



**Alberta Utilities Commission  
In the Matter of the Need for the  
Stirling Wind Project 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  
Stirling Wind Project 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 *Stirling Wind Project Connection Needs Identification Document* (Application).

**1.2 Application Overview** – Stirling Wind Project LP by its General Partner, Stirling Wind Project Ltd., (SWLP), has requested system access service to connect the proposed Stirling Wind Project<sup>2</sup> (the Facility) to be located in the Village of Stirling area (AESO Planning Area 55, Glenwood and AESO Planning Area 54, Lethbridge). The Facility has an expected commercial operation date of September 30, 2019. SWLP's request includes a new Rate STS, *Supply Transmission Service*, contract capacity of 113 MW and a new Rate DTS, *Demand Transmission Service*, contract capacity of 1 MW in the Village of Stirling area. SWLP's request can be met by adding one 138 kV circuit to connect the Facility to the existing 138 kV transmission line 820L (the "Proposed Transmission Development", as further described in Section 2.2). The scheduled in-service date for the Proposed Transmission Development is July 1, 2019.

This Application describes the need to respond to SWLP'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, in this case SWLP, to exchange electric energy and ancillary services. The Proposed Transmission Development is consistent with the AESO's long-

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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> SWLP submitted an application for the proposed Facility to the Commission, which was registered on April 7, 2017, in Application 22546-X0001 and Proceeding No. 22546.

<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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term plans for the South Planning Region, which includes the Village of Stirling 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 directions to assist the AESO in preparing this Application.<sup>6</sup>

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

SWLP 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. SWLP has made the appropriate applications to the AESO to obtain transmission system access service. The AESO, in collaboration with SWLP and the TFO, has determined that the Proposed Transmission Development is the preferred option to meet SWLP’s request for system access service.

Through the AESO Connection Process, the AESO, SWLP, and the TFO 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 the TFO to prepare a transmission facility proposal<sup>7</sup> (Facility Proposal) to meet SWLP’s request.

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

1. Add one 138 kV transmission line to connect the Facility to the existing 138 kV transmission line 820L using a T-tap configuration;<sup>8,9</sup>

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

<sup>8</sup> The TFO preferred route for the 138 kV transmission line will have an estimated length of approximately 5 kilometres. This is subject to change as routing and/or siting is finalized by the TFO.

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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>10</sup>

**2.3 Proposed Transmission Development Cost Estimate** – 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 \$10 million.<sup>11</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 SWLP and the TFO, examined six other transmission alternatives to respond to SWLP’s request for system access service:

1. **Radial connection to the Stirling 67S substation** – This alternative involves connecting the Facility to the existing Stirling 67S substation in a radial configuration. This alternative would require the addition of a new 138 kV circuit, approximately 15 km in length and the addition of a 138 kV circuit breaker and associated equipment at the Stirling 67S substation.

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<sup>9</sup> The 138 kV transmission line will connect to SWLP’s proposed Red Coat 967S substation, which is part of the Facility.

<sup>10</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 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. 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>11</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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- 2. In-and-out connection to the 138 kV transmission line 820L** – This alternative involves connecting the Facility to the 138 kV transmission line 820L (between the Stirling 67S substation and the Chin Chute 315S tap point) using an in-and-out configuration. This would require the addition of two 138 kV circuits, each approximately 5 to 7 km in length, and the addition of a new switching station with a minimum of three 138 kV circuit breakers.
- 3. Radial connection to Chin Chute 315S substation** – This alternative involves connecting the Facility to the existing Chin Chute 315S substation. This alternative would require the addition of a new 138 kV circuit, approximately 15 km in length, and the addition of one 138 kV circuit breaker and associated equipment at the Chin Chute 315S substation.
- 4. Radial connection to Hillridge 139S substation** – This alternative involves connecting the Facility to the existing Hillridge 139S substation. This alternative would require the addition of a new 138 kV circuit, approximately 18 km in length, and the addition of one 138 kV circuit breaker and associated equipment at the Hillridge 139S substation.
- 5. In-and-out connection to the 240 kV Montana-Alberta intertie** – This alternative involves connecting the Facility to the 240 kV Montana-Alberta intertie using an in-and-out configuration. This alternative would require the addition of one 240 kV circuit, approximately 10 km in length, and the addition of a new switching station with a minimum of three 240 kV circuit breakers.
- 6. Radial connection to Picture Butte 120S substation** – This alternative involves connecting the Facility to the existing Picture Butte 120S substation in a radial configuration. This alternative would require the addition of a new 138 kV circuit, approximately 45 km in length, and the addition of a 138/240 kV transformer and associated equipment at the Picture Butte 120S substation.

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All six 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 of the cost estimates and 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 transmission system.<sup>12</sup> Power flow, transient stability and short-circuit studies were conducted prior to and following connection of the Project.

The pre-connection assessment identified system performance issues. Under certain Category B conditions, thermal criteria violations and voltage range criteria violations were observed. Real-time operational practices and a planned remedial action scheme (RAS) can be used to mitigate the pre-connection system performance issues. The planned RAS includes a modification of the existing RAS 36, which will be included as part of the AESO's planned connection of the proposed Old Elm Wind Farm<sup>13</sup>; hereafter referred to as “planned RAS 36”.

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 and new thermal criteria violations were observed.

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<sup>12</sup> The connection assessment is included as Appendix A.

<sup>13</sup> The specifics of planned RAS 36 are outside the scope of the Project, and will be included in a separate Needs Identification Document application for the connection of the proposed Old Elm Wind Farm, to be filed with the Alberta Utilities Commission at a later date.

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The post-connection assessment indicates that two proposed new RASs are required to mitigate the observed new and exacerbated thermal criteria violations. A new RAS, hereafter referred to as “new 172L RAS”, is required to mitigate thermal criteria violations on the 138 kV transmission line 172L and the 240 kV transmission line 1036L under certain Category B conditions. If necessary, real time operational practices can be used to manage thermal criteria violations on the 138 kV transmission line 172L or the 240 kV transmission line 1036L, after the new 172L RAS action. The thermal criteria violations observed on the 138 kV transmission line 820L can be mitigated by a new RAS, referred to as the “new 820L RAS”. Post-connection, planned RAS 36 can be used to mitigate various Reliability Criteria violations, and can be used to mitigate thermal criteria violations in combination with the new 820L RAS, when necessary. The thermal criteria violations observed on the 138 kV transmission line 725AL can be mitigated by either the new 820L RAS, the new 172L RAS or real time operational practices.

**2.6 AESO Forecast and Transmission System Plans** – The AESO’s corporate forecast for the South Planning Region is consistent with the generation and load associated with the Proposed Transmission Development.<sup>14</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** – 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 the TFO to assist the AESO in conducting a participant involvement program (PIP). Between April

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<sup>14</sup> The *AESO 2017 Long-term Outlook* discusses the South Planning Region, which includes the Proposed Transmission Development area.



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2017 and October 2017, 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 2017, the AESO notified stakeholders of its intention to file this Application with the Commission. One Stakeholder raised a question about the AESO's plans for future development in the area, which the AESO has addressed. No concerns or objections 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>15</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>16</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 January 1, 2020, which is six months following the scheduled in-service date of July 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>17</sup>

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<sup>15</sup> Further information regarding the AESO's PIP for this Application is included in Appendix C.

<sup>16</sup> Please refer to the letter included as Appendix D of this Application.

<sup>17</sup> A detailed project schedule, which includes potential limitations or constraints as contemplated in AUC Rule 007, NID25(2), can be found in the TFO's Facility Proposal.

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**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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**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>18</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 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 SWLP'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>18</sup> The AESO understands that the TFO intends to file a Facility Proposal relating to this Application to be titled *Stirling Wind Project Connection*.

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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 January 1, 2020, which is six months following the scheduled in-service date of July 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 one 138 kV transmission line to connect the Facility to the existing 138 kV transmission line 820L 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 5<sup>th</sup> day of December 2017.

Alberta Electric System Operator

"Electronically Submitted"

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Kelly Yagelniski  
Director, Transmission Program Support

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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 - Stirling Wind Project 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, SWLP 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 the TFO 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 TFO Information Regarding AUC Rule 007, Section 6.2.2, NID23(3)** – Appendix D contains a letter provided by the TFO confirming that the requirements of AUC Rule 007, NID23(3) 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>19</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 [SWLP 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>20</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 as an attachment to 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>21</sup>

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<sup>19</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>20</sup> This link is provided for ease of reference and does not form part of this Application.

<sup>21</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 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*.