

March 16, 2021

Board of Commissioners of Public Utilities
Prince Charles Building
120 Torbay Road, P.O. Box 21040
St. John's, NL A1A 5B2

Attention: Ms. Cheryl Blundon
Director of Corporate Services & Board Secretary

Dear Ms. Blundon:

Re: *Reliability and Resource Adequacy Study Review – 2021 Update to the Reliability and Resource Adequacy Study*

On October 2, 2020, Newfoundland and Labrador Hydro (“Hydro”) advised the Board of Commissioners of Public Utilities (“Board”) of a delay to its filing of portions of its 2020 Update to the Reliability and Resource Adequacy Study. Specifically, Hydro advised that filing of an update to Hydro’s proposed planning considerations (Volume I of the Reliability and Resource Adequacy Study) and the supporting Long-Term Resource Plan (Volume III of the Reliability and Resource Adequacy Study) would be delayed until the outcomes of the “Assessment of Labrador-Island Link Reliability Considering Climatological Loads” could be assessed to determine the associated impact on Hydro’s planning considerations. Hydro has since received the report, “Assessment of Labrador Island Transmission Link (LIL) Reliability in Consideration of Climatological Loads,” as filed with the Board March 12, 2021 (“Haldar & Associates Assessment”).

The purpose of the Haldar & Associates Assessment is to identify the overall structural reliability of the Labrador-Island Link (“LIL”) with respect to the probability of failure based on the integrity of the system components and considering climatological conditions which could potentially result in an extended bipole outage.¹ The Haldar & Associates Assessment considered the LIL design with respect to CSA 60826 - Design Criteria of Overhead Transmission Lines and the overall likelihood of failure of the LIL with respect to both glaze and rime icing events. Scenarios not directly following the guidance of the CSA standard were also considered to provide a fully informed assessment. The assessment also included a qualitative review of local conditions based on past operational experience.

Based on CSA 60826 (Damage Limit State (“DLS”) analysis), the as-built design of the LIL reflects a return period of 1:72 years with an associated annual failure rate of 1.10%. Exceeding DLS limits is not expected to result in an extended outage due to major failure as the governing component in this analysis is the optical ground wire and failure of this component does not impact power flow. A high-level assessment was also completed considering an Ultimate Limit State (“ULS”) analysis which stretched various system

¹ “Reliability and Resource Adequacy Study Review – Further Information and Filing Schedule,” Newfoundland and Labrador Hydro, October 2, 2020. For the purpose of this report, an extended bipole outage is defined as a forced outage that would result in the inability of the utility to supply customers with power via the LIL for multiple days.

components to their ultimate limit, thus resulting in a higher probability of a forced outage of power delivery. The ULS analysis identified a return period of 1:160 years with an associated annual failure rate of 0.48%. Based on the findings of the Haldar & Associates Assessment, it is Hydro's opinion that the LIL has the greatest risk of experiencing an extended bipole outage under a ULS failure scenario.

Additional scenarios and return periods were identified in the Haldar & Associates Assessment based on line length considerations. While the CSA standard does not require analysis of the impact of line length on reliability, Haldar & Associates considered the independency between glaze and rime icing and the line length to be an important consideration. Correlations under both a DLS and a ULS scenario resulted in both having a return period of less than 50 years. Haldar & Associates has also identified additional considerations related to line reliability which are suggested for further investigation.

Given the high costs associated with resource expansion, as well as the requirement for rate mitigation resulting from the in-service of the Muskrat Falls Project, Hydro recommends completing a number of follow-on activities with respect to the reliability of the LIL, specifically, in advance of updating its view with respect to long-term planning considerations. As such, Hydro is deferring the filing of Volume I and Volume III of its planned Update to the Reliability and Resource Adequacy Study at this time. Activities are detailed in the following sections.

1.0 Additional Studies Regarding LIL Reliability

The Haldar & Associates Assessment identified additional considerations related to the as-built design of the LIL which are suggested for further investigation. These recommendations were identified as part of a limited sensitivity analysis and are additional considerations above the baseline as-built reliability calculations provided by Haldar & Associates. These additional considerations include:

- Effect of Icing on Large Diameter Conductor;
- Unbalanced Icing;
- Wind Speed Up Factors; and
- Combined Wind and Ice.

Hydro, in consultation with Nalcor Energy, is currently undertaking a preliminary assessment of the additional considerations identified by Haldar & Associates and will provide further follow-up to the Board on any necessary next steps by April 30, 2021. For further commentary on these additional considerations, please refer to Hydro's "Labrador-Island Link Reliability Assessment – Summary Report," filed with the Board on March 12, 2021.

2.0 Reports Pertaining to LIL Icing Incident Experienced in 2021

Through recent updates to the Board, Hydro provided information regarding damage to some of the steel crossarms on the LIL towers that carry the electrode line between Muskrat Falls and L'Anse-au-Diable following an ice storm in Labrador,² damage to the Pole 2 conductor of the LIL,³ and damage to

² The majority of the damage was isolated to the electrode line in three clusters and predominately, electrode line one; however, electrode line two did experience minor damage. In total, 36 electrode line conductor spans required conductor splicing, repair, or restringing, as well as 11 crossarms required repair or replacement. Repairs to electrode line one were complete on February 19, 2021 and to electrode line two on February 25, 2021.

the L'anse au Diable Grounding Site.⁴ Hydro will continue to keep the Board informed on these matters through its Labrador-Island Link Monthly Update.

While some preliminary analysis has been conducted regarding damage incurred on the overhead transmission assets, detailed failure investigations are underway. Nalcor has engaged EFLA Consulting Engineers and Kjeller Vindteknikk to support aspects of these investigations. The ongoing investigations are planned to address the following aspects:

- Summarizing locations of damage and evaluating failure patterns to identify failure trends for the storm event which will provide an indication of the type of failure cause(s);
- Information regarding the specific icing event including recorded site observations, icing measurements from site, data available from Environment Canada, and detailed modeling of storm and segment conditions to evaluate the return period of the segment;
- Review of construction quality documentation and site observations to determine if there were any construction or structural oversights;
- Failure calculations for conductor slippage, finite element modelling of crossarm capacity and PLS-CADD transmission line modeling of the LIL's as built condition to determine the line's performance under severe loading;
- Material testing to identify any component issues and/or manufacturing defects;
- An assessment of the response time associated with the noted events including lessons learned through the response, as well as any modifications required to current assessments of restoration times; and
- A design review for the L'Anse au Diable Grounding Site, including a review of the environmental criteria in the original front-end engineering design, to determine if design modifications to the site are required.

The investigation is intended to culminate in a report, which will include conclusions and identified recommendations for further consideration, as appropriate. In addition to the above, in correspondence on March 9, 2021, the Board also posed a number of questions following its receipt of the most recent Labrador-Island Link Monthly Update. Responses to the types of questions posed by the Board (e.g., Describe how, assuming the LIL was in full-rated load bipole operation, each event would have affected full-load LIL operation) will also form an important part of stakeholder considerations with respect to the reliability of the LIL through the Reliability and Resource Adequacy Study.

³ On February 3, 2021, during bipole dynamic commissioning, the LIL experienced an unplanned trip on Pole 2 when a failed eyebolt caused a section of Pole 2 conductor to fall from a tower. The protection and controls software switched from bipole to monopole operation on Pole 1 with no loss of load. Repairs were completed February 18, 2021.

⁴ In early December 2020, an inspection of the L'Anse au Diable Grounding Site identified damage to the protective berm, grounding pad, and some electrical equipment. A detailed inspection of the damage was conducted and determined that four of the ten electrode distribution sections were damaged; two sections were deemed repairable. After review of the design, it was determined that the grounding site can operate with eight out of ten electrode sections operational, therefore there was no impact to the energization or operation of the LIL. The site clean-up and initial repairs were completed in December 2020 to allow commissioning to continue. Work is planned for this coming spring to repair any of the remaining electrical and civil site damage.

The cost of any substantive identified mitigating measures may then be considered in the context of the associated improvements in line reliability and likelihood of the storm event to determine if the mitigating measures should be pursued.

The outcomes of the noted assessments are expected to inform stakeholder considerations when evaluating the requirement for incremental resources, as well as the magnitude and timing of those additions.

3.0 Update on Other Matters for Consideration as Part of Hydro's Reliability and Resource Adequacy Study

As Hydro has deferred the current filing of Volumes I and III of its planned Update to the Reliability and Resource Adequacy Study, Hydro provides the following as an update on other matters which would normally be considered and presented as part of the annual update process; specifically regarding the long-term viability of Holyrood Thermal Generating Station ("Holyrood TGS") as a resource option and Hydro's recommendation to migrate to planning on a provincial basis.

3.1 Assessment to Determine the Potential Long Term Viability of the Holyrood Thermal Generating Station

Through its Reliability and Resource Adequacy Study technical conference presentation on November 30, 2020, as well as subsequent correspondence to the Board, Hydro advised of its intention to undertake an Assessment to Determine the Potential Long Term Viability of the Holyrood Thermal Generating Station. The purpose of this assessment is to inform Hydro's options for incremental generation options, should it be determined additional backup generation is required to support the provision of least-cost, reliable service.

Hydro is seeking an in-depth independent assessment to fully understand the requirements (capital and operational) should the following options be considered for the Holyrood TGS:

- 1)** Continued extension of the Holyrood TGS, whether online in full generation mode or standby mode beyond the current March 31, 2023 retirement period, for an additional two years (i.e., 2025), four years (i.e., 2027), and six years (i.e., 2029); and
- 2)** The viability and suitability of the Holyrood TGS to be used as a backup generating facility to support the island system in the event of a prolonged outage of the Labrador-Island Link until the End of Economically Feasible Life of the plant.

Hydro believes it is important to fully understand the viability of continued operation of the Holyrood TGS from both an asset reliability and a total cost perspective. The outcomes of the Assessment to Determine the Potential Long Term Viability of the Holyrood Thermal Generating Station should provide the necessary information to assess whether the Holyrood TGS can economically provide support to the system in the near-term while incremental resources are constructed, based on outcome of item 1 noted above, or play a larger role in economically satisfying system requirements in future, based on outcome of item 2 noted above. This is an extensive work package requiring condition-based assessments on a number of major assets in the plant and requires time to complete in an operational facility. Hydro has issued a Request for Proposal through its existing master standing offers to engage an external consultant and anticipates that this report will be available in late 2021/early 2022.

3.2 Implementation of Network Additions Policy and Implications for Labrador Load

Hydro's Network Additions Policy for the Labrador Interconnected System is currently before the Board. The policy is intended to establish the framework for cost recovery of the transmission investments required on the Labrador Interconnected System to serve load growth.

The existing transmission systems in both eastern and western Labrador have reached full capacity and expansion is required to meet incremental customer requests. Hydro is executing a plan to confirm incremental load quantities from these requests, perform studies to identify transmission system expansion requirements, and then construct new transmission infrastructure. From a supply perspective, should the load growth identified by customers through the implementation of the Network Additions Policy materialize, the remaining Recapture Energy available to serve incremental load on the Labrador Interconnected System is likely to be insufficient to satisfy the resultant demand and energy requirements. As a result, incremental supply would be required to serve customers on the Labrador Interconnected System. Hydro is engaging interested customers and plans to undertake detailed system impact studies based on confirmed requests. The outcomes of these studies, anticipated in late 2021, will help inform on the demand and energy requirements of prospective customers on the Labrador Interconnected System, as well as an estimation of the incremental costs required to serve these customers.

In consideration of providing reliable service, to the extent that incremental resources are required to meet the increased demand and energy requirements, resource options would be pursued based on a least-cost basis to serve the Newfoundland and Labrador Interconnected System. This could result in the development of incremental resources on the island that would reduce the reliance on the LIL during periods of high demand. This would reduce the exposure for unserved energy on the Island in the event of an unplanned, prolonged outage of the LIL.

4.0 Planning Matters Ready for Full Consideration in the Near-Term

Additionally, there are other matters that have been presented through Hydro's Reliability and Resource Adequacy Study that are not impacted by the reliability of the LIL and thus are ready for the parties' full consideration (e.g., planning on a provincial basis). Resolution of these matters would provide additional certainty in Hydro's planning processes and provide a level of clarity when considering the additional information that has been noted above. Hydro proposes settlement discussions with the parties in the near term regarding such matters, to bring these items to conclusion.

5.0 Conclusion

While the Haldar & Associates Assessment is now available, additional information on a number of matters, including and in addition to Haldar & Associates work, is required to provide stakeholders with information necessary for informed opinions and decisions. Given the high costs associated with resource expansion, as well as the requirement for rate mitigation resulting from the in-service of the Muskrat Falls Project, Hydro committed to undertaking a preliminary assessment of the additional considerations identified by Haldar & Associates related to the reliability of the LIL; information on any necessary next steps is expected to be provided to the Board by April 30, 2021. Hydro proposes to discuss the most appropriate path forward for the next filings of Volumes I and III of its Reliability and Resource Adequacy Study with the Board and parties following that update. This will help to ensure that the timing and contents of those reports are meaningful to the parties. Table 1 summarizes the

anticipated timing of each of the next pieces of work which are expected to be helpful in informing future provincial reliability decisions.

Table 1: Anticipated Timing of Filings

Filing	Anticipated Timeframe for Completion
Preliminary Assessment of Additional Considerations Regarding LIL Reliability recommended by Haldar & Associates	April 30, 2021
Reports Pertaining to LIL Icing Incident Experienced in 2021	Q2 2021
Update Regarding the Design Review Pertaining to L'Anse au Diabie Electrode Site	Q3 2021
Assessment to Determine the Potential Long Term Viability of the Holyrood Thermal Generating Station	Q1 2022
Implementation of Network Additions Policy and Implications for Labrador Load	Q4 2021

Should you have any questions or comments about any of the enclosed, please contact the undersigned.

Yours truly,

NEWFOUNDLAND AND LABRADOR HYDRO



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