Alberta Utilities Commission

In the Matter of the Need for the Al Rothbauer 321S Substation

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 Al Rothbauer 321S Substation 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 *Al Rothbauer 321S Substation Needs Identification Document* (Application).

1.2 Application Overview – The City of Medicine Hat (COMH), as a market participant in the Medicine Hat area, has requested system access service to relocate its Alberta interconnected electric system (AIES) point of connection from the existing Medicine Hat 41S substation to improve reliability of electric supply for the COMH. The COMH's request can be met by: constructing a new switching station, to be designated the Al Rothbauer 321S substation, including three 138 kV breakers; connecting the proposed Al Rothbauer 321S substation to a proposed COMH substation through the new 138 kV transmission line 882L; modifying and connecting the 138 kV transmission lines 675L and 880L to the Al Rothbauer 321S substation; and discontinuing use of the Medicine Hat 41S substation and the 138 kV transmission line 674L (the "Proposed Transmission Development", as further described in Section 2.2). After completion of the Proposed Transmission Development, the COMH's electrical system will be connected to the AIES through the Al Rothbauer 321S substation, as shown in Figure 1. The scheduled in-service date for the Proposed Transmission Development is June 30, 2017.

This Application describes the need to respond to the COMH's request for system access service. Having followed the AESO Connection Process,[2] the AESO has determined that the Proposed Transmission Development provides a reasonable

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

opportunity for the market participant to exchange electricity. The Proposed Transmission Development is consistent with the AESO's long-term plans for the South region, which includes the Medicine Hat area. The AESO, in accordance with its responsibility to respond to requests for system access service, submits this Application to the Commission for approval.[3,4]

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.[5]

[3] 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.

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

[5] 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 COMH), a reasonable opportunity to exchange electric energy and ancillary services.

The COMH, as the market participant for the service area of the City of Medicine Hat has applied to the AESO to obtain transmission system access service to relocate its Alberta interconnected electric system (AIES) point of connection to improve reliability of electric supply for the COMH. The COMH has indicated that the Proposed Transmission Development is the preferred development to address this request.

Through the AESO Connection Process, the AESO, the COMH, and the TFO have collaborated to determine the characteristics of the Proposed Transmission Development and to assess the impacts that the Proposed Transmission Development would have on the transmission system. The AESO has issued directions to the TFO to prepare a Facility Proposal[6] to meet the COMH's identified need.

2.2 Proposed Transmission Development – The Proposed Transmission Development, as illustrated in Figure 1, includes the following elements:

1. Construct a new switching station, designated the Al Rothbauer 321S substation, including three 138 kV breakers;
2. Connect the proposed Al Rothbauer 321S substation to a proposed COMH substation, designated as the MHS-7, using a short 138 kV transmission line 882L;
3. Modify and connect the 138 kV transmission line 675L to the proposed Al Rothbauer 321S substation;

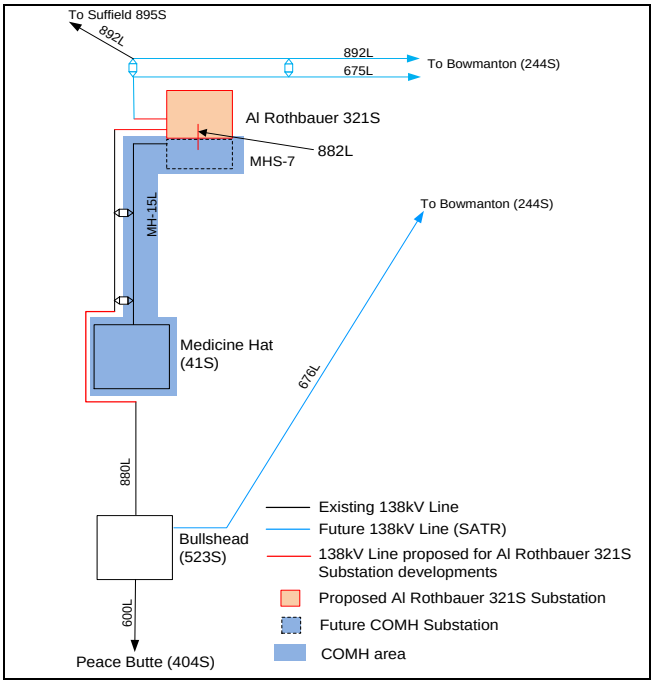
[6] Also referred to as facility application, or FA, under Commission Rule 007.

4. Disconnect the 138 kV transmission line 880L from the Medicine Hat 41S substation and terminate it at the proposed Al Rothbauer 321S substation by connecting it to the 892L between the Medicine Hat 41S substation and the Al Rothbauer 321S substation;
5. Discontinue use for transmission purposes the Medicine Hat 41S substation and the portion of the 138 kV transmission line 674L between the Medicine Hat 41S substation and the Al Rothbauer 321S substation; and
6. 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.[7]

[7] 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 modifications to the two 138 kV transmission lines contemplated in this Application add less than 100 metres to each transmission line. The new 138 kV transmission line 882L is currently estimated to have a length of approximately 30 metres. The proposed MHS-7 substation, to be connected by the Proposed Transmission Development, is the responsibility of the market participant, the COMH, and is not included in this Application.

Figure 1:

Schematic illustration of the Proposed Transmission Development



This schematic drawing is intended to illustrate the electrical interconnection in the area of the Proposed Transmission Development. It is not to scale, nor does it depict the exact line routes or substation locations.

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 $8 million ($2017).[8] 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 – No other transmission alternatives were identified. The Proposed Transmission Development, selected by the COMH, forms the basis of the cost estimates and the Connection Assessment described herein.

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

2.5 Connection Assessment – Power flow, voltage stability, transient stability, and short-circuit analyses were conducted to assess the impact that the Proposed Transmission Development would have on the transmission system. Power flow and short-circuit analyses were conducted prior to and following connection of the Proposed Transmission Development and power flow, voltage stability, and transient stability analyses were performed following connection of the Proposed Transmission Development. These analyses show that for the conditions studied, the Proposed Transmission Development does not create any Reliability Criteria violations under Category A or Category B system conditions and will not adversely impact transmission system performance.[9]

Load and generation assumptions were based on the AESO *2012 Long-term Outlook Update.* As part of its planning responsibilities, the AESO updates its corporate forecasts routinely to ensure they reflect the latest economic projects, factors and timing. While the AESO has updated its regional forecasts since the connection studies were performed, the use of the current AESO load forecasts, found in the AESO *2014 Long-term Outlook*, for the region would not materially alter the connection study results or affect its conclusions.

A sensitivity analysis was conducted with the Peace Butte wind power plant[10] in service following the completion of Medicine Hat area component of amended SATR[11] and prior to the Proposed Transmission Development connection. The results show that the section of 138 kV transmission line 674L between the Medicine Hat 41S and the proposed Al Rothbauer 321S substation will be overloaded under the contingency of the 138 kV transmission line 676L. If this situation were to occur, a temporary Remedial Action Scheme would be required to mitigate this overload.

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

[10] Pteragen Canada Inc. (Pteragen), pursuant to Approval No. U2013-225 and Decision 2013-171, is the owner of the 120-megawatt wind power plant designated as the Peace Butte wind power plant. Pteragen filed Application No. 1610614 on May 27, 2014, with the AUC requesting approval of a time extension, from June 30, 2014 to December 31, 2016, in order to complete construction of the power plant. The time extension was approved on June 11, 2014 under Decision No. 2014-166

[11] The Medicine Hat area component of the SATR project has a scheduled ISD of January 1, 2017

2.6 AESO Forecast and Transmission System Plan – The AESO's corporate forecast for the Medicine Hat area is consistent with the load and generation 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 Medicine Hat area will assume the Proposed Transmission Development will be in service for the date specified, unless new information indicates otherwise.

2.7 Transmission Dependencies – The Proposed Transmission Development is dependent on a proposed amendment to the Southern Alberta Transmission Reinforcement (SATR) Needs Identification Document (NID) Approval Amendment (SATR NID Approval Amendment).[13] The proposed SATR NID Approval Amendment is scheduled to be in service prior to the Proposed Transmission Development.

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 July and November 2015, the TFO and the AESO used various methods to notify occupants, residents, landowners, government bodies, agencies and stakeholder groups (collectively, the Stakeholders) in the area where the AESO has reasonably determined that 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

[12] Section 6.6 of the *AESO 2014 Long-term Outlook* discusses the South Region, which includes the Proposed Transmission Development area.

[13] The *Southern Alberta Transmission Reinforcement* NID was originally approved by the Commission in Decision 2009-126 on September 8, 2009, and issued NID Approval No. U2009-340 on September 17, 2009. The SATR NID Approval Amendment will be filed as a separate application.

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 by June 30, 2018, which is one year following the scheduled in-service date of June 30, 2017, 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.[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

[14] AltaLink executed the AESO's direction as part of its combined PIP activities for the Al Rothbauer 321S substation and the related SATR amendment facility proposals. 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.

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

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 containing more detailed engineering and designs for the Proposed Transmission Development. 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 the COMH'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.

3.3 The AESO also requests, and understands that AltaLink will be requesting, that this Application be considered with the proposed amendment to the SATR, which consists of the AESO's proposed SATR NID Approval Amendment[18] and the AltaLink Facility Proposal amendment.[19]

[17] The AESO understands that the TFO intends to file a Facility Proposal relating to this Application to be titled the *Al Rothbauer 321S Substation Interconnection*.

[18] Amendment to the Alberta Utilities Commission (Commission) Southern Alberta Transmission Reinforcement (SATR) Approval No. U2014-461 (SATR NID Approval Amendment)

[19] The AESO understands that the TFO intends to file an amendment to the SATR Facility Proposal.

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 June 30, 2018, which is one year following the scheduled in-service date of June 30, 2017, 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 to reliably connect the Al Rothbauer 321S substation, as follows:

A. Construct a new switching station, designated the Al Rothbauer 321S substation, including three 138 kV breakers;

B. Connect the proposed Al Rothbauer 321S substation to a proposed COMH substation, designated as the MHS-7 using a short 138 kV transmission line 882L;

C. Modify and connect the 138 kV transmission lines 675L to the Al Rothbauer 321S substation;

D. Disconnect the 138 kV transmission line 880L from the Medicine Hat 41S substation and terminate it at the proposed Al Rothbauer 321S substation by connecting it to the portion of the 892L between the Medicine Hat 41S substation and the Al Rothbauer 321S substation;

E. Discontinue use for transmission purposes the Medicine Hat 41S substation and a portion of the 138 kV transmission line 674L between the Medicine Hat 41S and the proposed Al Rothbauer 321S substation; and

F. 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 18th day of December 2015.

Alberta Electric System Operator

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Warren Clendining
Manager, Regulatory Transmission

PART B – APPLICATION APPENDICES

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

APPENDIX A **Connection Assessment –** Appendix A contains the *Connection Engineering Study Report for AUC Application, City of Medicine Hat AIES Interconnection* that assesses the transmission system performance prior to and following the connection of the Proposed Transmission Development.

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. [20] 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

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

performance requirements of the specified TPL standards (TPL-001-AB-0 and TPL-002-AB-0).

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.[21] 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 [22]

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[23]

[21] 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.

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

[23] 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 Section 9.1.