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October 1, 2018

The 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 Corporate Services & Board Secretary

Dear Ms. Blundon:

Re: The Liberty Consulting Group Report – Analysis of Newfoundland Island Interconnected System Power Supply Adequacy for the Winter of 2018-2019 – Biweekly Update Report

In its correspondence of September 19, 2018, the Board of Commissioners of Public Utilities (Board) requested that Newfoundland and Labrador Hydro (Hydro) provide a biweekly report on Hydro's supply adequacy for the Winter 2018-2019, commencing October 1, 2018.

This biweekly report provides an update on the in-service of the Labrador-Island Link (LIL) and how it relates to Winter 2018-2019 supply adequacy, as well as details regarding the submittal of further information on Hydro's production facilities asset management.

The LIL In-Service Update

This report contains:

- an overview of the critical path tasks required for reliable operation of the LIL for Winter 2018-2019;
- an overview of the highest risks being monitored and mitigated for the LIL in-service in Winter 2018-2019;
- Hydro's updated modelled assumptions for Winter 2018-2019 supply adequacy planning; and,
- Hydro's proposed contingency plan to mitigate the consequences of unavailability or unreliability of the LIL for all or part of the upcoming winter.

This report also contains meeting minutes from biweekly meetings held between Hydro, Transition to Operations (TTO), and Power Supply in which expectations of supply and energy

from the LIL in advance of Winter 2018-2019 are discussed. Minutes from these meetings will be provided with each biweekly update report to the Board.

Hydro's Asset Management Strategy Update

As requested by the Board, Hydro is developing a more robust response to Liberty's Recommendation 4 in its August 30, 2018 report.[1] Hydro will provide this complete response, in the form of a report, as part of its next biweekly filing on October 15, 2018.

To provide context for Hydro's September 7, 2018 response, the initiatives previously submitted to the Board were largely identified, documented, and monitored inside of the annual Reliability Improvement Plans for the hydraulic asset class. Hydro identified that additional initiatives for improvement were either complete, in progress, or planned, but had not yet been compiled under the current Reliability Improvement Plan. Therefore, in the third and fourth quarters of 2018, Hydro has undertaken the development of an expanded Reliability Improvement Plan, focused on the three areas of asset management - process, people, and equipment - as associated with organizational actions related to generating equipment asset management. Other asset classes have also utilized Reliability Improvement Plans since 2016; however, in the September 7, 2018 response, Hydro focused on the hydraulic assets to address comments from Liberty. The report which will be submitted on October 15, 2018 will discuss all generating asset classes.

This biweekly update will be an evolving report but its ultimate focus and purpose will be to meet all Board requirements for updates on Hydro's ability to provide reliable supply to customers for Winter 2018-2019.

Should you have any questions, please contact the undersigned.

Yours truly,

NEWFOUNDLAND AND LABRADOR HYDRO

Shirley A. Walsh
Senior Legal Counsel
SAW/sk

cc: Gerard Hayes – Newfoundland Power
Paul Coxworthy – Stewart McKelvey
Denis J. Fleming – Cox & Palmer
Dennis Browne, Q.C. – Brown Fitzgerald Morgan & Avis
Dean Porter – Poole Althouse

ecc: Van Alexopoulos – Iron Ore Company
Senwung Luk – Olthuis Kleer Townshend LLP
Benoît Pepin – Rio Tinto

[1] *The Analysis of Newfoundland Island Interconnected System Power Supply Adequacy for the Winter 2018-19*

Labrador-Island Link In-Service Update

October 1, 2018

A Report to the Board of Commissioners of Public Utilities

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1. Introduction

Hydro closely monitors its supply-related assets and issues to ensure its ability to provide reliable service to customers. The availability of power over the Labrador-Island Link (LIL) for the upcoming winter was identified in previous reports to the Board by both Hydro and Liberty as contributing to supply adequacy in advance of availability of the Muskrat Falls generation supply to the Island. Hydro is working closely with Nalcor's Power Supply leadership [Transition to Operations (TTO), Power Supply Transmission Operations, and the Lower Churchill Project (LCP) Transmission Project] to monitor and mitigate the risks associated with the timing of the in-service of the LIL to supply off-Island capacity and energy to the Island Interconnected System. In each biweekly report, Hydro will also provide an update on supply adequacy for the coming winter with the most up-to-date in-service assumptions of the LIL, as required.

2. In-Service Activities Update

The following outlines the specific critical path activities required for operation of the LIL for Winter 2018-2019,[1] as well as schedule or constraint information for those tasks. As this report is updated on a biweekly basis, information on the key activities and the associated schedule will be provided to inform the Board if any potential supply issues arise from the delivery of those activities.

Appendix A contains minutes from the biweekly meeting[2] held between Hydro and Power Supply, which included discussions on expectations of supply and energy from the LIL for Winter 2018-2019, and specific issues that may affect risks of supply over the LIL for the winter.

[1] This report discusses operational readiness for Winter 2018-2019. The final in-service review of the LIL is undertaken separately with the Board's consultant, Liberty, on a quarterly basis with Transition to Operations (TTO).

[2] The meeting minutes in Appendix A contain two separate meeting dates, as additional time was required in that instance. Going forward this meeting is scheduled to occur once during a biweekly period.

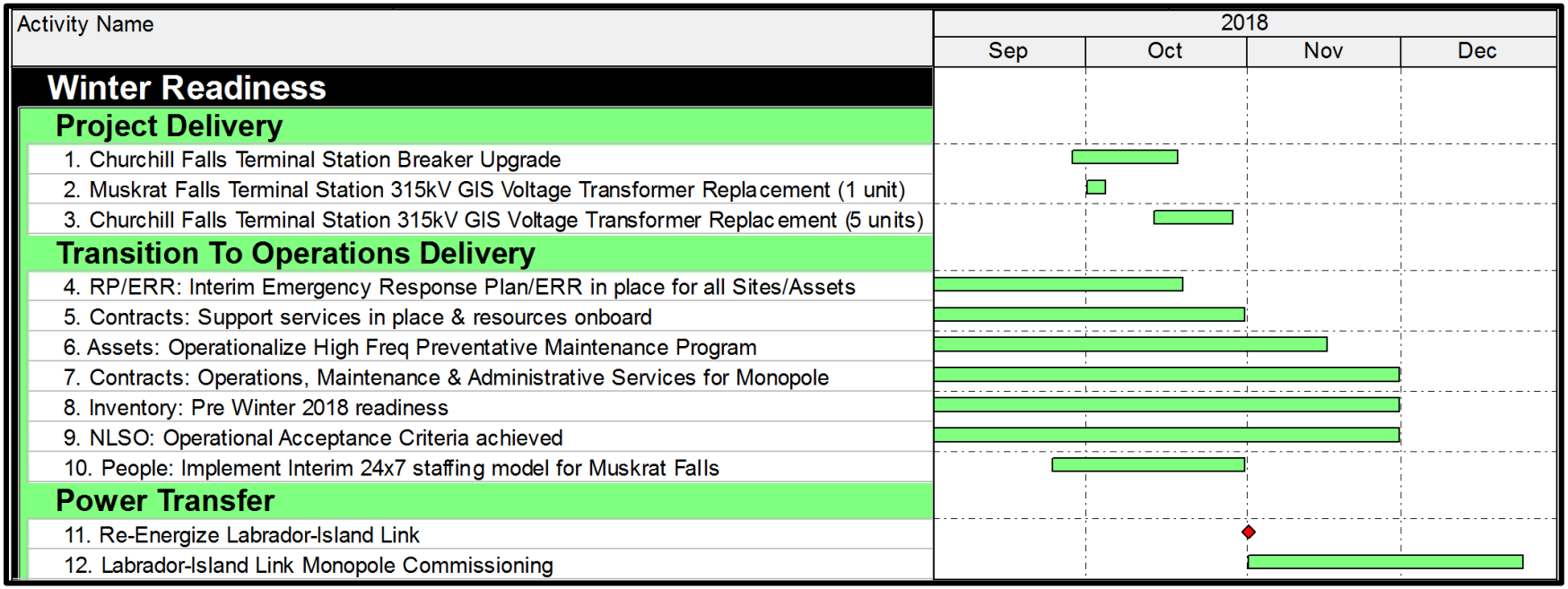

Figure 1: LIL In-Service Critical Path Activities

Project Delivery

Activity 1 – Churchill Falls Breaker Upgrade

Status: On track for mid-October 2018

- The breaker failure protection in the new Churchill Falls terminal station (CFTS2) is being modified to provide greater protection system redundancy. This protection will reduce the risk of a broader system impact if a breaker failed to operate as required. This modification will make the protection in the new Churchill Falls switchyard consistent with what is applied in the existing Churchill Falls switchyard.

Activity 2/3 – 315 kV GIS Voltage Transformer[3] Replacements[4]

Status: On track

- Muskrat Falls replacement planned for October 1-4, 2018, using the spare unit on site.
- Churchill Falls planned replacements will occur from October 14-30, 2018, 5 voltage transformers are currently being manufactured by GE under warranty in France with air freight delivery on schedule for installation by end of October 2018.

Transitions to Operations Delivery

Activity 4 – Emergency Response Plan (ERP)/Emergency Restoration and Recovery (ERR): Interim ERP/ERR in place as required at all sites/assets

Status: On track for mid-October 2018

- All interim ERP/ERR plans are in place. The ERR for the overhead transmission line will have mock trials concluded by mid-October 2018.

[3] 315 kV instrument transformers.

[4] During initial energization activities, some VT's failed. A Root Cause Analysis (RCA) identified poor quality control during assembly, resulting in new VT's manufactured under warranty. Existing VT's are being replaced with new ones to mitigate identified risk of failure. The spare to be utilized at Muskrat has been checked and confirmed to not have the same quality control issue. The quality control issue that required new Voltage Transformers to be manufactured has been addressed.

Activity 5 – Contracts: Support Services in Place and Resources on Board

Status: On track for November 1, 2018 start-up

- The support services contracts are in place with ATCO, GE and Growler. The personnel under the GE Support Services[5] contract for operations remain to be confirmed. These are currently under review and on schedule for completion by the end of October 2018.

Activity 6 – Assets: Operationalize High Frequency Preventative Maintenance Program

Status: On track for November 15, 2018 implementation for remaining scope

- Requirements to support operational maintenance of the HVac stations, HVac transmission lines and HVdc transition compounds are in place. Requirements for the HVdc transmission lines and converter stations are ongoing and are on schedule for completion by mid-November 2018.

Activity 7 – Contracts: Operations, Maintenance, and Administrative Services for Monopole

Status: On track to have required contracts in place for November 30, 2018.

- More than 20 operations, maintenance, and administrative service contracts are in place with two of the remaining three in progress for winter operation and one pending initiation upon the date of General Electric (GE) turn over.

Activity 8 – Inventory: Pre-Winter 2018 Readiness

Status: Completion of inventory on track for November 30, 2018

- The Labrador Transmission Assets (LTA) and the LIL station equipment is currently under contractor custody and care. In preparation for the turn-over of the equipment from the contractors, a listing identifying vendor supplied spares, quantities and their location to service both Nalcor's Labrador and Island asset needs for the coming winter season is being assembled from the contractor's records and contract requirements. Critical spares for the upcoming winter have been identified for most LTA and the LIL assets;

[5] The GE Support contract is independent of the contract for supply, install and construction of the HVdc facilities.

however, the inventory of spares for the converter stations is ongoing. Additional recommended spares required beyond the start-up inventory being identified for procurement. The completion of the start-up inventory quantity and location is on schedule to be completed for the end of November 2018.

Activity 9 – Newfoundland and Labrador System Operator (NLSO): Operational Acceptance Criteria Received

Status: On track for completion by November 30, 2018

- NLSO acceptance criteria, which are required in order for the LIL to be considered under NLSO control, are being addressed with remaining items related to implementation of remaining SCADA controls, completion/testing of redundant telecom paths and documentation on track for completion by November 30, 2018.

Activity 10 – People: Implement Interim 24/7 Staffing Model for Muskrat Falls

Status: On track for November 1, 2018

- An interim 24/7 staffing rotation is now planned for the Muskrat Falls site to support reliable operations during initial startup/operations due to software control limitations. A Staffing Plan, complete with process for implementation, has started.

Power Transfer

Activity 11 – Re-Energize Labrador Island Link

Status: On track for November 1, 2018

- While protection and controls software development and testing are ongoing with GE, the current plan ensures that power transfer can proceed with the current version of software. In the event that a future revision of the software is delivered by GE by end of year, a decision point between Hydro and Power Supply will be required to determine whether the new software will be uploaded. In the coming weeks, Hydro and Power Supply will work together to review the process regarding the decision of implementing

upgraded software, to ensure all parties understand and consider risks of upgrading software.

Activity 12 – Transmission Link Monopole Commissioning

Status: On track

- Power transfer is scheduled to recommence in November 2018 following the voltage transformer outage in Churchill Falls, and will be followed by further dynamic commissioning activity.
- Power Supply and Hydro are working together to operationalize TransGrid (TGS) studies on the LIL loading. These efforts will consider modelling work and commissioning test results to determine required operational parameters for the upcoming winter.

Punch list items are continually being addressed and closed by the project team. While punch list resolution shall continue in an effort to improve system reliability, this effort is not considered critical for power transfer.

As this is the first biweekly report, the discussion on each task will evolve appropriately as the execution of the activities progresses.

3. Key Risks

In addition to the activities described in Section 2, Hydro acknowledges that the as-yet-to-be-demonstrated reliability of the current GE software implementation remains the highest risk to the in-service of the LIL. The Power Supply LCP transmission project team has full-time representation in Stafford, England where the software is being developed and tested. Power Supply leadership also continues to work with GE leadership in an effort to establish an agreed path forward for implementing the required software upgrades for sustained reliable operation.

Dynamic commissioning with power transfer activities are scheduled to re-commence on November 1, 2018 with existing software while testing continues on the upgraded version on the system simulator in Stafford. If the existing software is proven reliable through November 2018, Hydro and Power Supply will evaluate proceeding with a software upgrade or maintaining the existing software version. The upgraded software would be considered only after demonstrated reliable results from the system simulator work.

An additional risk being monitored is the Maritime Link (ML) frequency response to the LIL initiated disturbances once the LIL is in-service. Should the LIL trip at a rate that causes frequent disturbances on neighboring utilities (Nova Scotia Power and New Brunswick Power), the request may be made by neighbouring utilities to take frequency response out of service. If that were to occur, Hydro would consider limiting the LIL to 50 MW deliveries to avoid under-frequency load shed in the event of a LIL trip. If the ML frequency response was turned off, the LIL contribution to the Island's power supply would be similar to a generator, and the reliability of the LIL will be the major factor in the decision on loading level. The NLSO will work with Nova Scotia Power and New Brunswick Power Service Operators to keep them informed of testing plans so as to understand and mitigate the risk from their perspective.

4. Modelled Assumptions

At the time of Hydro's previous response, dated September 7, 2018, Hydro understood that once available, the LIL would be capable of transferring 110 MW at a forced outage rate of 7.5%. Since that time, and in consideration of the Board's reply to Hydro's response, dated September 19, 2018, Hydro has taken a more conservative view, assuming the same transfer capability coupled with a higher forced outage rate of 30%. The following analysis, conducted in the same format as that provided in Hydro's previous response and Near-Term Generation Adequacy Report, provides insight into the expected loss of load and unserved energy for this assumption, as compared to the Conservative Supply Case from Hydro's Near-Term Generation Adequacy Report. These results with the updated 30% forced outage rate are presented in Table 1.

Table 1: Supply Adequacy Modelling Results for Updated Assumptions

EUE[6]

HRD DAFOR	Conservative Supply Case[9]	Holyrood Full Capability[7]			Holyrood Declining Capability[8]		
		LIL = 110 MW	LIL = 55 MW	No LIL[10]	LIL = 110 MW	LIL = 55 MW	No LIL
15%	37	97	139	242	142	204	364
18%	57	146	209	359	202	290	511
20%	74	185	265	453	250	359	626

LOLH

HRD DAFOR	Conservative Supply Case[9]	Holyrood Full Capability[7]			Holyrood Declining Capability[8]		
		LIL = 110 MW	LIL = 55 MW	No LIL[10]	LIL = 110 MW	LIL = 55 MW	No LIL
15%	0.69	1.64	2.36	3.95	2.55	3.66	6.33
18%	1.05	2.40	3.44	5.67	3.52	5.06	8.60
20%	1.34	3.01	4.30	7.04	4.28	6.15	10.35

5. Contingency Plan

In light of the new LIL Winter 2018-2019 transfer assumptions, Hydro has developed a two-phased contingency plan for the coming winter that includes incremental internal and external system support. Phase I of Hydro's contingency plan contains items that can be secured and incorporated into Hydro's base planning assumptions for the upcoming winter operating season. Details and status of items in Phase I of Hydro's contingency plan are contained in Table 2.

[6] LIL FOR is 1% for the Conservative Supply Case only, all other cases include LIL FOR of 30%. EUE criteria is 170 MWh and LOLH criteria is 2.8.

[7] Holyrood Full Capacity 170, 170, 150.

[8] Holyrood declining capacity starts at full capacity in December, declining through the operating season, consistent with behaviour observed during the Winter 2017-2018 Operating Season. Hydro expects the air flow issues that caused the declining performance at Holyrood in Winter 2017-2018 to be materially resolved with the investments completed in 2018. Final testing of the first unit returned to service is being completed week of October 1, 2018. Results will be communicated to the Board via Daily Supply and Demand reports and in this next biweekly report.

[9] Conservative Supply Case results are consistent with those filed in Hydro's Near-Term Generation Adequacy Assessment, filed May 22, 2018.

[10] The variance of results for the no-LIL case as compared to Hydro's Conservative Supply Case with the LIL delay, as filed in the Near-Term Generation Adequacy Report, results from seasonal reporting in this instance versus annual reporting in the previous filing.

Table 2: Phase I of Hydro's Contingency Plan

Item	Description	Incremental System Benefit	Parties Involved	Status	Notes
1	Increase of Capacity Assistance from 90 MW to 110 MW	+20 MW	Hydro, CBPP	Ongoing	In Negotiation.
2	Re-instatement of Capacity Assistance program	+7.6 MW	Hydro, Vale	Ongoing	Term Sheet sent to Vale.
3	Re-instatement of Load Curtailment program	+6 MW	Hydro, Vale	Ongoing	Term Sheet sent to Vale.
4	Voltage Reduction	+20 MW	Hydro, Newfoundland Power	Complete	Hydro has confirmed that it is reasonable to assume availability of 20 MW of Peak Voltage Reduction for the coming winter season. Voltage reduction is forecast on a week-ahead basis by the NLSO.
Potential Incremental System Benefit on peak		**53.6 MW**			

In addition to the items listed in Phase I of Hydro's contingency plan, Hydro has also identified elements that can provide additional system benefit, but will only be enacted if absolutely required. These items form Phase II of Hydro's contingency plan and are detailed in Table 3.

Table 3: Phase II of Hydro's Contingency Plan

Item	Description	Incremental System Benefit	Parties Involved	Status	Notes
5	Increased output of Holyrood GT beyond current base assumption	+10 MW	Hydro	Complete	The ability to increase the capability of the unit is available on a temporary basis subject to atmospheric and system conditions. The GT has been previously safely demonstrated to operate to 134 MW.
6	Temporary increased output of Holyrood Diesels	+1.5 MW	Hydro, Department of Environment	Ongoing	Requires approval of Department of Environment.
Potential Incremental System Benefit on peak		**+11.5 MW**			

1 Table 4 provides the overall impact of implementation of those Items in Table 3, in addition to
2 the items implemented as part of Phase I, as compared to the base case (provided in Table 1).

Table 4: Update of Winter 2018-2019 Supply Adequacy with Hydro's Contingency Plan Implemented

EUE[11]

HRD DAFOR	Holyrood Full Capability[12] LIL = 110 MW	LIL = 55 MW	No LIL	Holyrood Declining Capability[13] LIL = 110 MW	LIL = 55 MW	No LIL
15%	33	68	121	46	97	176
18%	51	104	182	67	140	251
20%	66	133	232	85	175	311

LOLH

HRD DAFOR	Holyrood Full Capability[12] LIL = 110 MW	LIL = 55 MW	No LIL	Holyrood Declining Capability[13] LIL = 110 MW	LIL = 55 MW	No LIL
15%	0.60	1.21	2.09	0.88	1.80	3.19
18%	0.91	1.80	3.06	1.25	2.54	4.43
20%	1.15	2.27	3.84	1.55	3.12	5.40

As evident from the results, implementation of the aspects noted in Hydro's contingency plan result in a material reduction of risk for the coming winter operating season. Hydro continues to conclude all six noted options and will provide updates on status of each as part of its biweekly updates to the Board.

6. Conclusion

Hydro is actively monitoring the availability of supply as it relates to the LIL and how this impacts reliability of the Island Interconnected System for this coming winter. Hydro's existing and newly developed contingency plans described above are progressing in the event that the LIL does not meet the current assumed capacity and reliability parameters.

[11] Includes the LIL FOR of 30%.
[12] Holyrood Full Capacity 170, 170, 150.
[13] Holyrood declining capacity starts at full capacity in December, declining through the operating season, consistent with behaviour observed during the Winter 2017-2018 Operating Season.

Hydro will keep the Board informed on developments related to the anticipated LIL in-service date and any material changes impacting supply adequacy for the Island Interconnected System in its biweekly report.

Appendix A

Meeting Minutes

Meeting Minutes

Purpose	**Discuss LIL In Service**	**Date**	**September 21, 2018, September 24, 2018**
Chair	Jennifer Williams	**Time**	9:30-10:30, 12:30-1:30 pm
Location	Hydro Place	**Minutes Taker**	Meghan Couves
Attendees	Renee Smith (Hydro), Jennifer Williams (Hydro), Meghan Couves (Hydro), Kevin Goulding (NLSO), Walter Parsons (Power Supply), Josh DeCoste (Hydro), Rob Henderson (TTO), Peter DeSouza (TTO), Steve Follet (Power Supply), Shawn Hurley (Power Supply), Chad Wiseman (Power Supply)		

Action Plan			
No.	**Action Item(s)**	**Owner**	**Target Date (DD-MMM-YYYY)**
1	S. Follett and S. Hurley (Project Execution) and P. DeSouza and R. Henderson (TTO) to draft key critical path activities required to reach reliable operation for winter for inclusion in Board reporting. Format to be confirmed.	S. Follett S. Hurley P. DeSouza R. Henderson	26-Sep-2018
2	Compile minimum required Newfoundland and Labrador System Operator (NLSO) operational needs for inclusion in critical path activities.	J. DeCoste K. Goudling NLSO	25-Sep-2018
3	Discussion regarding software and associated reliable operation efforts. Currently commencing power transfer on 1-Nov-2018, with existing software, and continuing testing. If existing software proven reliable through Nov 2018, Hydro and Power Supply will evaluate proceeding with software upgrade or maintaining existing software version. Upgraded software would be considered only after demonstrated reliable results from the system simulator work (RTDS). Power Supply leadership continues to work with GE leadership for continued path forward and Power Supply still has full-time representation in Stafford.	Hydro Power Supply	23-Nov-2018
4	Power Supply and Hydro working together to operationalize TransGrid (TGS) studies on Labrador-Island Link (LIL) loading. These efforts will take modelled findings and test findings during commissioning for determining actual operational parameters for winter.	Power Supply and Hydro (combined group)	First meeting 25-Sep-2018 and continuing
5	Compile assessment of risks of changing to upgraded software package in advance of decision whether to implement new software or not as described above. Will be used in evaluation discussion.	S. Hurley	12-Oct-2018

Please note: If there are any comments or amendments to be made to these meeting minutes, they must be brought to the notice of the Meeting Chair within 24 hours of issue and confirmed in writing.

Meeting Minutes

Action Plan			
No.	**Action Item(s)**	**Owner**	**Target Date (DD-MMM-YYYY)**
6	Additional risk item for winter was noted. Hydro is currently planning to utilize the LIL at 110 MW and with frequency response in service. Should the LIL trip at a rate that causes frequent disturbances on neighboring utilities, the request may be made by neighbouring utilities to take frequency response out of service. If that were to occur, Hydro would likely then decide to limit the LIL to 50 MW deliveries to avoid Underfrequency Load Shedding (UFLS). No action required at this time.	n/a	
7	NLSO will work with Nova Scotia Power Inc. System Operator (NSPI SO) and New Brunswick System Operator (NBSO) to keep them informed of testing plans so as to mitigate and understand the risk from their perspective.	K. Goulding	ongoing
8	No additional high level risks other than software implementation and frequency response item were noted. Critical path activities compiled per Item 1 will be documented and considered for discussion at next meeting if required.	N/A	
9	Current conservative supply assumptions of LIL delivery for winter 110 MW at a 30% forced outage rate. Impact of this set of assumptions to be communicated to the Board in first biweekly report. No change in assumptions required based on this risk discussion. To be confirmed at each biweekly or sooner if new information develops.	R. Smith	01-Oct-2018

Please note: If there are any comments or amendments to be made to these meeting minutes, they must be brought to the notice of the Meeting Chair within 24 hours of issue and confirmed in writing.