

Muskrat Falls Project

Assessment of implementation of
EY Interim Report recommendations

31 August 2017



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31 August 2017

Muskrat Falls Project - Assessment of implementation of EY Interim Report recommendations

Mr. Bown,

EY conducted a review of the Muskrat Falls Project's (the Project) cost, schedule and related risks, and issued an interim report (the Interim Report) dated 8 April 2016. In accordance with a statement of work dated 2 June 2017 between EY and Her Majesty in Right of Newfoundland and Labrador (the Provincial Government), EY was retained to assist the Provincial Government's Oversight Committee (the OC) for the Project in assessing the status of the implementation of the Interim Report's recommendations (the Recommendations).

The field work for this report was completed in July 2017 and consisted of reviewing project data and documentation as well as conducting enquiries and discussions with senior management and representatives of Nalcor Energy (Nalcor), Nalcor's Board of Directors, and the Provincial Government.

We would like to express our appreciation for the cooperation and assistance provided to us by representatives of Nalcor, Nalcor's Board and the OC.

Yours sincerely,

Chartered Professional Accountants

Ernst & Young LLP



Disclaimer

This report is intended solely for the information and use of Her Majesty in Right of Newfoundland and Labrador as represented by the Executive Council and is not intended to be and should not be used by any other parties. In preparing this report, EY relied on information provided by its client and by Nalcor. EY has not audited, reviewed or otherwise attempted to verify the accuracy or completeness of such information. This report has not considered issues relevant to third parties and is subject to certain limitations. We shall have no responsibility whatsoever to any third party that obtains a copy of this report. Any use such a third party may choose to make of this report is entirely at its own risk. We disclaim all responsibility for loss or damage, if any, suffered by any third party as a result of reliance on, decisions made or actions taken based on this report.

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1 Executive summary

- 1.1 In April 2016, EY issued a report to Her Majesty in Right of Newfoundland and Labrador (the Provincial Government) containing its assessment of the reasonableness of the Muskrat Falls Project's (the Project) cost and schedule forecast and identifying opportunities to address any material/critical risks (the Interim Report).
- 1.2 The recommendations in the Interim Report (the Recommendations) included four related to planning and forecasting, contingency and risk management and two related to overall project governance and project reporting.
- 1.3 In accordance with a statement of work dated 2 June 2017 between EY and the Provincial Government, EY was retained to assist the Provincial Government's Oversight Committee for the Project (the OC) in assessing the status of the implementation of the Recommendations (the Engagement).
- 1.4 The Project's most recent cost and schedule forecasts of May 2017 and the draft June 2017 (the June 2017 Forecast) were given due consideration by EY in conducting the Engagement; however, the scope of the Engagement and this Report do not include an assessment of the reasonableness of those or any other forecasts.
- 1.5 EY's assessment of the status of implementation of the Recommendations is as follows:

Recommendation 1: *"the Project should revise its planning and forecasting processes to explicitly include the regular reporting of a fully risk-adjusted final forecast of cost and schedule"*

 - ▶ EY observed substantial progress against this recommendation.
 - ▶ Risks identified by the Project Team are now quantified in terms of contingency allowances and are incorporated into the June 2017 Forecast. An opportunity exists to improve schedule forecasting through additional probabilistic modelling on a monthly basis.
 - ▶ Nalcor Energy (Nalcor) has identified three additional risks for which it does not hold contingency (Additional Risks). The Additional Risks are not included in the June 2017 Forecast, but have been identified and communicated to the OC. They are as follows:
 1. Significant protest unrest
 2. Vegetation and soil removal
 3. Other unforeseen directives from government



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- ▶ Additional Risk 1 is outside the control of the Project Team but may be influenced and mitigated by the actions of government. Additional Risks 2 and 3 are largely dependent on the actions and directives of government.
- ▶ On the understanding that the Additional Risks have been clearly communicated by the Project Team to the OC, the Nalcor Board and the Provincial Government, and that it is known that the realization of any of the Additional Risks would be additive to the June 2017 Forecast, EY considers the treatment of the Additional Risks to be reasonable.

Recommendation 2: *“the Project contingency should make appropriate allowances for all risks, including strategic, at a confidence level reflecting stakeholders’ required cost certainty. EY recommends that consideration be given to the use of a more conservative confidence level for setting Project contingency, based on a thorough risk assessment”*

- ▶ EY observed substantial progress against this recommendation.
- ▶ The Project has changed its confidence level for cost estimates from P(50) to a more conservative P(75).
- ▶ Tactical and strategic risks identified by the Project Team, other than the Additional Risks, are now quantified in terms of contingency allowances and are incorporated into the June 2017 Forecast.

Recommendation 3: *“the sufficiency of the Project contingency should be reviewed quarterly to assess whether it appropriately covers all risks, taking account of the effectiveness of mitigation plans and the likelihood of risks crystallizing”*

- ▶ EY observed a greater degree of diligence in the Project Team’s assessment of risk and the inclusion of risk contingencies in monthly forecasts.
- ▶ The Project Team discusses and updates contingency during monthly meetings, however such reviews lack formality. An opportunity exists to formally document the review process and its outcomes on a quarterly basis.

Recommendation 4: *“there should be separation of the Project contingency into an amount to be managed by the Project Team and an amount to be managed at a higher level of governance”*

- ▶ EY observed substantial progress against this recommendation.
- ▶ Tactical and strategic risks identified by the Project Team, other than the Additional Risks, are now quantified in terms of contingency allowances and are incorporated into the June 2017 Forecast.



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- ▶ Nalcor has identified certain Additional Risks which are not included in the June 2017 Forecast. Nalcor has communicated the Additional Risks to the OC.

Recommendation 5: *“Project governance and independent oversight should be re-evaluated by the Provincial Government and strengthened at the Project, Nalcor Board and Provincial Government levels”*

- ▶ EY observed strengthening of Project governance and independent oversight at the Project, Nalcor Board and Provincial Government levels. An opportunity exists to further strengthen Project governance by implementing an enhanced independent assurance function.

Recommendation 6: *“Project reporting should be enhanced to support senior management focus on key risks and issues, to communicate more clearly how key risks are reflected in the forecast and to enable more effective Provincial Government oversight”*

- ▶ EY observed improvements in the quality of project reporting at the Project Team, Nalcor Board and OC levels; however, additional opportunities exist to standardize and synchronize Project reporting.

1.6 EY observed the following material changes in the Project since the issuance of the Interim Report. These changes have reduced the Project’s risk profile and provide the opportunity for the Project to achieve an improved level of certainty regarding cost and schedule to complete:

- ▶ New appointments to the OC in April 2017 and revised methods of reporting in the public domain. This has improved the effectiveness of the OC;
- ▶ New Nalcor Board of Directors appointed in January 2017 following an interim Board of Directors from June 2016 to January 2017;
- ▶ New Nalcor Chief Executive Officer appointed in June 2016 implemented the following changes at the Project Team level:
 - ▶ June 2016 bifurcation of the Project into separate and distinct work streams, i.e., Generation and Transmission, each of which has its own dedicated leadership and project resources. This has had a positive impact on the management of the Project; however, it requires close day-to-day coordination and dialogue between respective teams and their executive sponsors.
 - ▶ Additional staff have been added to the Project Controls group. This has improved the quality, format and content of management reporting.
 - ▶ The Project Team provides a new suite of monthly/quarterly reports to the Nalcor executive team, Nalcor Board and the OC.



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- ▶ June 2017 re-baselining of cost and schedule forecasts through an updated Quantitative Risk Assessment (QRA) process. This has re-quantified the Project risk universe and identified Additional Risks. This has informed the risk management process and decision making framework within the Project Team; and
- ▶ Progress has been made resolving commercial disputes with major contractors.

1.7 The Project retains a high level of inherent risk for the following reasons:

- ▶ The Project is currently in a period with an expected high planned spend rate;
- ▶ The Project is approaching a period of intensive activity involving many contractors and interfaces between them;
- ▶ The Project is initiating a series of complex and significant activities, e.g., Roller Compacted Concrete North Dam, Balance of Plant installation, Turbine and Generator installation, and High-Voltage Direct Current (HVdc) commissioning; and
- ▶ The approaching winter season presents a challenging environment for the upcoming period of intensive and complex activity.

1.8 In addition to the matters described above, EY observed the following:

Project controls

- ▶ Once a specific risk is completely eliminated, any associated unused contingency is assumed to form part of a general contingency for the use of the Project, rather than being retired. This may result in an overstatement of forecasted costs for the Project.

Governance and oversight

- ▶ The OC and the Nalcor Board each have their own terms of reference, receive bespoke reporting directly from the Project and have their own meeting schedule with the Project Team and Provincial Government. In addition, there are multiple lines of communication to Provincial Government stakeholders. This is inefficient and could result in inconsistent or untimely communications to/from the Provincial Government.
- ▶ Independent assurance activities and related reporting to the Provincial Government related to cost, schedule and risks of the Project require strengthening.



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1.9 The Project, Nalcor and the Provincial Government should maintain a relentless focus on risk management given the Project's high level of inherent risk. In that regard, EY recommends the following:

Project controls

- 1) The Provincial Government and Nalcor should define a process for when and how the Project Team will retire unneeded contingency from cost forecasts.
- 2) The Project Team should perform probabilistic schedule modelling on a monthly basis to better inform decisions regarding schedule management.
- 3) The Project Team should formally document the results of its monthly internal risk modelling analyses on a quarterly basis. In addition, a QRA process involving Westney and other resources should be implemented on a biannual basis and following any event that materially changes the risk profile for the Project.

Governance and oversight

- 4) The Provincial Government and Nalcor should review and, where appropriate, standardize reporting from the Project to the OC and the Nalcor Board as well as synchronize reporting to Provincial Government stakeholders.
- 5) The Provincial Government, through the OC, should implement an enhanced independent assurance function that will conduct regular additional project assurance activities related to cost, schedule and associated risks.

2 Objective and scope

- 2.1 The objective of this Engagement is to assess the status of the implementation of the Recommendations.
- 2.2 The scope of the Engagement is limited to an assessment of the status of the implementation of the Recommendations. This Engagement does not provide an opinion on the reasonableness of the most recent cost and schedule forecasts for the Project, any cost and schedule baseline contained in any Authorization for Expenditure (AFE) issued by Nalcor, or any previous cost and schedule updates.
- 2.3 The Recommendations contained in paragraph 1.6 of the Interim Report are as follows:
1. *“the Project should revise its planning and forecasting processes to explicitly include the regular reporting of a fully risk-adjusted final forecast of cost and schedule”*
 2. *“the Project contingency should make appropriate allowances for all risks, including strategic, at a confidence level reflecting stakeholders’ required cost certainty. EY recommends that consideration be given to the use of a more conservative confidence level for setting Project contingency, based on a thorough risk assessment”*
 3. *“the sufficiency of the Project contingency should be reviewed quarterly to assess whether it appropriately covers all risks, taking account of the effectiveness of mitigation plans and the likelihood of risks crystallizing”*
 4. *“there should be separation of the Project contingency into an amount to be managed by the Project Team and an amount to be managed at a higher level of governance”*
 5. *“Project governance and independent oversight should be re-evaluated by the Provincial Government and strengthened at the Project, Nalcor Board and Provincial Government levels”*
 6. *“Project reporting should be enhanced to support senior management focus on key risks and issues, to communicate more clearly how key risks are reflected in the forecast and to enable more effective Provincial Government oversight”*



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- 2.4 At the commencement of the Engagement, the Project Team advised EY that it was in the process of preparing Project reporting materials for the June 2017 reporting period. These materials contain the Generation AFE5 and Transmission AFE4 re-baselines. Draft versions of the June 2017 Project status report were made available to EY and were given due consideration by EY in conducting the Engagement; however, the scope of the Engagement and this Report do not include an assessment of the reasonableness of those or any other forecasts.
- 2.5 The Project Team and the OC informed EY that changes were being made in the risk analysis and reporting processes used by both Nalcor and the OC. As a result, the Engagement assessed processes and practices as they were being implemented up to the end of the Engagement fieldwork on 20 July 2017.



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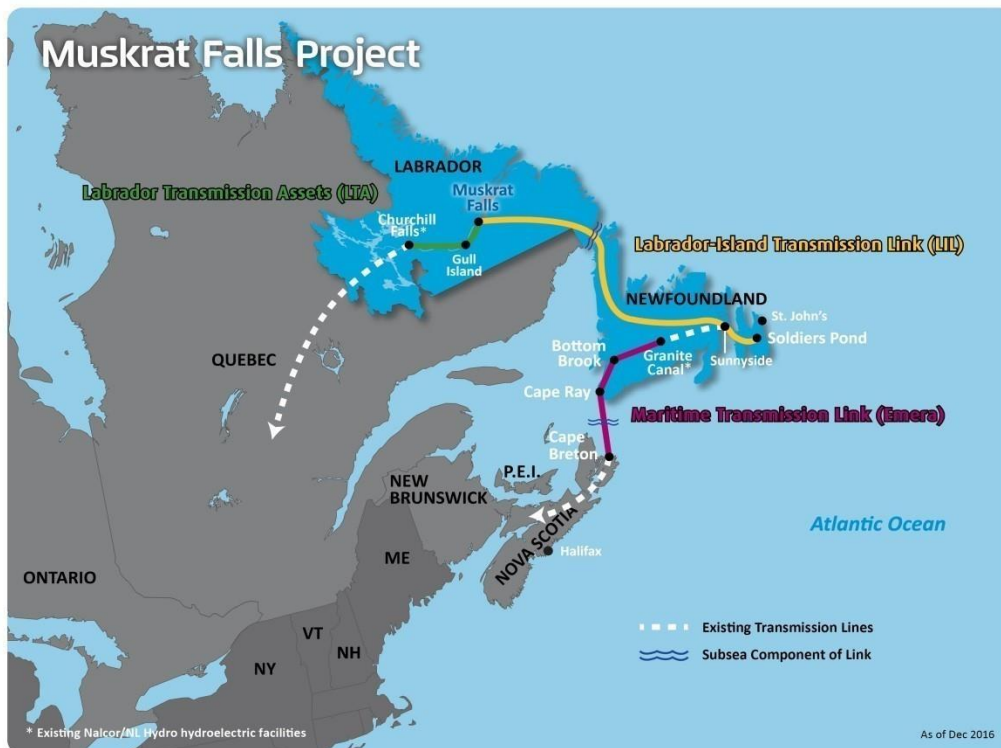
Assessment of implementation of recommendations

3 Project status

Scope

3.1 The Project is intended to help meet the Province of Newfoundland and Labrador's long-term energy needs by providing clean, renewable energy for future generations. The Project covers the design, procurement, manufacture and construction of the following three scopes of work:

- ▶ Labrador Transmission Assets (LTA): a 315-kV High-Voltage Alternating Current (HVac) transmission interconnection from Muskrat Falls to Churchill Falls and HVac switchyards;
- ▶ Labrador Island Transmission Link (LITL): includes a ± 350 -kV HVdc transmission connection from Muskrat Falls to Soldiers Pond (over 1,050 km of transmission line), HVac to HVdc converter stations, shore electrodes, and 30 km of 350-kV HVdc cable crossing at the Strait of Belle Isle; and
- ▶ Muskrat Falls Generation (MFG) Facility: includes 4 x 206-MW (totalling 824-MW) turbine/generators, dams/spillways, river diversion, North Spur stabilization, reservoir, access roads and buildings.





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3.2 The scope of the Project has remained consistent throughout the delivery phase. There have been no major changes in scope since the issuance of the Interim Report in April 2016.

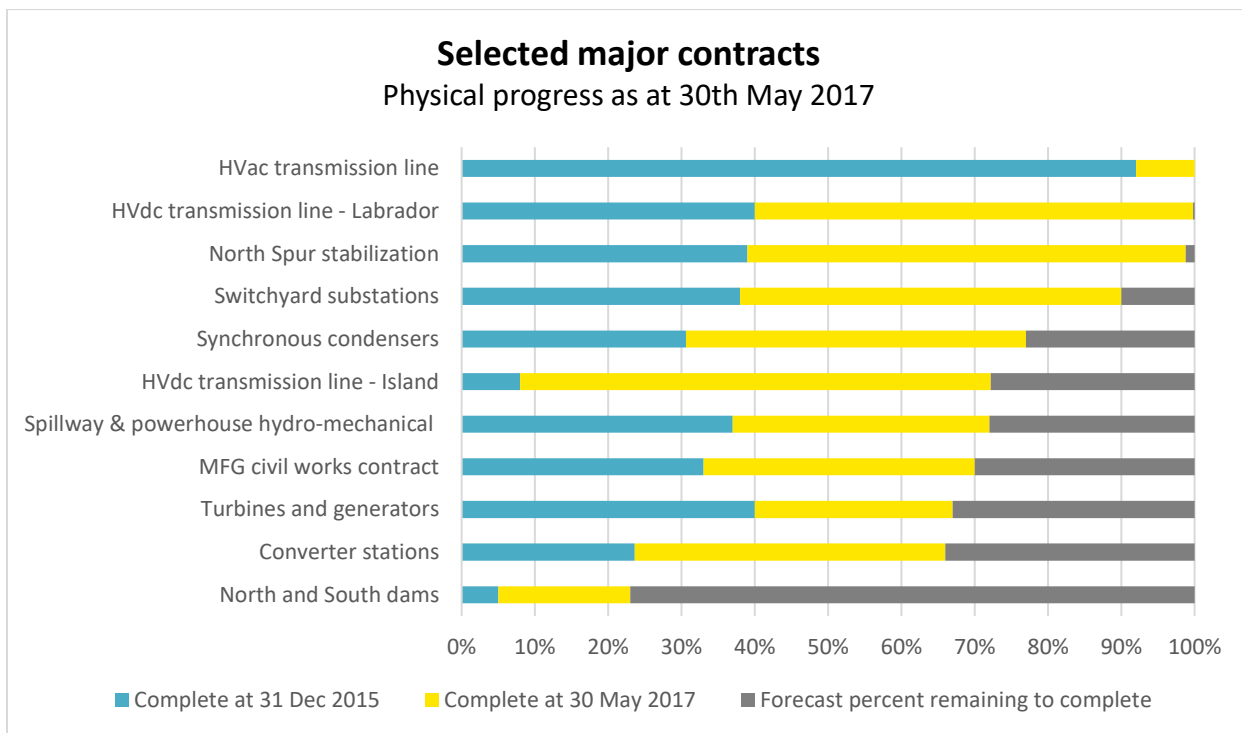
Progress to date

3.3 The Project Team does not report an overall progress percentage encompassing engineering/procurement/construction and commissioning. The main progress metric used is “overall construction/commissioning progress” which the Project Team reported as 78% for the June 2017 reporting cycle as set out in the table below.

	MFG AFE5	LITL AFE4	LTA AFE4	Muskrat Falls Project
Planned Progress	68.1%	87.1%	99.8%	79.5%
Earned Progress	68.7%	83.8%	95.8%	78.0%

As at June 2017 Reporting Period

3.4 The percentages of completion for selected major contracts are presented below:





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Current forecast to complete - cost

3.5 In June 2017, the Project adjusted the approved budget for both the Generation (AFE5) and Transmission (AFE4) sub-projects and increased the final forecast cost (FFC) upwards to \$10,117m. This is an increase of \$720m from the previous planned costs issued in December 2016. These figures exclude financing costs.

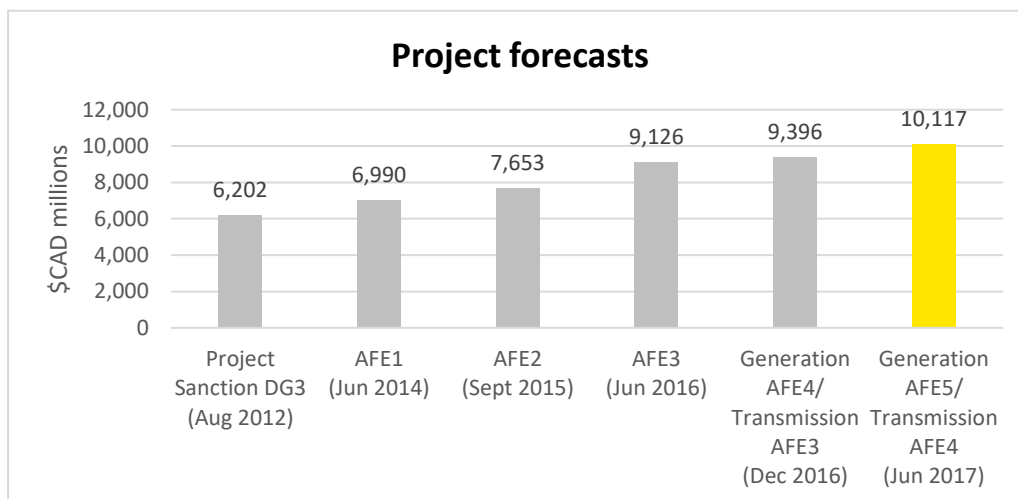
Forecast	Generation AFE5	Transmission AFE4	Muskrat Falls Project
June 2017 FFC	5,500m	4,617m	10,117m

As at June 2017 Reporting Period

3.6 Nalcor reports that the Generation AFE5 and Transmission AFE4 costs increased for the following reasons:

- Inclusion of the remaining value to settle commercial issues with Astaldi resulting from the signing of the completion agreement in February 2017;
- Settlement of claims with the overland transmission contractor due to site access issues and geotechnical conditions in Labrador being more challenging than planned;
- The financial consequences arising from protests and site shutdown during October and November 2016;
- The revised estimate for the Balance of Plant contract; and
- Additional and unplanned work largely related to camp expansion and cofferdam and transmission conductor issues.

3.7 Nalcor has advised that the evolution of the Project's FFC is as follows:





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Current forecast to complete - schedule

3.8 The Project Team is currently reporting the following key milestones for the Project:

Milestone description	Date at project sanction (DG3)	Re-baseline planned June 2016 (Generation AFE4/ Transmission AFE3)	Re-baseline planned June 2017 (Generation AFE5/ Transmission AFE4)	Forecast June 2017
Project sanction	17 Dec 2012	17 Dec 2012	17 Dec 2012	17 Dec 2012
<i>Major transmission milestones</i>				
Ready for power transmission (LTA)	31 May 2017	31 Oct 2017	31 Dec 2017	11 Dec 2017
1 st power transfer (Pole 1)	N/A	N/A	01 Jul 2018	21 Mar 2018
<i>Major generation milestones</i>				
First power from Muskrat Falls	30 Dec 2017	02 Aug 2019	02 Nov 2019	To be confirmed
Full power from Muskrat Falls	22 May 2018	14 May 2020	14 Aug 2020	To be confirmed

From Project Controls Monthly Review Package, June 2017, "Schedule F" Report

4 Approach

- 4.1 EY sought written and oral information from Nalcor and other stakeholders to inform our assessment of the status of the implementation of the Recommendations. Primary sources of information were as follows:
- ▶ The suite of documents provided by Nalcor and used by EY to prepare the Interim Report;
 - ▶ An updated suite of documents provided by Nalcor, current as at the June 2017 reporting cycle;
 - ▶ Interviews with the Project's senior project personnel and delivery team representatives; and
 - ▶ Interviews with Nalcor executives, members of the Nalcor Board, members of the OC and representatives of the Provincial Government.
- 4.2 The Engagement has been based on data and information provided by Nalcor, members of the Nalcor Board, members of the OC and representatives of the Provincial Government. EY has not sought to independently verify the data and information received. EY had direct access to the Project Team; EY did not have direct access to contractors.
- 4.3 EY toured the Project site at Muskrat Falls during the course of the Engagement; however, EY did not conduct any engineering review, physical inspection or validation of construction process.



5 General observations

- 5.1 EY noted improvement in project controls and processes since the issuance of the Interim Report largely as a result of the bifurcation, the change and increase in management personnel, the updated QRA and the outcomes of certain commercial renegotiations.
- 5.2 The Project retains an expected high level of inherent risk for the following reasons:
- ▶ The Project is currently in a period with an expected high planned spend rate;
 - ▶ The Project is approaching a period of intensive activity involving many contractors and interfaces between them;
 - ▶ The Project is initiating a series of complex and significant activities, e.g., Roller Compacted Concrete North Dam, Balance of Plant installation, Turbine and Generator installation, and HVdc commissioning; and
 - ▶ The approaching winter season presents a challenging environment for the upcoming period of intensive and complex activity.
- 5.3 The Project, Nalcor and the Provincial Government will need to maintain a relentless focus on risk management given the Project's high level of inherent risk.

6 Implementation of Recommendations 1, 2, 3 & 4

6.1 Recommendations 1, 2, 3 & 4 address forecasting, risk and contingency management:

- ▶ Recommendation 1: *“the Project should revise its planning and forecasting processes to explicitly include the regular reporting of a fully risk-adjusted final forecast of cost and schedule”*
- ▶ Recommendation 2: *“the Project contingency should make appropriate allowances for all risks, including strategic, at a confidence level reflecting stakeholders’ required cost certainty. EY recommends that consideration be given to the use of a more conservative confidence level for setting Project contingency, based on a thorough risk assessment”*
- ▶ Recommendation 3: *“the sufficiency of the Project contingency should be reviewed quarterly to assess whether it appropriately covers all risks, taking account of the effectiveness of mitigation plans and the likelihood of risks crystallizing”*
- ▶ Recommendation 4: *“there should be separation of the Project contingency into an amount to be managed by the Project Team and an amount to be managed at a higher level of governance”*

6.2 Prior to conducting its June 2017 reporting cycle, the Project Team undertook an exercise to capture all known project risks, including strategic risk, to support a fully risk-adjusted cost and schedule forecast (excluding any adjustments related to the Additional Risks). This exercise addressed identification, measurement and mitigation and has informed cost contingency and float values used in the current cost and schedule forecast.

6.3 The Project’s current cost and schedule forecast is measured against the re-baseline completed in June 2017 (Generation AFE5 and Transmission AFE4) and forms the basis of the revised plan and forecast figures published in the June 2017 reporting cycle. The Project Team advised that this re-baseline included a complete bottom-up QRA by work package, which was facilitated by Westney, Nalcor’s specialist risk consultant.

6.4 The Project now forecasts the impact of risks using Monte Carlo analysis at a P(75) confidence level. This level has been adopted since the issuance of the Interim Report, taking a more conservative view than the P(50) confidence level used in risk modelling for previous AFE updates.



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6.5 The Project Team identified the categories of cost contingency shown in the table below:

Nalcor/Westney Risk Categorization	EY Risk Categorization	Description
Tactical	Tactical (Package Level)	Specific risks identified at the work package level; specific contingency held against a risk within a work package
	Tactical (Project Level)	Specific risks applicable to the whole project; specific contingency held against a risk at project level
Strategic	Strategic (Project Funded)	Risks that are largely out of the control of the project; general contingency held against risk at project level
	Additional Risks (Not Project Funded)	Risks that Nalcor has no ability to influence; and no contingency is held at project level: <ul style="list-style-type: none"> ▶ Significant protest unrest ▶ Vegetation and soil removal ▶ Other unforeseen directives from government

6.6 The sufficiency of the Project's cost and schedule contingency is reviewed at different levels:

- ▶ The QRA model for each sub-project covering cost and schedule contingency is re-run annually, or where there is a major change to the risk profile;
- ▶ The Transmission Project team uses an abbreviated version of the QRA model in its monthly reviews to support its determination of appropriateness of cost contingency and to support monthly forecasting;
- ▶ The Generation Project team supports its determination of appropriateness of cost contingency via internal control reporting and discussion and evaluation at monthly project controls meetings of the cost impact of risks. It uses the output of that discussion to inform its monthly forecasting process; and
- ▶ Both the Generation Project team and the Transmission Project team determine the appropriateness of schedule float via internal control reporting and discussion and evaluation at their monthly project controls meetings.



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- 6.7 Additional Risks, which are not included in the \$10,117m FFC, are as follows:
- ▶ Significant project unrest (e.g., further protests);
 - ▶ Vegetation and soil removal from the reservoir (to mitigate the perceived risk of methyl mercury); and
 - ▶ Other unknown government directives.
- 6.8 The Project Team advised that the QRA risk model will be updated:
- ▶ Annually after the March 2017 update; and
 - ▶ Whenever there is an event causing a major shift in the risk profile of the Project.
- 6.9 The Project Team demonstrated for EY the monthly cost and schedule float forecast review processes that are followed by the Generation Project and Transmission Project teams. EY found that the processes demonstrated are consistent with good practice around active review, management and reporting of risks.
- 6.10 The Project Team advised EY that the Project's plans and processes for project controls management and risk management have changed only minimally since issuance of the Interim Report. They also advised of substantial change in controls at a level of detail beneath project plan level, such as report structures and content and quality of inputs to meetings.
- 6.11 The Project does not have a management reserve to deal with unknown risk or risks categorized as Additional Risks.

Observations specific to Recommendation 1

- 6.12 While the Project has not materially amended its project controls process documents, the performance of this function appears to have improved. The quality of project performance information gathered, reviewed and reported in the re-baseline and monthly reporting working sessions is consistent with good practice. Project performance monitoring, from a schedule perspective, would be enhanced by inclusion of probabilistic schedule modelling in the monthly integrated project schedule.
- 6.13 EY considers the Project to be reporting risk-adjusted cost and schedule information consistent with the Project's known risk universe existing at a given point in time. EY noted certain minor exceptions related to the timing of reporting changes to forecasts resulting from on-going commercial negotiations.
- 6.14 EY observed that the additional management bandwidth available to the Project since the bifurcation appears to have improved the depth and rigour of the project controls function.



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Observations specific to Recommendation 2

- 6.15 The QRA process now considers 100% of the identified risk “universe” for the Project, including strategic risk, and has specifically identified the exclusions, i.e., the Additional Risks. The confidence level has been raised from P(50) to P(75).
- 6.16 The overall risk profile of the Project has been reduced as a result of the following:
- ▶ Construction progress has narrowed the risk profile of activities or eliminated risks entirely;
 - ▶ Project bifurcation has enabled additional resources to be applied to the management of risk;
 - ▶ The completion of an updated risk review, which provided additional context against which to better quantify risks; and
 - ▶ On-going progress in settling commercial disputes with significant contractors.
- 6.17 As identified in section 6.5, there are a number of Additional Risks, which are not included in the Project’s contingency and not covered by Project funding.

Observations specific to Recommendation 3

- 6.18 EY has observed that contingency reporting and control documentation has improved significantly since the issuance of the Interim Report because the Project Team now takes a broader view of project risks, with only the Additional Risks not provided for in the cost forecast. The scoping, usage and forecast drawdown of cost contingency is more visible.
- 6.19 EY observed that the level of rigour around project cost risk analysis has improved, but documentation of schedule float analysis could be improved. The Project Team advised that analysis of schedule float is conducted at the subcontractor level; however, the level of analysis conducted by the Project Controls department requires further clarity.

Observations specific to Recommendation 4

- 6.20 Nalcor has separated the Project contingency into an amount managed within the relevant AFE by the Project Team and has clearly identified Additional Risks, which are not covered by the AFE. This has been communicated to the Nalcor Board and the OC.

7 Implementation of Recommendation 5

7.1 Recommendation 5 addresses project governance:

- ▶ Recommendation 5: *“Project governance and independent oversight should be re-evaluated by the Provincial Government and strengthened at the Project, Nalcor Board and Provincial Government levels”*

7.2 Since the issuance of the Interim Report, the Provincial Government, Nalcor and the Project Team have all implemented organizational and governance changes. Notably:

- ▶ The Provincial Government appointed a new CEO of Nalcor in June 2016;
- ▶ The Provincial Government announced a permanent 11 member Board of Directors of Nalcor in November 2016, replacing an interim Board that served Nalcor from April 2016 until that time;
- ▶ The Provincial Government appointed four additional members to the OC in April 2017, all of whom are independent of the Provincial Government;
- ▶ Nalcor bifurcated the Project in June 2016 into separate and distinct sub-projects, i.e., the Generation Project and the Transmission Project, each of which has its own dedicated leadership and project resources. This has had a positive impact on the management of the Project; however, it requires close day-to-day coordination and dialogue between respective teams and their executive sponsors;
- ▶ Nalcor has reinforced the Transmission Project team with additional project executives, subject matter experts and new management; and
- ▶ The Project Team increased the number of staff employed in the Project Controls group from approximately 44 to approximately 60 (i.e., 36%).

7.3 Project processes have remained largely unchanged, with the following notable exceptions:

- ▶ The content and presentation of performance reporting has improved significantly;
- ▶ The quality of engagement and accountability of project management personnel and project controls personnel with respect to monthly forecast reviews has improved; and
- ▶ More robust adherence to areas of project controls processes because additional resources are available within the project controls function.

7.4 EY observed that the Project Team’s approach to reporting to the OC in recent months has been more regular and consistent and provided a clearer focus on important matters. Project Team members noted a more meaningful and intensive level of questioning from the OC since the appointment of the OC’s independent members.



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- 7.5 Nalcor has a complicated corporate governance structure due to the breadth of its operations. Nalcor has six lines of business, including the Project, which has seven wholly owned subsidiary companies governed by boards of directors with a total of 26 members. The Project comprises the following entities:
- ▶ Lower Churchill Management Corporation (LCMC), provides management services to the Project
 - ▶ Muskrat Falls Corporation (MF Corp)
 - ▶ Labrador Transmission Corporation (Lab Transco)
 - ▶ Labrador Island Link Limited Partnership (LIL LP), a partnership in which LIL Holdco holds 75 Class A Partnership Units and an Emera affiliate holds 25 Class B Partnership Units
 - ▶ Labrador Island Link Limited Holding Corporation (LIL Holdco)
 - ▶ Labrador Island Link General Partner Corporation (LIL GP)
 - ▶ Labrador Island Link Operating Corporation (LIL Opco)
- 7.6 The entities developing the Project are MF Corp, Lab Transco and LIL LP. Each Project entity has its own board of directors, including independent directors, and three to four of each entity's directors also serve on the Nalcor Board.
- 7.7 Since the new CEO and new Nalcor Board have been in place, Nalcor has instituted joint meetings for the board members of all entities. Nalcor advised that approximately 80% of meeting time is allocated for collective review of common information, and the remaining 20% of the time is allocated to entity-specific business. This approach allows the interdependencies between entities to be addressed in real time and significantly reduces the demands on the Project Team related to preparing information for and attending board meetings.
- 7.8 The OC's terms of reference are to provide reliable and transparent oversight on the following key issues associated with the Project and to establish a direct and effective communication channel to Cabinet so that:
- ▶ The Project cost and schedule is well managed;
 - ▶ The Project is meeting the cost and schedule objectives; and
 - ▶ The cost and schedule risks are being reasonably anticipated and managed.
- 7.9 Independent assurance is a good practice for major capital projects. Additional independent assurance activities related to cost, schedule and associated risks would better enable the OC to fulfill its mandate.



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- 7.10 The independent assurance function that has existed to date for the Provincial Government has been limited to EY's report of 29 October 2015 titled "Review of Muskrat Falls Project Cost and Schedule Management Processes and Controls", the Interim Report and this Report (collectively, EY Reports). No other independent assurance procedures in respect of reported Project information have been performed for the benefit of the Provincial Government.
- 7.11 EY compared elements of the Project's current governance model (Current Model) against leading practice governance models (Leading Models) for organizations conducting major capital projects. The results of this comparison, including suggested additions to the Current Model, are outlined below:
- ▶ The Leading Models include a dedicated capital projects committee of the Board. Such a sub-committee would have terms of reference focused on project risks and their potential impact on the organization, and would, as good practice, be comprised of independent directors with knowledge and experience of similar capital projects development and delivery.
 - ▶ The Leading Models include an independent assurance function that contemplates sufficient and appropriate verification is provided on a regular basis (e.g., monthly/quarterly) by a qualified independent third party in respect of project reporting from the Project Team.
 - ▶ The Current Model has a separate oversight committee that operates outside the purview of the Board and reports directly to the shareholder. It is unusual for a shareholder to strike a separate project oversight body that bypasses the board of directors and reports directly to the shareholder.
 - ▶ At present, under the Current Model, independent assurance procedures are not conducted on a regular periodic basis (e.g., monthly/quarterly) and to date have consisted solely of EY's procedures underlying the EY Reports.
- 7.12 Given the current stage of the Project's life cycle, further significant and/or unnecessary changes to its governance structure may have negative implications for the Project. Nevertheless, an enhanced independent assurance function performed by a qualified independent third party on a regular basis (e.g., monthly/quarterly) would better enable the OC to fulfill its mandate and meet the expectations of stakeholders.
- 7.13 The key goal of the independent assurance function is to increase confidence in the validity and accuracy of reporting provided to the project owner and to the public on project progress.



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7.14 Key activities of the enhanced independent assurance function in the context of the Project should include:

- ▶ Assist in the coordination of standardized reporting from the Project to the OC and the Nalcor Board and from those entities to the Provincial Government;
- ▶ Regular independent reviews of project progress, status and risk reporting;
- ▶ Provide assurance of the integrity of critical project processes including ongoing implementation of the recommendations from project review reports;
- ▶ Assist with identification of key project issues, review associated action plans developed by project leadership and provide assurance of the implementation of these action plans;
- ▶ Independent reviews of critical risks and issues to provide a dependable source of information free of biases and filters;
- ▶ Independent review of the reasonableness of any significant update to the Project cost and schedule forecast; and
- ▶ Production of independent reports on a regular basis to communicate the results of the independent assurance activities to the OC, the Provincial Government and the public.

8 Implementation of Recommendation 6

8.1 Recommendation 6 addresses project reporting:

- ▶ Recommendation 6: *“Project reporting should be enhanced to support senior management focus on key risks and issues, to communicate more clearly how key risks are reflected in the forecast and to enable more effective Provincial Government oversight”*

8.2 The Project Team provided EY with a selection of key project reports produced by major subcontractors and Nalcor for internal project use and for reporting to project oversight entities. There are currently ten different reports each with different iterations depending on the intended recipient.

8.3 The Project Team advised that an improved level of data collection and analysis of performance data is being conducted by the Project Controls team, e.g., the re-establishment of the progress baseline document and the use of schedule analytics tools and contingency drawdown curves.

8.4 EY identified the reports being produced by the Project Controls group and mapped the monthly timeline for delivery of these reports to intended recipients.

8.5 EY found improvement in the control and oversight of project performance data and related reporting by the Project Controls team.

8.6 EY found that risks are more clearly communicated to senior project leaders and Project stakeholders than prior to the issuance of the Interim Report. Despite the improvements in reporting, issues remain in the following areas:

- ▶ The timing of the delivery of reports can depend on the schedule upon which the stakeholder group meets. Sometimes the timing of delivery does not serve the needs of the stakeholder group. The Nalcor Board and the OC, in particular, have sometimes received information up to two months out of date;
- ▶ The level of detail provided in some reports may be excessive for an executive level audience; and
- ▶ The Project Team has progressively reduced the number of unique reports sourced from common data, yet a high number of unique reports remain.



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- 8.7 The Provincial Government and Nalcor each require certain information related to the Project. Coordination and rationalization of the timing and content of the required reporting would reduce the administrative burden on the Project Team and improve the consistency and usefulness of information delivered to the various Project stakeholders.



9 Further Recommendations

- 9.1 The Project, Nalcor Board and the Provincial Government should maintain a relentless focus on risk management given the Project's high level of inherent risk. In that regard, EY recommends the following:

Project controls

1. The Provincial Government and Nalcor should define a process for when and how the Project Team will retire unneeded contingency from cost forecasts.
2. The Project Team should perform probabilistic schedule modelling on a monthly basis to better inform decisions regarding schedule management.
3. The Project Team should formally document its monthly internal risk modelling analyses on a quarterly basis. In addition, a QRA process involving Westney and other resources should be implemented on a biannual basis and following any event that materially changes the risk profile for the Project.

Governance and oversight

4. The Provincial Government and Nalcor should review and, where appropriate, standardize reporting from the Project to the OC and the Nalcor Board as well as synchronize reporting to Provincial Government stakeholders.
5. The Provincial Government, through the OC, should implement an enhanced independent assurance function that will conduct regular additional project assurance activities related to cost, schedule and associated risks.



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Glossary of terms

Balance of Plant - supporting components and auxiliary systems required to deliver energy, other than the generating units

Bifurcation - a separation into two parts - the term used to describe the establishment by Nalcor of distinct management teams for the Generation and Transmission sub-projects, which was implemented in June 2016

kV - Kilovolt

MW - Megawatt

P(50) and P(75) - Statistical confidence level of achieving cost and schedule forecasting

Project Team - the Nalcor project management team for the Project

Westney - Westney Consulting Group, a third party hired by Nalcor to conduct project risk analysis for the Project team



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