

In the Matter of the Need for the Forty Mile Wind Power Plant 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*

Application of the Alberta Electric System Operator for Approval of the
Forty Mile Wind Power Plant Connection
Needs Identification Document

Date: June 29, 2022

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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,¹ the Alberta Electric System Operator (AESO) applies to the Alberta Utilities Commission (Commission) for approval of the *Forty Mile Wind Power Plant Connection Needs Identification Document* (Application). This application is submitted in accordance with AUC Rule 007, Section 7.1.2, *Abbreviated needs identification document application information requirements*.

1.2 Application Overview – The market participant, RES Forty Mile Wind LP (RES), a fully owned subsidiary of Renewable Energy Systems Canada Inc., has requested system access service to connect its approved Forty Mile Wind Power Plant² (the Facility) to the transmission system in the Medicine Hat area (AESO Planning Area 4). The Facility includes the approved Forty Mile 516S substation. RES expects the Facility to be commercially operational by August 2024.

The RES request includes a new Rate STS, *Supply Transmission Service*, contract capacity of 266 MW and a new Rate DTS, *Demand Transmission Service*, contract capacity of 2 MW. The RES request also indicated its intention to submit a proposal to construct and to temporarily operate some transmission facilities, as contemplated in Section 24.31 of the *Transmission Regulation* (TReg). The RES request can be met by adding one 240 kilovolt (kV) substation, to be designated as Murray Lake 326S substation, including three 240 kV circuit breakers to connect to the existing 240 kV transmission line 964L using an in-and-out configuration and connecting the Facility to the proposed Murray Lake 326S substation (the Proposed Transmission Development,

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 (AUC Rule 007).

² Decision 22966-D01-2018: BHEC-RES Alberta G.P. Inc. – *Forty Mile Wind Power Project*, Proceeding 22966, Applications 22966-A001, August 30, 2018.

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as further described in Section 2.2). The scheduled in-service date for the Proposed Transmission Development is September 1, 2023.

This Application describes the need to respond to the RES request for system access service, and the AESO's determination of the manner in which to respond to the request. Having followed the AESO Connection Process,³ the AESO has determined that the Proposed Transmission Development provides a reasonable opportunity for RES 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 Medicine Hat area. The AESO submits this Application to the Commission for approval in accordance with the AESO's responsibility to respond to requests for system access service and having determined that transmission development is required and is in the public interest.^{4,5}

1.3 Market Participant Proposal – RES submitted a proposal to the AESO, pursuant to Section 24.31 of the TReg (Market Participant Proposal), for the construction and temporary operation of a transmission facility, specifically the Proposed RES Development defined in Section 2.2 below.

A completed Market Participant Proposal was submitted by RES on June 28, 2022. Subsequently, on June 28, 2022, the AESO conditionally approved the Market Participant Proposal pursuant to Section 36 of the Act, and in accordance with Section 35(1)(b) of the Act, specified the time within which RES was to submit, for Commission approval under the *Hydro and Electric Energy Act* (HEEA), a transmission facility proposal⁶ (Facility Proposal) for the Proposed RES Development.

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

⁴ For information purposes, some of the legislative provisions relating to the AESO's planning duties and duty to provide system access service are referenced in notes i and ii of Part C of this Application.

⁵ Note v of Part C of this Application describes the Application scope in more detail.

⁶ Also referred to as facility application under AUC Rule 007.

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1.4 AESO Directions to the TFO – During the AESO Connection Process, the AESO issued various directions to the legal owner of transmission facility (TFO), in this case, AltaLink Management Ltd. (AltaLink), in its capacity as general partner of AltaLink L.P., including a direction to submit, for Commission approval under the HEEA, a Facility Proposal for the Proposed AltaLink Development, as defined in Section 2.2.⁷

⁷ 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 AESO, in consultation with RES and AltaLink, has determined that the Proposed Transmission Development is the preferred option to provide RES with a reasonable opportunity to exchange electric energy and ancillary services. In accordance with Section 34 of the Act, the AESO has determined that the Proposed Transmission Development will result in an expansion or enhancement of the transmission system thereby establishing the need for this Application. RES has made the appropriate applications to the AESO to obtain transmission system access service.

Through the AESO Connection Process, the AESO, in consultation with RES and AltaLink, has determined the Proposed Transmission Development and has assessed the impacts that the Proposed Transmission Development and the associated generation would have on the Alberta interconnected electric system.

2.2 Proposed Transmission Development – The Proposed Transmission Development involves connecting the Facility to the transmission system, and consists of:⁸

- A. The Proposed RES Development, which includes transmission facilities that, as contemplated by Section 24.31 of the TReg, will be constructed by RES,

⁸ 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 RES Facility Proposal and AltaLink's Facility Proposal. Also, further details will be determined as detailed engineering progresses and RES' operating requirements are finalized. Routing and/or siting of transmission facilities do not form part of this Application and are addressed in the RES Facility Proposal and AltaLink'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. RES facilities that may subsequently be connected to the Proposed Transmission Development are the responsibility of RES and are not included in the Application.

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and, thereafter, jointly operated by RES and the TFO for a temporary period of time specified in the Market Participant Proposal;⁹ and

B. The Proposed AltaLink Development.

The scope of the Proposed RES Development and the Proposed AltaLink Development is described further below and shown in Figure 2-1.

A. The Proposed RES Development:

1. Add one 240 kV circuit, approximately 21 kilometers in length, with a minimum capacity no less than 487 MVA, to connect the Facility to the proposed Murray Lake 326S substation;¹⁰ and
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.

B. The Proposed AltaLink Development:

1. Add one 240 kV substation, to be designated Murray Lake 326S, including three 240 kV circuit breakers, and connect the substation to the existing 240 kV transmission line 964L (between the Bowmanton 244S substation and Granlea T-tap) using an in-and-out configuration; and
2. Modify, alter, add or remove equipment, including switchgear, and any operational, protection, control and telecommunication devices required to

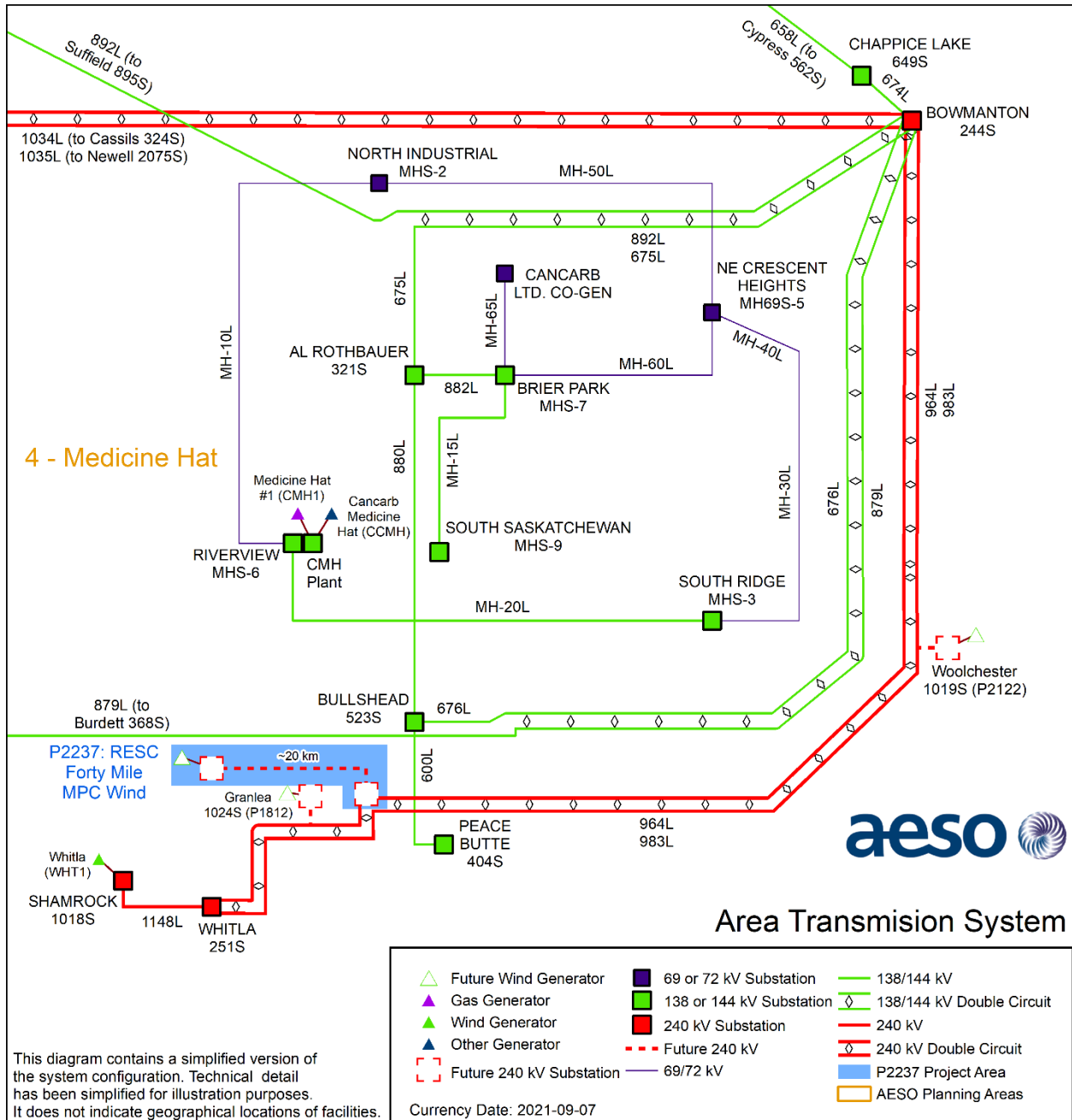
⁹ Where the AESO approves a proposal per section 24.31(7) of the TReg, RES and the incumbent TFO must, (a) before applying for any permit, licence or approval under the HEEA to construct or operate the transmission facility, enter into a written agreement under which ownership of the transmission facility will transfer from RES to the incumbent TFO on the expiry of the temporary period referred to in subsection (3)(c) of the TReg.

¹⁰ The 240 kV circuit will connect to the RES approved Forty Mile 516S substation, which is part of the Facility. RES has estimated that the 240 kV circuit will have a length of approximately 21 kilometers. This is subject to change as routing and/or siting is finalized by RES.

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undertake the work as planned and ensure proper integration with the transmission system.

Figure 2-1: Proposed Transmission Development



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2.3 Proposed Transmission Development Cost Estimate – RES has prepared a cost estimate for the Proposed RES Development, described in Section 2.2. The AESO also directed AltaLink to prepare a cost estimate for the Proposed AltaLink Development described in Section 2.2.

RES has estimated the cost of the Proposed RES Development to be approximately \$12 million.¹¹ AltaLink has estimated the cost of the Proposed AltaLink Development to be approximately \$13 million.¹²

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 RES and AltaLink, examined four other transmission development alternatives to respond to the RES request for system access service:

1. **Radial 240 kV Connection to Whitle 251S substation** – This alternative involves connecting the Facility to the existing Whitle 251S substation using a radial 240 kV configuration. This alternative requires the addition of one 240 kV circuit, approximately 26 kilometers in length.

This alternative is similar in scope to the Proposed Transmission Development, and therefore is expected to have similar cost; however, this alternative was ruled out as it had fewer technical benefits when compared to the Proposed Transmission Development. Specifically, the Proposed Transmission Development provides greater capacity for future T-tap connections, improves

¹¹ The cost is in nominal dollars using a base year of 2023 with escalation considered. Further details of this cost estimate, which has an accuracy level of +30%/-20%, can be found in Appendix B.

¹² The cost is in nominal dollars using a base year of 2023 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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the reliability of existing connections and minimizes generation losses, when compared to a radial connection to Whitla 251S substation.

2. **T-tap Connection to 240 kV Transmission Line 983L** – This alternative involves connecting the Facility to the existing 240 kV transmission line 983L using a T-tap configuration. This alternative would require the addition of one 240 kV circuit, approximately 20 kilometers in length.

This alternative was ruled out as the total capacity of the Project combined with other approved projects connecting to transmission line 983L using a T-tap configuration would exceed the current Most Severe Single Contingency (MSCC) limit of 466 MW.

3. **T-tap Connection to 240 kV Transmission Line 964L** – This alternative involves connecting the Facility to the existing 240 kV transmission line 964L using a T-tap configuration. This alternative would require the addition of one 240 kV circuit, approximately 20 kilometers in length.

This alternative was ruled as to the total capacity of the Project combined with other approved projects connecting to transmission line 964L using a T-tap configuration would exceed the current MSCC limit of 466 MW.

4. **In-and-Out Connection to 240 kV Transmission Line 964L (between the Whitla 251S substation and Granlea T-tap)** – This alternative involves connecting the Facility to the existing 240 kV transmission line 964L (between the Whitla 251S substation and Granlea T-tap) using an in-and-out configuration. This alternative would require the addition of a switching station, including three 240 kV circuit breakers and the addition of one 240 kV circuit, approximately 20 kilometers in length.

This alternative is similar in scope to the Proposed Transmission Development, and therefore is expected to have similar cost; however, this alternative was

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ruled out as it had fewer technical benefits when compared to the Proposed Transmission Development. Specifically, the Proposed Transmission Development provides greater capacity for future T-tap connections, improves the reliability of existing connections and minimizes generation losses, when compared to an in-and-out connection to the 240 kV transmission line 964L (between the Whitla 251S substation and Granlea T-tap).

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 would have on the transmission system. Power flow, transient stability and short-circuit studies were conducted prior to and following the connection of the Proposed Transmission Development.¹³

The pre-connection assessment identified some system performance issues. Under certain Category B conditions, thermal criteria and transient stability violations were observed. Real time operational practices and the existing remedial action scheme (RAS) 164 can be used to mitigate the pre-connection system performance issues.

All of the system performance issues identified in the pre-connection assessment were also identified in the post-connection assessment, and new system performance issues were observed. A new low voltage range violation was observed under the Category A condition in the post-connection assessment. Under certain Category B conditions, the previously observed transient stability violations were exacerbated and new voltage and transient stability criteria violations were observed. The thermal criteria violations

¹³ The connection assessment is included as Appendix A.

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observed under Category B conditions were unchanged in the post-connection assessment.

Real-time operational practices, including generation curtailment, and modification to the existing RAS 164 can be used to mitigate the post-connection system performance issues. Modification of RAS 164 could result in post-contingency generation curtailment by RAS in excess of the AESO's MSCC limit of 466 MW. Therefore, pre-contingency generation curtailment under the Category A condition may be required using real-time operational practices to prevent generation curtailment above the MSSC limit during Category B conditions.

Should Category A system performance issues materialize, the AESO will use operational procedures or other mitigation measures, to reduce the system performance issues to acceptable levels, which may include the application of Section 302.1 of the ISO rules, *Real Time Transmission Constraint Management* (TCM Rule) to dispatch down effective generation. If the AESO determines in the future that congestion is reasonably anticipated to arise, the AESO will make an application to the Commission to obtain approval for an exception under Section 15(2) of the *Transmission Regulation* and include the AESO's mitigation plan within the application. The AESO will notify market participants if and when the AESO determines that it is necessary to apply to the Commission for approval of such an exception.

2.6 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.

2.7 AESO Participant Involvement Program – The AESO directed AltaLink to assist the AESO in conducting the AESO's participant involvement program (PIP). The AESO also required RES to assist the AESO in conducting the AESO's PIP as a condition to the AESO's approval of the Market Participant Proposal.

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Between January and May 2022, AltaLink, RES 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 Proposed Transmission Development. The AESO has responded to the questions and concerns raised by one of the notified market participants. No other questions or concerns have been raised by the other notified market participants.

Apart from the inquiry described above, 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 June 2022, the AESO notified stakeholders of its intention to file this Application with the Commission.¹⁴

2.8 Environmental and Land Use Effects – AltaLink and RES have advised that the Proposed AltaLink Development and the Proposed RES Development are not expected to result in significant environmental effects.

2.9 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 RES request for system access service and the AESO's assessment thereof;
- the AESO's connection assessment;
- the cost estimates for the Proposed AltaLink Development and the Proposed RES Development;
- confirmation from AltaLink and RES that no significant environmental effects are expected;

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

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- 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 RES 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 Proposals for Consideration in a Single Process

3.1 Pursuant to Subsection 35(1) of the Act, the AESO has directed AltaLink to prepare a Facility Proposal corresponding with this Application. Pursuant to Section 36 of the Act, the AESO has conditionally approved the Market Participant Proposal.

The AESO understands that the AltaLink and RES Facility Proposals will be filed shortly.¹⁵ The AESO requests, and expects AltaLink and RES will request, that this Application be combined with the Facility Proposals 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 7.1 of AUC Rule 007.

3.2 While it is believed that this Application and the Facility Proposals 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 RES request for system access service and provide a preliminary description of the manner proposed to meet that need, having regard for the AESO's determination that the Proposed Transmission Development is required to provide RES with a reasonable opportunity to exchange electric energy and ancillary services. In contrast, the Facility Proposals will contain more detailed engineering and designs for the Proposed Transmission Development and seek approval for the construction and operation of specific facilities.

¹⁵ The AESO understands that AltaLink intends to file a Facility Proposal relating to this Application to be titled *RES Forty Mile Wind Power Connection Project – Murray Lake Switching Station*. The AESO understands that RES intends to file a Facility Proposal relating to this Application to be titled *Forty Mile Wind Power Connection Project*.

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4 Relief Requested

4.1 The AESO submits that its assessment of the need to meet the RES request for system access service is technically complete and that approval is in the public interest.

4.2 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 RES request for system access service, and to connect the Facility to the transmission system, by means of the following transmission development:

- A. Add the Murray Lake 326S substation, including three 240 kV circuit breakers, and connect the Murray Lake 326S substation to the existing 240 kV transmission line 964L using an in-and-out configuration;
- B. Add one 240 kV circuit to connect the Facility to the Murray Lake 326S substation;
and
- C. Modify, alter, add or remove equipment, including switchgear, and any operational, protection, control and telecommunication devices required to undertake the work as planned and ensure proper integration with the transmission system.

All of which is respectfully submitted this 29th day of June, 2022.

Alberta Electric System Operator

“Electronically Submitted by”

Amir Motamedi, P.Eng.
Director, Customer Grid Access

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 – P2237 Forty Mile Wind Power Plant 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 AESO defined the study scope, and provided the system models and study assumptions to RES who engaged a consultant to conduct the connection assessment studies. The AESO reviewed the results of the connection assessment studies prepared by the consultant, and found the results acceptable for the purposes of assessing the impacts of the Proposed Transmission Development on the transmission system.

APPENDIX B **Capital Cost Estimates** – Appendix B contains detailed cost estimates corresponding to the Proposed Transmission Development. These estimates have been prepared by AltaLink and RES. An estimate for the Proposed AltaLink Development was prepared by AltaLink, to an accuracy level of +20%/-10% which exceeds the accuracy required by AUC Rule 007, Section 7.1.2, NID 11. An estimate for the Proposed RES Development was prepared by RES, to an accuracy level of +30%/-20% which meets the accuracy required by AUC Rule 007, Section 7.1.2, NID 11.

APPENDIX C **AESO PIP** – Appendix C contains a summary of the PIP activities conducted, in accordance with requirements of NID12 and Appendix A2 of AUC Rule 007, regarding the need to respond to the RES request for system access service. Copies of the relevant materials distributed during the PIP are attached for reference.

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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.¹⁶ 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, RES (refer to note ii below) is requesting system access service, and the AESO has determined that 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 [RES Forty Mile Wind LP, a fully owned subsidiary of Renewables Energy Systems Canada Inc. in this case] wishing to exchange electric energy and ancillary services a reasonable opportunity to do so.”
- iii. **AESO Transmission 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 on the AESO website.

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 on the AESO website.

¹⁶ 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.

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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* and the AESO’s determination of the manner in which to respond to the request. 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 AltaLink, in its capacity as a legal owner of transmission facilities, 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 AltaLink, pursuant to Section 39 of the Act and Section 14 of the *Transmission Regulation*, to assist in the preparation of the AESO’s Application. AltaLink 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*.