From: <u>Mullaley, Julia</u>

To: King, Tracy; Myrden, Paul; Brewer, Donna; Bown, Charles W.; English, Tracy; Morris, Paul J.; Jacobs, Heather;

Grandy, Cory; Pelletier, Randy; Mercer, Cluney; Martin, Craig; Khurana, Harman

Subject: Final report and Nalcor Response

Date: Sunday, December 20, 2015 1:25:22 PM

Attachments: Muskrat Falls Project - OC Cost Schedule Review Executive Summary.pdf

LCMC Management Response EY Report Dec 18.pdf

As discussed in our most recent meeting, please find attached the final EY report on the Project Cost and Schedule Management Processes and Controls and the Nalcor response. The intent is to release both to the public tomorrow. Please advise if there are any further questions or comments before tomorrow. Thanks.

Julia

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Dieppe 11 Englehart Street Dieppe, NB E1A 7Y7 Tel: +1 506 853 3097 Fax: +1 506 859 7190

Fredericton 527 Queen Street Suite 110 Fredericton, NB E3B 3T2 Suite 500 Tel: +1 506 455 8181 Fax: +1 506 455 8141

Halifax **RBC Waterside Centre** 1871 Hollis Street Halifax, NS B3J 0C3

Saint John Red Rose Tea Building 5th floor 12 Smythe Street Saint John, NB E2L 5G5 Tel: +1 902 420 1080 Tel: +1 506 634 7000 Fax: +1 902 420 0503 Fax: +1 506 634 2129

St. John's Fortis Place 5 Springdale Street Suite 800 St. John's, NL A1E 0E4 Tel: +1 709 726 2840 Fax: +1 709 726 0345

Ernst & Young LLP Atlantic Canada ev.com

working world

Mr. Craig Martin Assistant Deputy Minister of Finance Muskrat Falls Oversight Committee Government of Newfoundland and Labrador 1st Floor East Block Confederation Building Prince Philip Driveway, P.O. Box 8700 St. John's, NL A1B 4J6

29 October 2015

#### Review of Muskrat Falls Project Cost and Schedule Management Processes and Controls

Dear Mr. Martin,

EY has completed its review of Nalcor's cost and schedule management processes and controls as related to the Muskrat Falls Project ("engagement"). The engagement was performed in accordance with the statement of work dated 9 March 2015 between EY and Her Majesty in Right of Newfoundland and Labrador, and our procedures were limited to those described in that statement of work.

The field work for the engagement was completed in April and May 2015, and consisted of reviewing Project data and documentation, as well as structured interviews with Nalcor personnel. The Project reporting period under review spanned December 2014 to February 2015. The report resulting from our engagement is titled "Review of Muskrat Falls Cost and Schedule Management Processes and Controls" and is provided under this transmittal letter.

The services provided by EY as summarized in this report are advisory in nature. They are intended to provide insight into Nalcor's Cost and Schedule management processes and controls, and related reporting. EY is not rendering an audit, review, examination, or other form of attestation as those terms are defined by the American Institute of Certified Public Accountants or Chartered Professional Accountants Canada.

#### Restrictions on the use of our work product

This report is prepared solely for use of the Government of Newfoundland and Labrador for the purpose of assessing cost and schedule management processes and controls for the Muskrat Falls Project. Ernst & Young LLP specifically disclaims any responsibility to any other party, and disclaims any responsibility for loss incurred through use of the report for any other purpose.

We appreciate the cooperation and assistance provided to us during the course of our work.

Yours very truly,

Ernst & Young LLP

Ernst & Young LLP

Review of Muskrat Falls Project Cost and Schedule Management Processes and Controls

**Executive Summary Report** 

30 October 2015



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# Background

The Government of Newfoundland and Labrador ("Government") has initiated oversight protocols for the Muskrat Falls Project ("Project"), a significant component of the Lower Churchill Project. This included establishing the Muskrat Falls Oversight Committee ("Oversight Committee"), which provides regular Project oversight reports to Cabinet.

The Oversight Committee is accountable to Cabinet for providing reliable and transparent oversight on the cost and schedule performance of the Project. The Oversight Committee is relying on the summary cost and schedule information produced by Nalcor as a key element in performing its mandate.

EY's Major Capital Projects practice was engaged to bring additional experience to assist the Oversight Committee in meeting its mandate. This report presents a summary of the results of EY's review of Nalcor's cost and schedule management processes and controls.

# Review scope

The scope of the review included an assessment of the:

- Adequacy of Nalcor's cost and schedule management processes and controls as it manages and reports on the execution of the Project;
- Consistency of Nalcor's use of those processes and controls in key areas of the Project; and
- Extent of reliance the Oversight Committee could place on Nalcor's management reporting for cost and schedule forecasts.

The field work for the review was completed in April and May 2015, and consisted of reviewing Project data and documentation, as well as structured interviews with Nalcor personnel. The Project reporting period under review spanned December 2014 to February 2015.

A sample of five key contracts (the "Sample") was selected in conducting procedures for this review, whose aggregate value exceeds \$2.3 billion.

This report summarizes the work performed by EY, our key findings and recommendations for the Oversight Committee's consideration. The Oversight Committee has been briefed on these and detailed findings from our review.

This report does not include a management response from Nalcor, as EY has not been engaged by Nalcor. This serves to preserve EY's independent reporting relationship to the Oversight Committee. The intention is that Nalcor will provide their management response directly to the Oversight Committee.

# **Review limitations**

The following areas were excluded from the scope of the review:

• The estimating processes and cost baseline process were not assessed. The Oversight Committee indicated it intended to rely on the results of the DG approval processes (DG2 having been reviewed by MHI Consulting and DG3 having been reviewed by the Independent Engineer) and the approval of the narrow scope cost adjustments in the 30 June 2014 update.



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- The accuracy of the forecasted costs or schedule dates for the contractors or Project as a whole.
- Change Management and Risk Management processes. The Oversight Committee indicated Nalcor's Internal Audit Department are assessing these areas and intends to assess Nalcor's Internal Audit reports for reliance purposes.

The services provided by EY as summarized in this report are advisory in nature. They are intended to provide insight into Nalcor's Cost and Schedule management processes and controls, and related reporting. EY is not rendering an audit, review, examination, or other form of attestation as those terms are defined by the American Institute of Certified Public Accountants or Chartered Professional Accountants Canada.

This report is prepared solely for use of the Government of Newfoundland and Labrador for the purpose of assessing cost and schedule management processes and controls for the Muskrat Falls Project. Ernst & Young LLP specifically disclaims any responsibility to any other party, and disclaims any responsibility for loss incurred through use of the report for any other purpose.

Fuller details of our observation are provided in a supplement to this report. We understand that the distribution of the supplement will be closely controlled as it includes certain commercially sensitive information that might otherwise adversely impact the performance of the project and its cost if this information was released.

# Summary of key findings

The following observations were noted:

- 1. Key project control processes have been developed, including:
  - a. Core project management and control processes for cost and schedule, including the development of an Integrated Program Schedule (IPS) for the program, identification of baseline, committed and incurred costs as well as linkage of cost and schedule baselines to change management processes and controls;
  - b. A Project Execution Plan defining the basis of the schedule and the estimate, and key assumptions supporting Project baseline cost and schedule; and
  - c. Coordination procedures for administration, execution control and management of the contractors' cost and schedule.
- 2. Project reporting summarizes key information on construction cost and schedule, including:
  - a. Schedule forecast and progress leveraging the IPS, including critical path and float review; and
  - b. Cost forecasting, including Estimate To Complete, Estimate At Complete, variances and trends, as well as basic contingency forecasting.
- 3. Nalcor's continued efforts to work with contractors on maintaining a disciplined approach to project management, control and reporting.
- 4. Proactive measures were being taken to manage potential claims.
- 5. Cost and schedule issues and risks arising during the Project were subject to active and formalized management.
- 6. A matrix organizational structure had been established, responsible for managing the Project as a whole. Key roles in this organizational structure had been staffed with resources experienced in cost and schedule management.



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The following observations summarize key aspects of management processes and controls not fully developed and deployed at the time of our review:

## Key schedule management process and control risks and issues

- 1. Certain baseline documents defining contractor schedules as well as the documents defining the control of project schedules were not yet complete.
- 2. Contractors' schedule updates were not being systematically rolled up into the Nalcor Integrated Project Schedule (IPS) that forms the basis of reporting to the Oversight Committee;
- 3. A completion date had not been established for finalizing an integrated baseline of contractor and IPS schedules to correct the issues noted in #1 and #2 above.
- 4. The IPS development and maintenance process is not fully documented.

#### Key cost management process and control risks and issues

- 1. The conditions and processes for rebaselining cost and schedule are not defined in the Project's control processes and procedures. The Oversight Committee's understanding of such conditions and processes is an important foundation, as it conducts its oversight activities.
- Nalcor uses a relatively basic approach to its updating of forecasted contingency requirements
  which in our experience is not consistent with the expected practices for a project of this scale
  and complexity. Given this, it is not clear whether the cost contingency as forecasted in reports
  for the Project will be adequate.
- 3. The Project does not define thresholds for variance management, reporting, and escalation purposes. We would normally expect these to be in place as they assist in giving clear indications of the severity of issues and the need to escalate to key stakeholders, such as the Oversight Committee.
- 4. Fully quantified risks or trends have not been documented for certain significant challenges on the project. The scale of potential challenges is also not quantified in the summary reporting made available to the Oversight Committee.

We recognize that Nalcor is using many conventional management processes and controls for the Project. However, while certain contractor Earned Value data is being collected, Nalcor is not reporting using a full Earned Value Management System across the whole of the project. Reporting on Earned Value performance would however, provide additional useful data and information to the Oversight Committee on both individual contractor and overall Project performance where available.

Until such time as the management process and controls risks and issues identified in this report and the supplement are addressed, the completeness and accuracy of Project cost and schedule status reporting to the Oversight Committee cannot be fully verified.

## Key recommendations

We recommend that the Oversight Committee:

1. Work with Nalcor to obtain management response for each of the findings noted in this report with defined corrective action, responsibility and anticipated completion dates. Given the volume of Project activity (burn), timeliness of action is critical. Therefore, the Oversight



CIMFP Exhibit P-03832
Committee should actively monitor status and verify completion of management response to its expectations.

2. Consider conducting detailed assessments of the cost and schedule status of the Project on an ongoing basis until Nalcor's corrective action addressing key risks and issues noted in this report is complete to the Oversight Committee's satisfaction. This ongoing assessment should include the basis and accuracy of the forecasts for completion at the contractor level, as well as the quantification of cost and schedule risk.



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**Lower Churchill Management Corporation** 

Corporate Office 500 Columbus Drive P.O. Box 12800 St. John's, NL Canada A1B 0C9

December 18, 2015

Ms. Julia Mullaley
Clerk of the Executive Council
Cabinet Secretariat
Government of Newfoundland and Labrador
Confederation Building
St. John's, NL A1B 4J6

Dear Ms. Mullaley:

Re: Review of Muskrat Falls Project Cost and Schedule Management Processes and Controls

Lower Churchill Management Corporation (LCMC) has had an opportunity to review the recent Ernst and Young (E&Y) report commissioned by the Oversight Committee to review the cost and schedule management processes and controls implemented by LCMC for the construction of Muskrat Falls, the Labrador-Island Transmission Link, and the Labrador Transmission Assets.

External reviews are a valuable mechanism to confirm that appropriate practices are being applied and to identify opportunities for further improvement. We look at this review in the same light as previous work commissioned internally by the project team and the feedback provided by the Independent Engineer (IE). We also believe it is important to provide context for such reports, as there is often information and background that provides some additional insight into the rationale for certain project decisions and processes. This letter, in response to the E&Y report, was written from that perspective. The major points outlined by E&Y have been addressed below; they are listed and addressed individually in tables of concordance attached to this letter.



As noted in the report, LCMC has implemented a suite of project control processes for project cost and schedule, a Project Execution Plan, and coordination procedures for administering, controlling, and managing contractors' costs and schedules. Reporting is also issued to provide updates on cost and schedule for the project. The project management controls and processes were developed early in the project development for standard project management oversight within the company. At that time, Nalcor did not design for these materials to be used in a public oversight process. As you will see noted below, Nalcor recognizes the different requirements of internal oversight related to project leadership and decision making versus the requirements of the Oversight Committee and the company will adjust process controls and management to address the needs of the Oversight Committee; in particular, in providing cost and schedule risk reports at a time and level that allows the Committee to identify and quantify project cost and schedule risks.

Contractor management is an important and strategic consideration for the project team, as progress must be monitored, while at the same time avoiding claims arising from directing their activities. We acknowledge that E&Y noted that cost and schedule risks are subject to active and formalized management and that the project team has been staffed with resources experienced in cost and schedule management.

We concur with the key schedule management process and control issues highlighted by E&Y and have been actively working with our contractors to see them addressed.

The baseline documents identified in issue number 1 (baseline schedules and control documents) are contractor deliverables. As contractors are engaged, our approach is to provide feedback and comments so that deficiencies in these documents can be rectified by the applicable contractor before this information is incorporated into the Integrated Project Schedule (IPS). All approved baseline contractor schedules have been incorporated into the schedule, and issues arising from unapproved schedules are being addressed directly by the project team. The noted documentation gaps in the IPS development and management processes have not precluded development and management of the schedule, and they will be closed by year-end 2015.



A decision to re-baseline project cost and schedule is made at the project leadership level and not by the Project Control team. Consequently, it is not in their mandate and therefore not in their process or procedure. However, it is part of the Project Control team processes and procedures to monitor and report cost and schedule performance and provide the necessary management information to project senior management to take necessary action including: contingency drawdown status, comprehensive trend identification, trend analysis, mitigation plans and actions, and potential cost, schedule and quality impacts when appropriate analysis is completed.

Project senior management's decision to re-baseline cost or schedule and seek related Approval for Expenditure (AFE) is an internal project process based on an evaluation of trends in project performance and the underlying risks associated with project execution that remain after mitigation strategies have been implemented.

In response to E&Ys finding that the Oversight Committee's understanding of such conditions and processes is an important foundation as it conducts its oversight activities, Nalcor will add a formal alert process to the regular monthly interface meeting agenda with the Oversight Committee. This will provide a summary of potential emerging vulnerabilities and opportunity trends, associated mitigation activities and a range of potential cost, schedule and quality impacts, provided the necessary analysis has progressed to the point where such impacts can be quantified. In addition, Nalcor will provide the Oversight Committee with an outlook, if and when a re-baseline may occur, and the rationale for such a decision.

In relation to E&Y's comments regarding contingency forecasting, a comprehensive contingency analysis was undertaken at Decision Gate 3 (DG3). Subsequent contingency forecasting is based on an outcome of multiple inputs including actual contractor bids, detailed oversight of the contractor and procurement performance, all summarized into a comprehensive trend analysis process. This process highlights issues and opportunities early, incorporates mitigation activities and assesses potential impacts in the future. The current approach to contingency is both deliberate and planned and intended to drive the project team to control costs within tight limits. We believe it prudent to avoid



excessive contingencies which are reflective of our desire to deliver the project at the lowest possible cost.

E&Y noted that it did not review the project's DG3 documentation. The process used by LCMC to develop the DG3 cost estimate was, however, reviewed by the IE as part of its initial review. The IE noted in its November 2013 report that:

The cost estimating methodology employed by Nalcor utilizes a deterministic approach to calculate the project's direct and indirect costs and a risk-adjusted analytical technique to develop a contingency allocation for defined tactile risks. Finally, a separate escalation analysis has been developed to calculate and fund anticipated changes in forward price levels via an allowance into the capital budget. The IE notes that Nalcor follows standard estimating practices as put forward by the Association for the Advancement of Cost Engineering International (AACEI), including 69R-12, 58R-10, 18R-97, and 17R-97.

The approaches to contingency development contemplated by E&Y were undertaken at project sanction in December 2012. Our current approach, which we believe to be appropriate and prudent at this stage of project development, is to continue to engage in direct discussion on emerging risks and cost pressures and take management action when they have emerged. This discussion will be supported by the regular risk ranging and trend analysis documentation as previously noted.

E&Y has suggested thresholds for variance management, reporting and escalation are not defined and they expect them to be in place to assist in giving a clear indication of the severity of issues and need to escalate to the Oversight Committee. Nalcor has set the threshold for variance on any work as zero. Authority to expend funds beyond the approved amount for any work package does not exist, and additional funds must be acquired through the change control process before additional expenditures can be authorized. That being said, as we noted above, we are adding a process to our Oversight Committee interface which will address this suggestion by clearly indicating the type and severity of issues to the Oversight Committee.



In relation to the note that fully quantified risks or trends may not be documented for certain challenges, we note that the internal project risk management framework captures such risks; however, quantification of risks is a function of many variables and detailed analysis needs to be completed prior to quantification. This obviously takes time and resources and can only be completed when the analysis is reasonably progressed. The trends are assessed on an ongoing basis by project leadership, as indicated by E&Y in their previous comments.

In summary, we believe that continued focus on, and enhanced discussion of project risks that could materially impact cost and schedule, as well as their mitigation strategies, is a valuable and important oversight tool to ensure a rigorous focus on cost and schedule to project completion. While E&Y and the other external organizations that have reviewed LCMC's processes and practices have consistently concluded that appropriate controls for cost and schedule are in place, we appreciate and understand the unique needs of the Oversight Committee and the important role it plays in advising Cabinet and are adjusting our reporting and alert processes with the Oversight Committee as discussed above.

Sincerely,

Gilbert J. Bennett, P. Eng., FCAE

Vice President

cc. Mr. Ed Martin, CEO & President, Nalcor Energy



Table 1 - LCMC RESPONSE TO KEY FINDINGS AND OBSERVATIONS IDENTIFIED BY E&Y	
E&Y Comment	LCMC Response
Key project control processes have been developed, including:	LCMC concurs with these observations.
a. Core project management and control processes for cost and schedule, including the development of an Integrated Program Schedule (IPS) for the program, identification of baseline, committed and incurred costs as well as linkage of cost and schedule baselines to change management processes and controls;	
<ul> <li>b. A Project Execution Plan defining the basis of the schedule and the estimate, and key assumptions supporting Project baseline cost and schedule; and</li> </ul>	
c. Coordination procedures for administration, execution control and management of the contractors' cost and schedule.	

	Table 1 - LCMC RESPONSE TO KEY FINDINGS AND OBSERVATIONS IDENTIFIED BY E&Y	
E&	Y Comment	LCMC Response
2.	Project reporting summarizes key information on construction cost and schedule, including:	LCMC concurs with these observations.
	<ul> <li>a. Schedule forecast and progress leveraging the IPS, including critical path and float review; and</li> </ul>	
	<ul> <li>b. Cost forecasting, including Estimate to Complete, Estimate at Complete, variances and trends, as well as basic contingency forecasting.</li> </ul>	
3.	Nalcor's continued efforts to work with contractors on maintaining a disciplined approach to project management, control and reporting.	LCMC concurs with these observations.
4.	Proactive measures were being taken to manage potential claims.	LCMC concurs with this observation.
5.	Cost and schedule issues and risks arising during the Project were subject to active and formalized management.	LCMC concurs with this observation.

Table 1 - LCMC RESPONSE TO KEY FINDINGS AND OBSERVATIONS IDENTIFIED BY E&Y	
E&Y Comment	LCMC Response
6. A matrix organizational structure had been established, responsible for managing the Project as a whole. Key roles in this organizational structure had been staffed with resources experienced in cost and schedule management.	LCMC concurs with this observation.

Table 2 - LCMC RESPONSE TO KEY SCHEDULE MANAGEMENT PROCESS AND CONTROL RISKS AN	D ISSUES
IDENTIFIED BY E&Y	
E&Y Comment LCMC Response	

1. Certain baseline documents defining contractor schedules as well as the documents defining the control of project schedules were not yet complete.

The baseline documents identified (baseline schedules and control documents) are contractor deliverables. As contractors are engaged, our approach is to provide feedback and comments so that deficiencies in these documents can be rectified by the applicable contractor before this information is incorporated into the **Integrated Project** Schedule (IPS). All approved baseline contractor schedules have been incorporated into the schedule, and issues arising from unapproved schedules are being addressed directly by the project team. The noted documentation gaps in the IPS development and

2. Contractors	6' Please refer to the
schedule updates were not being systematically rolled up into the Nalcor Integrated Project	response to #1
Schedule (IPS) that forms the basis of the reporting to the Oversight Committee.	above.
3. A completion date has not been established for finalizing an integrated baseline of contractor and	Please refer to the
IPS schedules to correct the issues noted in #1 and #2 above.	responses to #1 and
	#2 above.
4. The IPS development and maintenance process is not fully documented.	The level of
	documentation is
	sufficient to maintain
	the IPS; however, any
	documentation gaps
	will be addressed by
	year-end 2015.

Table 3 - LCMC RESPONSE TO KEY COST MANAGEMENT PROCESS AND CONTROL RISKS AND ISSUES	
IDENTIFIED BY E&Y	
E&Y Comment LCMC Response	

# Table 3 - LCMC RESPONSE TO KEY COST MANAGEMENT PROCESS AND CONTROL RISKS AND ISSUES IDENTIFIED BY E&Y

#### **E&Y Comment**

oversight activities.

## The conditions and processes for re-baselining cost and schedule are not defined in the Cost Control processes and procedures. The OC understanding of such conditions and processes

is an important foundation as it conducts its

#### **LCMC** Response

A decision to re-baseline project cost and schedule is made at the project leadership level and not by the Project Control team. Consequently, it is not in the Project Control team's mandate and therefore not in their process or procedure. However, it is part of the Project Control team's processes and procedures to monitor and report cost and schedule performance and provide the necessary management information to project senior management to take necessary action including: contingency draw down status, comprehensive trend identification, trend analysis, mitigation plans and actions, and potential cost, schedule and quality impacts when appropriate analysis is completed. Project senior management's decision to re-baseline cost or schedule and seek related Approval for Expenditure (AFE) is an internal project process based on an evaluation of trends in project performance and the underlying risks associated with project execution that remain after mitigation strategies have been implemented. These processes are designed for internal project utilization, and, in our experience, function well. In response to E&Y's finding that the Oversight Committee understanding of such conditions and processes is an important foundation as it conducts its oversight activities, Nalcor will add a formal alert process to the regular monthly interface meeting agenda with the Oversight Committee. This will include providing a summary of potential emerging vulnerabilities and opportunity trends, associated mitigation activities and a range of potential cost, schedule and quality impacts, provided the necessary analysis has progressed to the point where such impacts can be quantified. In addition, Nalcor will provide the Oversight Committee with an outlook, if and when a re-baseline may occur, and the rationale for such a decision.

	Table 3 - LCMC RESPONSE TO KEY COST MANAGEMENT PROCESS AND CONTROL RISKS AND ISSUES	
	IDENTIFIED BY E&Y	
	E&Y Comment	LCMC Response
2.	Nalcor uses a relatively basic approach to its updating of forecasted contingency requirements, which in our experience is not consistent with the expected practices for a project of this scale and complexity. Given this, it is not clear whether the cost contingency as forecasted in reports for the Project will be adequate.	A comprehensive contingency analysis was undertaken at DG3. Subsequent contingency forecasting is based on an outcome of multiple inputs including actual contractor bids, detailed oversight of the contractor and procurement performance, all summarized into a comprehensive trend analysis process. This process highlights issues and opportunities early, incorporates mitigation activities and assesses potential impacts in the future. The current approach to contingency is both deliberate and planned and intended to drive the project team to control costs within tight limits. We believe it prudent to avoid excessive contingencies which are reflective of our desire to deliver the project at the lowest possible cost.
3.	The Project does not define thresholds for variance management, reporting and escalation purposes. We would normally expect these to be in place as they assist in giving clear indications of the severity of issues and the need to escalate to key stakeholders, such as the OC.	Nalcor has set the threshold for variance on any work as zero. Authority to expend funds beyond the approved amount for any work package does not exist, and additional funds must be acquired through the change control process before additional expenditures can be authorized. That being said, as we noted above, we are adding a process to our Oversight Committee interface which will address this suggestion by clearly indicating the type and severity of issues to the Oversight Committee.

Table 3 - LCMC RESPONSE TO KEY COST MANAGEMENT PROCESS AND CONTROL RISKS AND ISSUES	
IDENTIFIED BY E&Y	
E&Y Comment	LCMC Response
4. Fully quantified risks or trends have not been documented for certain significant challenges on the project. The scale of potential challenges is also not quantified in the summary reporting made available to the Oversight Committee.	The internal project risk management framework captures such risks; however, quantification of risks is a function of many variables and detailed analysis needs to be completed prior to quantification. This takes time and resources and can only be completed when the analysis is reasonably progressed. The trends are assessed on an ongoing basis by project leadership, as indicated by E&Y in their previous comments. The scale of potential challenges will be addressed in the process we are adding to the Oversight Committee interface.