



**Alberta Utilities Commission  
In the Matter of the Need for the  
Sharp Hills Wind Farm 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 Regulations made thereunder, and  
Alberta Utilities Commission Rule 007**

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**Application of the Alberta Electric System Operator for  
Approval of the  
Sharp Hills Wind Farm Connection  
Needs Identification Document**

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**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,<sup>1</sup> the Alberta Electric System Operator (AESO) applies to the Alberta Utilities Commission (Commission) for approval of the *Sharp Hills Wind Farm Connection Needs Identification Document* (Application).

**1.2 Application Overview** – EDP Renewables SH Project Limited Partnership, by its general partner, EDP Renewables SH Project GP Ltd., (EDPR), has requested system access service to connect the proposed Sharp Hills Wind Farm<sup>2</sup> (the Facility) to be located in the Sedalia area (AESO Planning Area 42, Hanna). The Facility has an expected commercial operation date of Q4 2019. EDPR’s request includes a new Rate STS, *Supply Transmission Service*, contract capacity of 300 MW and a new Rate DTS, *Demand Transmission Service*, contract capacity of 1 MW in the Sedalia area. EDPR’s request can be met by adding the New Brigden 2088S substation with four 240 kV circuit breakers; adding two 240 kV circuits to connect the New Brigden 2088S substation to the existing 240 kV transmission line 9L46; and, connecting the Facility to the New Brigden 2088S substation (the “Proposed Transmission Development”, as further described in Section 2.2). The scheduled in-service date for the Proposed Transmission Development is May 1, 2019.

This Application describes the need to respond to EDPR’s request for system access service. Having followed the AESO Connection Process,<sup>3</sup> the AESO has determined that the Proposed Transmission Development provides a reasonable opportunity for the

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<sup>1</sup> 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).

<sup>2</sup> EDPR submitted an application for the proposed Facility to the Commission, which was registered on September 8, 2017, in Applications 22665-A001, 22665-A002 and 22665-A003 and Proceeding No. 22665.

<sup>3</sup> For information purposes, refer to note iv of Part C of this Application for more information on the AESO Connection Process.

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market participant, in this case EDPR, to exchange electric energy and ancillary services. The Proposed Transmission Development is consistent with the AESO's long-term plans for the Central Planning Region, which includes the Sedalia area. The AESO, in accordance with its responsibility to respond to requests for system access service, submits this Application to the Commission for approval.<sup>4,5</sup>

**1.3 AESO Directions to the TFO** – During the AESO Connection Process, the AESO issued various directions to the legal owners of transmission facilities (TFOs) in the applicable service areas, including directions to assist the AESO in preparing this Application.<sup>6</sup> In this case, the TFOs were ATCO Electric Ltd. (ATCO), and AltaLink Management Ltd. (AltaLink), in its capacity as general partner of AltaLink, L.P.

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<sup>4</sup> 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.

<sup>5</sup> Note v of Part C of this Application describes the Application scope in more detail.

<sup>6</sup> The directions are described in more detail in the following sections of this Application and in Part C, note vi.

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**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 EDPR, a reasonable opportunity to exchange electric energy and ancillary services.

EDPR has requested system access service through a connection to the transmission system. In accordance with Section 34 of the Act, the AESO has determined that an expansion or enhancement of the transmission system is required to respond to the request, thereby establishing the need for this Application. EDPR has made the appropriate applications to the AESO to obtain transmission system access service. The AESO, in collaboration with EDPR and the TFOs, has determined that the Proposed Transmission Development is the preferred option to meet EDPR's request for system access service.

Through the AESO Connection Process, the AESO, EDPR, and the TFOs have collaborated to determine the characteristics of the Proposed Transmission Development and to assess the impacts that the Proposed Transmission Development and the associated generation would have on the transmission system. The AESO has issued directions to ATCO to prepare a transmission facility proposal<sup>7</sup> (Facility Proposal) to meet EDPR's request.<sup>8</sup>

**2.2 Proposed Transmission Development** – The Proposed Transmission Development involves connecting the Facility to the transmission system, including the following elements:

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<sup>7</sup> Also referred to as facility application, or FA, under AUC Rule 007.

<sup>8</sup> AltaLink advised the AESO that its scope of work will consist of relay setting changes at Jarrow 252S substation and the addition of three relays at the Buffalo Creek 526S substation. AltaLink further advised the AESO that its scope will not require a participant involvement program or the preparation of a Facility Proposal. As a result, the AESO did not direct AltaLink to prepare a Facility Proposal or to assist the AESO in undertaking its PIP activities.

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### A. Proposed ATCO development

1. Add a new switching station, to be designated New Brigden 2088S substation, including four 240 kV circuit breakers;
2. Add two 240 kV transmission lines to connect the New Brigden 2088S substation to the existing 240 kV transmission line 9L46 using an in-and-out configuration<sup>9</sup>;
3. Connect the Facility to the New Brigden 2088S substation.<sup>10</sup>

### B. Proposed ATCO and AltaLink development

4. 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.<sup>11</sup>

**2.3 Proposed Transmission Development Cost Estimate** – The AESO directed the TFOs to prepare cost estimates for the Proposed Transmission Development, described in Section 2.2. ATCO has estimated the cost of its scope of work to be approximately \$18 million.<sup>12</sup> In addition, AltaLink has estimated the cost of its scope of

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<sup>9</sup> One 240 kV circuit will have an estimated length of approximately 200 metres, and the other 240 kV circuit will have an estimated length of approximately 300 metres. These are subject to change as routing and/or siting is finalized by ATCO.

<sup>10</sup> The New Brigden 2088S substation will connect to EDPR's proposed Sedalia 363S substation, which is part of the Facility.

<sup>11</sup> 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 ATCO'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 ATCO's Facility Proposal. Line numbering and substation names provided here are for ease of reference and are subject to change as engineering and design progresses. Market participant facilities that may subsequently be connected to the Proposed Transmission Development are the responsibility of the market participant and are not included in the Application.

<sup>12</sup> The cost is in nominal dollars using a base year of 2017 with escalation considered. Further details of this cost estimate, which has an accuracy level of +20%/-10%, can be found in Appendix B.

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work to be approximately \$1 million.<sup>13</sup> In accordance with the ISO tariff, the AESO has determined that all costs associated with the Proposed Transmission Development will be classified as participant-related.

**2.4 Transmission Development Alternatives** – No alternatives to the Proposed Transmission Development were identified.

**2.5 Connection Assessment** – Power flow, transient stability and short-circuit studies were conducted to assess the impact that the Proposed Transmission Development and the associated generation (the Project) would have on the transmission system.<sup>14</sup> Power flow and short-circuit studies were conducted prior to and following connection of the Project, and transient stability studies were performed following connection of the Project. In addition, two different renewable electricity generation dispatch cases were studied both pre-connection and post-connection: Case A assessed the impact that the Project would have on the transmission system if the planned Irma Wind Power Project<sup>15</sup> was not connected, and Case B assessed the impact that the Project would have on the transmission system after the planned Irma Wind Power Project was connected.

### Case A – Connecting the Facility without the planned Irma Wind Power Project

The pre-connection assessment identified system performance issues. Under certain Category B conditions, thermal criteria violations were observed. Real-time operational practices, an existing remedial action scheme (RAS), and a planned RAS can be used to mitigate the pre-connection system performance issues. The existing RAS is known as RAS #138; the planned RAS includes a modification of the existing RAS #139, which was identified in the approved BluEarth Hand Hills and Suncor Hand Hills Needs

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<sup>13</sup> The cost is in nominal dollars using a base year of 2017 with escalation considered. Further details of this cost estimate, which has an accuracy level of +20%/-10%, can be found in Appendix B.

<sup>14</sup> The connection assessment is included as Appendix A.

<sup>15</sup> *Irma Wind Power Project Connection Needs Identification Document*, as filed with the AUC as application no. 22857-A001.

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Identification Document (NID) applications,<sup>16,17</sup> hereafter referred to as planned RAS #139.

The post-connection assessment identified the same system performance issues that were identified in the pre-connection assessment, as well as additional system performance issues, under certain Category B conditions. Some thermal criteria violations were exacerbated in the post-connection assessment compared to the pre-connection assessment. The following mitigation measures can be used to mitigate the post-connection system performance issues:

- Real-time operational practices;
- modifications to the existing RAS #138;
- modifications to the planned RAS #139;
- an ATCO capital maintenance project to restore the thermal ratings on the 144 kV transmission line 7L127; and
- an AltaLink capital maintenance project to restore the thermal ratings on the 240 kV transmission line 912L.

### Case B – Connecting the Facility after the planned Irma Wind Power Project

The pre-connection assessment identified system performance issues. Under certain Category B conditions, thermal criteria violations were observed. Real-time operational practices, planned RAS #139, and modifications to the RAS planned for the Irma Wind Power Project can be used to mitigate the pre-connection system performance issues. The RAS planned for the Irma Wind Power Project was identified in the Irma Wind Power Project NID application, and this RAS is hereafter referred to as the planned 7L129 RAS.

The post-connection assessment identified the same system performance issues that were identified in the pre-connection assessment, as well as additional system

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<sup>16</sup> *Suncor Hand Hills Wind Energy Connection Needs Identification Document*, as originally approved by AUC Decision 2482-D01-2015 and Approval 2482-D03-2015; and

<sup>17</sup> *BluEarth Hand Hills Wind Energy Connection Needs Identification Document*, as originally approved by AUC Decision 2482-D01-2015 and Approval 2482-D02-2015.

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performance issues, under certain Category B conditions. Some thermal criteria violations were exacerbated in the post-connection assessment compared to the pre-connection assessment. The following mitigation measures can be used to mitigate the post-connection system performance issues:

- Real-time operational practices;
- an existing RAS, known as RAS #134;
- modifications to the planned RAS #139;
- modifications to the planned 7L129 RAS; and
- an AltaLink capital maintenance project to restore the thermal ratings on the 240 kV transmission line 912L.

**2.6 AESO Forecast and Transmission System Plans** – The AESO’s corporate forecast for the Central Planning Region is consistent with the generation and load associated with the Proposed Transmission Development.<sup>18</sup> 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.

**2.7 Transmission Dependencies** – As discussed in Section 2.5, the Proposed Transmission Development is dependent on restoration of the 144 kV transmission line 7L127 and restoration of the 240 kV transmission line 912L.

Restoring the capacity of 7L127 will mitigate the observed thermal criteria violations on 7L127 during certain Category B conditions. Restoring 7L127 is part of an ATCO capital maintenance project, and is outside the scope of the Proposed Transmission Development. ATCO has advised that the 7L127 restoration will be complete by Q4 2018, which is before the scheduled in-service date of the Proposed Transmission Development.

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<sup>18</sup> The *AESO 2017 Long-term Outlook* discusses the Central Planning Region, which includes the Proposed Transmission Development area.

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Restoring the capacity of 912L will mitigate the observed thermal criteria violations on 912L during certain Category B conditions. Restoring 912L is part of an AltaLink capital maintenance project, and is outside the scope of the Proposed Transmission Development. AltaLink has advised that the 912L restoration will be complete by Q4 2017, which is before the scheduled in-service date of the Proposed Transmission Development.

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

**2.8 AESO Participant Involvement Program** – The AESO directed ATCO to assist the AESO in conducting a participant involvement program (PIP). Between August 2016 and September 2017, ATCO 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. This included a notification to market participants that may be affected by the Project. In October 2017, the AESO notified stakeholders of its intention to file this Application with the Commission. The AESO is not aware of any concerns or objections that have been raised regarding the need for the Proposed Transmission Development or the AESO’s preferred option to respond to the system access service request. In addition, no concerns have been raised by the notified market participants.<sup>19</sup>

**2.9 Information Regarding AUC Rule 007, Section 6.2.2, NID23(3)** – The AESO has been advised that ATCO’s Facility Proposal addresses the requirements of AUC Rule 007, Section 6.2.2, NID23(3).<sup>20</sup> AltaLink has advised the AESO that its scope of work does not have any environmental or land use effects as outlined in NID23(3). In consideration of these facts, and as the filing of the Application is combined with ATCO’s Facility Proposal, the AESO has not undertaken a separate assessment of the sort contemplated in AUC Rule 007, Section 6.2.2, NID23(3).

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<sup>19</sup> Further information regarding the AESO’s PIP for this Application is included in Appendix C.

<sup>20</sup> Please refer to the letter included as Appendix D of this Application.

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**2.10 Confirmation Date** – In the event that the proposed facilities are not in service by November 1, 2019, which is six months following the scheduled in-service date of May 1, 2019, 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.<sup>21</sup>

**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 request for system access service;
- the connection assessment;
- the cost estimates for the Proposed Transmission Development;
- 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.

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<sup>21</sup> A detailed project schedule, which includes potential limitations or constraints as contemplated in AUC Rule 007, NID25(2), can be found in ATCO’s Facility Proposal.

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**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 ATCO to prepare a Facility Proposal to meet the need identified. The AESO understands that ATCO's Facility Proposal will be filed shortly.<sup>22</sup> The AESO requests, and expects ATCO 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 EDPR'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.

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<sup>22</sup> The AESO understands that ATCO intends to file a Facility Proposal relating to this Application to be titled *Sharp Hills Transmission Project*.

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**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 November 1, 2019, which is six months following the scheduled in-service date of May 1, 2019, 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 connect the Facility to the transmission system, as follows:

- A. Add the New Brigden 2088S substation, including four 240 kV circuit breakers;
- B. Add two 240 kV transmission lines to connect the New Brigden 2088S substation to the existing 240 kV transmission line 9L46 using an in-and-out configuration;
- C. Connect the Facility to the New Brigden 2088S substation; and
- D. 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 27<sup>th</sup> day of October 2017.

Alberta Electric System Operator

*"Electronically submitted"*

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Kelly Yagelniski  
Director, Transmission Program Support

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**Alberta Electric System Operator**

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**PART B – APPLICATION APPENDICES**

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

**APPENDIX A Connection Assessment** – Appendix A contains the *AESO Engineering Connection Assessment - Sharp Hills Wind Farm Connection* that assesses the transmission system performance prior to and following the connection of the Proposed Transmission Development and the associated generation. As part of the AESO Connection Process, EDPR engaged a consultant to conduct the connection assessment studies. The AESO defined the study scope, and provided the system models and study assumptions. The AESO also reviewed the Connection Assessment Results report prepared by the consultant, and finds the Connection Assessment Results report acceptable for the purposes of assessing the impacts of the Proposed Transmission Development and the associated generation 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 ATCO and AltaLink at the direction of the AESO, to an accuracy level of +10%/-20%, which exceeds the accuracy required by AUC Rule 007, NID24.

**APPENDIX C AESO PIP** – Appendix C contains a summary of the PIP activities conducted, in accordance with requirement NID27 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 ATCO Information Regarding AUC Rule 007, Section 6.2.2, NID23(3)** – Appendix D contains a letter provided by ATCO confirming that the requirements of AUC Rule 007, NID23(3) will be addressed within ATCO's Facility Proposal.

**APPENDIX E AESO Transmission Planning Criteria – Basis and Assumptions** – Appendix E contains the *Transmission Planning Criteria – Basis and Assumptions*, Version 1, which includes the applicable thermal and voltage limits in

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support of the Transmission Planning (TPL) standards.<sup>23</sup> 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-AB-0).

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<sup>23</sup> TPL Standards are included in the current Alberta Reliability Standards.

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## PART C – REFERENCES

- i. **AESO Planning Duties and Responsibilities** – Certain aspects of 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.<sup>24</sup> 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, 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 [EDPR 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:<sup>25</sup> <https://www.aeso.ca/rules-standards-and-tariff/alberta-reliability-standards/>  
  
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: <https://www.aeso.ca/grid/connecting-to-the-grid/connection-process/><sup>26</sup>

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<sup>24</sup> 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.

<sup>25</sup> This link is provided for ease of reference and does not form part of this Application.

<sup>26</sup> This link is provided for ease of reference and does not form part of this Application.

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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 TFOs** – Pursuant to Subsection 35(1) of the Act, the AESO has directed the ATCO, in its capacity as a 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 ATCO, pursuant to Section 39 of the Act and Section 14 of the *Transmission Regulation*, to assist in the preparation of the AESO’s Application. ATCO and AltaLink have 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. **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*.