

In the Matter of the Need for the Alderson Solar Power 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*

Application of the Alberta Electric System Operator for Approval of the
Alderson Solar Power Project Connection
Needs Identification Document

Date: November 16, 2023

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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 *Alderson Solar Power Project 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, hep Canada SPV 1 Ltd. (market participant), has requested system access service to connect its proposed Alderson Solar Power Project (the Facility) to the transmission system in the Vauxhall area (AESO Planning Area 52). The Facility includes the proposed Alderson Park 1061S substation. The market participant expects the Facility to be commercially operational by December, 2025.

The market participant's request includes a new Rate STS, *Supply Transmission Service*, contract capacity of 100 MW and a new Rate DTS, *Demand Transmission Service*, contract capacity of 0.5 MW. The market participant's request can be met by adding one 138 kilovolt (kV) circuit to connect the Facility to the existing 138 kV transmission line 100L using a T-tap configuration and increasing the minimum rating of the 138 kV transmission line 100L to 120 MVA, between the T-tap point and the Tilley 498S substation (the Proposed Transmission Development, as further described in Section 2.2). The scheduled in-service date for the Proposed Transmission Development is December 2, 2024.

This Application describes the need to respond to the market participant's request for system access service, and the AESO's determination of the manner in which to

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).

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respond to the request. Having followed the AESO Connection Process,² 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 Vauxhall 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.^{3,4}

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

A completed Market Participant Proposal was submitted by the market participant on September 18, 2023. Subsequently, on November 9, 2023, the AESO conditionally approved the Market Participant Proposal pursuant to Section 36(1) of the Act, and in accordance with Section 36(2) of the Act, specified the time within which the market participant was to submit, for Commission approval under the *Hydro and Electric Energy Act* (HEEA), a transmission facility proposal⁵ (Facility Proposal) for the Proposed Market Participant Development.

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., in its capacity as general partner of AltaLink L.P. (AltaLink),

² For information purposes, refer to note iv of Part C of this Application for more information on the AESO Connection Process.

³ For information purposes, some of the legislative provisions relating to the AESO's planning duties and duty to provide system access service are referenced in notes i and ii of Part C of this Application.

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

⁵ Also referred to as facility application under AUC Rule 007.

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including a direction to submit, for Commission approval under the HEEA, a Facility Proposal⁶ for the Proposed Transmission Development, as defined in Section 2.2.⁷

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

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 the market participant and AltaLink, has determined that the Proposed Transmission Development is the preferred option to provide the market participant 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 capability of the transmission system thereby establishing the need for this Application. The market participant has made the appropriate applications to the AESO to obtain transmission system access service.

Through the AESO Connection Process, the AESO, in consultation with the market participant 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 Market Participant Development, which includes transmission facilities that, as contemplated by Section 24.31 of the TReg, will be constructed by the market participant, and, thereafter, jointly operated by the

⁸ Details and configuration of equipment required for the Proposed Transmission Development are more specifically described in the AESO's Functional Specification included in the market participant 's Facility Proposal and AltaLink'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 market participant 's 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. The market participant's 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.

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market participant and AltaLink for a temporary period of time specified in the Market Participant Proposal;⁹ and

B. The Proposed AltaLink Development (as defined below).

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

A. The Proposed Market Participant Development:

1. Add one 138 kV circuit, approximately 4 kilometers in length, with a minimum rating of 112 MVA, to connect the Facility to the existing 138 kV transmission line 100L;¹⁰ using a T-tap configuration;
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. Increase the rating of the 138 kV transmission line 100L between the Facility T-tap point and the existing Tilley 498S substation,¹¹ to a minimum rating of 120 MVA, 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.

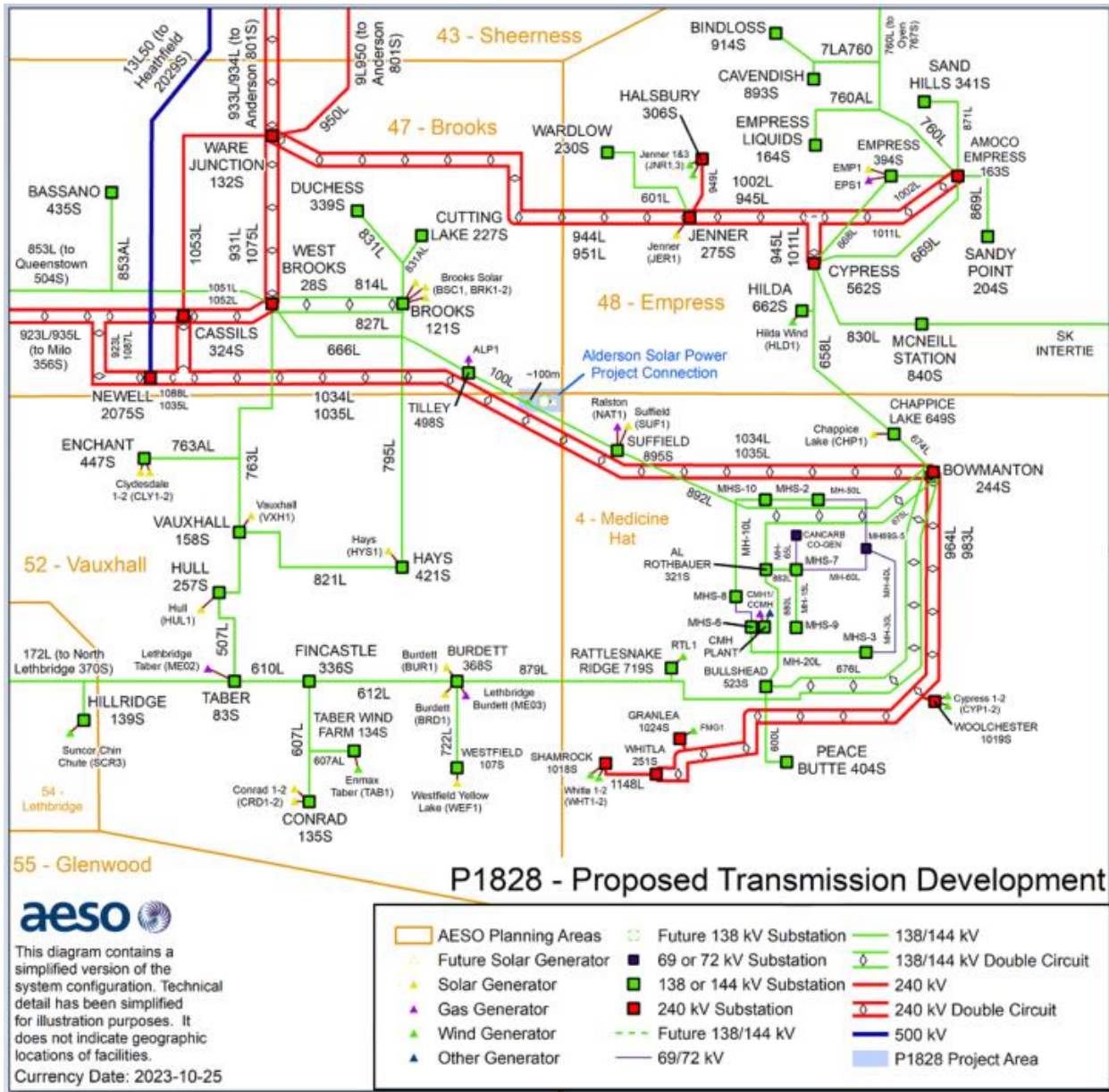
⁹ Where the AESO approves a proposal per section 24.31(7) of the TReg, the market participant and the incumbent TFO must, (a) before applying for any permit, licence or approval under the HEEA to construct or operate the transmission facility, enter into a written agreement under which ownership of the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

¹⁰ The 138 kV circuit will connect to the market participant's proposed Alderson Park 1061S substation, which is part of the Facility. Through its detailed routing and siting activities the market participant has estimated that the 138 kV circuit will have a length of approximately 4 kilometers. This is subject to change as routing and/or siting is finalized by the market participant.

¹¹ Actual line length to be determined by AltaLink.

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Figure 2-1: Proposed Transmission Development



2.3 Proposed Transmission Development Cost Estimate – the market participant has prepared a cost estimate for the Proposed Market Participant 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.

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The market participant has requested that the AESO not include the cost for the Proposed Market Participant Development in this application as the information is considered confidential and commercially sensitive. AltaLink has estimated the cost of the Proposed AltaLink Development to be approximately \$5.5 million.¹²

In accordance with the ISO tariff, the AESO has determined all costs associated with the Proposed Market Participant Development will be classified as participant-related. In accordance with the ISO tariff, the AESO has determined that approximately \$4.8 million of the cost associated with the Proposed AltaLink Development will be classified as participant-related. Approximately \$0.7 million of the cost associated with the Proposed AltaLink Development, will be classified as system-related.¹³

2.4 Transmission Development Alternatives – In addition to the Proposed Transmission Development, the AESO, in consultation with the market participant and AltaLink, examined four other transmission development alternatives to respond to the market participant’s request for system access service:

1. **In-and-Out Connection to the 240 kV Transmission Line 1034L** – This alternative involves connecting the Facility to the existing 240 kV transmission line 1034L using an in-and-out configuration. This alternative requires adding a substation, including three 240 kV circuit breakers, and one 240 kV circuit, approximately 3 kilometers in length.
2. **In-and-Out Connection to the 240 kV Transmission Line 1035L** – This alternative involves connecting the Facility to the existing 240 kV transmission line 1035L using an in-and-out configuration. This alternative requires adding a substation, including three 240 kV circuit breakers, and one 240 kV circuit,

¹² The cost is in nominal dollars using a base year of 2024 with escalation considered. Further details of this cost estimate, which has an accuracy level of +20%/-10%, can be found in Appendix B.

¹³ This cost is related to increasing the rating of the 138 kV transmission line 100L between the Facility T-tap point and the existing Tilley 498S substation, to a minimum rating of 120 MVA.

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approximately 3 kilometers in length, which would cross 240 kV transmission line 1034L.

3. **T-tap Connection to the 240 kV Transmission Line 1034L** – This alternative involves connecting the Facility to 240 kV transmission line 1034L using a T-tap configuration. This alternative requires adding one 240 kV circuit, approximately 3 kilometers in length.
4. **T-tap Connection to the 240 kV Transmission Line 1035L** – This alternative involves connecting the Facility to 240 kV transmission line 1035L using a T-tap configuration. This alternative requires adding one 240 kV circuit, approximately 3 kilometers in length, which would cross 240 kV transmission line 1034L.

All of the alternatives above involve 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 estimate 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 and short-circuit studies were conducted prior to and following the connection of the Proposed Transmission Development. Transient stability studies were conducted following the connection of the Proposed Transmission Development.¹⁴

Pre-Connection Assessment Results

The pre-connection assessment identified system performance issues under Category A and Category B conditions. Category A thermal criteria violations were observed on the 138 kV transmission lines 610L, 612L, 172L, and 760L, and 240 kV transmission

¹⁴ The connection assessment is included as Appendix A.

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lines 924L and 927L. These pre-connection Category A thermal criteria violations are expected to arise following the connection of additional generation projects in the Study Area, with the exception of 610L where congestion is presently occurring in real-time.¹⁵ Thermal criteria violations were also observed under certain Category B conditions in the pre-connection assessment.

Post-Connection Assessment Results

All of the system performance issues identified in the pre-connection assessment were also identified in the post-connection assessment, and additional system performance issues were observed. A new thermal criteria violation on the 138 kV transmission line 100L was observed under the Category A condition in the post-connection assessment. The Category A thermal criteria violations observed on the 138 kV transmission lines 610L, 612L, 172L, and 760L, and 240 kV transmission lines 924L and 927L were exacerbated following the connection of the Proposed Transmission Development.

All of the thermal criteria violations observed in the pre-connection assessment under Category B conditions were also identified in the post-connection assessment, and new Category B thermal criteria violations were observed. Most of the thermal criteria violations observed under Category B conditions in the pre-connection assessment were exacerbated in the post-connection assessment.

Post-Connection Mitigation Measures

The Category A thermal criteria violation observed on 138 kV transmission line 100L will be addressed by increasing the line rating on the section of 100L between the Facility T-tap point and the Tilley 498S substation to a minimum rating of 120 MVA. The thermal criteria violations observed under the Category A condition on the 240 kV transmission lines 924L and 927L and 138 kV transmission lines 612L, 172L, and 760L can be managed by applying Section 302.1 of the ISO rules, *Real-Time Transmission*

¹⁵ Decision 27776-D01-2023, Alberta Electric System Operator, Needs Identification Document Application, Vauxhall Area Transmission Development and Section 15(2) Application, September 19, 2023. Approval 27776-D02-2023, Appendix 1 to Decision 27776-D01-2023.

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Constraint Management (TCM Rule) to curtail generation as required until such a time that system developments or operational measures are in place to alleviate congestion.

The approved Vauxhall Area Transmission Development,¹⁶ will address congestion on transmission line 610L and is expected to be fully energized by Q3 2024. The Alberta Utilities Commission also approved, pursuant to Section 15(2) of the TReg, a specific and limited exception to the matters described in Section 15(1)(f) of the TReg, thereby allowing for congestion to occur on 610L, until the Vauxhall Area Transmission Development Project is energized.¹⁷

The AESO will continue to monitor the pace of generation development and will notify market participants if it determines that it is necessary to obtain approval for a Section 15(2) exception for 924L, 927L, 612L, 172L and 760L.

Real-time operational practices, and the use of existing RASs 164, 175, and 181, planned RAS 197, and new RAS 209 can be used to mitigate the post-connection system performance issues observed under certain Category B conditions.

2.6 Transmission Dependencies – The Proposed Transmission Development does not require the completion of any other AESO plans to expand or enhance the capability of 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 the market participant to assist the AESO in conducting the AESO’s PIP as a condition to the AESO’s approval of the Market Participant Proposal.

Between February 2023 and November 2023, AltaLink, the market participant 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

¹⁶ *Ibid.*

¹⁷ Commission Decision 27776-D01-2023, Alberta Electric System Operator, Needs Identification Document Application, Vauxhall Area Transmission Development and Section 15(2) Application, September 19, 2023. Approval 27776-D02-2023, Appendix 1 to Decision 27776-D01-2023.

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included a notification to market participants that may be affected by the Proposed Transmission Development. The AESO has responded to questions and concerns raised by two of the notified market participants. No other questions or concerns have been raised by the other notified market participants.

Apart from the two inquiries 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 November 2023, the AESO notified stakeholders of its intention to file this Application with the Commission.¹⁸

2.8 Environmental and Land Use Effects – AltaLink and the market participant have advised that the Proposed AltaLink Development and the Proposed Market Participant 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 market participant 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 Market Participant Development;
- confirmation from AltaLink and the market participant that no significant environmental effects are expected;
- information obtained from AESO PIP activities; and
- the AESO's long-term transmission system plans;

¹⁸ Further information regarding the AESO's PIP for this Application is included in Appendix C.

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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 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 the market participant Facility Proposals will be filed shortly.¹⁹ The AESO requests, and expects AltaLink and the market participant 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 market participant's 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 the market participant 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.

¹⁹ The AESO understands that AltaLink intends to file a Facility Proposal relating to this Application to be titled P1828 hep *Alderson Solar Project Connection*. The AESO understands that the market participant intends to file a Facility Proposal relating to this Application to be titled *Alderson Solar Power 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 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. Add one 138 kV circuit to connect the Facility to the existing 138 kV transmission line 100L using a T-tap configuration;
- B. Increase the line rating of the 138 kV transmission line 100L between the proposed Facility T-tap point and the Tilley 498S substation to have a minimum rating of 120 MVA; 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 16th day of November, 2023.

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 – P1828 Alderson Solar Power Project 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 the market participant 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 Estimate** – Appendix B contain a detailed cost estimate corresponding to the Proposed AltaLink Development. The 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. The market participant has requested that the AESO not include the cost for the Proposed Market Participant Development in this application as the information is considered confidential and commercially sensitive.

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 market participant 's 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.²⁰ 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 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 [hep Canada SPV 1 Ltd.] 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.
- 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*

²⁰ 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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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*.