

# Information Document

## Central West Area Transmission Constraint Management

### ID #2018-005R



Information Documents are not authoritative. Information Documents are for information purposes only and are intended to provide guidance. In the event of any discrepancy between an Information Document and any Authoritative Document(s)<sup>1</sup> in effect, the Authoritative Document(s) governs.

#### 1 Purpose

This Information Document relates to the following Authoritative Document:

- Section 302.1 of the ISO rules, *Real Time Transmission Constraint Management* (“Section 302.1”).

The purpose of this Information Document is to provide additional information regarding the unique operating characteristics and resulting constraint conditions and limits in the Central West area of the Alberta interconnected electric system (AIES). For the purposes of this Information Document, the Central West area is the area illustrated by the maps in Appendix 2, 3a and 3b.

Section 302.1 sets out the general transmission constraint management protocol steps the AESO uses to manage transmission constraints in real time on the AIES. These steps are referenced in Table 1 of this Information Document as they are applied to the Central West area.

#### 2 General

Given the existing load, generation and transmission system configuration in the Central West area, with the loss of certain transmission lines or the Brazeau Generation Tripping Scheme (Remedial Action Scheme (“RAS”) 25) being out of service, transient issues may occur for the next contingency.

A detailed geographical map of the Central West area indicating bulk transmission lines and substations is provided in Appendix 2 of this Information Document.

#### 3 Constraint Conditions and Limits

When managing a transmission constraint in the Central West area, the AESO ensures that bulk transmission line flows out of the area are managed in accordance with bulk transmission line ratings established by the legal owner of the transmission facility to protect transmission facilities and ensure the continued reliable operation of the AIES.

##### 3.1 Non-Studied Constraints and Limits

For system conditions that have not been pre-studied, the AESO uses energy management system tools and dynamic stability tools to assess unstudied system operating limits in real time. The limits are determined by monitoring Real Time Contingency Analysis to ensure flows do not reach an unsafe level after N-1 events.

##### 3.2 Studied Constraints and Limits

The AESO’s study of the Central West area identified the following constraints and limits:

##### Bighorn

With the loss of any one of 848L, 870L, 717L, 166L, 719L, 418L, 281s Johnson Transformer 1, 17s Benalto Transformer 2, or 17s Benalto Transformer 3, transient issues at Bighorn generators occur.

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<sup>1</sup> “Authoritative Documents” is the general name given by the AESO to categories of documents made by the AESO under the authority of the *Electric Utilities Act* and associated regulations, and that contain binding legal requirements for either market participants or the AESO, or both. AESO Authoritative Documents include: the ISO rules, the Alberta reliability standards, and the ISO tariff.

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Where possible, transmission reconfiguration is the preferred method to eliminate the transient stability concerns; however, depending on system conditions this may not be possible and curtailing Bighorn generation may be necessary.

#### Brazeau 62s Stability Concerns

The AESO monitors the Brazeau Generation Tripping Scheme (RAS 25) that is in place in the Central West area. When the Brazeau Generation Tripping Scheme is available, it monitors the status of 995L and the Brazeau units output to protect against N-1 thermal overloads by tripping Brazeau Unit 2 under certain conditions.

Studies have indicated that with any of 995L, 202L, 672L, 673L, 801L, 828L, 834L, 836L, 841L, 844L, 320P Transformer 1 and/or the Brazeau Generation Tripping Scheme (RAS 25) out of service, transient issues at Brazeau may occur for the next contingency. Refer to Appendix 5 for Brazeau N-1 Transient Stability Limits with the Brazeau Generation Tripping Scheme (RAS 25) Armed. With the Brazeau Generation Tripping Scheme (RAS 25) Not Armed, refer to Appendix 6 for N-1 Transient Stability Limits. For Brazeau N-1 Thermal Limits refer to Appendix 7.

#### 4 Application of Transmission Constraint Management Procedures

The AESO manages transmission constraints in all areas of the AIES in accordance with the provisions of Section 302.1. However, not all of those provisions are effective in the Central West area due to certain operating conditions that exist in that area. Table 1 below describes the applicability of subsection 2(1) of Section 302.1 to the Central West area, and additional clarifying steps required to effectively manage transmission constraints in the area.

**Table 1  
Transmission Constraint Management  
Sequential Procedures for the Central West Area**

<b>Section 302.1 of the ISO rules, subsection 2(1) protocol steps</b>	<b>Applicable to the Central West area?</b>
(a) Determine effective pool assets	Yes
(b) Ensure maximum capability not exceeded	Yes
(c) Curtail effective downstream constraint side export service and upstream constraint side import service	No
(d) Curtail effective demand opportunity service on the downstream constraint side	No
(e)(i) Issue a dispatch for effective contracted transmission must-run	No
(e)(ii) Issue a directive for effective non-contracted transmission must-run	No
(f) Curtail effective pool assets in reverse energy market merit order followed by pro-rata curtailment	Yes
(g) Curtail effective loads with bids in reverse energy market merit order followed by pro-rata load curtailment	No

#### Applicable Protocol Steps

The first step in managing constraints in Alberta is to identify those generating units effective in managing a constraint. All of the generating units and loads operating in the Central West area are indicated in the single line diagram in Appendix 3 and the generating units effective in managing a transmission constraint

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in the Central West area are identified in Appendix 1. Pursuant to subsection 2(4) of Section 302.1, when a transmission constraint has been or is expected by the AESO to activate a RAS, the AESO recommences the procedural sequence in Table 1 (above) once the AESO ensures that the system is operating in a safe and reliable mode.

Step (a) in Table 1

The effective pool assets are as shown in Appendix 1.

Step (b) in Table 1

Ensuring maximum capabilities are not exceeded is effective in managing Central West area transmission constraints.

Step (c) in Table 1

There are no interties in the Central West area and curtailing import and export flows elsewhere on the system is not effective in managing a transmission constraint.

Step (d) in Table 1

Curtailing effective demand opportunity service on the downstream constraint side is not effective in managing transmission constraints in the Central West area because there is no demand opportunity service.

Steps (e)(i) and (ii) in Table 1

There are no transmission must-run contracts in the Central West area and using transmission must-run is not effective in managing a transmission constraint.

Step (f) in Table 1

Curtailing effective pool assets using reverse energy market merit order followed by pro-rata curtailment is effective in managing Central West area transmission constraints.

Step (g) in Table 1

When the local voltage RAS is not available, curtailing load is not effective in managing Central West transmission constraints.

## 5 Project Updates

As necessary, the AESO intends to provide information in this section about projects underway in the Central West area that are known to have an impact on the information contained in this Information Document.

### Appendices

Appendix 1 – *Effective Pool Assets*

Appendix 2 – *Geographical Map of the Central West area*

Appendix 3A – *Central West Area Single Line Diagram (256 Harmanton-178s Cynthia)*

Appendix 3B - *Central West Area Single Line Diagram (Edson Area)*

Appendix 4 – *Bighorn Transient Stability Limits*

Appendix 5 – *Brazeau N-1 Transient Stability Limits with Brazeau Generation Tripping Scheme (RAS 25) Armed*

Appendix 6 – *Brazeau N-1 Transient Stability Limits with Brazeau Generation Tripping Scheme (RAS 25) Not Armed*

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Appendix 7 – Brazeau N-1 Thermal Limits

## Revision History

Posting Date	Description of Changes
2024-09-03	Updated Section 3.2, Appendix 4, and Appendix 5.
2023-12-20	Updated Appendix 2 map, Appendix 5 and 6 tables.
2019-02-07	Administrative amendments to Section 3, title changes to Appendix 4, and Appendix 5, addition of Appendix 6.
2018-09-19	Administrative amendments to Section 3. Table layout and title changes to Appendix 4, and Appendix 5. Removal of Appendix 6.
2018-04-25	Initial release

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**Appendix 1 – Effective Pool Assets**

The effective pool assets for the Central West area, listed alphabetically by their pool IDs, are:

**Big Horn (BIG)**

**Brazeau (BRA)**

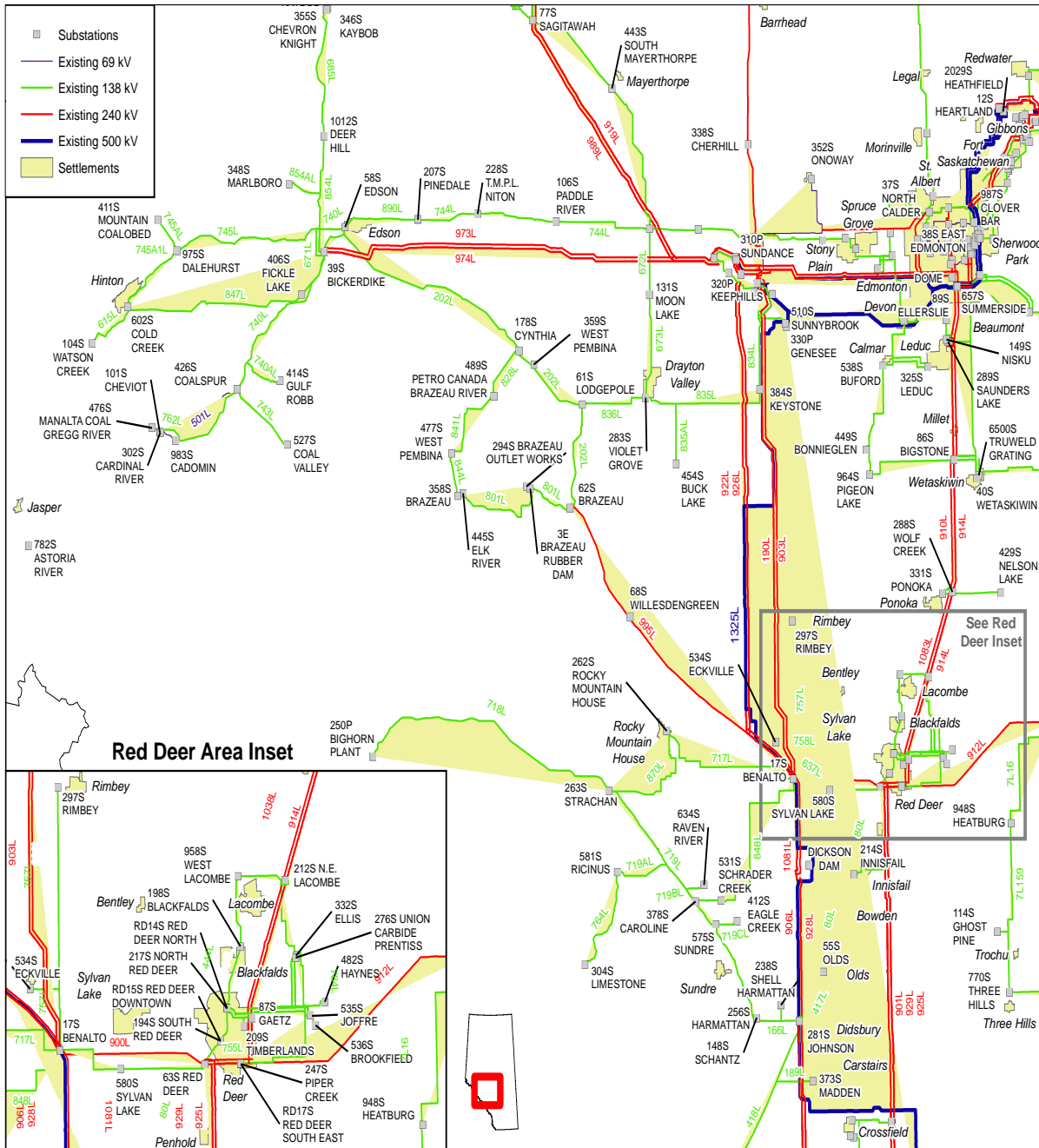
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### Appendix 2 – Central West Geographic Map



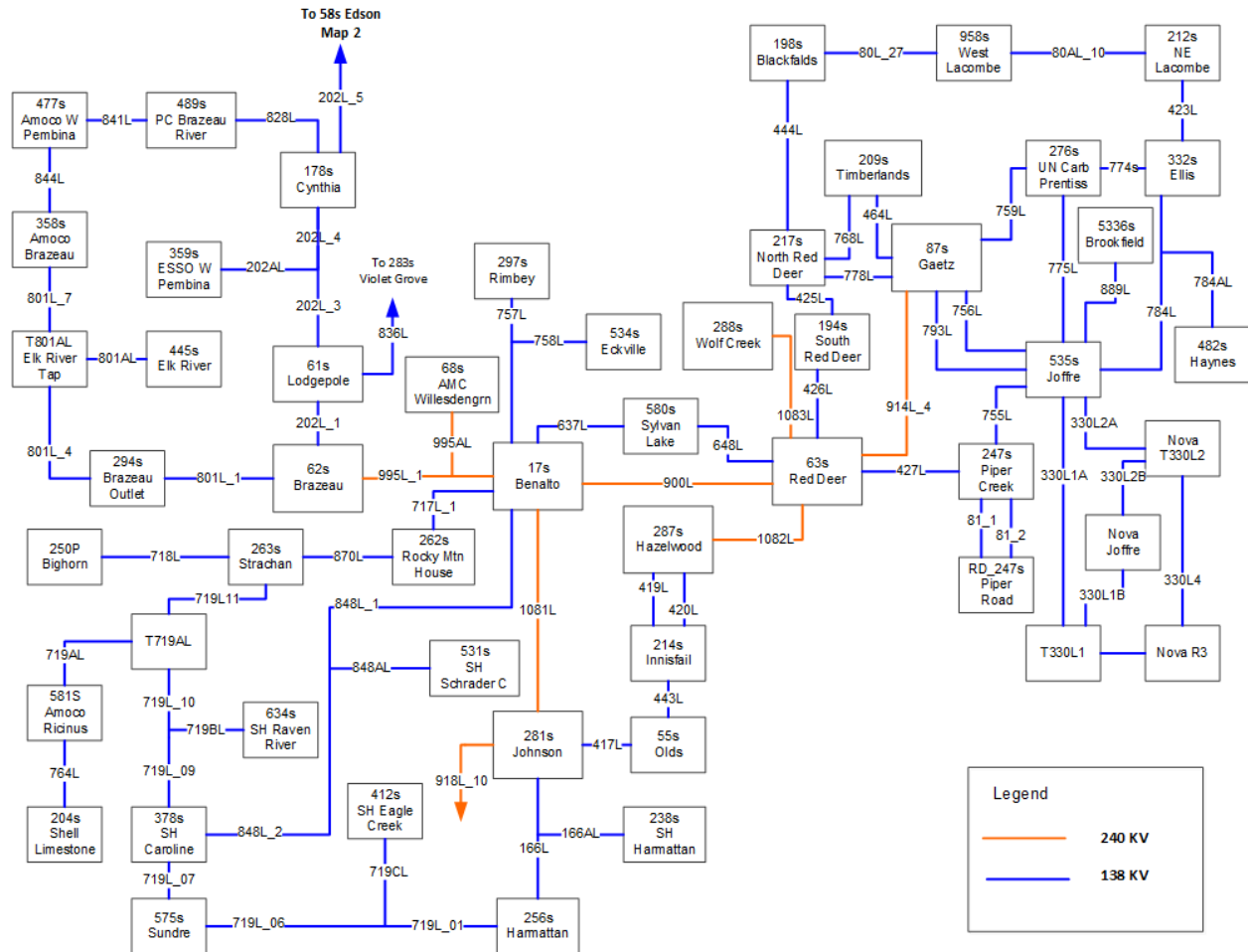
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Appendix 3A – Central West Single Line Diagram (256 Harmanton-178s Cynthia)



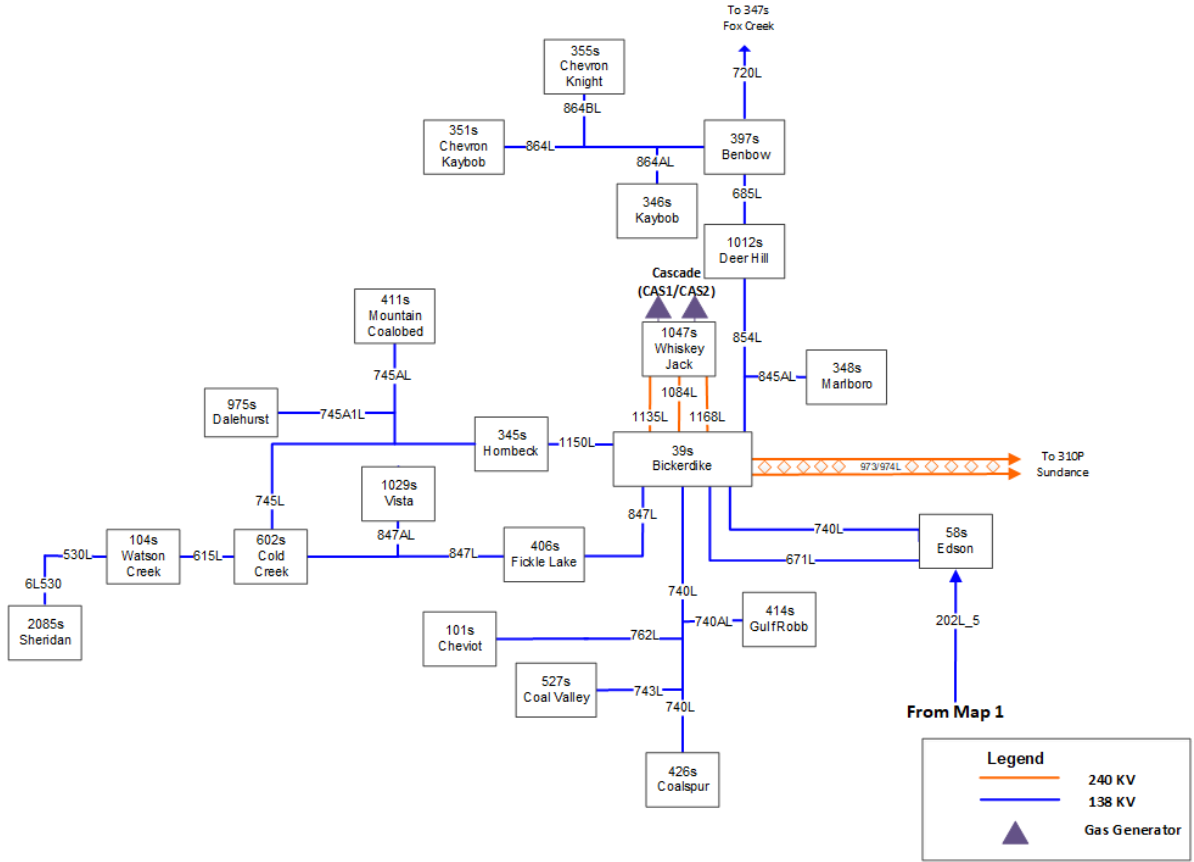
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#### Appendix 3B – Central West Single Line Diagram (Edson Area)







Appendix 4 – Bighorn N-1 Transient Stability Limits

Outage		Bighorn Units Online	Transient Stability Limit (MW)		Possible Transient Stability Mitigation	
			G1	G2		
System Normal (N-0)	None	One unit	offline	41	None	
		Both units	41	offline		
N-1	848L (17s Benalto-378s Shell Caroline)	One unit	offline	40	Open 719L_09 (Shell Caroline 378S to 719BL Tap) <sup>1</sup>	
		Both units	40	offline		
	166L (256s Harmattan - 281s Johnson)	One unit	offline	40		
		Both units	40	offline		
	719L (575s Sundre-378s Shell Caroline)	One unit	offline	40		
		Both units	40	offline		
	719L (575s Sundre-256s Harmattan)	One unit	offline	40		
		Both units	40	offline		
	717L (262s Rocky Mountain House - 17s Benalto)	One unit	offline	46		Open 719L_07 (378s Shell Caroline to 575s Sundre)
		Both units	46	offline		
	870L (262s Rocky Mountain House - 263s Strachan)	One unit	offline	49		
		Both units	49	offline		
	281s Johnson T1	One unit	offline	41		None
		Both units	41	offline		
	418L (281s Johnson-20s Ghost)	One unit	57	57		
		Both units	57	57		
17s Benalto T2 or T3	One unit	offline	41	None		
	Both units	41	offline			
17s Benalto T2 or T3	One unit	offline	40	None		
	Both units	40	offline			
17s Benalto T2 or T3	One unit	56	56	None		
	Both units	56	56			

**Note:**

1. There are no transient stability concerns for the Bighorn unit(s) if the Bighorn Hydro plant is radially connected by 719L (575s Sundre-378s Caroline) or 719L (378s Shell Caroline-719BL Tap).

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#### Appendix 5 – Brazeau N-1 Transient Stability Limits with Brazeau Generation Tripping Scheme (RAS 25) Armed

Outage		Brazeau Units Online	Transient Stability Limit (MW)	
<b>N-0 System Normal</b>	None	Both units online	No Limit	
		One unit online (G1 or G2)	170	
<b>N-1</b>	995L (62s Brazeau- T995AL- 17s Benalto)	Both units online	127	
		Only G1 online	89	
		Only G2 online	75	
	202L <sup>1</sup> (61s Lodgepole - 62s Brazeau)	Both units online	G1	137
			G2	No Limit
		Only G1 online	139	
	202L (178s Cynthia -58s Edson)	Both units online	No Limit	
		One unit online (G1 or G2)	154	
	202L (61s Lodgepole- T202AL-178s Cynthia)	Both units online	No limit	
		One unit online (G1 or G2)	168	
	672L (235s Entwistle- 131s Moon Lk)	Both units online	No Limit	
		One unit online (G1 or G2)	162	
	673L (131s Moon Lk- 283s Violet Grove)	Both units online	No Limit	
		One unit online (G1 or G2)	162	
	801L <sup>1</sup> (62s Brazeau- 294s Brazeau Outlet Works)	Both units online	No Limit	
		One unit online (G1 or G2)	163	
801L (294s Outlet Works- T801AL- 358s Amoco Brazeau)	Both units online	No Limit		
	One unit online (G1 or G2)	162		

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Outage	Brazeau Units Online	Transient Stability Limit (MW)
828L (489s P.C. Brazeau River - 178s Cynthia)	Both units online	No Limit
	One unit online (G1 or G2)	164
834L (320P Keephills - 384s Keystone)	Both units online	No Limit
	One unit online (G1 or G2)	162
835L (384s Keystone– 283s Violet Grove)	Both units online	No Limit
	One unit online (G1 or G2)	162
836L (283s Violet Grove - 61s Lodgepole)	Both units online	No Limit
	One unit online (G1 or G2)	143
841L (477s West Pembina – 178s Cynthia)	Both units online	No Limit
	One unit online (G1 or G2)	164
844L (358s Amoco Brazeau-477s West Pembina)	Both units online	No Limit
	One unit online (G1 or G2)	164
320P Keephills T1	Both units online	No Limit
	One unit online (G1 or G2)	162

**Note:**

1. There are no transient stability concerns for Brazeau 62s when both 202L (62s Brazeau -61s Lodgepole) and 801L (62s Brazeau-294s Brazeau Outlet W) are out of service.

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#### Appendix 6 – Brazeau N-1 Transient Stability Limits with Brazeau Generation Tripping Scheme (RAS 25) Not Armed

Outage		Brazeau Output Limit (MW)	
<b>N-0 System Normal</b>	None	Both units online	250
		One unit online (G1 or G2)	175
<b>N-1</b>	995L (62s Brazeau -T995AL- 17s Benalto)	Both units online	132
		Only G1 online	89
		Only G2 online	75
	202L <sup>1</sup> (61s Lodgepole - 62s Brazeau)	Both units online	130
		Only G1 online	139
		Only G2 online	126
	202L (178s Cynthia -58s Edson)	Both units online	217
		One unit online (G1 or G2)	159
	202L (61s Lodgepole-T202AL- 178s Cynthia)	Both units online	247
		One unit online (G1 or G2)	173
	672L (235s Entwistle - 131s Moon Lake)	Both units online	230
		One unit online (G1 or G2)	167
	673L (131s Moon Lake - 283s Violet Grove)	Both units online	229
		One unit online (G1 or G2)	167
801L (62s Brazeau - 294s Brazeau Outlet Works)	Both units online	229	

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Outage		Brazeau Output Limit (MW)	
		One unit online (G1 or G2)	168
	801L (294s Brazeau Outlet Works -T801AL- 358s Amoco Brazeau)	Both units online	232
		One unit online (G1 or G2)	167
	828L (489s P.C. Brazeau River - 178s Cynthia)	Both units online	237
		One unit online (G1 or G2)	169
	834L (320P Keephills - 384s Keystone)	Both units online	232
		One unit online (G1 or G2)	167
	835L (384s Keystone -T835AL- 283s Violet Grove)	Both units online	232
		One unit online (G1 or G2)	167
	836L (283s Violet Grove - 61s Lodgepole)	Both units online	184
		One unit online (G1 or G2)	148
	841L (477s West Pembina - 489s P.C. Brazeau- 178s Cynthia)	Both units online	235
		One unit online (G1 or G2)	169
	844L (358s Amoco Brazeau-477s West Pembina)	Both units online	235
		One unit online (G1 or G2)	169
	320P Keephills T1	Both units online	233
		One unit online (G1 or G2)	167

**Note:**

1. There are no transient stability concerns for Brazeau 62s 138 kV bus outages that affect both 202L (62s Brazeau -61s Lodgepole) and 801L (62s Brazeau-294s Brazeau Outlet W).



**Appendix 7 – Brazeau N-1 Thermal Limits**

If real time contingency analysis allows a higher thermal limit for the contingencies listed in the table below, the AESO operates to the higher limit.

Outage		Brazeau Output (MW) Summer (May 1-Oct 31)	Brazeau Output (MW) Winter (Nov 1-April 30)
N-1	202L (61s Lodgepole - 62s Brazeau)	140	170
	801L (62s Brazeau - 294s Brazeau Outlet Works)	140	170
	801L (294s Brazeau Outlet Works - 358s Amoco Brazeau)	145	175
	828L (489s P.C. Brazeau River - 178s Cynthia)	165	195
	836L (283s Violet Grove - 61s Lodgepole)	155	160
	841L (477s West Pembina - 489s P.C. Brazeau River)	160	190
	844L (477s West Pembina - 489s P.C. Brazeau River)	155	185
	995L (17s Benalto – 68s Willesdengreen)	150	170
	995L (62s Brazeau – 68s Willesdengreen)	140	160
	62s Transformer T5	300	300
	Breakers 17s13 or 17s12	205	235
	61s 138kV Bus 1	145	175