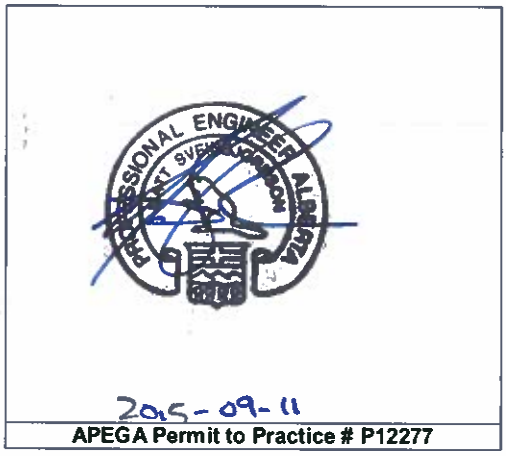
APPENDIX E DFO NEED FOR DEVELOPMENT REPORT

Distribution Deficiency Report

Thornton POD
Grande Prairie District



2015-09-11
APEGA Permit to Practice # P12277

Approvals		Signature	Date
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September 11, 2015

Contents

Revision History:

R0	Original Draft	Erin Ebbers	May 23, 2014
R1	Customer loading changes	Erin Ebbers	October 17, 2014
R2	Customer loading changes	Erin Ebbers	October 23, 2014
R3	Implementing comments	Sonya Wallbank	November 25, 2014
R4	Updated load forecast	Matt Sveinbjornson	December 12, 2014
R5	AESO Updates	Matt Sveinbjornson	December 18, 2014
R6	Updates to Alternative 2	Matt Sveinbjornson	December 20, 2014
R7	Updates to Alternative 3	Matt Sveinbjornson	January 5, 2015
R8	Updated for Regulatory Filing	Matt Sveinbjornson	May 29, 2015
R9	Load Forecast updates.	Matt Sveinbjornson	August 28, 2015
R10	Final regulatory updates..	Matt Sveinbjornson	September 11, 2015

1 Executive Summary

ATCO Electric Distribution Division has received multiple requests to serve oilfield loads south of Grande Prairie.

To serve the requested loads ATCO Electric Distribution Division considered the following alternatives:

Alternative 1: Serve the loads with a distribution-based solution

Alternative 2: Build a new POD at the Gold Creek Load Center (Gold Creek POD)

Alternative 3: Build Gold Creek POD & Upgrade 810S Dome Cutbank

Alternative 4: Feed the load from two new PODs (Gold Creek POD and Thornton POD)

The existing area PODs either do not have enough capacity to serve the load requests or are too distant to provide a distribution-based solution.

Based on the analysis outlined in this report, ATCO Electric Distribution Division prefers Alternative 4 to serve the requested loads.

The proposed Thornton POD (from Alternative 4) would have an ISD of Q3-2016. The ISD for the Gold Creek POD (from Alternative 4) is requested to be Q1-2018. As these proposed developments have different requested ISDs, ATCO Electric Distribution Division is submitting separate System Access Service Requests (SASR) and proposes each new development is managed under separate connection projects. This project will address the need of the Thornton POD only.

2 Existing Distribution and Transmission System Assessment

2.1 Existing System

The PODs closest to the new load requests are 798S Bridge Creek, 810S Dome Cutbank and 823S Wapiti. 857S Kakwa Ridge and 845S Big Mountain were not considered as they are not Distribution PODs and are deemed to be too far from the requested loads to be served with distribution voltages. 733S Simonette and 740S H.R. Milner have not been considered since they are deemed to be too far from the requested loads to be served with distribution voltages.

Figure 2.1-1, on the next page, shows the existing Transmission system near the requested loads.

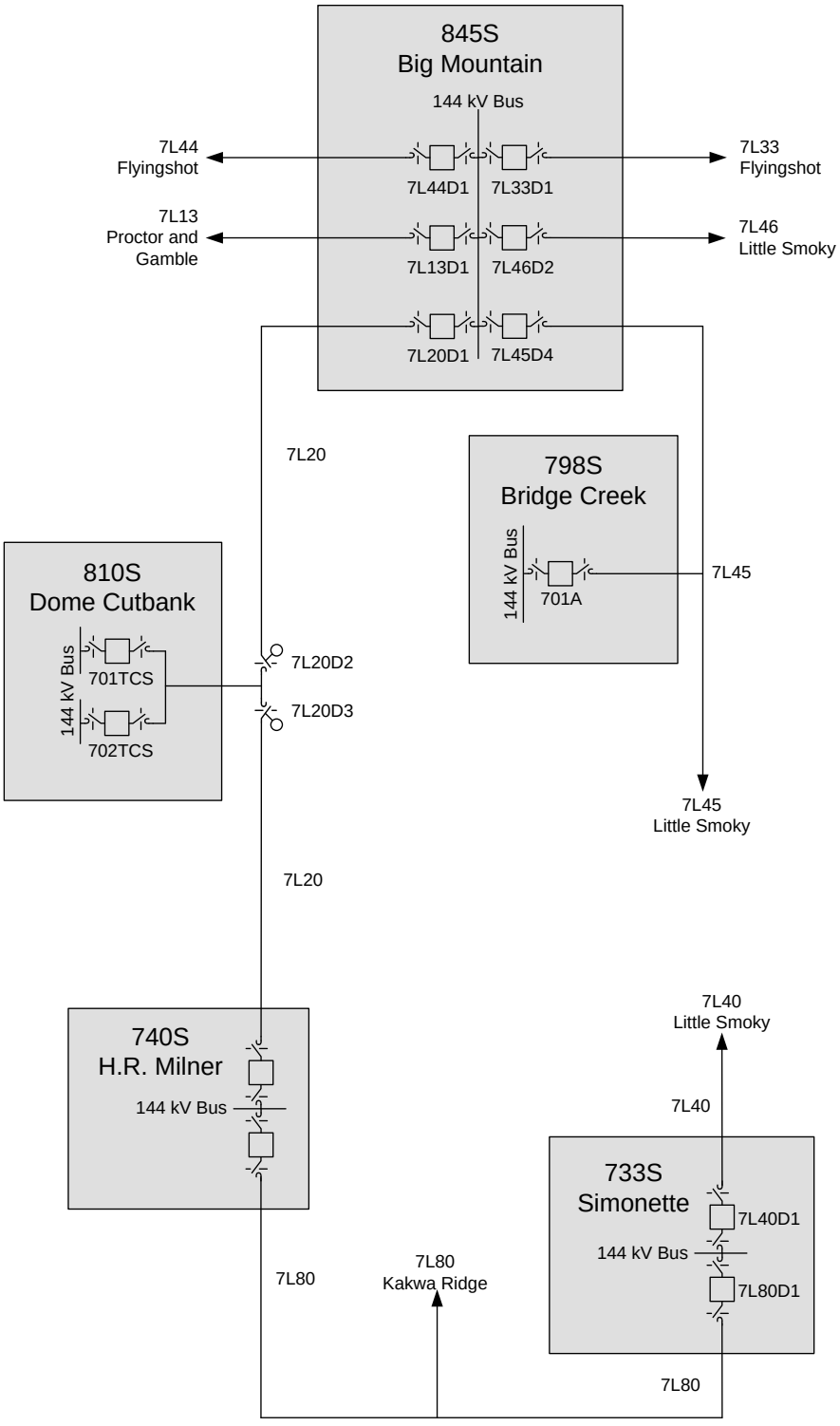

Figure 2.1-1 – Existing Transmission System

2.2 810S Dome Cutbank

Table 2.2-1, in Appendix A, shows the load forecast for 810S Dome Cutbank with existing customer loading and forecasts. In 2016, the load at 810S Dome Cutbank is forecasted to be at 98% the rated capacity of the POD transformers. There is only 520 kW of remaining transformer capacity at 810S Dome Cutbank.

Figure 2.2-1 shows the simplified SLD for 810S Dome Cutbank.

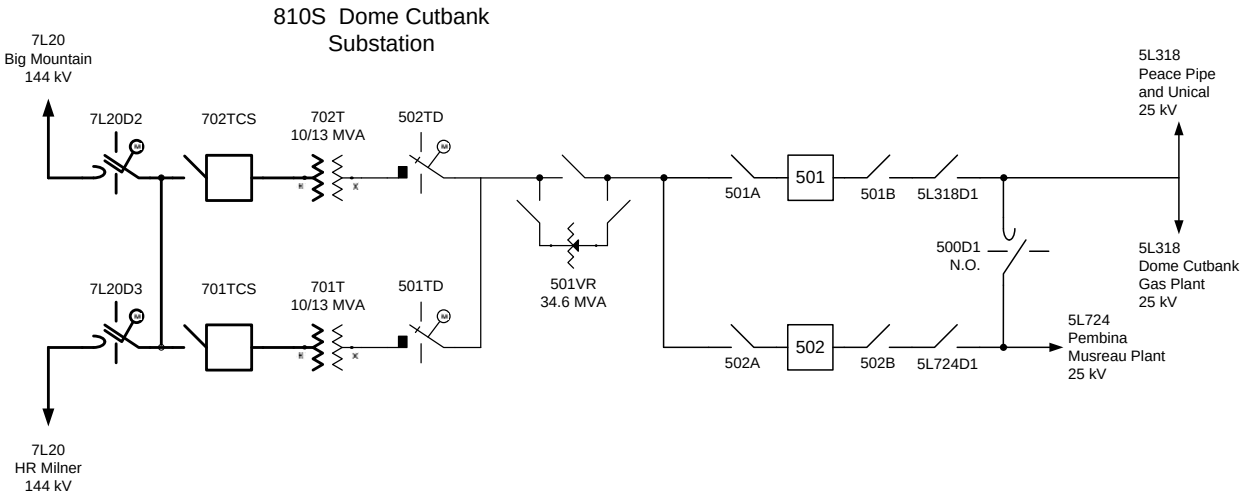

Figure 2.2-1 – Simplified SLD of 810S Dome Cutbank

2.3 798S Bridge Creek

Table 2.3-1, in Appendix A, shows the load forecast for 798S Bridge Creek with existing customer loading and forecasts

Figure 2.3-1 shows the simplified SLD for 798S Bridge Creek.

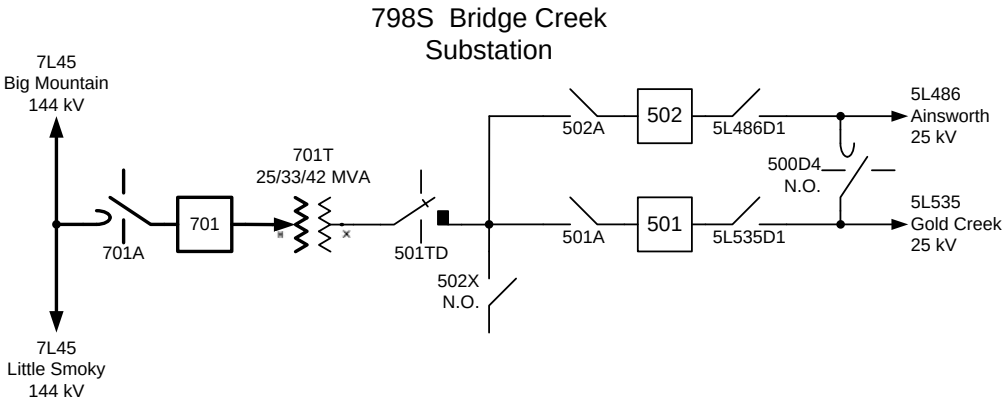

Figure 2.3-1 – Simplified SLD of 798S Bridge Creek

2.4 823S Wapiti

Table 2.4-1, in Appendix A, shows the load forecast for 823S Wapiti with existing customer loading and forecasts. Figure 2.4-1 shows the simplified SLD for 823S Wapiti.

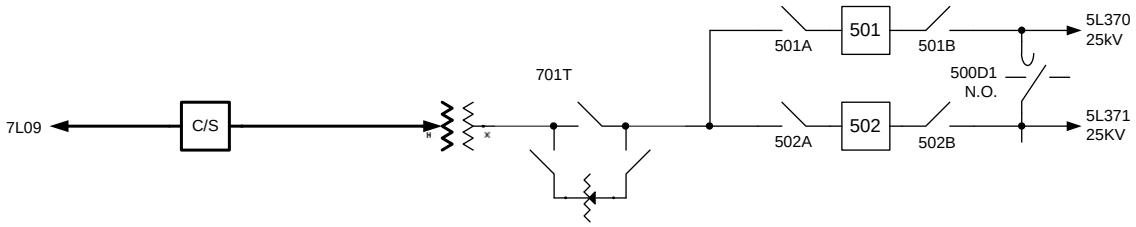

Figure 2.4-1 – Simplified SLD of 823S Wapiti

3 Customer Requests

ATCO Electric Distribution Division has received multiple requests to serve oilfield loads south of Grande Prairie.

An industrial customer has submitted requests for 52 MW of load in the Gold Creek and Cutbank areas south of Grande Prairie. Table 3.1-1 details the loads and ISDs for the Gold Creek and Cutbank load centers.

Load Location	Load Description	Requested Operating Load	Requested ISD
Gold Creek Area			
15-14-67-05-W6M	Gas Plant- Train #1	14.4 MW	Q1 2018
15-14-67-05-W6M	Gas Plant- Train #2	14.4 MW	Q1 2019
15-14-67-05-W6M	Gas Plant- Train #3	14.4 MW	Q1 2020
	Total	43.2 MW	
Cutbank Area			
64-4/5-W6M	Pads #1-2	0.5 MW	Q1 2015
10-10-65-5-W6M	Gas Plant	3.2 MW	Q1 2016
64-4/5-W6M	Pads #3-4	0.5 MW	Q1 2016
Twp 64-4/5-W6M	4 Well Pads	0.8 MW	Q2 2016
7-11-64-4-W6M	Battery	1.6 MW	Q2 2016
Twp 65-05-W6M	Camp	0.8 MW	Q1 2017
64-4/5-W6M	Pads #5-6	0.5 MW	Q1 2017
64-4/5-W6M	Pads #7-8	0.5 MW	Q1 2018
64-4/5-W6M	Pads #9-10	0.4 MW	Q1 2018
	Total	8.8 MW	

Table 3.1-1 –Load Requests

ATCO Electric has also received requests from other customers for load additions in townships 63-5-W6M, 62-6-W6M and 62-4-W6M, which are located to the south of the Gold Creek load center and the Cutbank load center. Table 3.1-2 details the loads and ISDs of the requested load additions in townships 63-5-W6M, 62-6-W6M and 62-4-W6M.

Load Location	Load Description	Requested Operating Load	Requested ISD
63-5-W6M	Multi-phase Gas Plant	8 MW	2017
62-4-W6M	Multi-phase Gas Plant	8 MW	2017
62-6-W6M	Midstream Facility	9.1 MW	2017
62-4-W6M	Multi-phase Gas Plant	8 MW	2018
	Total	33.1 MW	

Table 3.1-2 –Other Area Load Requests

The closest PODs to the Gold Creek load center are 798S Bridge Creek and 823S Wapiti. 798S Bridge Creek is 28 km away from the load center and 823S Wapiti is 50 km away. The closest POD to the Cutbank load center and the loads identified in Table 3.1-2 is 810S Dome Cutbank. The Cutbank load center is approximately 30 km away from 810S Dome Cutbank.

Figure 3.1-1 shows the locations of the requested loads in respect to the existing PODs.

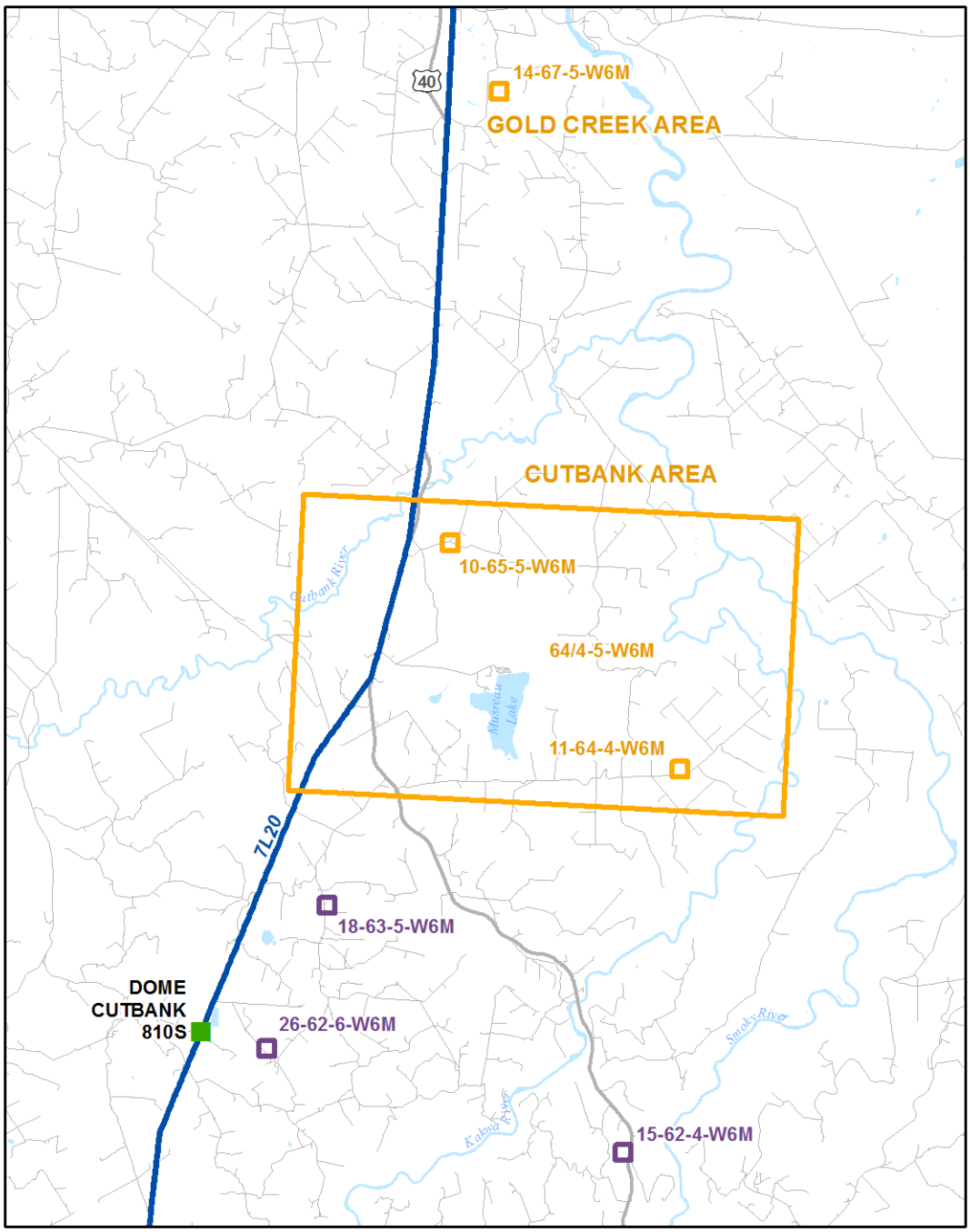

Figure 3.1-1 – Requested Load Locations with respect to the Existing PODs

4 Alternatives

The following alternatives were considered and are described in Sections 4.1, 4.2, 4.3 and 4.4.

Alternative 1: Serve the loads with a distribution-based solution

Alternative 2: Build a new POD at the Gold Creek Load Center (Gold Creek POD)

Alternative 3: Build Gold Creek POD & Upgrade 810S Dome Cutbank

Alternative 4: Feed the load from two new PODs (Gold Creek POD and Thornton POD)

4.1 Alternative 1: Serve the loads with a distribution-based solution

A. 823S Wapiti

Three express 25 kV feeders, one feeder per train, would be constructed to serve the load in the Gold Creek area. Three additional 25 kV breakers would also be required at 823S Wapiti. Each feeder would be approximately 50 km long. This scenario was modelled in ATCO Electric's load flow simulation software. ATCO Electric's minimum acceptable distribution voltage levels (0.97 Vpu) cannot be obtained in this scenario as the line lengths are too long to support the requested load. No further estimates were completed.

The Cutbank loads are approximately 40 km further south of the Gold Creek load. Site voltage levels cannot be supported from 823S Wapiti.

Feeding the requested loads from 823S Wapiti is not technically viable and has been ruled out.

B. 798S Bridge Creek

Three express 25kV feeders, one feeder per train, would be constructed to serve the load in the Gold Creek area. Each feeder would be approximately 28 km long. Three additional 25 kV breakers would also be required at 798S Bridge Creek. This scenario was modelled in ATCO Electric's load flow simulation software. ATCO Electric's minimum acceptable distribution voltage levels (0.97 Vpu) cannot be obtained in this scenario as the line lengths are too long to support the requested load. No further estimates were completed.

The Cutbank loads are approximately 40 km further south of the Gold Creek load. Site voltage levels cannot be supported from 798S Bridge Creek.

Feeding the requested loads from 798S Bridge Creek is not technically viable and has been ruled out.

C. 810S Dome Cutbank

The Gold Creek load is approximately 54 km from 810S Dome Cutbank. ATCO Electric's minimum acceptable voltage levels (0.97 Vpu) cannot be obtained in this scenario as the line lengths are too long to support the requested load. This option is not technically feasible and has been ruled out.

The Cutbank loads are approximately 30 km north of 810S Dome Cutbank and acceptable distribution voltage levels can be obtained to serve these loads additions. Table 4.1-1, in Appendix A, shows the load forecast for 810S Dome Cutbank after the connection of the requests in Table 3.1-1. In 2016, load at 810S Dome Cutbank exceeds the nameplate capacity of transformer 701T.

D. Load Shifting

The 810S Dome Cutbank distribution system is an isolated system with no 25 kV connections to adjacent, area PODs. ATCO Electric investigated the possibility of shifting existing load served from 810S Dome Cutbank to adjacent PODs. The closest distribution system is approximately 44 km from the Dome Cutbank system. This scenario was modelled and minimum acceptable voltage levels cannot be obtained in this scenario as the line lengths are too long to support the load on the existing 810S Dome Cutbank distribution system. Load shifting is not a technically feasible solution.

From the analysis above, a distribution-based solution cannot be achieved to serve the loads identified in Section 3 and transmission development is required.

4.2 Alternative 2: Build a new POD at the Gold Creek Load Center (Gold Creek POD)

For this alternative a new POD would be located near the Gold Creek load at NE14-67-5-W6M. This is the DFO preferred location considering the load magnitude 43.2 MW, per Table 3.1-1 above, at the Gold Creek load center. This location minimizes distribution feeder length and losses and provides optimal voltage support for starting the large motors at the Gold Creek load center.

The Gold Creek POD would also serve the 8.8 MW of load requested in the Cutbank area.

Proposed Transmission System Development

The new Gold Creek POD would be built out in two stages. In the first stage, Transmission line 7L20 would be bisected and would connect the new POD to line 7L20 via an In-Out connection. The new Gold Creek POD and apparatus would be installed, which may include:

- Three (3) 144 kV breakers c/w ganged disconnect switch
- One (1) 30/40/50 MVA, 144 to 25 kV LTC transformer
- One (1) 25 kV motorized disconnect switch
- Two (2) 25 kV line gang switches
- Two (2) 25 kV breakers c/w disconnect switches and instrument transformers
- Associated protection and metering

A future project, Stage 2, would install a second 30/40/50 MVA transformer and two (2) additional 25 kV breakers to serve the loads forecast at the Gold Creek load center in 2019 and 2020.

Each train identified in Table 3.1-1 at the Gold Creek load center would connect via a dedicated breaker. Breaker 502, installed in Stage 1, would connect to a feeder to serve the Cutbank area field loads.

Figure 4.2-1 shows the load locations near the Proposed POD.

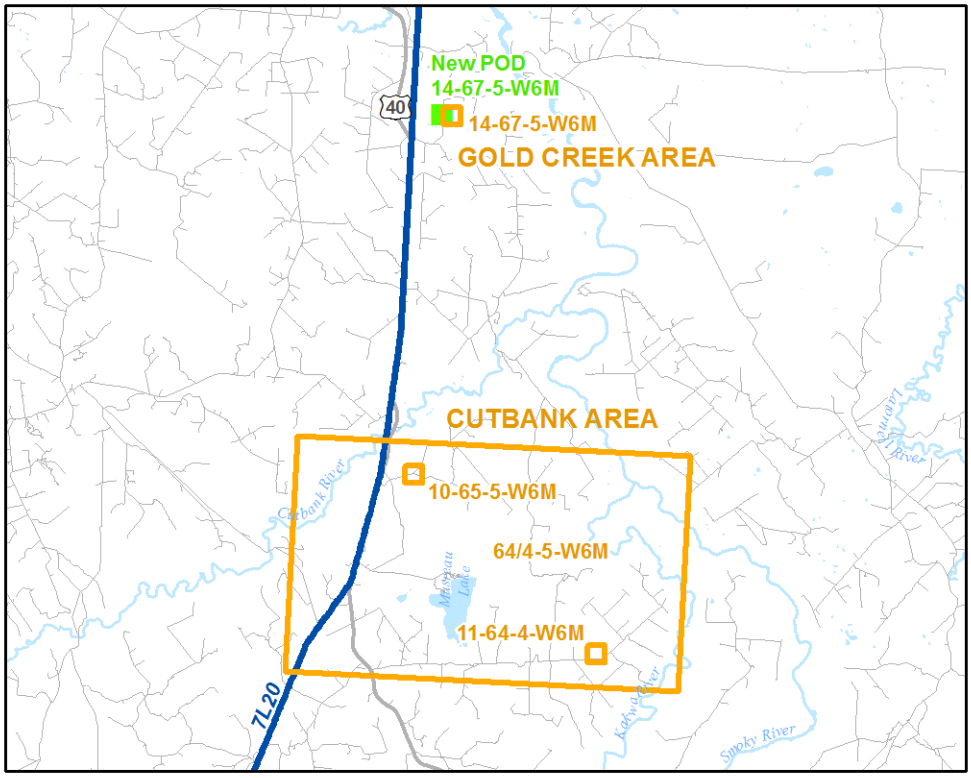

Figure 4.2-1 – Requested Load Locations with respect to the Proposed POD

System SLDs

Figures 4.2-2 and 4.2-3 show the simplified SLDs of the system development.

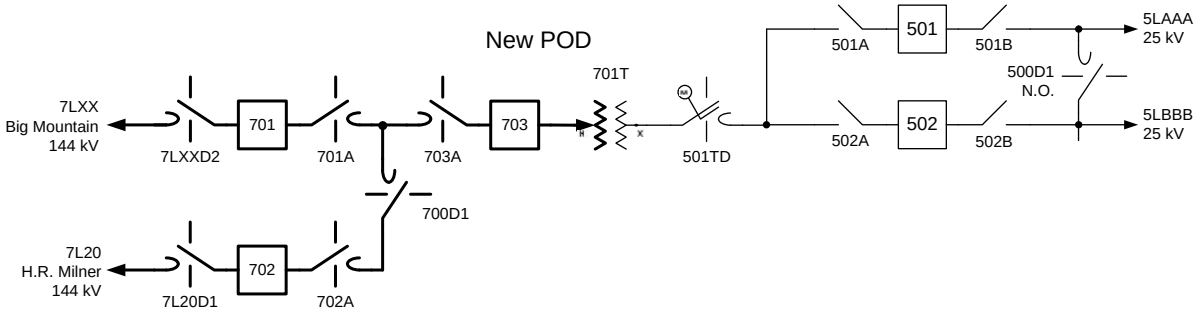

Figure 4.2-2 – Simplified SLD of the New POD, Alternative 2 – Stage 1

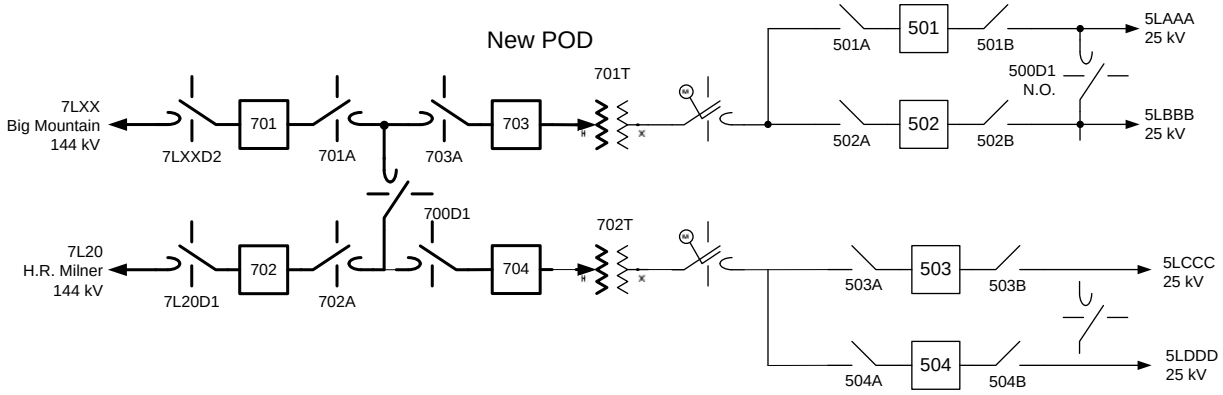

Figure 4.2-3 – Simplified SLD of the New POD, Alternative 2 – Stage 2

Load Forecast

Table 4.2-1, in Appendix A, shows the load forecast resulting from this alternative.

Distribution Development

Three express feeders, one per train, would be constructed to serve the Gold Creek area load. The short distribution feeder length provides optimal voltage support for starting the large motors at the Gold Creek load center.

In order to serve loads identified in the Cutbank area, approximately 27.5 km of 477ACSR, 12 km of 266 ACSR 25 kV and 27 km of 1/0 ACSR line will be constructed at a cost of $10.3M (+/-50%). Distribution line losses on this alternative are forecast at 945 kW on the 67 km distribution line.

The other load requests shown in Table 3.1-2 were modelled in ATCO Electric's load flow simulation software. ATCO Electric's minimum acceptable voltage levels (0.97 Vpu) cannot be obtained in this scenario as the line lengths are too long (>80 km) to support the requested load. No further estimates were completed.

Alternative 2 has been ruled out as it cannot feed all load requests, identified in Section 3.

4.3 Alternative 3: Build Gold Creek POD & Upgrade 810S Dome Cutbank

For this alternative a new POD would be located near the Gold Creek load at NE14-67-5-W6M, to serve the 43.2 MW of load additions in the Gold Creek area, and upgrades at 810S Dome Cutbank would be completed to accommodate the additional capacity required to serve the Cutbank loads and loads identified in Table 3.1-2.

Proposed Transmission Development – Gold Creek POD

This POD is located at the same site as discussed in Alternative 2. The requested in service date would now be adjusted to Q1-2018 and POD would be constructed with one transformer and three 25 kV breakers. The apparatus used to construct the Gold Creek POD in this alternative is similar to the apparatus outlined in Alternative 2.

Proposed Transmission System Development – 810S Dome Cutbank

Upgrade 810S Dome Cutbank with the installation of:

- 144 kV to 25 kV transformer(s) with sufficient capacity to serve a total of 65 MW of load. This equates to the existing loads at 810S Dome Cutbank plus the additional 41.9 MW of forecasted load, namely the Cutbank area loads and the loads identified in Table 3.1-2.
- Three (3) 25 kV breakers c/w disconnect switches and instrument transformers.

System SLDs

Figures 4.3-1 and 4.3-2 show the simplified SLD of the system development.

Each train identified in Table 3.1.1, in the Gold Creek area, would connect via a dedicated breaker.

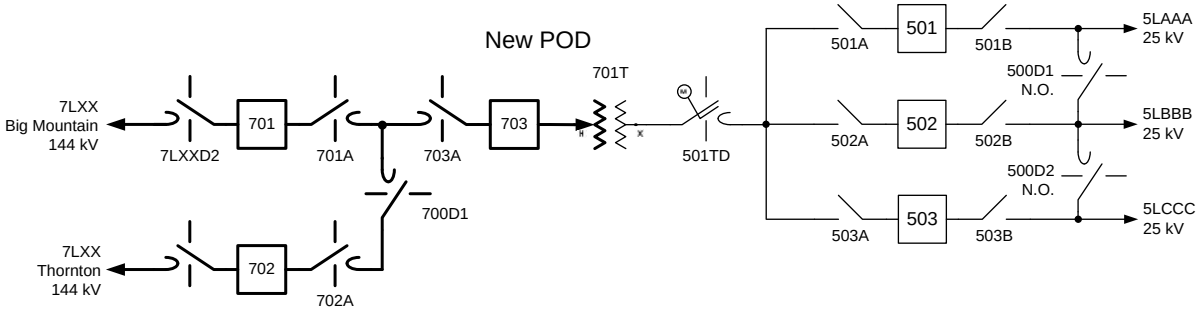

Figure 4.3-1 – Simplified SLD of the New Gold Creek POD, Alternative 3

Figures 4.3-2 shows the simplified SLD of the system development after the upgrades to 810S Dome Cutbank.

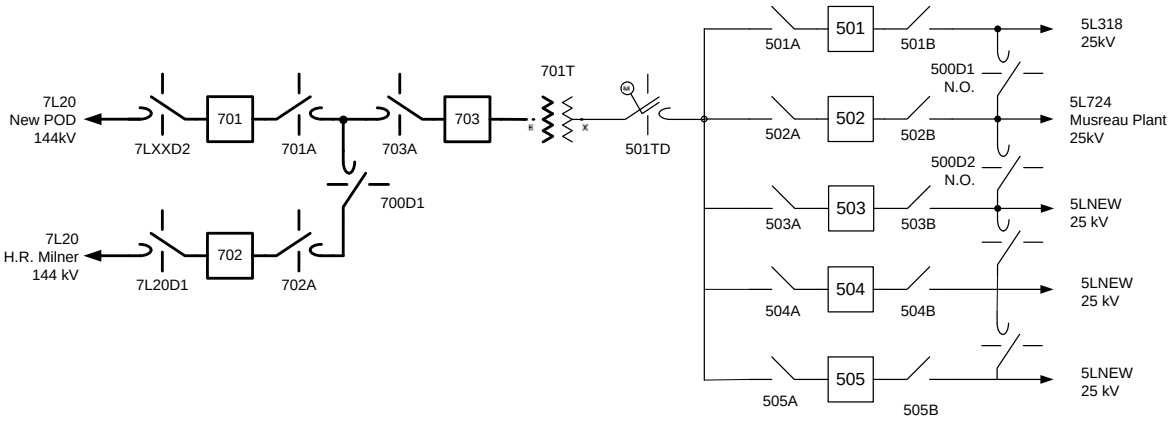

Figure 4.3-2 – Simplified SLD Dome Cutbank after upgrades

Load Forecast

The load forecast for the Gold Creek POD is shown in Table 4.3-1. The load forecast of 810S Dome Cutbank, after the proposed changes, is shown in Table 4.3-2.

Distribution Development – Gold Creek POD

Three express feeders, one per train, would be constructed to serve the Gold Creek area load. The short distribution feeder length provides optimal voltage support for starting the large motors at the Gold Creek load center.

Distribution Development – 810S Dome Cutbank

Three new 25 kV feeders will be constructed to serve the loads identified in the Cutbank area and in Table 3.1-2.

The Cutbank loads are approximately 30 km north of 810S Dome Cutbank. An express 25 kV feeder, fed from breaker 503, would need to be constructed to serve the Cutbank loads. The feeder would be 42 km long and cost $8.6M (+/-50%). Distribution line losses on this feeder are forecast at 627 kW.

The 17.1 MW of load addition at Twp. 62-6-W6M and Twp. 63-5-W6M (two of the load locations shown in Table 3.1-2) would be served from a 25 kV feeder, from Breaker 504. The new feeder would be 15 km long and cost $3.4M (+/-50%). Distribution losses on this feeder are forecast at 535 kW.

The loads in Twp. 62-4-W6M (the remaining load in Table 3.1-2) are also approximately 30 km north of 810S Dome Cutbank. An express 25 kV feeder, fed from Breaker 505, would need to be constructed to serve this 16 MW load. The shortest route to this load is 30 km through inaccessible terrain. The feeder is estimated to cost $6.3M (+/-50%) and distribution line losses on this feeder are forecast at 2000 kW.

Alternative 3 is not preferred for the following reasons:

- Distribution system development costs.
- High distribution system line losses.
- Difficult 25 kV line routing required to serve the load at 62-4-W6M.

4.4 Alternative 4: Feed the load from two new PODS (Gold Creek POD and Thornton POD)

For Alternative 4, two new PODs would be added. The proposed Gold Creek POD would be strategically located to serve the Gold Creek load centre at NE14-67-5-W6M; the proposed Thornton POD would be strategically located to serve both the Cutbank load centre and the loads identified in Table 3.1-2, at LSD 19-63-5-W6M.

The proposed Thornton POD is located near existing 25 kV lines served from 810S Dome Cutbank. This will minimize the distribution development required to serve the loads requested in Table 3.1-2 and will provide additional opportunity to offload the existing load served from 810S Dome Cutbank.

Proposed Transmission Development– Gold Creek POD

This POD is located at the same site as discussed in Alternative 2. The requested in service date would now be adjusted to Q1-2018 and POD would be constructed with one transformer and three 25 kV breakers. The apparatus used to construct the Gold Creek POD in this alternative is similar to the apparatus outlined in Alternative 2.

Each train identified in Table 3.1.1 at the Gold Creek load center would connect via a dedicated breaker.

Proposed Transmission Development – Thornton POD

Thornton POD would install one 25 kV breaker (Breaker 501) and connect to a feeder to serve the Cutbank area field loads, one 25 kV breaker (Breaker 502) for loads forecast in 63-5-W6M and 62-6-W6M, and Breaker 503 would connect to load addition in 62-4-W6M.

The source to the new POD would bisect Transmission line 7L20 and connect the new POD to line 7L20 via an In-Out connection. Install the new Thornton POD substation and apparatus, which may include:

- Three (3) 144 kV breakers c/w ganged disconnect switch
- One (1) 30/40/50 MVA, 144 to 25 kV LTC transformer
- One (1) 25 kV motorized disconnect switch
- Three (3) 25 kV line gang switches
- Three (3) 25 kV breakers c/w disconnect switches and instrument transformers
- Associated protection and metering

This POD would have a requested in service date of Q3-2016.

Figure 4.4-1 shows the load locations near the Proposed POD.

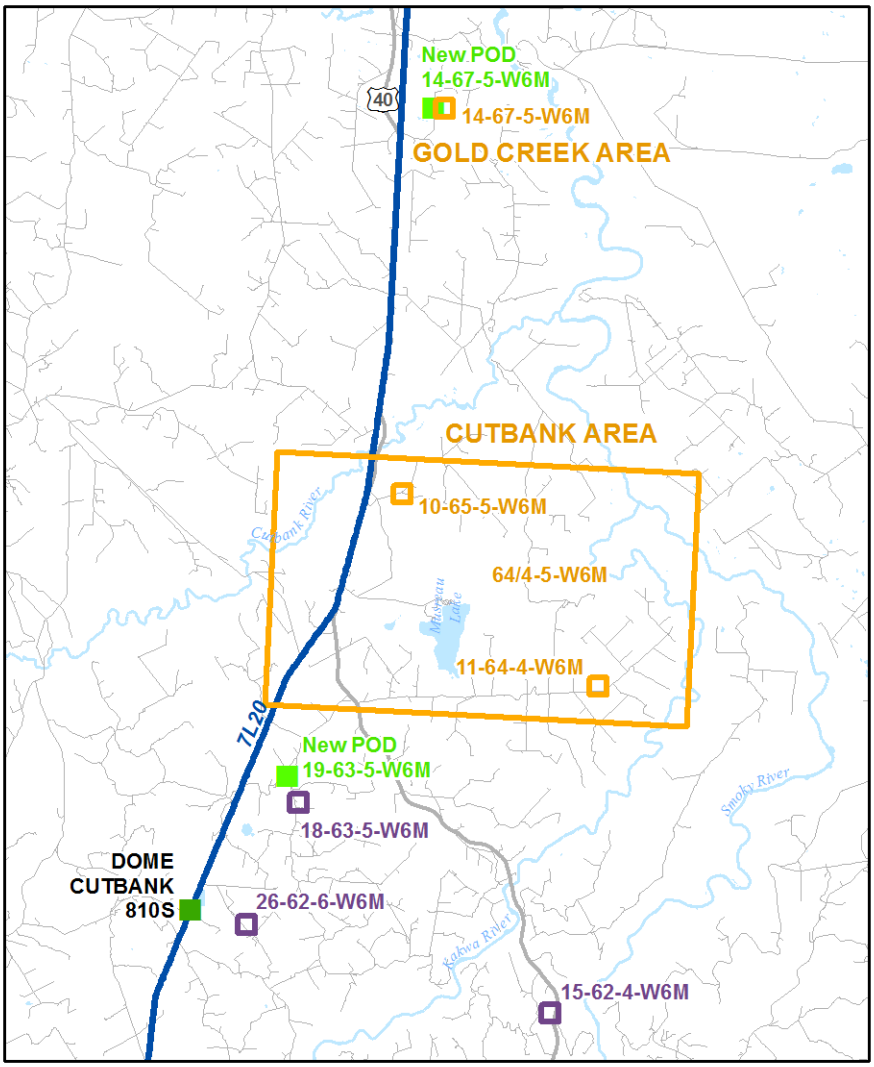

Figure 4.4-1 – Requested Load Locations with respect to the Proposed PODs in Alternative 4

System SLDs

Figures 4.4-2 and 4.4-3 show the simplified SLD of the system development.

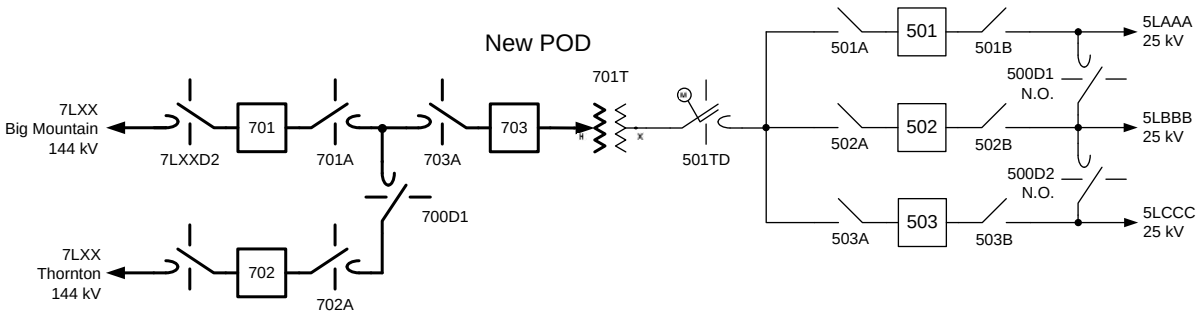

Figure 4.3-2 – Simplified SLD of the New Gold Creek POD, Alternative 4

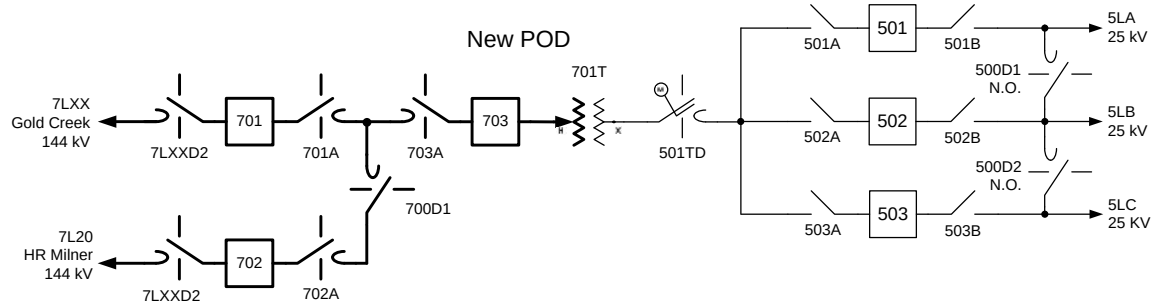

Figure 4.3-3 – Simplified SLD of the New Thornton POD, Alternative 4

Load Forecast

Tables 4.4-1 and 4.4-2, in Appendix A, shows the load forecast for the Gold Creek and Thornton POD. The load forecast for 810S Dome Cutbank is shown in Table 2.2-1 after the development of this alternative.

The Thornton POD will provide operational flexibility to offload 810S Dome Cutbank in the future, if needed, alleviating the need to expand and upgrade this facility.

Distribution Development – Gold Creek POD

Three express feeders, one per train, would be constructed to serve the Gold Creek area load. The short distribution feeder length provides optimal voltage support for starting the large motors at the Gold Creek load center.

Distribution Development – Thornton POD

Three new 25 kV feeders will be constructed to serve the loads identified in the Cutbank area and in Table 3.1-2.

The Cutbank loads are approximately 13 km north of Thornton POD and would be served from Breaker 501. Approximately 12 km of 266 ACSR and 13 km of 1/0 ACSR 25 kV line will be constructed at a cost of $4.6M (+/-50%) to serve the Cutbank loads. Distribution line losses on this alternative are forecast at 596 kW.

The 17.1 MW of load additions at Twp. 62-6-W6M and Twp. 63-5-W6M (two of the load locations shown in Table 3.1-2) would be served from a 25 kV feeder from Breaker 502. The loads forecast in Twp. 63-5-W6M are located approximately 1 km from the Thornton POD location and the load in Twp. 62-6-W6M is approximately 11 km from the Thornton POD. The new feeder would cost $2.3M (+/-50%) and distribution losses are forecast at 261kW.

Approximately 23 km of 477 ACSR 25 kV line will be constructed at a cost of $ 4.9M (+/-50%) to serve the load forecast in Twp. 62-4-W6M (the remaining load in Table 3.1-2). Distribution line losses on this alternative are forecast at 1550 kW. The 25 kV feeder would be constructed next to existing service roads and Hwy 40 to get to the load at Twp. 62-4-W6M. This is the DFO's preferred route to serve this load.

Recommendation

Alternative 4 is the preferred development to address the need to provide capacity to serve customer requests shown in Section 3. ATCO Electric Distribution Division prefers this alternative for the following reasons:

- A distribution-based solution is not viable to serve any of the loads forecast.
- The Gold Creek POD is the optimum location to serve the 43.2 MW of requested load due to the magnitude and characteristics of the load at the Gold Creek load center.
- The Thornton POD has the least distribution system development needed compared to the other alternative to serve the Cutbank load.
- The Thornton POD has the lowest estimated distribution capital costs.
- The Thornton POD will provide operational flexibility to offload 810S Dome Cutbank, alleviating the need to expand and upgrade this facility.

As the proposed developments associated with the Gold Creek and Thornton PODs have different requested ISDs, ATCO Electric Distribution Division is submitting separate System Access Service Requests (SASR) and proposes each new development is managed under separate connection projects.

This project will address the need of the Thornton POD only.

Appendix A – Load Forecasts

Table 2.2-1 – 810S Dome Cutbank Current Load Forecast excluding requested loads

				Recorded					Predicted										
				Peak MW	Peak MW	Peak MW	Peak MW	Peak MW	Peak MW	Peak MW	Peak MW	Peak MW	Peak MW	Peak MW	Peak MW	Peak MW	Peak MW	Peak MW	Peak MW	Peak MW
Sub No.	**Feeder**	**Capacity**	**PF**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**
810S	Dome Cutbank	701T/702T	92%	9.8	18.2	19.6	21.1	21.2	22.9	23.4	23.6	23.8	24.1	24.3	24.5	24.7	24.9	25.1	25.3
	5L318	20/26 MVA	94%	10.0	9.8	10.1	9.9	10.0	10.2	10.6	10.7	10.8	10.9	11.0	11.1	11.2	11.3	11.4	11.5
	5L724		90%	0.0	9.7	10.5	12.0	12.8	14.4	14.6	14.7	14.8	15.0	15.1	15.2	15.3	15.5	15.6	15.7
810S	**Total Station**		**92%**	**9.8**	**18.2**	**19.6**	**21.1**	**21.2**	**22.9**	**23.4**	**23.6**	**23.8**	**24.1**	**24.3**	**24.5**	**24.7**	**24.9**	**25.1**	**25.3**

Notes:
A feeder coincidence factor of 0.93 was applied to the feeders
Tranformer capacity violations

Table 2.3-1 – 798S Bridge Creek Current Load Forecast excluding requested loads

				Recorded					Predicted										
				Peak MW	Peak MW	Peak MW	Peak MW	Peak MW	Peak MW	Peak MW	Peak MW	Peak MW	Peak MW	Peak MW	Peak MW	Peak MW	Peak MW	Peak MW	Peak MW	Peak MW
Sub No.	**Feeder**	**Capacity**	**PF**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**
798S	Bridge Creek	701T	98%	13.6	13.5	14.5	14.0	15.2	16.2	23.4	23.7	24.0	24.3	24.5	24.8	25.1	25.3	25.6	25.8
	5L486	25/33/42 MVA	93%	9.2	9.1	9.2	10.2	10.1	10.1	10.3	10.4	10.5	10.6	10.7	10.8	10.9	11.0	11.1	11.2
	5L535		100%	4.9	5.0	5.2	5.1	6.3	7.4	15.3	15.5	15.8	15.9	16.1	16.3	16.5	16.7	16.9	17.1
798S	**Total Station**		**98%**	**13.6**	**13.5**	**14.5**	**14.0**	**15.2**	**16.2**	**23.4**	**23.7**	**24.0**	**24.3**	**24.5**	**24.8**	**25.1**	**25.3**	**25.6**	**25.8**

Notes:
A feeder coincidence factor of 0.91 was applied to the feeders
Tranformer capacity violations

Table 2.4-1 – 823S Wapiti Current Load Forecast excluding requested loads

				Recorded					Predicted										
				Peak MW	Peak MW	Peak MW	Peak MW	Peak MW	Peak MW	Peak MW	Peak MW	Peak MW	Peak MW	Peak MW	Peak MW	Peak MW	Peak MW	Peak MW	Peak MW	Peak MW
Sub No.	**Feeder**	**Capacity**	**PF**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**
823S	Wapiti	701T	95%	8.2	7.6	7.8	8.0	8.3	8.6	11.5	11.6	11.7	11.8	11.9	12.0	12.1	12.2	12.3	12.4
	5L371	10/13 MVA	92%	2.6	2.0	2.0	2.6	2.7	2.7	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.9	2.9	2.9
	5L370		95%	6.3	5.7	6.4	5.6	6.1	6.4	9.5	9.6	9.7	9.8	9.9	10.0	10.1	10.2	10.2	10.3
823S	**Total Station**		**95%**	**8.2**	**7.6**	**7.8**	**8.0**	**8.3**	**8.6**	**11.5**	**11.6**	**11.7**	**11.8**	**11.9**	**12.0**	**12.1**	**12.2**	**12.3**	**12.4**

Notes:
A feeder coincidence factor of 0.94 was applied to the feeders
Tranformer capacity violations

Table 4.1-1 – 810S Dome Cutbank POD Load Forecast including requested loads– Alternative 1

				Recorded					Predicted										
				Peak MW	Peak MW	Peak MW	Peak MW	Peak MW	Peak MW	Peak MW	Peak MW	Peak MW	Peak MW	Peak MW	Peak MW	Peak MW	Peak MW	Peak MW	Peak MW
Sub No.	**Feeder**	**Capacity**	**PF**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**
810S	Dome Cutbank	TBD	92%	9.8	18.2	19.6	21.1	21.2	22.9	23.4	29.5	47.0	63.0	63.2	63.4	63.6	63.9	64.1	64.3
	5L318		94%	10.0	9.8	10.1	9.9	10.0	10.2	10.6	10.7	10.8	10.9	11.0	11.1	11.2	11.3	11.4	11.5
	5L724		90%	0.0	9.7	10.5	12.0	12.8	14.4	14.6	14.7	14.8	15.0	15.1	15.2	15.3	15.5	15.6	15.7
	Load Requests		90%								6.6	25.0	41.9	41.9	41.9	41.9	41.9	41.9	41.9
810S	**Total Station**		**92%**	**9.8**	**18.2**	**19.6**	**21.1**	**21.2**	**22.9**	**23.4**	**29.5**	**47.0**	**63.0**	**63.2**	**63.4**	**63.6**	**63.9**	**64.1**	**64.3**

Notes:
A feeder coincidence factor of 0.93 was applied to the feeders
Tranformer capacity violations
A power factor of 91% was applied to POD going forward from 2017

Table 4.2-1 – New Gold Creek POD Load Forecast – Alternative 2

				Peak MW	Peak MW	Peak MW	Peak MW	Peak MW	Peak MW	Peak MW	Peak MW	Peak MW	Peak MW	Peak MW	Peak MW	Peak MW	Peak MW	Peak MW	Peak MW	Peak MW	Peak MW	Peak MW	Peak MW
Sub No.	**Feeder**	**Capacity**	**PF**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**
TBD	Gold Creek	701T	90%									6.6	7.9	22.1	22.1	22.1	22.1	22.1	22.1	22.1	22.1	22.1	22.1
	5LA	30/40/50 MVA	90%											14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4
	5LB		90%									6.6	7.9	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8
	Gold Creek	702T	90%												14.4	27.4	27.4	27.4	27.4	27.4	27.4	27.4	27.4
	5LC	30/40/50 MVA	90%												14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4
	5LD		90%													14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4
	Total Station		**90%**										**7.8**	**21.8**	**36.1**	**48.9**	**48.9**	**48.9**	**48.9**	**48.9**	**48.9**	**48.9**	**48.9**

Notes:
A feeder coincidence factor of 0.95 was applied to the feeders
A transformer coincidence factor of 0.99 was applied to the feeders

Table 4.3-1 – New Gold Creek POD Load Forecast – Alternative 3

				Recorded						Predicted											
				Peak MW	Peak MW	Peak MW	Peak MW	Peak MW	Peak MW	Peak MW	Peak MW	Peak MW	Peak MW	Peak MW	Peak MW	Peak MW	Peak MW	Peak MW	Peak MW	Peak MW	Peak MW
Sub No.	**Feeder**	**Capacity**	**PF**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**
TBD	Gold Creek	701T	90%											14.4	27.4	41.0	41.0	41.0	41.0	41.0	41.0
	5LA	30/40/50 MVA	90%											14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4
	5LB		90%												14.4	14.4	14.4	14.4	14.4	14.4	14.4
	5LC		90%													14.4	14.4	14.4	14.4	14.4	14.4
	Total Station		**90%**											**14.4**	**27.4**	**41.0**	**41.0**	**41.0**	**41.0**	**41.0**	**41.0**

Notes:
A feeder coincidence factor of 0.95 was applied to the feeders

Table 4.3-2 – New 810S Dome Cutbank POD Load Forecast after upgrades – Alternative 3

				Recorded					Predicted										
				Peak MW	Peak MW	Peak MW	Peak MW	Peak MW	Peak MW	Peak MW	Peak MW	Peak MW	Peak MW	Peak MW	Peak MW	Peak MW	Peak MW	Peak MW	Peak MW
Sub No.	**Feeder**	**Capacity**	**PF**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**
810S	Dome Cutbank	TBD	92%	9.8	18.2	19.6	21.1	21.2	22.9	23.4	29.5	47.0	63.0	63.2	63.4	63.6	63.9	64.1	64.3
	5L318		94%	10.0	9.8	10.1	9.9	10.0	10.2	10.6	10.7	10.8	10.9	11.0	11.1	11.2	11.3	11.4	11.5
	5LNEW		90%								6.6	7.9	8.8	8.8	8.8	8.8	8.8	8.8	8.8
	5LNEW		90%									17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1
	5LNEW		90%										16.0	16.0	16.0	16.0	16.0	16.0	16.0
	5L724		90%	0.0	9.7	10.5	12.0	12.8	14.4	14.6	14.7	14.8	15.0	15.1	15.2	15.3	15.5	15.6	15.7
810S	**Total Station**		**92%**	**9.8**	**18.2**	**19.6**	**21.1**	**21.2**	**22.9**	**23.4**	**29.5**	**47.0**	**63.0**	**63.2**	**63.4**	**63.6**	**63.9**	**64.1**	**64.3**

Notes:
A feeder coincidence factor of 0.93 was applied to the feeders
Tranformer capacity violations
A power factor of 91% was applied to substation going forward from 2017

Table 4.4-1 – New Gold Creek POD Load Forecast – Alternative 4

				Recorded						Predicted											
				Peak MW	Peak MW	Peak MW	Peak MW	Peak MW	Peak MW	Peak MW	Peak MW	Peak MW	Peak MW	Peak MW	Peak MW	Peak MW	Peak MW	Peak MW	Peak MW	Peak MW	Peak MW
Sub No.	**Feeder**	**Capacity**	**PF**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**
TBD	Gold Creek	701T	90%											14.4	27.4	41.0	41.0	41.0	41.0	41.0	41.0
	5LA	30/40/50 MVA	90%											14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.4
	5LB		90%												14.4	14.4	14.4	14.4	14.4	14.4	14.4
	5LC		90%													14.4	14.4	14.4	14.4	14.4	14.4
	Total Station		**90%**											**14.4**	**27.4**	**41.0**	**41.0**	**41.0**	**41.0**	**41.0**	**41.0**

Notes:
A feeder coincidence factor of 0.95 was applied to the feeders

Table 4.4-2 – New Thornton POD Load Forecast – Alternative 4

				Recorded						Predicted											
				Peak MW	Peak MW	Peak MW	Peak MW	Peak MW	Peak MW	Peak MW	Peak MW	Peak MW	Peak MW	Peak MW	Peak MW	Peak MW	Peak MW	Peak MW	Peak MW	Peak MW	Peak MW
Sub No.	**Feeder**	**Capacity**	**PF**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**
2091S	Thornton	701T	90%									6.6	23.8	39.8	39.8	39.8	39.8	39.8	39.8	39.8	39.8
	5LA	30/40/50 MVA	90%									6.6	7.9	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8
	5LB		90%										17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1	17.1
	5LC		90%											16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0
	Total Station		**90%**									**6.6**	**23.8**	**39.8**	**39.8**	**39.8**	**39.8**	**39.8**	**39.8**	**39.8**	**39.8**

Notes:
A feeder coincidence factor of 0.95 was applied to the feeders