



**Alberta Utilities Commission**  
**In the Matter of the Need for the**  
**Suncor Forty Mile Wind Power Project 964L 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**  
**Suncor Forty Mile Wind Power Project 964L 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 *Suncor Forty Mile Wind Power Project 964L Connection Needs Identification Document (Application)*.

**1.2 Application Overview** – Forty Mile Granlea Wind GP Inc., a wholly owned subsidiary of Suncor Energy Inc., (market participant), requested two connections to the transmission system through two separate requests for system access service to the AESO, each for the connection of 200 MW of capacity for the proposed Suncor Forty Mile Wind Power Project (Facility).<sup>2</sup> As such, the AESO is addressing the two requests for system access service through two needs identification document applications, one being this application for the *Suncor Forty Mile Wind Power Project 964L Connection Needs Identification Document*; and the other being the *Suncor Forty Mile Wind Power Project Whitla 251S Substation Connection Needs Identification Document*. This Application addresses the market participant's request for system access service to connect the Facility to the transmission system in the Maleb area (AESO Planning Area 4), via the market participant's proposed Granlea 1024S substation. The market participant expects the Granlea phase of the Facility to be commercially operational in December 2020.

The market participant's request includes a new Rate STS, *Supply Transmission Service*, contract capacity of 200 MW and a new Rate DTS, *Demand Transmission Service*, contract capacity of 0.25 MW in the Maleb area. The market participant's

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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> Forty Mile Granlea Wind GP Inc. submitted an application for the proposed Facility to the Commission, which was registered on October 19, 2017, in Application Nos. 23030-A001 to 23030-A005 and Proceeding No. 23030.

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request can be met by adding one 240 kV circuit to connect the proposed Facility to the existing 240 kV transmission line 964L (the “Proposed Transmission Development”, as further described in Section 2.2). The scheduled in-service date for the Proposed Transmission Development is June 1, 2020.

This Application describes the need to respond to the market participant’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 market participant to exchange electric energy and ancillary services. The Proposed Transmission Development is consistent with the AESO’s long-term plans for the South Planning Region, which includes the Maleb 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 owner of transmission facilities (TFO), in this case, AltaLink Management Ltd., in its capacity as general partner of AltaLink, L.P., including direction to assist the AESO in preparing this Application.<sup>6</sup>

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

<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 a reasonable opportunity to exchange electric energy and ancillary services.

The market participant 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. The market participant has made the appropriate applications to the AESO to obtain transmission system access service.

The AESO, in consultation with the market participant and the TFO, has determined that the Proposed Transmission Development is the preferred option to meet the market participant's request for system access service.

Through the AESO Connection Process, the AESO, in consultation with the market participant and the TFO, has determined the characteristics of the Proposed Transmission Development and assessed the impacts that the Proposed Transmission Development and the associated generation would have on the Alberta interconnected electric system. The AESO has issued directions to the TFO to prepare a transmission facility proposal<sup>7</sup> (Facility Proposal) to meet the need to respond to the market participant's request.

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

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

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1. Add one 240 kV circuit to connect the Facility to the existing 240 kV transmission line 964L using a T-tap configuration. The minimum capacity of the 240 kV circuit shall be the same as the existing 964L.<sup>8</sup>
2. 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>9</sup>

**2.3 Proposed Transmission Development Cost Estimate** – The AESO directed the TFO to prepare cost estimates for the Proposed Transmission Development, described in Section 2.2. The TFO estimated the cost of the Proposed Transmission Development to be approximately \$4 million.<sup>10</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** – In addition to the Proposed Transmission Development, the AESO, in consultation with the market participant and the TFO, examined four other transmission alternatives to respond to the market participant's request for system access service:

1. **T- tap Connection to the 240 kV transmission line 983L** – This alternative involves connecting the Facility to the existing 240 kV transmission line 983L using a T-tap configuration. The TFO has advised that this alternative would

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<sup>8</sup> The TFO has estimated that the 240 kV circuit that will connect the Facility to the existing 240 kV transmission line 964L, will have a length of approximately 230 metres. This is subject to change as routing and/or siting is finalized by the TFO. The 240 kV circuit will connect to Forty Mile Granlea Wind GP Inc. proposed Granlea 1024S substation, which is part of the Facility.

<sup>9</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 the TFO's Facility Proposal. Also, further details will be determined as detailed engineering progresses. Routing and/or siting of transmission facilities do not form part of this Application and are addressed in the TFO'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>10</sup> The cost is in nominal dollars using a base year of 2018 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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require the addition of a 240 kV circuit, approximately 250 metres in length, and a crossing of the existing 240 kV transmission line 964L.

2. **In-and-Out Connection to the 240 kV transmission line 964L** – This alternative involves connecting the Facility to the 240 kV transmission line 964L using an in-and-out configuration. The TFO has advised that this alternative would require the addition of a switching station, including three 240 kV circuit breakers and the addition of two 240 kV circuits, each approximately 230 metres in length.
3. **In-and-Out Connection to the 240 kV transmission line 983L** – This alternative involves connecting the Facility to the 240 kV transmission line 983L using an in-and-out configuration. The TFO has advised that this alternative would require the addition of a switching station, including three 240 kV circuit breakers. The TFO has also advised that this alternative would require the addition of two 240 kV circuits, each approximately 250 metres in length and a crossing of the existing 240 kV transmission line 964L.
4. **Radial connection to Whitley 251S substation** – This alternative involves connecting the Facility to the existing Whitley 251S substation in a radial configuration. The TFO has advised that this alternative would require the addition of one 240 kV circuit, approximately 9.5 kilometres in length and one 240 kV circuit breaker.

All four of these alternatives were ruled out due to increased transmission development, and hence overall increased cost, compared to the Proposed Transmission Development. The Proposed Transmission Development was selected as the preferred transmission alternative and forms the basis for the cost estimates and the connection assessment described herein.

**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

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transmission system.<sup>11</sup> Power flow, transient stability and short-circuit studies were conducted prior to and following connection of the Project.

### **Initial Assessment**

Initial post-connection studies using the AESO's original generation assumptions identified voltage criteria violations under Category A conditions. However, at this time the actual impact of the Project on the AES will depend on the energization timing of the Project in relation to the energization of other planned generation facilities in the area.

To alleviate these observed system performance issues under Category A conditions, the AESO adjusted its generation assumptions for planned renewable generation projects. All subsequent studies were completed based on these adjusted generation assumptions.

If the AESO anticipates that Reliability Criteria violations will occur under Category A conditions, then the AESO is required to file and obtain approval from the Commission for an "exception" under Section 15(2) of the *Transmission Regulation*. The AESO will notify market participants if and when the AESO determines it is necessary to apply to the Commission for approval of such an exception.

### **Pre-Connection Assessment**

The pre-connection assessment identified system performance issues. Under certain Category B conditions, voltage criteria, thermal criteria and transient stability criteria violations were observed. The following mitigation measures can be used to mitigate the pre-connection system performance issues:

- existing RAS 149;
- planned remedial action scheme (RAS) for 1034L contingency;
- planned RAS for 1035L contingency; and

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<sup>11</sup> The connection assessment is included as Appendix A.

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- planned RAS for 1074L contingency.<sup>12</sup>

### Post-Connection Assessment

All of the system performance issues identified in the pre-connection assessment were identified in the post-connection assessment. In addition, new system performance issues were observed under certain Category B conditions. The voltage and transient stability criteria violations were exacerbated in the post-connection assessment compared to the pre-connection assessment and new voltage and transient stability criteria violations were observed. The thermal criteria violation observed in the pre-connection assessment was not impacted post-connection.

The post-connection assessment indicates that the following mitigation measures can be used to manage the post-connection system performance issues:

- existing RAS 149;
- modifications to the planned RAS for 1034L contingency;
- modifications to the planned RAS for 1035L contingency;
- modifications to the planned RAS for 1074L contingency; and
- new RAS for 983L contingency.

**2.6 AESO Forecast and Transmission System Plans** – The AESO’s corporate forecast for the South Planning Region is consistent with the generation associated with the Proposed Transmission Development.<sup>13</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.

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<sup>12</sup> Planned RAS’s for 1034L, 1035L and 1074L contingencies are identified in the *Suncor Forty Mile Wind Project Whitla 251S Substation Connection NID*. These planned RASs may be required for either of the Suncor Forty Mile Wind Power Project 964L Connection or the Suncor Forty Mile Wind Power Project Whitla 251S substation Connection projects, depending on the actual energization timing of these projects, as well the energization timing of other planned generation projects in the area.

<sup>13</sup> The *AESO 2017 Long-term Outlook* provides forecasting information for the South Planning Region, which includes the Proposed Transmission Development area.

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Therefore, the need associated with the Proposed Transmission Development is consistent with the AESO's long-term plans for this region.

**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 the AESO's participant involvement program (PIP). Between October 2017 and November 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. This included a notification to market participants that may be affected by the Project. In November 2018, the AESO notified stakeholders of its intention to file this Application with the Commission. There are no 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. In addition, no concerns have been raised by the notified market participants.<sup>14</sup>

**2.9 Information Regarding AUC Rule 007, Section 6.2.2, NID23(3)** – The AESO has been advised that the TFO's Facility Proposal addresses the requirements of AUC Rule 007, Section 6.2.2, NID23(3).<sup>15</sup> In consideration of this 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 6.2.2, NID23(3).

**2.10 Confirmation Date** – In the event that the proposed facilities are not in service by June 1, 2020, which is the scheduled in-service date of the Project, the AESO will inform the Commission in writing if the need to expand or enhance the transmission

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<sup>14</sup> Further information regarding the AESO's PIP for this Application is included in Appendix C.

<sup>15</sup> Please refer to the letter included as Appendix D of this Application.

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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. In addition, in the event that the AESO believes that the in-service date will not be met, and such delay will have a material impact on this Application, the AESO will advise the Commission of the same.

The AESO has been advised that the TFO's Facility Proposal addresses the requirements of AUC Rule 007, Section 6.2.2, NID25(2).<sup>16</sup> In consideration of this fact, and as the filing of this Application is combined with the TFO's Facility Proposal, the AESO has not included an implementation schedule of the sort contemplated in AUC Rule 007, Section 6.2.2, NID25(2).

### **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 market participant's request for system access service;
- the AESO's connection assessment;
- the TFO's cost estimate 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>16</sup> *Ibid.*

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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 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.<sup>17</sup> 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 *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 each, 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 market participant'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>17</sup> The AESO understands that the TFO intends to file a Facility Proposal relating to this Application to be titled *Suncor Granlea Connection 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 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 1, 2020, which is the scheduled in-service date of the Project, 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 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, by means of the following transmission development:

- A. The addition of one 240 kV circuit to connect the Facility to the existing 240 kV transmission line 964L using a T-Tap configuration; and
- B. 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 6<sup>th</sup> day of December, 2018.

Alberta Electric System Operator

*"Electronically Submitted by"*

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Robert Davidson, P.Eng.  
Director, Transmission Connection Projects

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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 – Suncor Forty Mile Wind Power Project 964L Connection* that assesses the transmission system performance prior to and following the connection of the Proposed Transmission Development. As part of the AESO Connection Process, the market participant 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 on the transmission system.

**APPENDIX B**      **Capital Cost Estimate** – Appendix B contains a detailed cost estimate corresponding to the Proposed Transmission Development. This estimate has 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, 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**      **TFO Information Regarding AUC Rule 007, Section 6.2.2, NID23(3) and NID25(2)** – Appendix D contains a letter provided by the TFO confirming that the requirements of AUC Rule 007, NID23(3) and NID25(2) will be addressed within the TFO’s Facility Proposal.

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### 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.<sup>18</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 [Forty Mile Granlea Wind GP Inc. 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/><sup>19</sup>  
  
In addition, the AESO’s *Transmission Planning Criteria – Basis and Assumptions* is included in Appendix A.
- 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>20</sup>

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<sup>18</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>19</sup> This link is provided for ease of reference and does not form part of this Application.

<sup>20</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 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. **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*.