Alberta Utilities Commission

In the Matter of the Need for 138 kV Transmission System Reinforcement in Downtown Calgary

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 *Transmission Regulation*, AR 86/2007 and Alberta Utilities Commission Rule 007, all as amended

Application of the Alberta Electric System Operator for Approval of the Needs Identification Document for 138 kV Transmission System Reinforcement in the Downtown Calgary

PART A - APPLICATION

1 Introduction

1.1 Application – Pursuant to Section 34 of the *Electric Utilities Act* ("Act"), and in accordance with the further provisions included in the legislation set out in the title to this application, the Independent System Operator, operating as the Alberta Electric System Operator ("AESO") applies to the Alberta Utilities Commission ("Commission") for approval of this *138 kV Transmission System Reinforcement in Downtown Calgary Needs Identification Document*. For ease of reference, the AESO will refer to this needs identification document as the "Application". In addition, the area addressed by the Application is referred to as the "Downtown Calgary Area", which encompasses the existing ENMAX No. 1, No. 5, and No. 8 substations and the transmission lines connected to these substations.

1.2 Application Overview – This Application seeks approval of the need for 138 kV transmission system reinforcement ("Preferred Transmission Development") to alleviate identified constraints and to contribute to the long-term reliable operation of the 138 kV transmission system in the Downtown Calgary Area. This Application is organized as follows:

Part A – Application	
Section 1 – Introduction	Describes the Application, its organization, and AESO directions that were issued to ENMAX Power Corporation.

Section 2 – Determination of Need for Transmission System Reinforcement	Describes the system adequacy and reliability requirements to supply load in the Downtown Calgary Area, the AESO's load and generation forecast, and timing of the need for transmission system reinforcement.
Section 3 – Preferred Transmission Development	Describes the Preferred Transmission Development and its estimated cost.
Section 4 – Evaluation of Options and Selection of the Preferred Transmission Development	Describes the transmission development options that were evaluated, and provides a summary of the system studies and the report required to address the requirements of NID13, Section 6.1 of Commission Rule 007, as well as a comparison between the options to select the Preferred Transmission Development.
Section 5 – Participant Involvement Program	Describes the AESO's participant involvement program.
Section 6 – Proposed Development Schedule	Describes the proposed development schedule and next steps.
Section 7 – Long-term Transmission Plans	Describes the alignment between the Preferred Transmission Development and the AESO's long-term plans, as well as the dependency of any future developments on this Application, and vice-versa.
Section 8 – Relief Requested	Describes the relief requested by the AESO.

Part B – Application Appendices	
Appendices A to G	A list of all appendices to the Application and a brief description of each are provided in this part. These appendices provide all the supporting materials and details for the Application.

For information purposes, some of the legislative provisions applicable to the AESO are referenced in Part C of this Application, together with additional considerations relating to this Application.

1.3 AESO Directions – In the process of determining the need for transmission system reinforcement in the Downtown Calgary Area and preparing this Application, the AESO directed ENMAX Power Corporation ("ENMAX"), in its capacity as the legal owner of transmission facilities in the Downtown Calgary Area, pursuant to Section 39 of the Act and Section 14 of the *Transmission Regulation*, to assist the AESO in preparing this Application.

2 Determination of Need for Transmission System Reinforcement

This Section describes the transmission system adequacy and reliability requirements in the Downtown Calgary Area, the AESO's load and generation forecast, as well as the timing of transmission reinforcement required in the Downtown Calgary Area.

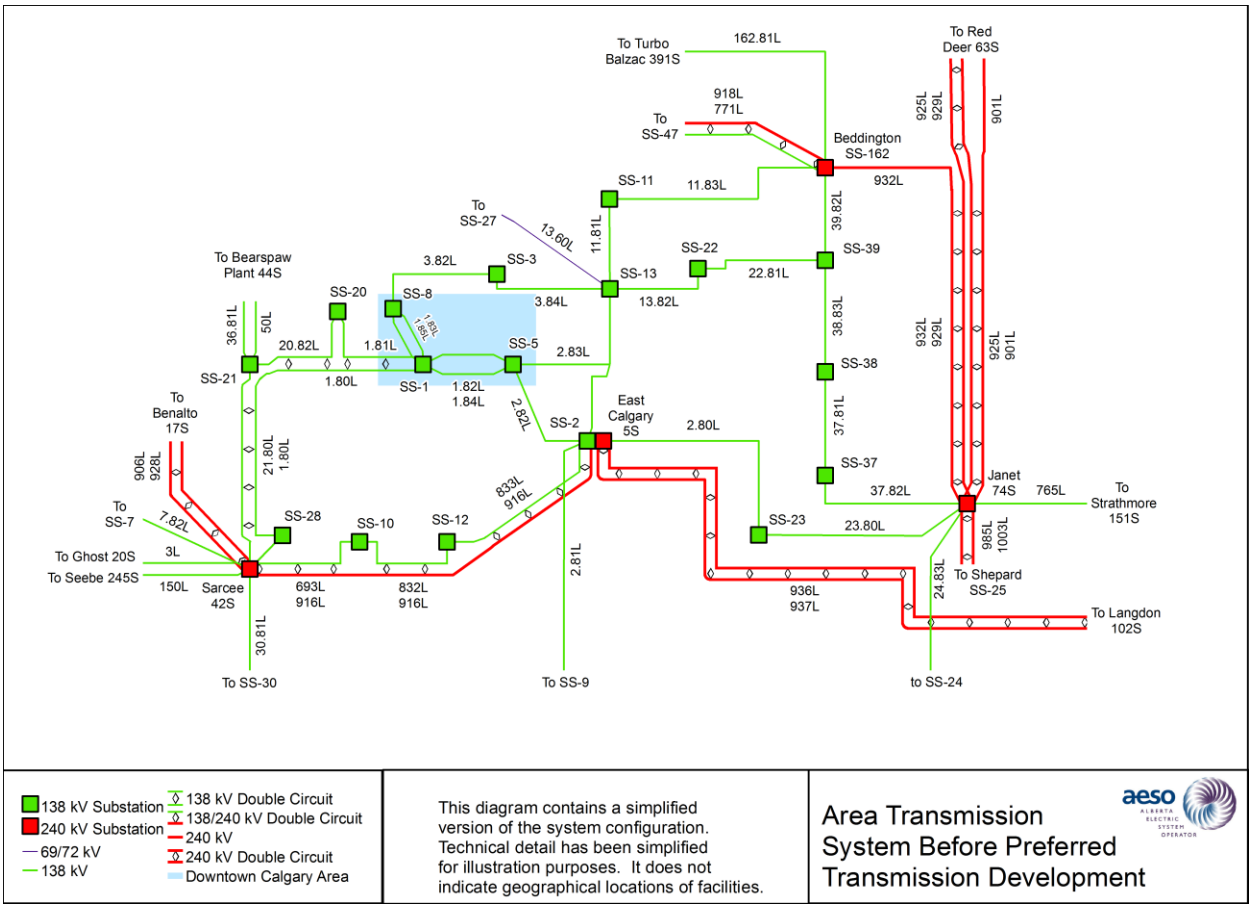
2.1 The Downtown Calgary Area 138 kV Transmission Network – The Downtown Calgary Area is a sub-area of the AESO's Calgary Planning Area ("Area 6"). The load in the Downtown Calgary Area is supplied by an existing local 138 kV transmission network, which is comprised of three 138 kV substations: ENMAX No. 1, No. 5 and No. 8 substations, and the associated 138 kV transmission lines connecting to these three substations (See Figure 1). In total there are three pathways transmitting power to these three substations, comprised of five existing 138 kV transmission lines:

- 2.82L and 2.83L form a power transfer path from ENMAX No. 2 substation in southeast Calgary to the ENMAX No. 5 substation, and is the predominant power transfer path serving Downtown Calgary ("Predominant Path");

- 1.80L and 1.81L form a power transfer path from the existing transmission system in the west of Calgary through the ENMAX No. 1 substation, and

- 3.82L forms a power transfer path from northeast Calgary into the ENMAX No. 8 substation.

Figure 1: Simplified single-line diagram of the Downtown Calgary Area 138 kV Transmission Network and Surrounding Area Transmission System (Prior to Implementation of the Preferred Transmission Development)



2.2 Regional Transmission System Serving the Downtown Calgary Area 138 kV Transmission Network –

The Downtown Calgary Area is predominantly served from the well-established 240 kV and higher-voltage regional transmission system on the east side of Calgary, which is connected to various sources of power, including:

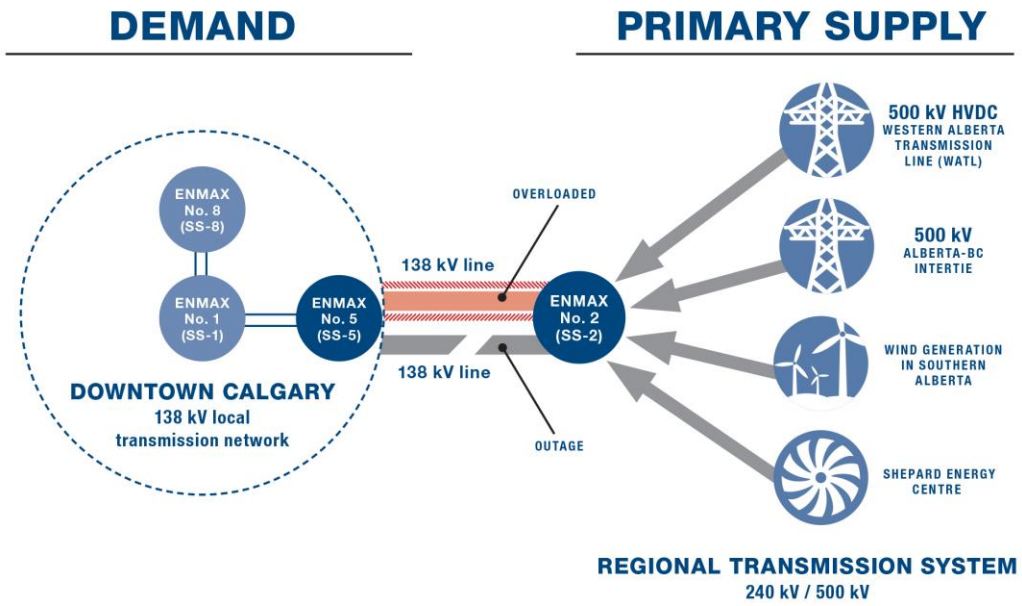
- Imports from British Columbia ("BC") through the 500 kV AB-BC intertie, which connects Cranbrook substation in BC to the Bennett 520S substation east of the City of Calgary.

- ENMAX's new Shepard Energy Center, an 873 MW power plant located in southeast Calgary.

- Generation in southern Alberta, including wind power generation, that produce power that is transmitted to the Calgary area through the 240 kV regional transmission system from Windy Flats 138S substation in the Fort MacLeod area to the ENMAX No. 65 substation in southeast Calgary via Foothills 237S substation.

Additionally, the 500 kV high-voltage direct current Western Alberta Transmission Line, soon to be energized, will facilitate transmission of power between northern Alberta and Crossings 511S substation east of the City of Calgary. See Figure 2 for a simplified illustration of the Downtown Calgary Area load centre and the predominant power transfer path serving the area load.

Figure 2: A simplified illustration of the Downtown Calgary Area load centre and the predominant power transfer path serving the area load



2.3 Transmission System Adequacy and AESO Reliability Requirements in the Downtown Calgary Area – The AESO has studied the transmission system under forecast load and under various generation dispatch assumptions and transmission

contingencies.[1] The studies demonstrate that there are no thermal overloads in the Downtown Calgary Area with all transmission elements in service in this area. However, the study results indicate that this path is prone to overloading under single contingency conditions ("Identified Constraints"). The 138 kV transmission line 2.82L experiences up to an approximate 9% thermal overload in 2017 under an outage of transmission line 2.83L assuming summer peak loading conditions. As load in the area continues to grow, the severity of the thermal overloads will increase and reach up to 42% in the 20-year planning horizon . Additionally, the 138 kV transmission line 2.83L experiences thermal overload under an outage of line 2.82L in near, medium and long-term planning horizons. The Identified Constraints are in violation of Alberta Reliability Standards, specifically Transmission Planning ("TPL") Standard TPL-002-AB-0. Therefore, transmission system reinforcement is required to alleviate the Identified Constraints. Further, no system topology changes are planned over the long-term that could change the need for such reinforcements. Planning studies further confirm that load growth is the primary driver of the Identified Constraints, while different generation assumptions studied in the different scenarios have an impact on the severity of the Identified Constraints.

2.4 AESO Load and Generation Forecast – Pursuant to its responsibilities under Section 33 of the Act and Section 8 of the *Transmission Regulation*, the AESO has forecast load growth in the Calgary area, including the load to be served in the Downtown Calgary Area. The AESO has also forecast the timing and location of future generation sources to be integrated into the transmission system in the South Region, including the Calgary area.

[1] As defined in the AESO's *Consolidated Authoritative Document Glossary*, a contingency means the unexpected failure or outage of a system component, such as a generating unit, transmission line, circuit breaker, switch or electrical element. Appendix 1 to each one of the Alberta Transmission Planning Standards explains the contingency conditions through categories of events and their expected performance requirements. AESO Transmission Reliability Criteria is referenced in note ii of Part C of this Application.

The AESO's current forecast is the 2014 Long-term Outlook, or 2014 LTO, which consists of a Main Outlook ("2014 LTO MO") forecast and several scenario-based forecasts, including a Low Growth ("LG") scenario. The AESO has determined that the 2014 LTO MO forecast overestimates the load growth potential for the Downtown Calgary Area and has elected to use the LG scenario for the purposes of planning the reinforcement of the Downtown Calgary Area. The LG scenario, however, may overestimate near-term load growth by as much as 45 MW, especially considering recent historical peak load levels. As such, the AESO has also used a sensitivity scenario, being the LG scenario minus 45 MW ("Sensitivity Scenario"). The Sensitivity Scenario provides for a range of near-term load growth assumptions and is used to assess the sensitivity of the Identified Constraints relative to near-term load growth uncertainty.

Summer peak load in the Downtown Calgary Area has historically been greater than winter peak load due to cooling (air conditioning requirements) and the AESO expects this trend to continue over the 20-year planning horizon. The AESO is currently forecasting 384 MW of summer peak load in the Downtown Calgary Area by 2020 in the LG scenario, which is expected to grow to 428 MW in 2025, with additional growth of approximately 59 MW by 2034/2035 to reach 487 MW in the long-term; in other words, an approximate 181 MW increase in load from the recorded 2015 summer peak load.[2]

In addition to the forecast load growth, various generation dispatches were considered in the Downtown Calgary Area planning studies. Both wind and gas-fired generation comprise the existing and forecast generation mix in the South Region.

2.5 Determination of Timing for Transmission System Reinforcement – The AESO's planning studies demonstrate that the Identified Constraints arise as early as

[2] The AESO's load growth forecasts and generation assumptions are derived from its corporate forecasts. The AESO's forecasts used in the Downtown Calgary Area planning studies are contained in the *AESO 2014 Long-Term Outlook.* Appendix B to this Application contains further information on the AESO's 2014 forecasts. The Downtown Calgary Area is contained within the AESO's Calgary Planning Area.

summer 2017 under single contingency conditions based on the 2014 LG scenario. However, utilizing the Sensitivity Scenario, studies indicate thermal overloads do not arise until summer 2021 under the same single contingency conditions that were observed earlier. While the timing for the transmission reinforcement is sensitive to the near-term forecast assumptions and associated near-term load growth uncertainty, ENMAX's earliest estimated in-service date ("ISD") for the Preferred Transmission Development, being Q1 2021, falls within this range. Section 6 below provides further details regarding the development schedule. It may be necessary for the AESO to impose operational measures, including system reconfiguration or generation re-dispatch, until the transmission system reinforcement has occurred.

3 Preferred Transmission Development

This Section describes the Preferred Transmission Development included in this Application to alleviate the Identified Constraints described in Section 2 above.

3.1 Preferred Transmission Development – Figure 2 illustrates the transmission system in the Downtown Calgary Area after implementation of the Preferred Transmission Development.[3] The Preferred Transmission Development includes the following major elements, all to be in-service in 2021:

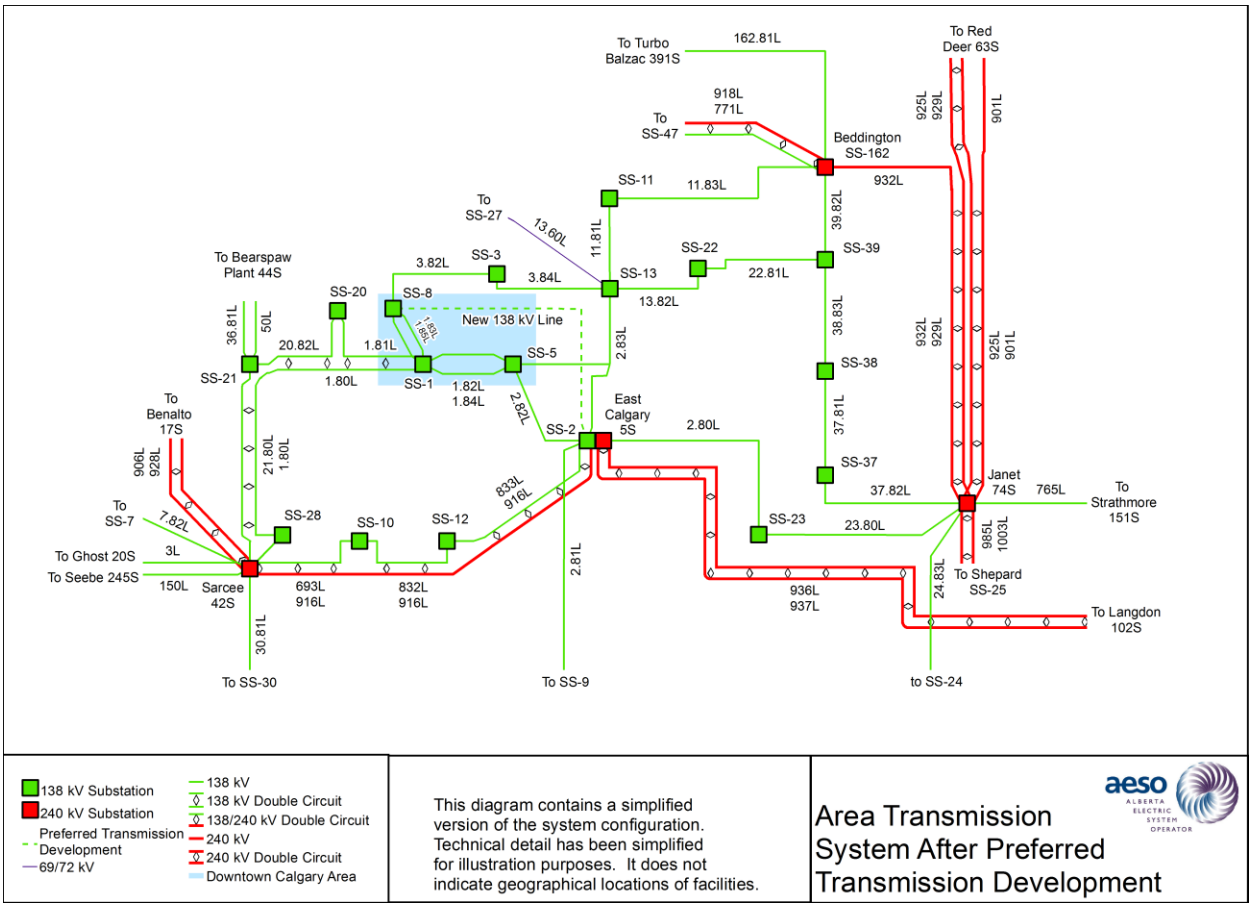
1. One new 138 kV transmission circuit between the existing ENMAX No. 2 and ENMAX No. 8 substations, with a minimum capacity in the order of 300 MVA.[4]

2. Modify, alter, add or remove equipment, including switchgear, and any operational, protections, control and telecommunication devices required to undertake the work as planned and ensure reliable integration of the Preferred Transmission Development with the transmission system.

[3] Details and configuration of equipment required for the Preferred Transmission Development, including substation single line diagrams will be more specifically described in the AESO's Functional Specification, which will be included in ENMAX's transmission facility proposal. Also, further specifics will be determined as detailed engineering progresses. Routing and/or siting of the transmission facilities do not form part of this Application and will be addressed in ENMAX's transmission facility proposal.

[4] Studied transmission circuit ratings have been approximated to the accuracy level required by the AESO for transmission planning purposes. Minimum circuit ratings specified by the AESO are consistent with ratings of the existing circuits. Actual ratings of constructed facilities may vary.

Figure 3: Simplified single-line diagram of the Downtown Calgary Area 138 kV Transmission Network and Surrounding Area Transmission System (Following Implementation of the Preferred Transmission Development)



A simplified single-line diagram of the Preferred Transmission Development is included at Appendix G of this Application.

3.2 Preferred Transmission Development Costs – The total capital cost of the Preferred Transmission Development to meet the minimum requirements as outlined in this Application is estimated to be in the order of $144 million (+/-30%, $2021).[5] The Preferred Transmission Development does not include any costs classified as participant-related in accordance with the ISO tariff.

[5] See the TFO Capital Cost Estimates included at Appendix C of this Application for further details. Also, note iv of Part C of this Application describes the AESO's responsibilities with respect to transmission cost estimates and reporting.

4 Evaluation of Options and Selection of the Preferred Transmission Development

This Section explains the transmission development options that were evaluated by the AESO and all factors that were taken into consideration in the process of selecting the Preferred Transmission Development.

4.1 Transmission Development Options – In addition to the AESO's Preferred Transmission Development, the AESO identified a 240 kV transmission development option, which included a new 240 kV circuit between the ENMAX No. 2 and No. 8 substations energized at 138 kV until future conversion to 240 kV is required ("Staged-240 kV Option").

In the course of preparing this Application, the AESO reviewed the options identified in its Long-term Transmission Plan and concluded that the options presented in this Application have sufficient capacity to alleviate the Identified Constraints in the 20-year planning horizon. Section 7 below provides further details.

4.2 Development Schedule and Estimated Costs for the Staged-240 kV Option– The earliest ISD for the Staged-240 kV Option is 2021. The total capital cost of the Staged-240 kV Option is estimated to be in the order of $148 million (+/-30%, $2021).[6] The Staged-240 kV Option does not include any costs classified as participant-related in accordance with the ISO tariff.

4.3 Summary of the AESO's System Study Results – System planning studies have indicated that the Preferred Transmission Development will alleviate the Identified Constraints in the Downtown Calgary Area, described in Section 2, for the 20-year planning horizon. Further, system study results demonstrate that following implementation of the Preferred Transmission Development, no new constraints arise that would require additional development.

[6] See footnote 5.

Similarly, system studies were performed assuming the Staged-240 kV Option. These studies yield the same results as for the Preferred Transmission Development. Considering the maximum loading observed on the new circuit in the long-term, both transmission development options provide sufficient capacity for the 20-year planning horizon. Therefore, there is no need to energize the circuit in the Staged-240 kV Option at 240 kV in the 20-year planning horizon. Further, the studies revealed that a higher line rating associated with the Staged-240 kV option, when energized at 240 kV, will not have any additional advantage in improving system performance, as compared to the Preferred Transmission Development, considering that the outage of the new line would become the most limiting contingency following its implementation.

4.4 Information In Regards to Rule 007, Section 6.1 - NID13 – The AESO directed ENMAX to prepare a report comparing transmission development options according to the major aspects contemplated in NID13, Section 6.1 of Commission Rule 007: *Applications for Power Plants, Substations, Transmission Lines, Industrial System Designations and Hydro Developments* ("NID13 Requirements"), including agricultural, environmental and residential impacts. In response to this direction, ENMAX submitted a NID13 report to the AESO that concluded that no differences in impact were expected between the two transmission development options considered by the AESO. Further, the NID13 report did not identify any factors that would preclude the development of either transmission development option; nor did the NID13 report indicate any difference in ENMAX's ability to comply with the objectives of the South Saskatchewan Regional Plan made under the *Alberta Land Stewardship Act* between the two transmission development options. ENMAX made certain assumptions in preparing the NID13 report, including that both transmission development options would be executed using only underground transmission infrastructure. ENMAX will be investigating its routing options in detail when preparing its transmission facility proposal.

The above-referenced NID13 report is included at Appendix E of this Application.

4.5 Selection of the Preferred Transmission Development – The AESO has compared the Preferred Transmission Development and Staged-240 kV Option in terms of their performance through planning study results, their cost estimates, and NID13 Requirements as presented below.

Merits	Preferred Transmission Development	Staged-240 kV Option
System Study Results	Acceptable performance; alleviate the Identified Constraints reliably within the 20-year planning horizon.	Acceptable performance; alleviate the Identified Constraints reliably within the 20-year planning horizon.
+/- 30% Estimated Development Costs (2021 ISD)	Approximately $144 million	Approximately $148 million
NID13 Requirements	Same impact	Same impact

As presented in the above table, both options have acceptable performance considering the Alberta Reliability Standards, alleviate the Identified Constraints in the Downtown Calgary Area within the 20-year planning horizon, and will not require any additional developments. Further, there are no differences in impact of either option considering the NID13 Requirements and there are no factors that would preclude the development of either option. The Preferred Transmission Development has sufficient capacity to alleviate the Identified Constraints within the Downtown Calgary Area in the 20-year planning horizon, and it has a lower cost than the Staged-240 kV Option. The higher line rating associated with the Staged-240 kV Option, when energized at 240 kV, is well beyond the required line rating within the planning horizon and will not offer any additional advantage, as compared to the Preferred Transmission Development, considering that in either option the outage of the new line is the most limiting

contingency following its implementation. For these reasons, the AESO selected the Preferred Transmission Development, as described in Section 3, as its preferred transmission system reinforcement option.

5 Participant Involvement Program

The AESO conducted a participant involvement program (“PIP”), in accordance with the requirement of NID14 and Appendix A2 of Commission Rule 007. Between August 2014 and November 2015, the AESO utilized various methods to notify occupants, residents and landowners as well as stakeholder groups and appropriate government bodies, agencies and representatives (collectively, ”Stakeholders”) of the need for transmission reinforcement in the area where transmission facilities could be installed to address the identified need.

In August 2014, the AESO notified Stakeholders of its plans to reinforce the existing downtown Calgary transmission system by developing a new 240 kV transmission line between the existing ENMAX No. 8 and East Calgary 5S substations, including the addition of two new 240/138 kV transformers at the ENMAX No. 8 substation. Four open houses were hosted at various locations between September 9 and September 18, 2014.

On October 9, 2015, the AESO notified Stakeholders of its updated plans to use a lower voltage, 138 kV, transmission line instead of the 240 kV transmission line, consistent with the Preferred Transmission Development. Considering that the existing ENMAX No. 2 substation is located adjacent to the East Calgary 5S substation, the Stakeholder list was unaffected by the updated plans.

Additionally, on November 3, 2015, the AESO notified the public in the area where transmission facilities could be installed, of its intention to file the Application with the Commission for approval. The AESO believes that all comments and questions regarding the need for the Preferred Transmission Development have been appropriately addressed. No concerns or objections to the need for the reinforcements and/or the Preferred Transmission Development have been raised. Further information regarding the AESO’s PIP for this Application is included at Appendix D.

6 Proposed Development Schedule

The earliest ISD for the Preferred Transmission Development, as estimated by ENMAX, is Q1 2021. Currently, this in-service date falls within the range of years, (summer 2017-summer 2021), identified by the AESO's studies described in Section 2.5 above. As such, the AESO does not intend to direct ENMAX to proceed with an expedited schedule for the Preferred Transmission Development.

It is the AESO's understanding that ENMAX's current schedule takes into account all permitting activities that may be required in connection with the Preferred Transmission Development including, without limitation, the time necessary to conduct required wildlife inventories.

ENMAX's schedule also takes into account the preparation and filing of ENMAX's transmission facility proposal for the Preferred Transmission Development and assumes that it will be submitted for Commission approval, under the *Hydro and Electric Energy Act*, in October 2016. The AESO currently intends to direct ENMAX to commence preparation of its transmission facility proposal prior to October 2016, followed by a direction to submit the transmission facility proposal for Commission approval in October 2016. However, the timing of the AESO's direction is subject to change. As such, in the event that the AESO has not, by November 1, 2017, issued an unconditional direction for ENMAX to submit its transmission facility proposal for the Preferred Transmission Development, the AESO will confirm in writing that the need for the transmission reinforcement in the Downtown Calgary Area continues, and that the Preferred Transmission Development continues to be the AESO's preferred option for transmission system development. Otherwise, the AESO will advise the Commission of its intention to apply to amend or cancel the NID approval.

ENMAX's schedule is dependent on a number of variables, including the regulatory process, impact of seasonal construction, and the availability of transmission outages to accommodate construction and commissioning activities. Should operational constraints arise prior to the ISD of the Preferred Transmission Development, it may be necessary

for the AESO to impose operational measures until the reinforcement has been completed as explained in Section 2.5. Consideration of such operational matters are beyond the scope of this Application and will be addressed via operational studies as required.

7 Long-term Transmission Plans

Long-term plans are a high-level assessment of transmission capability and required transmission system development in Alberta while focusing on broad technical aspects. More detailed studies are performed in preparation of a needs identification document application to ensure the recommended solution will address the identified reliability violation in the most efficient manner.

The AESO's 2015 Long-term Transmission Plan ("2015 LTP") has considered the addition of two 240/138 kV transformers to the existing ENMAX No. 8 substation and a new 240 kV circuit between the East Calgary 5S and ENMAX No. 8 substations using the 2014 LTO MO forecast. However, the LG scenario in the 2015 LTP replaces the 240 kV additions with a new 138 kV transmission line between the ENMAX No. 2 and ENMAX No. 8 substations, which is consistent with the Preferred Transmission Development in this Application.

Given the forecast considerations specific to the Downtown Calgary Area, the higher capacity of a 240 kV development is significantly beyond what is needed in the 20-year planning horizon. Additionally, considering that outage of the new circuit will become the most limiting factor, there are no material differences between a 240 development and the Preferred Transmission Development when comparing the transmission system performance following implementation of either development.

7.1 Transmission Development Interdependencies – The Preferred Transmission Development will alleviate the identified need in the 20-year planning horizon and is independent of any other transmission developments that are currently planned within the Alberta Interconnected Electric System in this timeframe. Similarly, there are no other plans that directly depend on the Preferred Transmission Development.

8 Relief Requested

8.1 Approval is in the Public Interest: Having regard to the factors set out in Section 38 of the *Transmission Regulation*, and in particular, Subsection 38(d) and (e), the AESO submits that:

- its assessment of the need for 138 kV transmission system reinforcement in the Downtown Calgary Area is technically complete; and

- the Preferred Transmission Development meets the identified need, satisfies Alberta Reliability Standards, and is consistent with the AESO long-term forecasts and area transmission system plans, and is in the public interest.

As such, the AESO also submits that approval of the Application is in the public interest.

8.2 Request – For the reasons set out herein, and pursuant to Section 34 of the Act, the AESO respectfully requests that the Commission approve this Application, including the Preferred Transmission Development, which shall be comprised of the following, with a target ISD of 2021:

1. Add a new 138 kV transmission circuit between the existing ENMAX No. 2 and No. 8 substations.

2. Modify, alter, add or remove equipment, including switchgear, and any operational, protections, control and telecommunication devices required to undertake the work as planned and ensure reliable integration of the Preferred Transmission Development with the transmission system.

The AESO will, by November 1, 2017, issue an unconditional direction for ENMAX to submit, for Commission approval under the *Hydro and Electric Energy Act*, a transmission facility proposal for the Preferred Transmission Development. In the event the AESO has not issued such a direction for the Preferred Transmission Development by this date, the AESO will confirm in writing to the Commission that the need to reinforce the transmission system continues, and that the Preferred Transmission

Development approved by the Commission remains the AESO's preferred transmission system reinforcement option. Otherwise, the AESO will advise the Commission of its intention to apply to amend or cancel the NID approval.

All of which is respectfully submitted this 18th day of November, 2015.

Alberta Electric System Operator

< SIGNED ELECTRONICALLY >

Doyle Sullivan, P. Eng.
Director, Regulatory Transmission

PART B – APPLICATION APPENDICES

The following appended documents support the Application (Part A). The appendices include work undertaken by the AESO in the execution of its duties to plan the transmission system and in the preparation of this Application.

APPENDIX A **AESO Downtown Calgary Transmission Studies –** Appendix A contains the *Downtown Calgary Transmission Reinforcement (DCTR) Planning Studies Report*, which describes the need for transmission system reinforcement in the Downtown Calgary Area. By way of presenting relevant transmission planning studies undertaken to simulate the future performance of the system under forecasted loading and generation dispatches and various contingencies, the AESO identified the elements of the system that are subject to reliability violations. Further, the technical report discusses the alternatives and documents system performance in long-term planning horizon following implementation of the Preferred Transmission Development. The technical report demonstrates that the Preferred Transmission Development will alleviate the Identified Constraints.

APPENDIX B **AESO Load and Generation Forecast –** Appendix B contains the AESO's *Downtown Calgary 2014 Long-term Outlook (2014 LTO) – Load and Generation Forecast* used in the *DCTR Planning Studies Report* contained in Appendix A.

APPENDIX C **TFO Capital Cost Estimates –** Appendix C contains the ENMAX-prepared capital cost estimates referred to in this Application. The estimates have been prepared by ENMAX according to the AESO's directions. The estimates are prepared to an approximate accuracy level of (+/-30), which meets the accuracy requirement of Commission Rule 007, NID11.

APPENDIX D **AESO Participant Involvement Program –** Appendix D provides a summary of the PIP activities conducted regarding the need for the transmission

reinforcement to address the Identified Constraints and the Preferred Transmission Development described in this Application.

APPENDIX E **Commission Rule 007, Section 6.1, NID13** – Appendix E contains the NID13 report provided by ENMAX confirming that no differences in impact are expected between the transmission development options proposed by the AESO considering the major aspects of Commission Rule 007, Section 6.1, NID13 and that no factors were identified to preclude the Preferred Transmission Development in whole or in part.

APPENDIX F **AESO Transmission Planning Criteria – Basis and Assumptions** – Recently the AESO has revised the Transmission Reliability Criteria, Part II System Planning, Version 0, dated March 11, 2005 to mainly remove all criteria that are now included in the TPL Standards[7]. Appendix F contains the Transmission Planning Criteria – Basis and Assumptions, Version 1, which includes the applicable thermal and voltage limits in support of the TPL standards. Planning studies that are included in this Application meet all the performance requirements of the specified TPL Standards (TPL-001-AB-0, TPL-002-AB-0, and TPL-003-AB-0).

APPENDIX G **A simplified single-line diagram of the Preferred Transmission Development** – Appendix G provides a simplified single-line diagram of the Preferred Transmission Development with its terminating points at ENMAX No. 2 and No. 8 substations.

[7] TPL Standards are included in the current Alberta Reliability Standards.

PART C – REFERENCES

i. **AESO Planning Duties and Responsibilities and Duty to Forecast Need –** 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), states the general planning duties of the AESO. [8] 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". As stated in subsection 34(1) of the Act, when the AESO determines that an expansion or enhancement of the capability of the transmission system is or may be required to meet the needs of Alberta and is in the public interest, the AESO must prepare and submit to the Commission for approval a needs identification document that describes the constraint or condition affecting the operation or performance of the system and indicates the means by which or the manner in which the constraint or condition could be alleviated. Where, as in this case, the AESO has identified a need to reinforce the transmission system to relieve anticipated reliability violations, it has set about to determine a reasonable solution to meet the identified need. In determining the means by which, or the manner in which, the constraint or condition affecting the operation or performance of the transmission system could be alleviated, the AESO has applied engineering judgments and made assumptions as necessary; such judgments and assumptions being required and permitted by its prescribed responsibilities and authorities under the Act. In accordance with Section 11 of the *Transmission Regulation*, the AESO has considered technical, economic, environmental and other factors as necessary in determining its preferred option for system expansion.

ii. **AESO Planning Criteria** – The AESO is required to plan a transmission system that satisfies applicable reliability standards. TPL standards are included in the Alberta Reliability Standards and are described at: http://www.aeso.ca/rulesprocedures/17006.html[9]

In addition, the AESO's *Transmission Planning Criteria – Basis and Assumptions* is included in Appendix F.

[8] 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.

[9] This link is provided for ease of reference and does not form part of this Application.

iii. **Application for Approval of the Need for Expansion or Enhancement of the Capability of the Transmission System –** This Application is directed solely to the question of the need for expansion or enhancement of the capability of the transmission system 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 such other processes or information from time to time, the inclusion of such 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 is not intended to constitute an application for approval of such facilities, and the responsibility for seeking such regulatory or other approval remains the responsibility of such market participants or other parties.

iv. **Capital Cost Estimates** – Capital costs estimates provided in the Application are planning cost estimates used by the AESO for the sole purpose of comparing transmission development options. Where only a single transmission development option has been studied, capital cost estimates are provided for context. Project costs will be determined by ENMAX as part of its transmission facilty proposal. The AESO's responsibilities with respect to project cost reporting are described in the *Transmission Regulation*, including Section 25, and Section 9.1 of the ISO rules.