Alberta Utilities Commission

In the Matter of the Need for the Battle Sands 594S Substation Connection

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 *Transmission Regulation*, AR 86/2007 and Alberta Utilities Commission Rule 007, all as amended

Application of the Alberta Electric System Operator for Approval of the Battle Sands 594S Substation Connection 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 *Battle Sands 594S Substation Connection Needs Identification Document* (Application).

1.2 Application Overview – Enbridge Pipelines Inc. (Enbridge), having obtained necessary approvals under Section 101(2) of the Act, has requested system access service to reliably connect its proposed Battle Sands 594S substation[2] to the 138 kV transmission system at the Enbridge Hardisty Terminal located in the Hardisty area (AESO Planning Area 32, Wainwright). Enbridge's request can be met by constructing a new 138 kV transmission line connecting the proposed Battle Sands 594S substation to the existing 138 kV transmission line 769L and adding a 138 kV breaker to the Rosyth 296S substation (the "Proposed Transmission Development", as further described in Section 2.2). The scheduled in-service date for the Proposed Transmission Development is July 1, 2017.

This Application describes the need to respond to Enbridge'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 market participant to exchange electricity. The Proposed Transmission Development is

[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 Transmission Regulation, AR 86/2007 and Alberta Utilities Commission Rule 007, all as amended.

[2] Based on a review of the economics of providing more than a single point of delivery, and in accordance with section 13(4) of the ISO tariff, the AESO has determined that this project is eligible for totalized billing. As a result, the AESO has agreed to support the totalization of the proposed Battle Sands 594S substation load with Enbridge's current Demand for Transmission Service (DTS) at its Hardisty Terminal. Enbridge's Hardisty Terminal DTS will remain at 60.3 MW.

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

aligned with the AESO's long-term plan for the Wainwright area. 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 AltaLink Management Ltd. (AltaLink), as the legal owner of transmission facilities (TFO), including direction to assist the AESO in preparing this Application.[6]

[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 Enbridge), a reasonable opportunity to exchange electric energy and ancillary services.

FortisAlberta Inc., as the legal owner of the distribution facilities (DFO) in the area and in executing its duties as defined under Section 105(1)(b) of the Act, has granted approval pursuant to Section 101(2) of the Act for Enbridge to enter into an arrangement directly with the AESO for the provision of system access service.[7]

Enbridge has applied to the AESO to obtain transmission system access service to reliably connect its proposed Battle Sands 594S substation at the Enbridge Hardisty Terminal to the transmission system. Enbridge has indicated that the Proposed Transmission Development is the preferred development to address this request.

Through the AESO Connection Process, the AESO, Enbridge, and the TFO have collaborated to determine the characteristics of the Proposed Transmission Development and assess the impacts of connecting the Proposed Transmission Development to the transmission system. The AESO has issued directions to the TFO to prepare a Facility Proposal[8] to meet Enbridge's identified need.

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

1. Add one new 138 kV circuit to connect the proposed Battle Sands 594S substation to the existing 138 kV transmission line 769L using a T-tap configuration;
2. Add one 138 kV breaker to the Rosyth 296S substation; and

[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 Commission Rule 007.

3. 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.[9]

2.3 Proposed Transmission Development Cost Estimates – The AESO directed the TFO to prepare a cost estimate for the Proposed Transmission Development. The TFO estimated the in-service cost of the Proposed Transmission Development, described in Section 2.2, to be approximately $5 million ($2017).[10] In accordance with the ISO tariff, the AESO has determined that there are no system-related costs associated with the Proposed Transmission Development.

2.4 Transmission Development Alternatives – In addition to the Proposed Transmission Development, three other transmission alternatives were identified and ruled out:

1. Radial Connection to the Rosyth 296S substation or to Enbridge's Clipper 656S substation – Connect the proposed Enbridge Battle Sands 594S substation radially to the existing Rosyth 296S substation or Enbridge's Clipper 656S substation; and add a new 138 kV bay to the Rosyth 296S substation or to Enbridge's Clipper 656S substation to supply the proposed Battle Sands 594S substation. Enbridge and AltaLink have advised that both substations have insufficient space to accommodate an additional circuit breaker bay and have right-of-way constraints. For these reasons, this alternative was ruled out.

[9] 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 the market participant's 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. The new 138 kV circuit is currently estimated to have a length of approximately 1 kilometre. This is subject to change as routing and/or siting is finalized by the TFO. The proposed Battle Sands 594S substation, to be connected by the Proposed Transmission Development, is the responsibility of the market participant, Enbridge, and is not included in this Application.

[10] Further details of this cost estimate can be found in Appendix B, with an approximate accuracy level of +20%/-10%.

2. In-and-out connection to the 138 kV transmission line 769L – Radially connect the proposed Battle Sands 594S substation to a new switching station connected to the 138 kV transmission line 769L using an in-and-out configuration. The new switching station will include three 138 kV breakers and another 138 kV breaker would be required at the Rosyth 296S substation for reliability. This alternative was ruled out because of the additional facilities and hence higher cost compared to the Proposed Transmission Development.

3. In-and-out connection to the 138 kV transmission line 703L – Radially connect the proposed Battle Sands 594S substation to a new switching station connected to the 138 kV transmission line 703L using an in-and-out configuration. The new switching station will include three 138 kV breakers and another 138 kV breaker would be required at the Rosyth 296S substation for reliability. This alternative would result in an improvement in reliability for Enbridge over the Proposed Transmission Development. This alternative was ruled out because of the additional facilities and hence higher cost compared to the Proposed Transmission Development.

The Proposed Transmission Development, selected by Enbridge as the lower-cost option, forms the basis of the cost estimates and the Connection Assessment described herein.

2.5 Connection Assessment – Power flow, voltage stability, short-circuit, and motor starting analyses were conducted to assess the impact that the Proposed Transmission Development would have on the transmission system. [11] Power flow analysis was conducted prior to the connection of the Proposed Transmission Development and for 2017 summer peak (SP) and 2017 winter peak (WP). Voltage stability analysis was conducted prior to the connection of the Proposed Transmission Development. for 2017WP.

Post-connection power flow and voltage stability analyses were not undertaken because the Proposed Transmission Development does not include an increase to load on the

[11] The Connection Assessment is included as Appendix A.

138 kV transmission line 769L that serves Enbridge's load at the Enbridge Hardisty Terminal; therefore, post-connection power flow and voltage stability analyses are expected to yield the same result as the pre-connection analyses. As a result, a number of overloads that were identified in the pre-connection scenarios are not expected to be worsened. No voltage violations were identified prior to the connection of the Proposed Transmission Development.

Short-circuit analyses were conducted prior to and following the Proposed Transmission Development for 2017WP, and following the Proposed Transmission Development in 2024WP. The proposed Battle Sands 594S substation will include four motors. Therefore, post-connection motor starting analysis was performed to evaluate whether the starting of one motor at the proposed Battle Sands 594S substation is acceptable during both system normal and contingency conditions.

Load and generation assumptions used in the analyses align with the *AESO 2014 Long-term Outlook* (2014 LTO) corporate forecast.

These analyses indicate that the Proposed Transmission Development will not adversely impact transmission system performance.

2.6 AESO Forecast and Transmission System Plan – The AESO's corporate forecast for the Wainwright area is consistent with the load to be served from the Proposed Transmission Development.[12] 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 the region.

Future AESO needs identification documents in the Wainwright area will assume the Proposed Transmission Development will be in-service for the date specified, unless new information indicates otherwise.

[12] Section 6.5 of the *AESO 2014 Long-term Outlook* discusses the Central Region, which includes the Proposed Transmission Development area.

2.7 Transmission Dependencies – The Proposed Transmission Development is not dependent on the AESO's plans to expand or enhance the transmission system.

2.8 AESO Participant Involvement Program – The AESO directed the TFO to assist the AESO in conducting a participant involvement program (PIP), in accordance with requirement NID14 and Appendix A2 of Commission Rule 007. Between June and October 2015, the TFO and the AESO used various methods to notify residents, landowners, government bodies, agencies and stakeholder groups (collectively, the Stakeholders)[13] in the area where transmission facilities could be installed to implement the Proposed Transmission Development. Additionally, the AESO notified the public in the area where transmission facilities could be installed to implement the Proposed Transmission Development, of its intention to file this Application with the Commission for approval. No concerns or objections have been raised regarding the need for the Proposed Transmission Development.[14]

2.9 Information Regarding Rule 007, Section 6.1 - NID13 – The AESO has been advised that the TFO's Facility Proposal addresses the major aspects listed in Commission Rule 007, Section 6.1 - NID13.[15] 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 Commission Rule 007, Section 6.1 – NID13.

2.10 Confirmation Date – In the event that the proposed facilities are not in-service six months following the proposed in-service date, in this case January 1, 2018, 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

[13] The TFO did not identify any occupants in the area where transmission facilities could be installed to implement the Proposed Transmission Development.

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

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

described in this application approval continues to be the AESO's preferred technical solution.[16]

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

- the transmission planning duties of the AESO as described in Sections 29, 33 and 34 of the Act;
- the System Access Service Request;
- the Connection Assessment;
- 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 electricity. In consideration of these factors, the AESO submits that approval of this Application is in the public interest.

[16] A detailed project schedule can be found in the TFO's Facility Application.

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.[17] 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 Commission 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 Enbridge'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.

[17] The AESO understands that the TFO intends to file a Facility Proposal relating to this Application to be titled *Enbridge Battle Sands 594S Substation Interconnection*.

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 six months following the proposed in-service date, in this case January 1, 2018, 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 ISO'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 to reliably connect the proposed Battle Sands 594S substation, as follows:

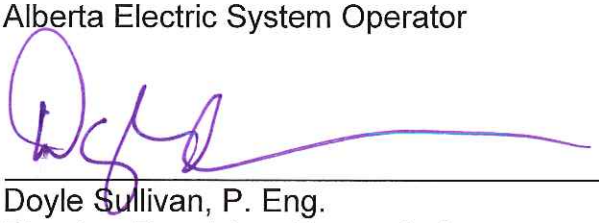
A. Add one new circuit of 138 kV transmission line to connect the proposed Battle Sands 594S substation to the existing 138 kV transmission line 769L using a T-tap configuration;

B. Add one 138 kV breaker at the Rosyth 296S substation; and

C. 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 19th day of October 2015.

Alberta Electric System Operator



Doyle Sullivan, P. Eng.
Director, Regulatory Transmission

PART B – APPLICATION APPENDICES

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

APPENDIX A **Connection Assessment –** Appendix A contains the *Connection to Enbridge Pipelines Inc. Proposed Battle Sands 594S Substation Engineering Study Report* that assesses the transmission system performance prior to and following the connection of the Proposed Transmission Development. As part of the AESO Connection Process, Enbridge engaged a consultant to conduct the connection assessment (Study). The AESO defined the Study scope, and provided the system models and Study assumptions. The AESO also reviewed this report and its conclusions, and finds the Study acceptable for the purposes of assessing the impacts of the Proposed Transmission Development on the transmission system.

APPENDIX B **TFO Capital Cost Estimates –** Appendix B contains detailed cost estimates corresponding to the Proposed Transmission Development. These estimates have been prepared by the TFO at the direction of the AESO, to an approximate accuracy level of +20%/-10%, which exceeds the accuracy required by Commission Rule 007, NID11.

APPENDIX C **AESO PIP –** Appendix C contains a summary of the PIP activities conducted 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 **Information Regarding Rule 007, Section 6.1 - NID13 –** Appendix D contains a letter provided by the TFO confirming that the seven major aspects of Commission Rule 007, NID13 will be addressed within the TFO's Facility Proposal.

APPENDIX E **AESO Transmission Planning Criteria – Basis and Assumptions –** The AESO has revised the *Transmission Reliability Criteria, Part II Transmission System Planning Criteria*, Version 0, dated March 11, 2005 primarily to

remove criteria that are now included in the Transmission Planning (TPL) Standards. [18] Appendix E contains the *Transmission Planning Criteria – Basis and Assumptions,* Version 1, which includes the applicable thermal and voltage limits in support of the TPL standards. Planning studies that are included in this Application meet all the performance requirements of the specified TPL standards (TPL-001-AB-0, TPL-002-AB-0, and specified contingencies associated with TPL-003-AB-0).

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

PART C – REFERENCES

i. **AESO Planning Duties and Responsibilities –** Certain aspects of AESO 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.[19] 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 wishing to exchange electric energy and ancillary services a reasonable opportunity to do so."

iii. **AESO Planning Criteria –** 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: http://www.aeso.ca/rulesprocedures/17006.html [20]

In addition, the AESO's *Transmission Planning Criteria – Basis and Assumptions* is included in Appendix E.

iv. **AESO Connection Process** – For information purposes, the AESO Connection Process, which changes from time to time, is generally described at: http://www.aeso.ca/connect[21]

[19] 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.

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

[21] 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 TFO has also been directed by the AESO under Section 39 of the Act to prepare a proposal to provide services to address the need for the Proposed Transmission Development. 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.

vii. **Duties of the owner of an electric distribution system –** 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 AESO's responsibilities in respect of project cost reporting are described in the *Transmission Regulation*, including Section 25, and ISO Rule 9.1.