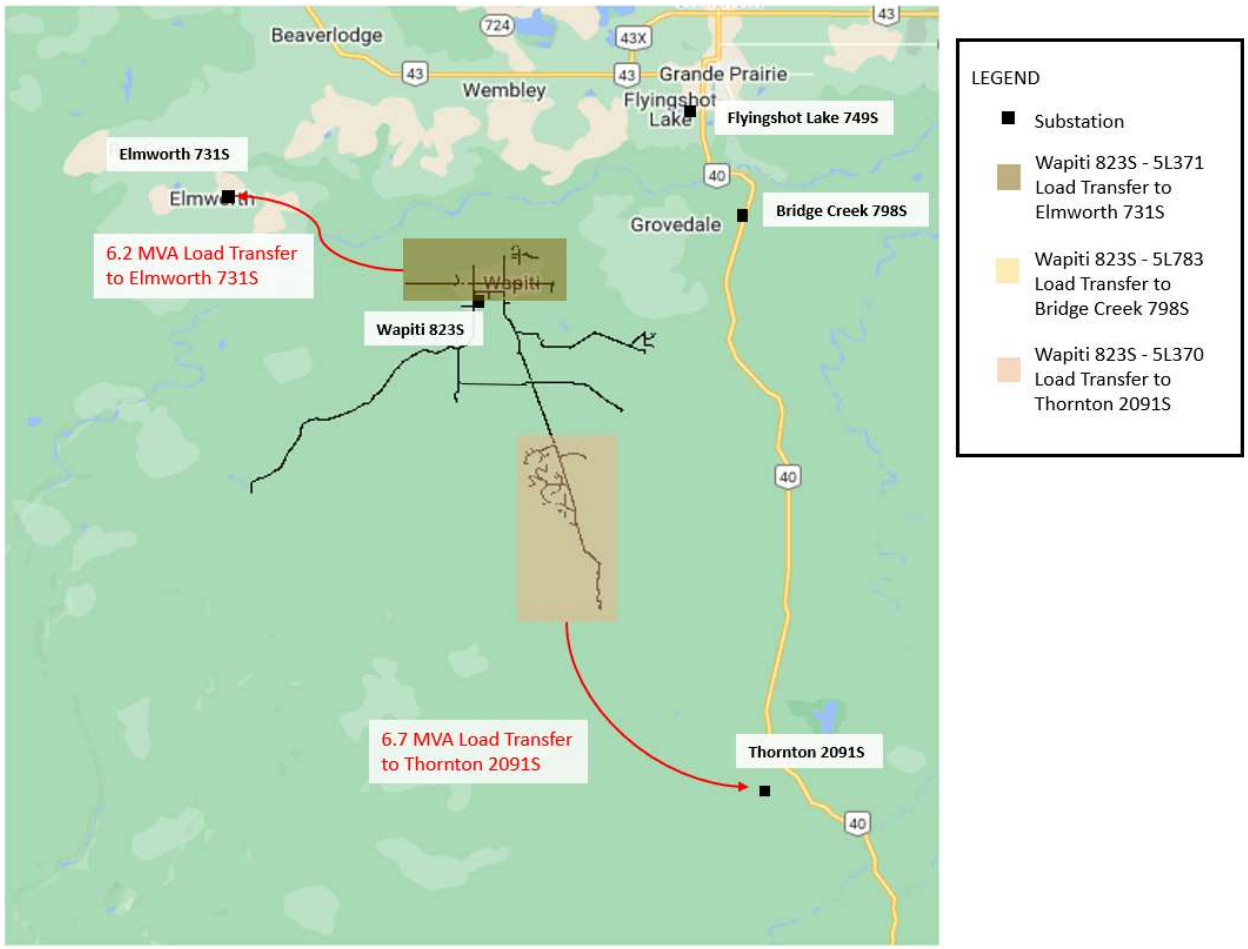


Table 4-2: Wapiti 823S POD Capacity Shortfall

Year	Total Offloads from Wapiti 823S (MVA)	Required Offload from Wapiti 823S (MVA)	POD Capacity Shortfall (MVA)
2028	12.9	23.9	**11**

As there is not enough distribution system capacity from the surrounding PODs to prevent overloading at Wapiti 823S, this alternative to offload Wapiti 823S to the surrounding PODs is not a feasible solution and will not be investigated further.

4.2 Alternatives Which Include Transmission

4.2.1 Transmission-Based Alternative 1: Increase Capacity at Wapiti 823S

Transmission-based alternative 1 involves increasing Wapiti 823S POD capacity to a minimum rating of 76 MVA in 2028 to accommodate all the load requests outlined in Table 2-1.

The scope is identified below.

- Install one (1) 50 MVA[4] 144/25 kV LTC transformer with associated apparatus.
- Install three (3) new 25 kV breakers.
  Construct three (3) new feeders from Wapiti 823S to the load request in SW 8-67-6-W6. Each feeder will be approximately 38 km in length with two regulators and one 3 Mvar VAR compensator.

Table 4-3 summarizes the cost breakdown and the total cost estimate for this transmission-based alternative.

Table 4-3 : Transmission-Based Alternative 1 Cost Summary

Transmission Scope	**Class 4 (NID) Estimate in Million (-30% to +50% Range, 2024)**
Substation Expansion including One 50 MVA POD Transformer & Three 25 kV Breakers	14.6
Distribution Scope	**Class 4 (NID) Estimate in Million (-30% to +50% Range, 2024)**
Three 25 kV Feeders	36

The new POD transformer addition is required by April 1, 2028. Appendix A Table 6-5 shows Wapiti 823S load forecast for this alternative. The feeder coincidence factor of 1 for the new POD transformer is assumed because all three feeders out of the new POD transformer are supplying the same load centre.

The potential new transformer size and placement of the three new 25 kV breakers for Wapiti 823S will be further assessed and determined by Transmission Facility Owner (TFO). ATCO DFO requests a minimum POD capacity of 76 MVA based on the 2028 forecast loading of 71.4 MVA with 4.6 MVA of load growth room, as per ATCO DFO planning criteria “POD Capacity Planning –

[4] ATCO TFO has indicated that 50 MVA transformers are the standard size.

System Normal". This does not account for any N-1 contingencies if either transformer is out of service.

This alternative reduces the maximum feeder capacity on the proposed feeders to 12.5 MVA due to the long distance between Wapiti 823S and the load centre in SW 8-67-6-W6. This alternative also limits future load growth in the requested area, as any additional loads greater than 1.9 MW on the proposed feeders will cause 25 kV voltage level violation, as per ATCO DFO planning criteria "25 kV Voltage Level" provided in Appendix B. Therefore, a new 25 kV breaker will be required in Wapiti 823S for future growth in the area.

4.2.2 Transmission-Based Alternative 2: Construct a new POD

4.2.2.1 New POD near customer load request

The assumed transmission development for this alternative involves constructing a new transmission connection and a new POD with minimum capacity of 33 MVA in 2028. ATCO DFO suggests the new POD to be developed adjacent to the largest customer load request identified in Table 2-1 at SW 8-67-6-W6.

ATCO DFO suggests the following scope for the purpose of alternative comparison.

- Construct 15 km of 144 kV transmission line, "T-Tapping" existing transmission line 7L228 to the new POD location near customer site
- Construct a new POD with one 50 MVA 144/25 kV LTC transformer and associated apparatus.
- Install two new 25 kV breakers to connect to two new feeders.
- Construct two 1 km distribution feeders to serve the 28 MW load request at SW 8-67-6-W6.

Error! Reference source not found. Table 4-4 summarizes the cost breakdown and the total cost estimate for this transmission-based alternative.

Table 4-4: Transmission Alternative 2 Cost Summary

Transmission Scope	Class 4 (NID) Estimate in Million (-30% to +50% Range, 2024)
144 kV Transmission Line	16
New POD including One 50 MVA POD Transformer & Two 25 kV Breakers	16

Distribution Scope	Class 4 (NID) Estimate in Million (-30% to +50% Range, 2024)
Two 25 kV Feeders	0.7

The potential new POD location and POD transformer size will be further assessed and determined by Transmission Facility Owner (TFO). ATCO DFO requests a minimum POD capacity of 33 MVA in 2028 based on the load request at SW 8-67-6-W6.

Table 6-6 in Appendix A shows the forecast for Wapiti 823S, and Table 6-7 in Appendix A for the proposed new POD in this alternative. The feeder coincidence factor of 1 for the new POD transformer is assumed because the majority of the POD loads are from the same load centre.

The new POD is required by April 1, 2028 to serve the load request.

4.3 Evaluation of Transmission Alternatives

ATCO DFO assessment of the transmission alternatives is provided below:

- Transmission-Based Alternative 1 will require one (1) POD transformer addition and three (3) new distribution feeders to serve the load requests in SW 8-67-6-W6. This alternative requires significant substation expansion and multiple long distribution feeder constructions. Even with notable project scopes and costs, this alternative provides limited potential growth in the area.
- Transmission-Based Alternative 2 will require a new POD near the load request in SW 8-67-6-W6. When both transmission and distribution Class 4 (NID) estimates are considered, it is the least cost alternative. This alternative also provides the capacity to serve future customer load requests in the area without additional requests for transmission.
- ATCO DFO strongly recommends transmission alternative 2 for the following reasons:
    - reduces the overall project cost when both distribution and transmission are considered as well as future distribution connection costs for load requests between Wapiti 823S and Thornton 2091S;
    - reduces distribution system losses significantly (approx. 1386 kVA) with the POD placement near the requested load centre;
    - reduces future reliability and service quality concerns by minimizing distribution line lengths and exposure assisting in trouble shooting and load restoration efforts;
    - considers potential growth areas with placement of new area POD.

Table 4-5 shows the cost comparison between the two transmission-based alternatives.

Table 4-5 : Transmission Alternatives Cost Estimates

Transmission Alternative		Class 4 (NID) Estimate in Million (-30% to +50% Range, 2024)
#	Alternative Name / Description	
1	Increase Wapiti 823S POD Capacity	50.6
2	Construct a New POD	32.7

5 Conclusion

From a distribution perspective, Transmission-Based Alternative 2 is the recommended option for the following reasons:

- Overall project cost is less.
- The new POD can be located adjacent to the identified load request resulting in overall shorter 25 kV feeder lengths, greater future system capacity due to higher distribution system voltages, and the lowest calculated distribution system losses and development.
- This alternative accommodates the requested load growth while maintaining distribution system stability.

ATCO DFO suggests the new POD be developed near SW 8-67-6-W6. The requested date for transmission service is April 1,2028.

The requested Rate DTS for the new system access service is 28 MW .

6 Appendix A – POD Load Forecast Tables

6.1 Existing Forecasts

Table 6-1 : Wapiti 823S Load Forecast without SW 8-67-6-W6 Load Request

Wapiti 823S				MVA LOADING - RECORDED						PREDICTED - Required Capacity									
				2021/2022	2022/2023	2023/2024	2024/2025	2025/2026		2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
SUB		CAPACITY		Peak	Peak	Peak	Peak	Peak		Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak
No	Feeder	T/R	MVA	MVA	MVA	MVA	MVA	MVA	PF	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA
823S	5L370	701T	50	4.5	3.6	3.9	7.6	8.1	96.5%	12.9	12.9	12.9	12.9	12.9	12.9	12.9	12.9	12.9	12.9
	5L371			5.4	6.2	6.5	10.5	7.7	97.5%	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1
	5L783			10.6	10.6	11.1	14.3	14.3	93.5%	20.8	20.8	20.8	20.8	20.8	20.8	20.8	20.8	20.8	20.8
		701T Total		18.1	19.9	19.8	26.6	26.5		40.3	40.3	40.3	40.3	40.3	40.3	40.3	40.3	40.3	40.3
		823S Total		18.1	19.9	19.8	26.6	26.5		40.3	40.3	40.3	40.3	40.3	40.3	40.3	40.3	40.3	40.3

Notes:
A feeder coincidence factor of 0.883 was applied to 823S 701T feeders
This LF includes Accepted and Proposed projects.
Values shown are annual peaks.

Distribution Planning Criteria Violation

Table 6-2: Bridge Creek 798S Load Forecast without SW 8-67-6-W6 Load Request

Bridge Creek 798S				MVA LOADING - RECORDED						PREDICTED - Required Capacity									
				2021/2022	2022/2023	2023/2024	2024/2025	2025/2026		2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
SUB		CAPACITY		Peak	Peak	Peak	Peak	Peak		Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak
No	Feeder	T/R	MVA	MVA	MVA	MVA	MVA	MVA	PF	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA
798S	5L486	701T	42	11.4	11.5	11.4	11.1	11.1	89.1%	11.1	24.0	24.8	24.8	24.8	24.8	24.8	24.8	24.8	24.8
	5L535			12.4	13.0	14.3	15.0	18.5	97.0%	23.0	20.3	31.4	31.4	31.4	31.4	31.4	31.4	31.4	31.4
		701T Total		23.3	24.2	24.9	25.6	29.1		33.5	43.5	55.2	55.2	55.2	55.2	55.2	55.2	55.2	55.2
		798S Total		23.3	24.2	24.9	25.6	29.1		33.5	43.5	55.2	55.2	55.2	55.2	55.2	55.2	55.2	55.2

Notes:
A feeder coincidence factor of 0.984 was applied to 798S 701T feeders

Load Transfer			
MVA	From	To	Year
5.1	5L535	5L486	2027

Distribution Planning Criteria Violation
Feeder Capacity Exceeded
Transformer Capacity Exceeded

Table 6-3: Thornton 2091S Load Forecast without SW 8-67-6-W6 Load Request

Thornton 2091S				MVA LOADING - RECORDED						PREDICTED - REQUIRED CAPACITY									
				2021/2022	2022/2023	2023/2024	2024/2025	2025/2026		2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
SUB		CAPACITY		Peak	Peak	Peak	Peak	Peak		Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak
No	Feeder	T/R	MVA	MVA	MVA	MVA	MVA	MVA	PF	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA
2091S	5L703	701T	50	3.0	2.9	2.7	2.7	3.3	97.6%	17.4	17.5	7.5	7.5	7.6	7.6	7.6	7.7	7.7	7.7
	5L720			9.9	12.5	12.4	14.5	13.4	91.8%	17.0	17.2	17.3	17.5	17.6	17.7	17.9	18.0	18.1	18.3
	5L775			6.2	5.9	6.1	5.4	6.1	98.2%	8.3	8.4	7.6	7.6	7.7	7.8	7.8	7.9	7.9	8.0
		701T Total		18.0	20.2	19.7	21.7	21.2		39.7	40.1	30.1	30.3	30.5	30.8	31.0	31.2	31.4	31.6

Thornton 2091S				MVA LOADING - RECORDED						PREDICTED - REQUIRED CAPACITY									
				2021/2022	2022/2023	2023/2024	2024/2025	2025/2026		2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
SUB		CAPACITY		Peak	Peak	Peak	Peak	Peak		Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak
No	Feeder	T/R	MVA	MVA	MVA	MVA	MVA	MVA	PF	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA
2091S	5LNew4	702T (NEW)	50	0.0	0.0	0.0	0.0	0.0	-	0.0	0.0	12.0	12.1	12.2	12.4	12.5	12.6	12.7	12.9
	5LNew5			0.0	0.0	0.0	0.0	0.0	-	0.0	0.0	10.0	10.1	10.2	10.3	10.4	10.5	10.6	10.7
	5LNew6			0.0	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		702T Total		0.0	0.0	0.0	0.0	0.0		0.0	0.0	20.5	20.7	20.9	21.1	21.3	21.5	21.7	21.9
		2091S Total		18.0	20.2	19.7	21.7	21.2		39.7	40.1	50.6	51.0	51.4	51.8	52.3	52.7	53.1	53.5

Notes:
Assume new Transformer is in service in 2028
A feeder coincidence factor of 0.930 was applied to 2091S 701T and 702T
POD total coincidence factor assumed to be 1.0
Values shown are annual peaks.
Load growth is estimated to be at 1% annually
Feeder 5L720 is still show as exceeding planning criteria. Because of the size and location of the loads, offloading is not possible.
Feeder 5L720 still allows for N-1 contigency for other feeders on transformer 701T.

Distribution Planning Criteria Violation

Load Transfers			
MVA	**From**	**To**	**Year**
12.0	5L775	5LNew4	2028
10.0	5L703	5LNew6	2028

6.2 Distribution-Based Alternative 1

Table 6-4: Wapiti 823S Load Forecast with SW 8-67-6-W6 Load Request

Wapiti 823S				MVA LOADING - RECORDED						PREDICTED - Required Capacity									
				2021/2022	2022/2023	2023/2024	2024/2025	2025/2026		2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
SUB		CAPACITY		Peak	Peak	Peak	Peak	Peak		Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak
No	Feeder	T/R	MVA	MVA	MVA	MVA	MVA	MVA	PF	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA
823S	5L370	701T	50	4.5	3.6	3.9	7.6	8.1	96.5%	12.9	12.9	44.0	44.0	44.0	44.0	44.0	44.0	44.0	44.0
	5L371			5.4	6.2	6.5	10.5	7.7	97.5%	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1
	5L783			10.6	10.6	11.1	14.3	14.3	93.5%	20.8	20.8	20.8	20.8	20.8	20.8	20.8	20.8	20.8	20.8
		701T Total		18.1	19.9	19.8	26.6	26.5		40.3	40.3	71.4	71.4	71.4	71.4	71.4	71.4	71.4	71.4
		823S Total		18.1	19.9	19.8	26.6	26.5		40.3	40.3	71.4	71.4	71.4	71.4	71.4	71.4	71.4	71.4

Notes:
A feeder coincidence factor of 0.93 was applied to 823S 701T feeders
This LF includes Accepted and Proposed projects.
Values shown are annual peaks.

Distribution Planning Criteria Violation
Transformer Capacity Exceeded
Substation Capacity Exceeded

6.3 Transmission-Based Alternative 1

Table 6-5: Wapiti 823S Forecast for Transmission-Based Alternative 1

Wapiti 823S				MVA LOADING - RECORDED						PREDICTED - Required Capacity									
				2021/2022	2022/2023	2023/2024	2024/2025	2025/2026		2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
SUB		CAPACITY		Peak	Peak	Peak	Peak	Peak		Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak
No	Feeder	T/R	MVA	MVA	MVA	MVA	MVA	MVA	PF	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA
823S	5L370	701T	50	4.5	3.6	3.9	7.6	8.1	96.5%	12.9	12.9	12.9	12.9	12.9	12.9	12.9	12.9	12.9	12.9
	5L371			5.4	6.2	6.5	10.5	7.7	97.5%	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1
	5L783			10.6	10.6	11.1	14.3	14.3	93.5%	20.8	20.8	20.8	20.8	20.8	20.8	20.8	20.8	20.8	20.8
		701T Total		18.1	19.9	19.8	26.6	26.5		40.3	40.3	40.3	40.3	40.3	40.3	40.3	40.3	40.3	40.3
		823S Total		18.1	19.9	19.8	26.6	26.5		40.3	40.3	40.3	40.3	40.3	40.3	40.3	40.3	40.3	40.3

Wapiti 823S				MVA LOADING - RECORDED						PREDICTED - Required Capacity									
				2020/2021	2021/2022	2022/2023	2023/2024	2025/2026		2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
SUB		CAPACITY		Peak	Peak	Peak	Peak	Peak		Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak
No	Feeder	T/R	MVA	MVA	MVA	MVA	MVA	MVA	PF	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA
823S	5LNew1	Proposed 702T	50						90.0%			10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4
	5LNew2								90.0%			10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4
	5LNew3								90.0%			10.4	10.4	10.4	10.4	10.4	10.4	10.4	10.4
		702T Total										31.1	31.1	31.1	31.1	31.1	31.1	31.1	31.1
		Total		18.1	19.9	19.8	26.6	26.5		40.3	40.3	71.4	71.4	71.4	71.4	71.4	71.4	71.4	71.4

Notes:
A feeder coincidence factor of 0.883 was applied to 823S 701T feeders and a factor of 1.00 to the proposed 702T feeders
This LF includes Accepted and Proposed projects.
Values shown are annual peaks.

Distribution Planning Criteria Violation

6.4 Transmission-Based Alternative 2

Table 6-6: Wapiti 823S Forecast for Transmission-Based Alternative 2

Wapiti 823S				MVA LOADING - RECORDED						PREDICTED - Required Capacity									
				2021/2022	2022/2023	2023/2024	2024/2025	2025/2026		2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
SUB		CAPACITY		Peak	Peak	Peak	Peak	Peak		Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak
No	Feeder	T/R	MVA	MVA	MVA	MVA	MVA	MVA	PF	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA
823S	5L370	701T	50	4.5	3.6	3.9	7.6	8.1	96.5%	12.9	12.9	12.9	12.9	12.9	12.9	12.9	12.9	12.9	12.9
	5L371			5.4	6.2	6.5	10.5	7.7	97.5%	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1
	5L783			10.6	10.6	11.1	14.3	14.3	93.5%	20.8	20.8	20.8	20.8	20.8	20.8	20.8	20.8	20.8	20.8
		701T Total		18.1	19.9	19.8	26.6	26.5		40.3	40.3	40.3	40.3	40.3	40.3	40.3	40.3	40.3	40.3
		823S Total		18.1	19.9	19.8	26.6	26.5		40.3	40.3	40.3	40.3	40.3	40.3	40.3	40.3	40.3	40.3

Notes:
A feeder coincidence factor of 0.883 was applied to 823S 701T feeders
This LF includes Accepted and Proposed projects.
Values shown are annual peaks.

Distribution Planning Criteria Violation

* Studies are underway to address this criteria violation. A recommended solution will be presented to the AESO once the analysis is completed, along with the appropriate next steps. Further study will be addressed in a separate DDR and SASR.

Table 6-7: New POD Forecast for Transmission-Based Alternative 2

Proposed New POD				MVA LOADING - RECORDED						PREDICTED - Required Capacity									
				2021/2022	2022/2023	2023/2024	2024/2025	2025/2026		2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
SUB		CAPACITY		Peak	Peak	Peak	Peak	Peak		Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak	Peak
No	Feeder	T/R	MVA	MVA	MVA	MVA	MVA	MVA	PF	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA	MVA
New POD	5LNew1	Proposed 701T	50						90.0%			15.6	15.6	15.6	15.6	15.6	15.6	15.6	15.6
	5LNew2								90.0%			15.6	15.6	15.6	15.6	15.6	15.6	15.6	15.6
		701T Total										31.1	31.1	31.1	31.1	31.1	31.1	31.1	31.1
		Total										31.1	31.1	31.1	31.1	31.1	31.1	31.1	31.1

Notes:
A feeder coincidence factor of 1 was applied to the proposed 701T feeders
This LF includes Accepted and Proposed projects.
Values shown are annual peaks.
The two new feeders out of the proposed new POD will be express industiral feeders serving a single load centre. Under N-1 contingency, the total load supplying the site will be limited to 24.5 MVA.

7 Appendix B – 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.

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