

Information Document

Crossfield Area Transmission Constraint Management

ID #2012-017R



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) in effect, the Authoritative Document(s) governs.

1 Purpose

This Information Document relates to the following Authoritative Document¹:

- 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 near the Crossfield area (north of Calgary) on the interconnected electric system.

Section 302.1 sets out the general transmission constraint management protocol steps the ISO uses to manage transmission constraints in real time on the interconnected electric system. These steps are referenced in Table 1 of this information document as they are applied to the Crossfield area.

2 General

The transmission and generation facilities in the Crossfield/Airdrie area are shown in a geographical map in Appendix 2. Two generation facilities: ENMAX Crossfield Energy Centre (“ENMAX Crossfield”) and Nexen Inc # 1 (“Nexen”) are located in the area.

ENMAX Crossfield consists of three generating assets totaling 144 MW which are connected to the AIES via the 653S Summit substation. The generation pool asset ID’s for Crossfield are CRS1, CRS2 and CRS3.

Nexen consists of three generating assets totaling 120 MW and is connected to the AIES via 391S Balzac substation. The generation pool asset ID for Nexen is NXO1.

AESO transmission system studies indicate that 752L (653S Summit – 64S East Crossfield) and 688L (653S Summit – 199S East Airdrie) may become overloaded under certain contingency conditions, and require a remedial action scheme (RAS) to mitigate such a contingency. Several RAS are in place in the Crossfield area to ensure system reliability until the area transmission system is strengthened. The AESO has also established two monitoring points or cutplanes on each of 752L and 688L.

For a schematic of the Crossfield area 752L cutplane inflow and 688L cutplane outflow, see Appendix 3 in this information document. Appendix 4 of this information document provides relevant bulk transmission line ratings.

A cutplane is a common term used in engineering studies and is a theoretical boundary or plane crossing two (2) or more bulk transmission lines or electrical paths. The cumulative power flow across the cutplane is measured and can be utilized to determine flow limits that approximate conditions that would allow safe, reliable operation of the interconnected system.

3 Constraint Conditions and Limits

When managing a transmission constraint in the Crossfield area, the ISO 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 to ensure the continued

¹ “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 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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reliable operation of the interconnected electric system. In addition, the ISO monitors the remedial action schemes that are in place on each of 752L and 688L.

Further descriptions of those transmission constraints and the remedial action schemes are set out below.

3.1 Non-Studied Constraints and Limits

For system conditions that have not been pre-studied, the ISO uses the resultant limits from the Energy Management System Voltage Stability Analysis and the Contingency Analysis tools to determine real time system operating limits when limits are related to voltage or thermal concerns. For system conditions that have not been pre-studied, the ISO uses dynamic analysis software to determine the real time system operating limits when limits are related to dynamic stability concerns.

3.2 725L Remedial Action Scheme

With respect to the Crossfield area, a remedial action scheme is required and in place on each of 752L and 688L to ensure system reliability.

In accordance with subsection 2(1) of ISO rule Section 302.1, *Real Time Transmission Constraint Management*, the ISO follows the transmission constraint management procedures and applies the procedures to the Crossfield area as outlined in section 5 of this information document. Transmission constraint management is employed in all of the following circumstances:

- (a) when the remedial action scheme is unavailable;
- (b) prior to remedial action scheme activation (if required); and
- (c) for an appropriate period after the remedial action scheme has been activated once the system is operating in a safe and reliable mode.

The 752L remedial action scheme provides mitigation action in relieving an overload on 752L when the direction of line flow is towards 64S East Crossfield. The seasonal bulk transmission line ratings which are monitored by the 752L remedial action scheme are specified in Appendix 4 of this information document. The 752L remedial action scheme functions as follows once the AESO has received an overload alarm:

- (a) If the direction of bulk transmission line flow on 752L is towards 64S East Crossfield and:
 - (i) the bulk transmission line flow exceeds one hundred percent (100%) but is not greater than one hundred and ten percent (110%) of the seasonal bulk transmission line rating for ten (10) seconds, then the ENMAX Crossfield operator will manually run-back the CRS1, CRS2, CRS3 units to mitigate the 752L overload in response to the run-back signal;
 - (ii) the bulk transmission line flow exceeds one hundred percent (100%) but is not greater than one hundred and ten percent (110%) of the seasonal bulk transmission line rating for ten (10) minutes, then pool assets CRS1, CRS2 and CRS3 will be automatically tripped in a pre-defined sequence in response to the trip signal, or
 - (iii) the bulk transmission line flow exceeds one hundred and ten percent (110%) of the seasonal line rating for ten (10) seconds, then pool assets CRS1, CRS2, CRS3 units will be automatically tripped in a pre-defined sequence in response to the trip signal.
- (b) Once the run-back or trip signal starts, as applicable, the 752L remedial action scheme timer will not reset until the bulk transmission line flow decreases to ninety five percent (95%) of the applicable seasonal rating or below for at least one (1) second.

688L Remedial Action Scheme

The 688L remedial action scheme provides mitigation action in relieving an overload on 688L when the direction of 688L bulk transmission line flow is towards 199S East Airdrie. The related seasonal bulk transmission line ratings which are monitored by the 688L remedial action scheme are specified in Appendix 4 of this information document. The 688L remedial action scheme functions as follows once an overload alarm has been received:

- (a) If the direction of bulk transmission line flow on 688L is towards 199S East Airdrie and:
 - (i) the bulk transmission line flow exceeds one hundred percent (100%) but is not greater than one hundred and ten percent (110%) of the seasonal bulk transmission line rating for ten (10) seconds, then the ENMAX Crossfield operator will manually run-back pool assets CRS1, CRS2 and CRS3 to mitigate the 688L overload in response to the run-back signal;
 - (ii) the bulk transmission line flow exceeds one hundred percent (100%) but is not greater than one hundred and ten percent (110%) of the seasonal bulk transmission line rating for ten (10) minutes, then pool assets CRS1, CRS2 and CRS3 will be automatically tripped in a pre-defined sequence in response to the trip signal, or
 - (iii) the bulk transmission line flow exceeds one hundred and ten percent (110%) of the seasonal bulk transmission line rating for ten (10) seconds, then the ENMAX CRS1, CRS2, CRS3 units will be automatically tripped in a pre-defined sequence in response to the trip signal.
- (b) Once the run-back or trip signal starts as applicable, the 688L remedial action scheme timer will not reset until the flow decreases to ninety five percent (95%) of the applicable seasonal bulk transmission line rating or below for at least one (1) second.

4 Application of Transmission Constraint Management Procedures

The AESO manages transmission constraints in all areas of Alberta in accordance with the provisions of Section 302.1. However, not all of those provisions are effective in the Crossfield area due to certain operating conditions that exist in that area and so this information document represents the application of the general provisions of Section 302.1 to the Crossfield area, and provides additional clarifying steps as required to effectively manage transmission constraints in that area.

The protocol steps which are effective in managing transmission constraints are outlined in Table 1 below.

**Table 1
 Transmission Constraint Management
 Sequential Procedures for Crossfield Area**

Section 302.1 of the ISO rules, subsection 2(1) protocol steps	Applicable to a 752L transmission constraint?	Applicable to a 688L transmission constraint?
(a) Determine effective pool assets	Yes	Yes
(b) Ensure maximum capability not exceeded	Yes	Yes
(c) Curtail effective downstream constraint side export service and upstream constraint side import service	No	No
(d) Curtail effective demand opportunity service on the downstream constraint side	No	No

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Section 302.1 of the ISO rules, subsection 2(1) protocol steps	Applicable to a 752L transmission constraint?	Applicable to a 688L transmission constraint?
(e)(i) Issue a dispatch for effective contracted transmission must-run	No	No
(e)(ii) Issue a directive for effective non-contracted transmission must-run	No	No
(f) Curtail effective pool assets in reverse energy market merit order followed by pro-rata curtailment	Yes	Yes
(g) Curtail effective loads with bids in reverse energy market merit order followed by pro-rata load curtailment	No	No

Applicable Protocol Steps

The first step in managing constraints is to identify those pool assets, both generating units and loads, effective in managing constraints. A list of the generating assets that are effective in managing constraints are identified in Appendix 1. As per section 2(4) of 302.1, when a transmission constraint has been or is expected by the ISO to activate a remedial action scheme, the ISO recommences the procedural sequence in Table 1 (above) once the ISO has ensured 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 capability levels are not exceeded is effective in managing Crossfield area transmission constraints. The effective pool assets that the AESO may curtail are listed in Appendix 1.

Step (c) in Table 1

There are no interties in the Crossfield 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 Crossfield area constraints because there is no demand opportunity service in the area.

Step (e) in Table 1

With respect to steps (e)(i) and (ii), there are no transmission must-run contracts in the Crossfield area and using transmission must-run is not effective in managing a transmission constraint.

Step (f) in Table 1

Curtailing effective generating units in reverse energy market merit order followed by pro-rata curtailment is effective in managing Crossfield area transmission constraints. The effective pool assets that the AESO may curtail are listed in Appendix 1.

Step (g) in Table 1

Because of the configuration of the interconnected electrical system curtailing load on the upstream side is not effective in managing Crossfield area constraints.

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5 Project Updates

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

6 Appendices

Appendix 1 – Effective Pool Assets

Appendix 2 – Geographical Map of the Crossfield Area

Appendix 3 – Crossfield Area Single Line Diagram

Appendix 4 – AltaLink Bulk Transmission Line Ratings

Revision History

Posting Date	Description of Changes
2016-09-28	Administrative amendments
2012-11-27	Initial Release

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Appendix 1 – Effective Pool Assets

The effective pool assets for transmission constraints on 752L, listed alphabetically by their pool IDs, are:

CRS1

CRS2

CRS3

NX01

The effective pool assets for transmission constraints on 688L, listed alphabetically by their pool IDs, are:

CRS1

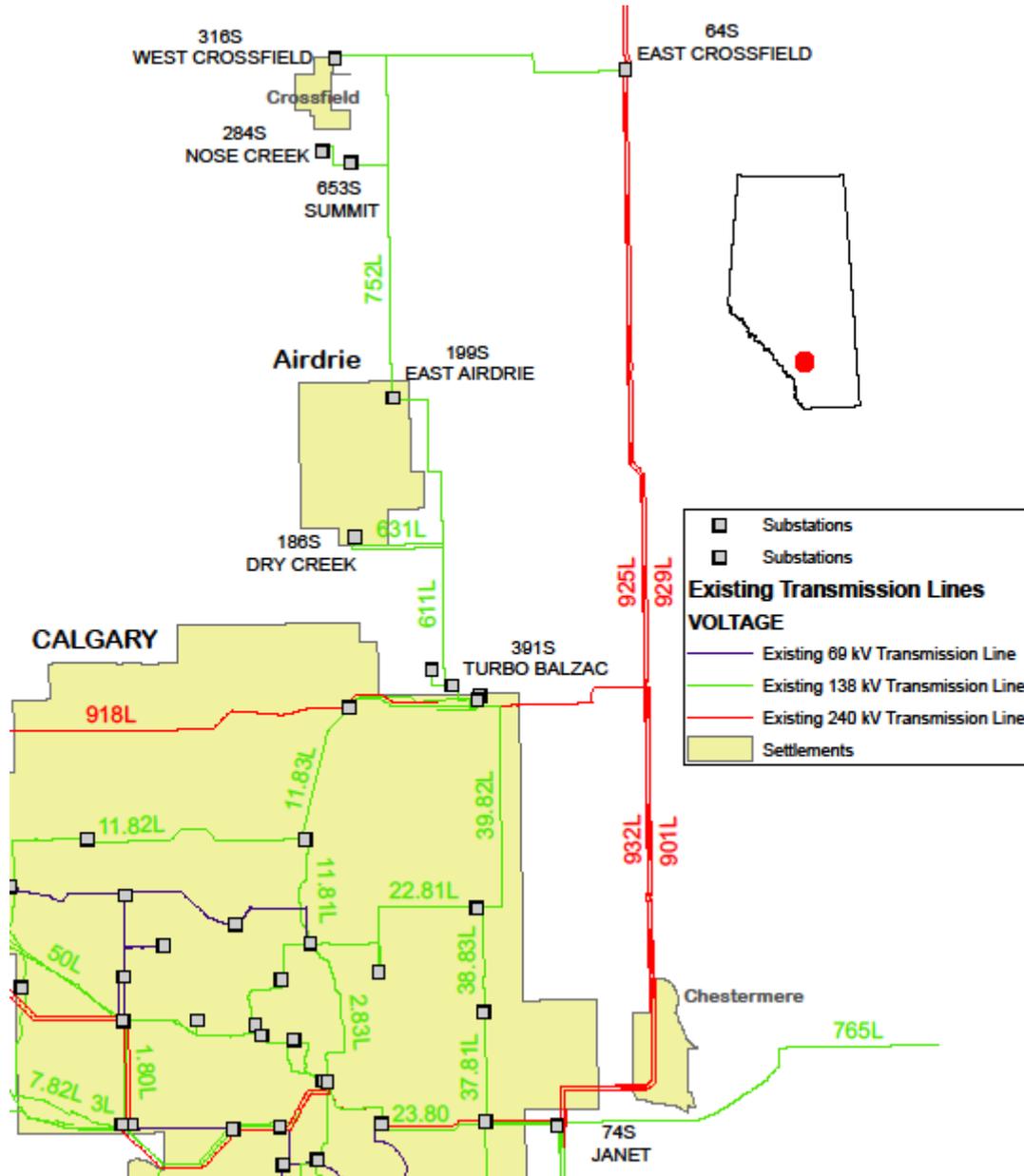
CRS2

CRS3

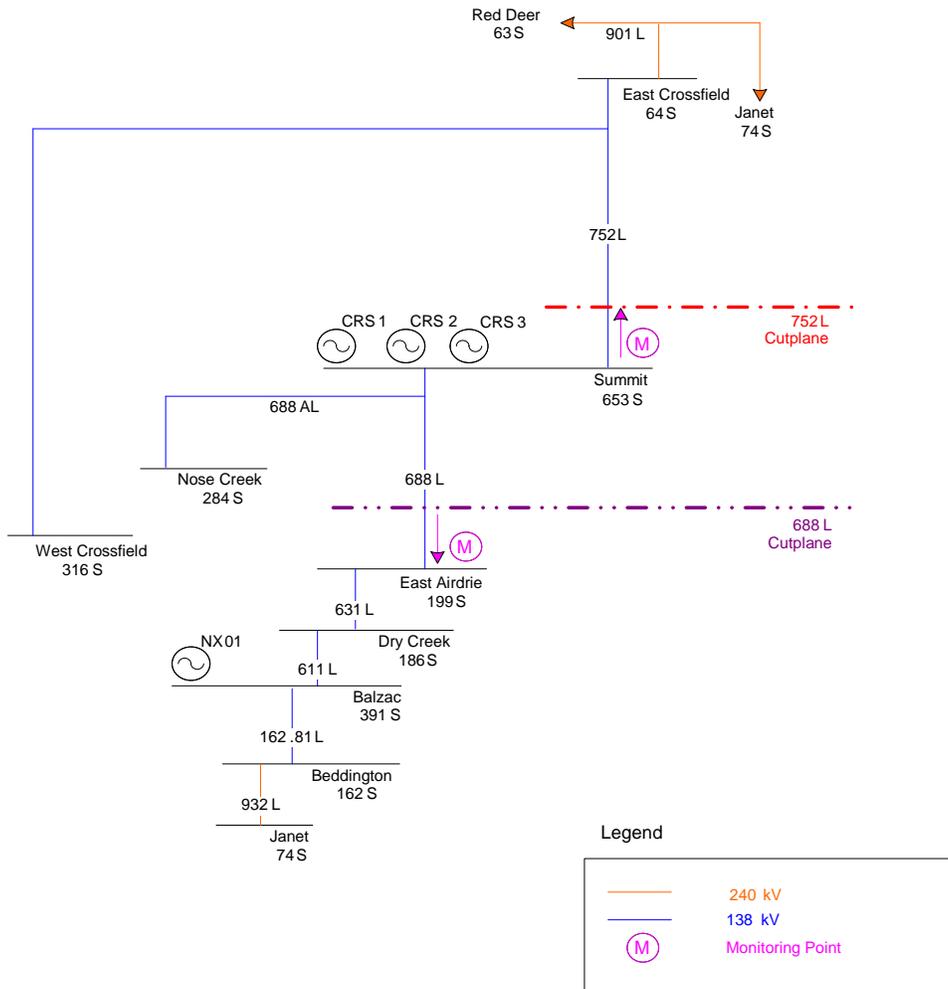
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Appendix 2 – Geographical Map of the Crossfield Area



Appendix 3 – Crossfield Area Single Line Diagram



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Appendix 4 – AltaLink Bulk Transmission Line Ratings

AltaLink Bulk Transmission Line Ratings

Transmission Line	Summer (May 1 to October 31)		Winter (November 1 to April 30)	
	100% Line Rating MVA	110% Line Rating MVA	100% Line Rating MVA	110% Line Rating MVA
752L	119	131	136	150
688L	121	133	142	156