Alberta Utilities Commission

In the Matter of the Need for the Transmission Enhancements in the West Edmonton Area

And in the matter of the *Electric Utilities Act*, S.A. 2003, c. E-5.1, the *Alberta Utilities Commission Act*, S.A. 2007, c. A-37.2, the *Hydro and Electric Energy Act*, R.S.A. 2000, c. H-16, the Regulations made thereunder, and Alberta Utilities Commission Rule 007

Application of the Alberta Electric System Operator for Approval of the Transmission Enhancements in the West Edmonton Area Needs Identification Document

PART A - APPLICATION

1 Introduction

1.1 Application – Pursuant to Section 34(1)(c) of the *Electric Utilities Act* (Act), and in accordance with further provisions set out in legislation,[1] the Alberta Electric System Operator (AESO) applies to the Alberta Utilities Commission (Commission) for approval of the *Transmission Enhancements in the West Edmonton Area Needs Identification Document* (Application).

1.2 Application Overview – EPCOR Distribution & Transmission Inc. (EDTI)[2] as the legal owner of an electric distribution system (DFO), has requested system access service to reliably serve growing demand for electricity in the west Edmonton area (AESO Planning Area 60, Edmonton). EDTI's request includes a Rate DTS, *Demand Transmission Service*, contract capacity increase of 20.9 MW, from 52.1 MW to 73.0 MW, for the system access service provided at the existing Garneau substation. EDTI's request can be met by:

i. adding one 72 kilovolt (kV) transmission circuit to connect the existing Poundmaker substation and the existing Meadowlark substation;

ii. upgrading the Poundmaker substation, including adding one 240/72 kV transformer, one 240 kV circuit breaker, and one 72 kV circuit breaker;

iii. modifying the Meadowlark substation, including adding two 72 kV circuit breakers;

iv. upgrading the existing Garneau substation, including replacing three 72/14.4 kV transformers with three 72/14.4 kV transformers of higher capacity; and

[1] The *Alberta Utilities Commission Act*, S.A. 2007, c. A-37.2, the *Hydro and Electric Energy Act*, R.S.A.2000, c. H-16, the Regulations made thereunder, and Alberta Utilities Commission Rule 007 (AUC Rule 007).

[2] In this Application, EDTI acts as both the legal owner of the electric distribution system (DFO) and the legal owner of transmission facilities (TFO) as applicable to its specific business functions.

v. adding or modifying associated equipment as required for the above transmission developments (collectively the "Proposed Transmission Development", as further described in Section 2.2).

The scheduled in-service date for the Proposed Transmission Development is staged. The first stage has a scheduled in-service date of June 30, 2020 and includes the addition of the 72 kV transmission circuit, upgrades at Poundmaker substation, modifications at Meadowlark substation and upgrades at Garneau substation, including replacement of one transformer. The remaining upgrades at Garneau substation have scheduled in-service dates of September 30, 2021 and September 30, 2022, for the second and third transformer replacements.

This Application describes the need to respond to the DFO's request for system access service. Having followed the AESO Connection Process,[3] the AESO has determined that the Proposed Transmission Development provides a reasonable opportunity for the DFO to exchange electric energy and ancillary services. The Proposed Transmission Development is consistent with the AESO's long-term plans for the Edmonton Planning Region. The AESO, in accordance with its responsibility to respond to requests for system access service, submits this Application to the Commission for approval.[4,5]

1.3 AESO Directions to the TFO – During the AESO Connection Process, the AESO issued various directions to the legal owner of transmission facilities (TFO), in this case EDTI, including direction to assist the AESO in preparing this Application.[6]

[3] For information purposes, refer to note iv of Part C of this Application for more information on the AESO Connection Process.

[4] For information purposes, some of the legislative provisions relating to the AESO's planning duties and duty to provide system access service are referenced in notes i and ii of Part C of this Application.

[5] Note v of Part C of this Application describes the Application scope in more detail.

[6] The directions are described in more detail in the following sections of this Application and in Part C, note vi.

2 Need Overview and Proposed Transmission Development

2.1 Duty to Provide Transmission System Access Service – The AESO, pursuant to its responsibilities under Section 29 of the Act, must provide system access service on the transmission system in a manner that gives all market participants (in this case the DFO), a reasonable opportunity to exchange electric energy and ancillary services.

The AESO, in consultation with the DFO and the TFO, has determined that the Proposed Transmission Development is the preferred option to meet the DFO's request for system access service. The DFO, in executing its duties as defined under Section 105(1)(b) of the Act, has determined that the Proposed Transmission Development will meet its distribution planning criteria and improve the reliability of the electric distribution services in the west Edmonton area. The DFO has made the appropriate applications to the AESO to obtain transmission system access service.[7]

Through the AESO Connection Process, the AESO, in consultation with the DFO and the TFO, has determined the characteristics of the Proposed Transmission Development and assessed the impacts that the Proposed Transmission Development and the associated load would have on the transmission system. The AESO has issued directions to the TFO to prepare a transmission facility proposal[8] (Facility Proposal) to meet the DFO's request.

2.2 Proposed Transmission Development – The Proposed Transmission Development involves the following elements:

1. Add one 72 kV transmission circuit, with a minimum capacity of 69 MVA, to connect the existing Poundmaker substation and the existing Meadowlark substation;[9]

[7] For information purposes, some of the duties of the DFO are described in note vii of Part C of this Application.

[8] Also referred to as facility application, or FA, under AUC Rule 007.

[9] The TFO has estimated the 72 kV circuit that will connect the Poundmaker and Meadowlark substations will have a length of approximately 10 kilometers (km).

2. Upgrade the Poundmaker substation, including adding one 240/72 kV transformer, with a minimum transformation capacity of 69 MVA, one 240 kV circuit breaker, and one 72 kV circuit breaker;
3. Modify the Meadowlark substation, including adding two 72 kV circuit breakers;
4. Upgrade the existing Garneau substation, including replacing three 72/14.4 kV transformers with three 72/14.4 kV transformers, which each have a minimum transformation capacity of 41 MVA; and
5. Modify, alter, add or remove equipment, including switchgear, and any operational, protection, control and telecommunication devices required to undertake the work as planned and ensure proper integration with the transmission system.[10,11]

2.3 Transmission Development Alternatives – In addition to the Proposed Transmission Development, the AESO, in consultation with the DFO and TFO, examined three other transmission alternatives to respond to the DFO's request for system access service:

1. Add a 72 kV circuit between the existing Poundmaker and Meadowlark substations and add a fourth transformer to Garneau substation (the Garneau Transformer Addition Alternative) – This alternative involves adding one 72 kV circuit between the existing Poundmaker and Meadowlark substations. The TFO has advised that the new 72 kV circuit would be approximately 9 km in length. This alternative also involves upgrading the existing Poundmaker substation, including adding one 240/72 kV transformer, one 240 kV breaker, and one 72 kV breaker. This alternative also involves modifying the existing Meadowlark

[10] Details and configuration of equipment required for the Proposed Transmission Development, including substation single-line diagrams, are more specifically described in the AESO's Functional Specification included in the TFO's Facility Proposal. Also, further details will be determined as detailed engineering progresses and DFO operating requirements are finalized. Routing and/or siting of transmission facilities do not form part of this Application and are addressed in the TFO's Facility Proposal.

[11] Distribution facilities that may subsequently be connected to the Proposed Transmission Development are the responsibility of the DFO and are not included in the Application.

substation, including adding two 72 kV circuit breakers, and associated equipment. In addition, this alternative involves upgrading the Garneau substation, including adding one 72/14.4 kV transformer and one 72 kV breaker. This alternative was selected for further consideration.

2. Add a 72 kV circuit between the existing Jasper and Meadowlark substations and upgrade the Jasper and Meadowlark substations[12] – This alternative involves adding one 72 kV circuit between the existing Jasper and Meadowlark substations. The TFO has advised that the new 72 kV circuit would be approximately 11 km in length. This alternative also involves upgrading the existing Jasper substation, including adding one 240/72 kV transformer, one 240 kV circuit breaker, three 72 kV circuit breakers, and associated equipment. To complete these upgrades the TFO has advised that expansion of the Jasper substation fenceline would be required. In addition, this alternative involves modifying the Meadowlark substation including adding three 72 kV circuit breakers.

   The TFO has advised that there is not enough space within or surrounding the Jasper substation to allow for expansion; therefore, this alternative was deemed not viable from a TFO perspective and was not selected for further consideration.

3. Increase the transmission capacity between Rossdale and Garneau substations[13] – This alternative increases the transmission capacity between the Rossdale and Garneau substations. This alternative could be carried out in one of three ways:

[12] In addition, this alternative would also require the addition of transformation capacity at the Garneau substation as described in the Proposed Transmission Development and the Garneau Transformer Addition Alternative.

[13] In addition, this alternative would also require the addition of transformation capacity at the Garneau substation as described in the Proposed Transmission Development and the Garneau Transformer Addition Alternative.

A. Replace the existing 72 kV underground circuit 72RG1 between the Rossdale and Garneau substations with one new 72 kV underground circuit of higher capacity.

B. Replace the two existing 72 kV underground circuits between the Rossdale and Garneau substations (72RG1 and 72RG7) with two new 72 kV underground circuits of higher capacity.

C. Add one overhead 72 kV circuit between the Rossdale and Garneau substations.

The DFO has advised that these alternatives would not meet its Distribution Planning Criteria – POD Loading Policy.

The Proposed Transmission Development and the Garneau Transformer Addition Alternative (collectively, the Considered Alternatives) were selected for further consideration, including the cost estimates described herein.[14]

2.4 Cost Estimates for the Considered Alternatives – The AESO requested that the TFO prepare cost estimates for the Considered Alternatives.

The TFO estimated the in-service cost of the Proposed Transmission Development, described in Section 2.2, to be approximately $47 million.[15]

The TFO estimated the in-service cost of the Garneau Transformer Addition Alternative, described in Section 2.3, to be approximately $53 million.[16]

The total estimated in-service cost of the Garneau Transformer Addition Alternative exceeds the total estimated in-service cost of the Proposed Transmission Development; therefore, the Garneau Transformer Addition Alternative was ruled out.

[14] The DFO also examined and ruled out load shifting and distribution system upgrades, as detailed in Section 5 of the DFO's Distribution Deficiency Report, which is included as Appendix E.

[15] The cost is in nominal dollars using a base year of 2019 with escalation considered. Further details of this cost estimate, which has an accuracy level of +20%/-10%, can be found in Appendix B.

[16] The cost is in nominal dollars using a base year of 2019 with escalation considered, at an accuracy level of +20%/-10%. Further details of this cost estimate can be found in Appendix B.

2.5 Connection Assessment – Power flow, voltage stability and short-circuit analyses were conducted to assess the impact that the Proposed Transmission Development and the associated load would have on the transmission system. Power flow and short-circuit analysis were conducted prior to and following connection of the Proposed Transmission Development, and voltage stability analysis was performed following connection of the Proposed Transmission Development.

The pre-connection assessment identified system performance issues. Under certain Category B conditions, thermal criteria violations were observed. Real-time operational practices can be used to mitigate the pre-connection system performance issues.

The post-connection assessment identified some of the same system performance issues that were identified in the pre-connection assessment under Category B conditions. Some of the thermal criteria violations that were observed in the pre-connection assessment were marginally reduced in the post-connection assessment, while others were exacerbated in the post-connection assessment compared to the pre-connection assessment. In addition, two new thermal criteria violations were observed in the post-connection assessment. Real-time operational practices and a new reconfiguration remedial action scheme can be used to mitigate the identified post-connection system performance issues.[17]

2.6 AESO Forecast and Transmission System Plans – The AESO's corporate forecast for the Edmonton Planning Region is consistent with the load associated with the Proposed Transmission Development.[18] The AESO's corporate forecasts are used by the AESO to assess the adequacy of the regional transmission system and as a basis for identifying the need for transmission system expansion or enhancement. Therefore, the need associated with the Proposed Transmission Development is consistent with the AESO's long-term plans for this region.

[17] The connection assessment is included as Appendix A.

[18] The *AESO 2017 Long-term Outlook* provides forecasting information for the Edmonton Planning Region, which includes the Proposed Transmission Development area.

2.7 Transmission Dependencies –The Proposed Transmission Development does not require the completion of any other AESO plans to expand or enhance the transmission system prior to connection.

2.8 AESO Participant Involvement Program – The AESO directed the TFO to assist the AESO in conducting a participant involvement program (PIP). From September 2016 to August 2018, the TFO and the AESO used various methods to notify stakeholders about the need for development and the AESO's preferred option to respond to the system access service request. In September 2018, the AESO notified stakeholders of its intention to file this Application with the Commission. The AESO is not aware of outstanding concerns or objections regarding the need for the Proposed Transmission Development or the AESO's preferred option to respond to the system access service request.[19]

2.9 Information Regarding AUC Rule 007, Section 6.2.1, NID15(2) – The AESO has been advised that the TFO's Facility Proposal addresses the requirements of AUC Rule 007, Section 6.2.1, NID15(2).[20] In consideration of that fact, and as the filing of the Application is combined with the TFO's Facility Proposal, the AESO has not undertaken a separate assessment of the sort contemplated in AUC Rule 007, Section 6.2.1, NID15(2).

2.10 Confirmation Date – In the event that the proposed facilities are not in service by March 30, 2023, which is six months following the last scheduled in-service date of September 30, 2022, the AESO will inform the Commission in writing if the need to expand or enhance the transmission system described in this Application continues, and if the technical solution described in this Application approval continues to be the AESO's preferred technical solution.[21]

2.11 Approval is in the Public Interest – Having regard to the following:

[19] Further information regarding the AESO's PIP for this Application is included in Appendix C.

[20] Please refer to the letter included as Appendix D of this Application.

[21] A detailed project schedule, which includes potential limitations or constraints as contemplated in AUC Rule 007, NID17(2), can be found in the TFO's Facility Proposal.

- the transmission planning duties of the AESO as described in Sections 29, 33 and 34 of the Act;
- the DFO's request for system access service;
- the DFO's Distribution Deficiency Report;
- the AESO's connection assessment;
- the TFO's cost estimates for the Considered Alternatives;
- information obtained from AESO PIP activities; and
- the AESO's long-term transmission system plans;

it is the conclusion of the AESO that the Proposed Transmission Development provides a reasonable opportunity for the market participant to exchange electric energy and ancillary services. In consideration of these factors, the AESO submits that approval of this Application is in the public interest.

3 Request to Combine this Application with the Facility Proposal for Consideration in a Single Process

3.1 Pursuant to Subsection 35(1) of the Act, the AESO has directed the TFO to prepare a Facility Proposal to meet the need identified. The AESO understands that the TFO's Facility Proposal will be filed shortly.[22] The AESO requests, and expects the TFO will request, that this Application be combined with the Facility Proposal for consideration by the Commission in a single process. This request is consistent with Section 15.4 of the *Hydro and Electric Energy Act* and Section 6 of AUC Rule 007.

3.2 While it is believed that this Application and the Facility Proposal will be materially consistent, the AESO respectfully requests that in its consideration of both, the Commission be mindful of the fact that the documents have been prepared separately and for different purposes. The purpose of this Application is to obtain approval of the need to respond to the DFO's request for system access service and provide a preliminary description of the manner proposed to meet that need. In contrast, the Facility Proposal will contain more detailed engineering and designs for the Proposed Transmission Development and seek approval for the construction and operation of specific facilities.

[22] The AESO understands that the TFO intends to file a Facility Proposal relating to this Application to be titled *West Edmonton Transmission Upgrade*.

4 Relief Requested

4.1 The AESO submits that its assessment of the need to meet the market participant's request for transmission system access service is technically complete and that approval is in the public interest.

4.2 In the event that the proposed facilities are not in service by March 30, 2023, which is six months following the last scheduled in-service date of September 30, 2022, the AESO will inform the Commission in writing if the need to expand or enhance the transmission system described in this Application continues, and if the technical solution described in this Application approval continues to be the AESO's preferred technical solution.

4.3 For the reasons set out herein, and pursuant to Section 34 of the Act, the AESO requests that the Commission approve this Application, including issuing an approval of the need to respond to the market participant's request for system access service, and for transmission developments as follows:

1. Add one 72 kV transmission circuit to connect the existing Poundmaker substation to the existing Meadowlark substation;
2. Upgrade the Poundmaker substation, including adding one 240/72 kV transformer, one 240 kV circuit breaker, and one 72 kV circuit breaker;
3. Modify the Meadowlark substation, including adding two 72 kV circuit breakers;
4. Upgrade the existing Garneau substation, including replacing three 72/14.4 kV transformers with three 72/14.4 kV transformers of higher capacity; and
5. Modify, alter, add or remove equipment, including switchgear, and any operational, protection, control and telecommunication devices required to undertake the work as planned and ensure proper integration with the transmission system.

All of which is respectfully submitted this 1st day of October 2018.

Alberta Electric System Operator

"Electronically submitted by"

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Robert Davidson
Director, Transmission Connection Projects

PART B – APPLICATION APPENDICES

The following appended documents support the Application (Part A).

APPENDIX A **Connection Assessment –** Appendix A contains the *Engineering Connection Assessment – Transmission Enhancements in the West Edmonton Area* that assesses the transmission system performance prior to and following the connection of the Proposed Transmission Development.

APPENDIX B **TFO Capital Cost Estimate –** Appendix B contains a detailed cost estimate corresponding to the Proposed Transmission Development and the Garneau Transformer Addition Alternative. These estimates have been prepared by the TFO at the direction of the AESO, to an accuracy level of +20%/-10%, which exceeds the accuracy required by AUC Rule 007, NID16.

APPENDIX C **AESO PIP –** Appendix C contains a summary of the PIP activities conducted, in accordance with requirement NID19 and Appendix A2 of AUC Rule 007, regarding the need to respond to the market participant's request for system access service. Copies of the relevant materials distributed during the PIP are attached for reference.

APPENDIX D **TFO Information Regarding AUC Rule 007, Section 6.2.1, NID15(2) –** Appendix D contains a letter provided by the TFO confirming that the requirements of AUC Rule 007, NID15(2) will be addressed within the TFO's Facility Proposal.

APPENDIX E **DFO Distribution Deficiency Report –** Appendix E contains the DFO's *Garneau Area Upgrades Distribution Deficiency Report* that provides information in support of the DFO's request for system access service, including describing the need for development.

APPENDIX F **AESO Transmission Planning Criteria -** Appendix F contains the *Transmission Planning Criteria – Basis and Assumptions,* Version 1.1, which includes the applicable thermal and voltage limits in support of the Transmission Planning (TPL) standards.[23] Planning studies that are included in this Application meet the relevant performance requirements of the specified TPL standards (TPL-001-AB-0 and TPL-002-AB1-0).

[23] TPL Standards are included in the current Alberta Reliability Standards.

PART C – REFERENCES

i. **AESO Planning Duties and Responsibilities –** Certain aspects of the AESO's duties and responsibilities with respect to planning the transmission system are described in the Act. For example, Section 17, Subsections (g), (h), (i), and (j), describe the general planning duties of the AESO.[24] Section 33 of the Act states that the AESO "must forecast the needs of Alberta and develop plans for the transmission system to provide efficient, reliable, and non-discriminatory system access service and the timely implementation of required transmission system expansions and enhancements." Where, as in this case, the market participant (refer to note ii below) is requesting system access service to meet its distribution planning needs, and the request requires or may require the expansion or enhancement of the capability of the transmission system, the AESO must prepare and submit for Commission approval, as per Section 34(1)(c), a needs identification document that describes the need to respond to requests for system access service, including the assessments undertaken by the AESO regarding the manner proposed to address that need. Other aspects of the AESO's transmission planning duties and responsibilities are set out in Sections 8, 10, 11, and 15 of the *Transmission Regulation*.

ii. **Duty to Provide Transmission System Access –** Section 29 of the Act states that the AESO "must provide system access service on the transmission system in a manner that gives all market participants [the DFO in this case] wishing to exchange electric energy and ancillary services a reasonable opportunity to do so."

iii. **AESO Planning Criteria –** In accordance with the Act, the AESO is required to plan a transmission system that satisfies applicable reliability standards. Transmission Planning (TPL) standards are included in the Alberta Reliability Standards, and are generally described at: https://www.aeso.ca/rules-standards-and-tariff/alberta-reliability-standards/[25] In addition, the AESO's *Transmission Planning Criteria – Basis and Assumptions* is included in Appendix F.

iv. **AESO Connection Process –** For information purposes, the AESO Connection Process, which changes from time to time, is generally described at: https://www.aeso.ca/grid/connecting-to-the-grid/connection-process/[26]

[24] The legislation and regulations refer to the Independent System Operator or ISO. "AESO" and "Alberta Electric System Operator" are the registered trade names of the Independent System Operator.

[25] This link is provided for ease of reference and does not form part of this Application.

[26] This link is provided for ease of reference and does not form part of this Application.

v. **Application for Approval of the Need to Respond to a Request for System Access Service –** This Application is directed solely to the question of the need to respond to a request for system access service, as more fully described in the Act and the *Transmission Regulation*. This Application does not seek approval of those aspects of transmission development that are managed and executed separately from the needs identification document approval process. Other aspects of the AESO's responsibilities regarding transmission development are managed under the appropriate processes, including the ISO rules, Alberta reliability standards and the ISO tariff, which are also subject to specific regulatory approvals. While the Application or its supporting appendices may refer to other processes or information from time to time, the inclusion of this information is for context and reference only**.**

Any reference within the Application to market participants or other parties and/or the facilities they may own and operate or may wish to own and operate, does not constitute an application for approval of such facilities. The responsibility for seeking such regulatory or other approval remains the responsibility of the market participants or other parties.

vi. **Directions to the TFO –** Pursuant to Subsection 35(1) of the Act, the AESO has directed the TFO, in whose service territories the need is located, to prepare a Facility Proposal to meet the need identified. The Facility Proposal is also submitted to the Commission for approval. The AESO has also directed the TFO, pursuant to Section 39 of the Act and Section 14 of the *Transmission Regulation*, to assist in the preparation of the AESO's Application. The TFO has also been directed by the AESO under Section 39 of the Act to prepare a service proposal to address the need for the Proposed Transmission Development.

vii. **Duties of DFOs –** The duties of DFOs to make decisions about building, upgrading and improving their electric distribution systems are described in Section 105(1)(b) of the Act. The DFO, being responsible for electric distribution system planning, determines its need for transmission system access service based on its own distribution planning guidelines and criteria. While the DFO's plans are considered during the AESO Connection Process, the AESO, in executing its duties to plan the transmission system, does not oversee electric distribution planning or the development of specific DFO planning criteria. The AESO does, however, review the DFO forecasts that are submitted to the AESO, which may be considered in the preparation of the AESO's corporate forecasts.

viii. **Capital Cost Estimates –** The provision of capital costs estimates in the Application is for the purposes of relative comparison and context only. The requirements applicable to cost estimates that are used for transmission system planning purposes are set out in Section 25 of the *Transmission Regulation*, AUC Rule 007, and Section 504.5 of the ISO rules, *Service Proposals and Cost Estimating*.