

ENGINEERING CONNECTION ASSESSMENT

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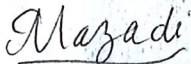

P2123 North Lethbridge 370S Substation Upgrade

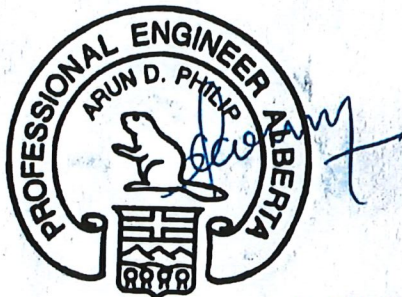
FortisAlberta Inc.

Date: September 28, 2020

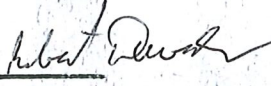
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1 Introduction

1.1 Project Overview

FortisAlberta Inc. (FortisAlberta) (Market Participant), in its capacity as the legal owner of an electric distribution system (DFO), has submitted a request for system access service to the Alberta Electric System Operator (AESO) to improve the reliability of the electrical service in the Lethbridge area.

The DFO's request includes a request for transmission development (the Project). There was no change to existing *Demand Transmission Service*, Rate DTS, contract capacities in the DFO's request.

The scheduled in-service date (ISD) for the Project is November 1, 2021.

1.2 Existing System

Geographically, the Project is located in the AESO Planning Area of Lethbridge (Area 54), which is part of the AESO South planning region. Lethbridge (Area 54) is surrounded by the planning areas of Stavely (Area 49), Vauxhall (Area 52), Fort Macleod (Area 53) and Glenwood (Area 55).

From a transmission system perspective, Lethbridge (Area 54) consists primarily of a 240 kV and 138 kV transmission system.

Currently the North Lethbridge 370S substation serves a mixture of resident, farm and commercial customers, and has three phase 25 kV ties to the Coaldale 254S, Monarch 492S and Riverbend 618S substations. The substation contains one 130/24.9 kV 25/33/41 MVA transformer (T1) that is in service and one 138/26.5 15/20/25 MVA transformer (T4) that is normally out of service and is only energized for standby use.

Existing constraints in the South planning region are managed in accordance with the procedures set out in Section 302.1 of the ISO rules, Real Time Transmission Constraint Management (TCM Rule).

2 Connection Alternatives

2.1 Overview

The AESO, in consultation with the TFO and the DFO, examined four transmission alternatives to meet the DFO's request for system access service, as detailed in Section 2.2.

2.2 Connection Alternatives Examined

Below is a description of the developments associated with the transmission alternatives that were examined for the Project.

Alternative 1 – Energize the existing T4 transformer at the North Lethbridge 370S Substation

This alternative includes the following developments:

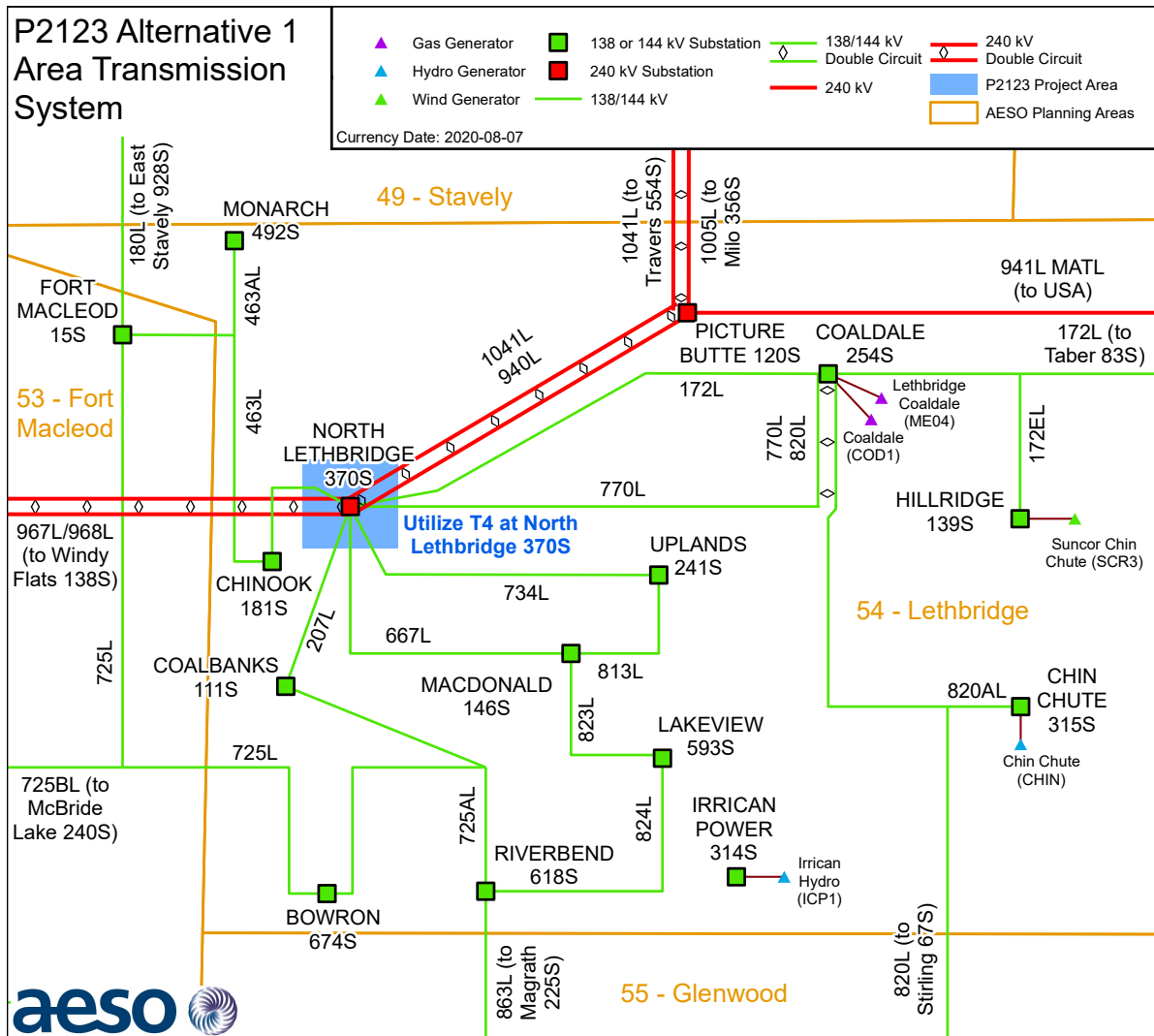
- Modify the existing North Lethbridge 370S substation by energizing an existing spare transformer, including adding a 138 kV circuit breaker and a 25 kV circuit break.
- Add or modify associated equipment as required for the above transmission developments.

The proposed connection configuration is shown in Figure 2-1.

The DFO has advised distribution upgrades associated with this alternative requires the addition or rebuilding of approximately 22 km of distribution lines and the installation of voltage regulators to increase backup capability within the area and from surrounding feeders.¹

¹ DFO will determine the exact length of distribution lines and required equipment to address any voltage issues.

Figure 2-1: Alternative 1 – Energize T4 transformer at the North Lethbridge 370S Substation



Alternative 2 – Add one transformer at the North Lethbridge 370S Substation

This alternative includes the following developments:

- Upgrade the existing North Lethbridge 370S substation including the addition of one 138/25 kV transformer, one 138 kV circuit breaker and one 25 kV circuit breaker
- Add or modify associated equipment as required for the above transmission developments.

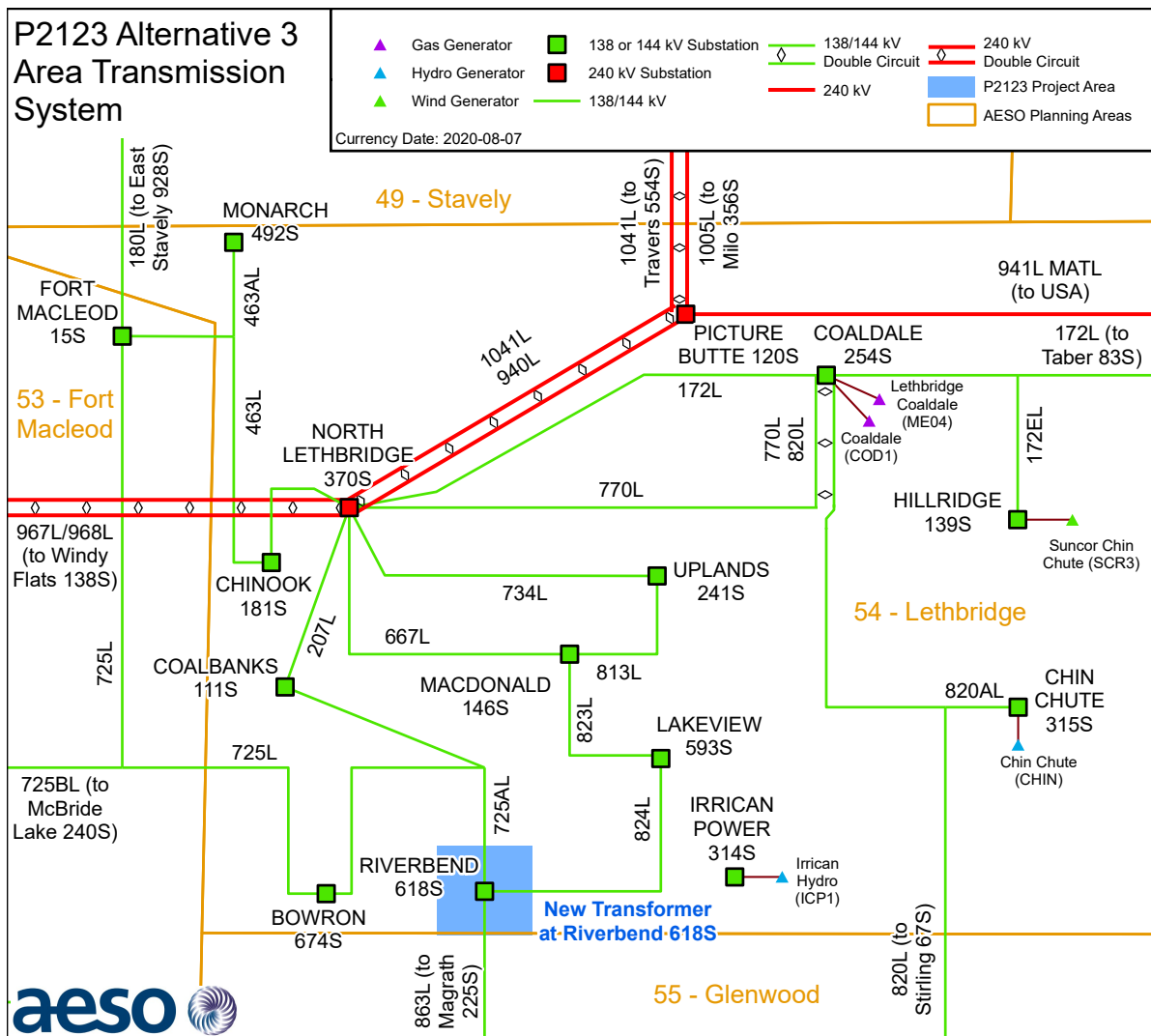
The DFO has advised distribution upgrades associated with this alternative requires the addition or rebuilding of approximately 22 km of distribution lines and the installation of voltage regulators to increase backup capability within the area and from surrounding feeders².

² Ibid.

The DFO has advised that this alternative requires extensive distribution upgrades to improve load transfer capability from the North Lethbridge 370S substation to adjacent substations.³ These upgrades cannot solve the reliability issues at North Lethbridge 370S without violating distribution voltage requirements or exceeding distribution equipment nameplate capacity.

The proposed connection configuration is shown in Figure 2-3.

Figure 2-3: Alternative 3 - Add one transformer at Riverbend 618S Substation



Alternative 4 – Add one transformer at MacDonald 146S Substation

This alternative includes the following developments:

- Upgrade the existing MacDonald 146S substation including the addition of one 138/25 kV transformer, one 138 kV circuit breaker and three 25 kV circuit breakers.

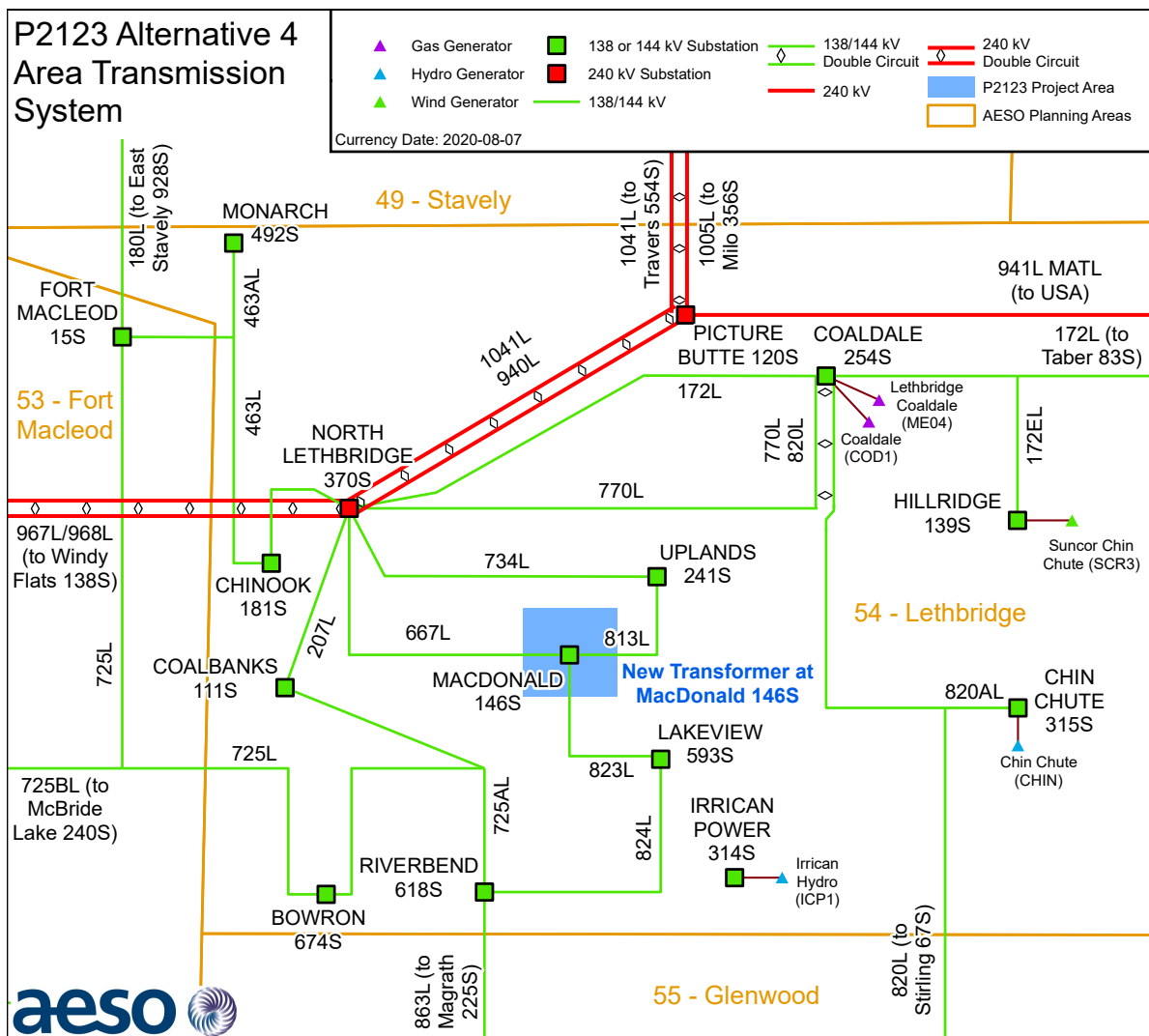
³ DFO would determine the required distribution scope of work for this alternative.

- Add or modify associated equipment as required for the above transmission developments.

Distribution voltage level of City of Lethbridge is 13.8 kV while FortisAlberta’s system voltage is 25 kV. As well, FortisAlberta distribution system is not in-phase with City of Lethbridge system due to the transformer wiring configuration (Delta – Wye). FortisAlberta does not have any existing feeder connection to City of Lethbridge. Due to the above reasons, FortisAlberta requires a dedicated transformer at MacDonald 146S Substation to address the need for this project.

The proposed connection configuration is shown in Figure 2-4.

Figure 2-4: Alternative 4 - Add one transformer at MacDonald 146S Substation



2.3 Connection Alternative Selected

Alternative 1 is considered technically feasible and was selected.

2.4 Connection Alternatives Not Selected

Alternative 2, 3 and 4 would involve increased overall transmission and distribution development and hence increased cost, compared to Alternative 1. Therefore, Alternatives 2, 3 and 4 were not selected.

Power flow and voltage stability studies are not required to assess the impact of Alternative 1 on the Albert Interconnected Electric System (AIES), as there is no increase to the Rate DTS or significant change in transmission system topology. There is no impact on the AIES performance.

3 Project Dependencies

The Project does not require the completion of any other AESO plans to expand or enhance the transmission system prior to connection

4 Conclusions and Recommendations

The AESO recommends proceeding with the Project using Alternative 1 as the preferred alternative to respond to the DFO's request for system access service.

Alternative 1 involves energizing the existing transformer T4 and adding one 138 kV breaker, one 25 kV bus-tie breaker and associated to equipment at North Lethbridge 370S substation to allow both transformers (T1 & T4) to operate simultaneously. The continuous parallel operation of the two 138/25 kV transformers at the North Lethbridge 370S substation will provide transmission system access to improve the reliability of the electrical services in the Lethbridge area.