

Conceptual System Plan

Cluster 1 - Central Region

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1. Introduction

The objective of providing this conceptual system plan is to assist market participants to better understand the scope of potential transmission system developments required to integrate Cluster 1 projects in the Central region. The scope of transmission developments identified is in compliance with the existing *Transmission Regulation*, which requires the AESO to plan a system sufficiently robust such that 100% of anticipated in-merit electric energy can occur when all transmission facilities are in service (Category A or N-0 condition), and assumes that all cluster projects in this region proceed. Development options such as new transmission lines, increasing the capability of existing transmission lines, and network topology optimization were considered in the development of this conceptual system plan.

Typically, a major transmission system project can take at least 8-10 years to complete. The timing must consider significant work required in developing a detailed plan, initiating a project, engaging stakeholders, selecting the preferred alternative, seeking all necessary regulatory approvals, and the construction and commissioning of the transmission facilities.

Please note that the conceptual system plan identified here is different from the AESO's Long-term Transmission Plan and is based on different integration assumptions. The AESO's planning process still needs to be conducted to determine the timing and configuration of the system transmission projects being developed to meet planning standards and transmission regulation and policy. The pace and location of new load, storage, and generation developments play an important role in the AESO's planning process. The timing and configuration of the proposed system transmission projects as an outcome of the AESO's planning process, will be influenced by the timing and volume of connection projects meeting the AESO's project inclusion criteria¹.

2. Conceptual Transmission Development Plan

2.1 SW/SE Transmission Development

Cause:

- Interregional backbone transmission network is not capable to transfer increased generation. This development is also included in Southwest-Calgary and Southeast Region Conceptual System Plan.

Mitigation:

- Add two 500 kV circuits between Newell 2075S, Milo 356S, and Langdon 102S substations².
- Add two 240 kV transmission lines between Whitla 251S and Newell 2075S substations³.

2.2 240 kV Transmission Network Reinforcement

Cause:

- The current 240 kV network capacity is not sufficient to transfer the increased generation out of local area.

¹ The definition of project inclusion criteria is available in the Connection Project List Guide on the AESO website.

² This development is also included in Southwest-Calgary Region conceptual system plan.

³ This development is also included in Southeast Region conceptual system plan.

Mitigation:

- Add a new 240 kV substation near Vermilion 710S (to be designated as Drury substation)
- Upgrade the following existing 138 kV substations to 240 kV and include 240/138 kV facilities:
 - Lloydminster 716S
 - Edgerton 899S
 - Buffalo Creek 526S
- Add new 240 kV transmission lines between
 - Benalto 17S and Red Deer 63S substations
 - Red Deer 63S and Nevis 766S substations
 - Gaetz 87S and Tinchebray 972S substations (two circuits)
 - Tinchebray 972S and Anderson 801S substations
 - Tinchebray 972S and 240 kV Buffalo Creek substations
 - 240 kV Buffalo Creek and New Drury substations
 - New Drury and Marguerite Lake 826S substations
 - New Drury and 240 kV Lloydminster substations
 - 240 kV Lloydminster and 240 kV Edgerton substations
 - 240 kV Edgerton and Hansman Lake 650S substations
 - Hansman Lake 650S and Lanfine 959S substations
 - Lanfine 959S and Oakland 946S substations
 - Lanfine 959S and Cypress 562S substations
 - Battle River 757S and Saunders Lake 289S substations
- Increase the capability of the following existing lines:
 - 9L97 & 9L70 (Anderson 801S – Oakland 946S)
 - 9L950 & 933L/934L (Anderson 801S – Ware 132S)
 - 9L59 (Anderson 801S – Tinchebray 972S)
 - 9L24 (Oakland 946S – Lanfine 959S)
 - 9L16 (Tinchebray 972S – GoldeyeTap – Cordel 755S)
 - 925L (Red Deer 63S – Janet 74S)
 - 929L (Hazelwood 287S – Janet 74S)
 - 920L (Nevis 766S – Cordel 755S)
 - 953L (Cordel 755S – Nilrem 574S)
 - 1083L (Red Deer 63S – Wolf Creek 288S)
 - 914L (Red Deer 63S – Gaetz 87S – Bigstone 86S)
 - 922L (Benalto 17S – Sundance 301P)
- Increase the capacity of the following existing transformers:
 - 650ST3 (Hansman Lake 650S T3)
 - 766S901T (Nevis 766S 1T)

2.3 138 kV Network Upgrade**Cause:**

- Low-rated 138 kV lines are not capable to transfer out the increased generation. Robust 138kV network is required to flow power towards local load pockets and 240kV system.

Mitigation:

- Add new 138 kV transmission lines between
 - Vegreville 709S and Lac La Biche 157S substations (two circuits)
 - Vegreville 709S and Vermillion 710S substations
 - Jarrow 252S and Tucuman 478S substations
 - Hansman Lake 650S and Provost 545S substations
- Increase the capability of the following existing 138 kV lines:
 - 7L130 (Vermillion 710S – Kitscoty 750S)
 - 7L14 (Kitscoty 750S – Hill 751S)
 - 702L/7L702/702AL (Hardisty 377S – Sedgewick 137S – Battle River 757S)
 - 749L/749AL (Edgerton 899S – Killarney Lake 267S – Metiskow 648S)

2.4 138kV Network Open-Loop Adjustment**Cause:**

- The existing 138 kV network carries some interregional flow exchange. However, capacity of the existing 138 kV network is not sufficient to integrate all Cluster 1 generation. Some open-loops are required to push power flow onto the 240 kV paths.

Mitigation:

- Open the following existing 138 kV line segments:
 - 174L (North Holden 395S – Bardo 197S)
 - 7L92 (Vegreville 709S to Vilna 777S)
 - 7L53 (Bonnyville 7L53 to 7LA53 Tap)
 - 491L (Jarrow 252S – 7L50 Tap)
 - 760L/7L760 (760AL Tap – Empress Liquids 164S)

3. System Plan SLD

See attached pages.

