

May 2017 Briefing to CEO and EVP AFE Rev 5 MF \$5.5B Project \$10.1B

This briefing was as result of the 2017 QRA by Westney Consulting Group.

This QRA was a P75 number from the previous AFE Rev 4 of \$5.071B

The increase of \$429M was notified as follows:

- Project unrest \$270M (previously identified in Dec 2016 but full cost impact now included)
- Project delay \$220M with \$120M included in AFE rev 4 (previously identified in Dec 2016 with Astaldi Agreement , however full cost impact now included)
- Project Change \$180M however \$130M was already included in AFE 4
- EXCLUDED were any costs associated with Government directives and further project unrest .

Range of potential costs for strategic risks were identified but not included in the AFE as follows:

- Additional risk including increased negative external impacts such as further protests, loss of key personnel and potential weather issues would increase the P75 cost to \$6.0B.
- Unprecedented risk in reservoir clearing to remove the soil would increase the P75 cost to \$7.5B.

This section includes the meeting call with the CEO and EVP plus some other meetings to discuss timing and schedule for informing of stakeholders and shareholder.



[Hide Details](#)

LCP Schedule / Cost Update - Timing / Schedule

Mon 05/29/2017 12:30 PM - 1:30

PM

Attendance is **required** for Paul Harrington

Chair: **Auburn Warren/NLHydro**

Rooms: LVL6BRD1/Hydro Place@NLHydro

No Location Information

	This entry has an alarm. The alarm will go off 5 minutes before the entry starts.
Required:	Dave Jones/NLHydro@NLHYDRO, Deanne Fisher/NLHydro@NLHYDRO, Derrick Sturge/NLHydro@NLHydro, Elizabeth Lewis/NLHydro@NLHydro, Gilbert Bennett/NLHydro@NLHydro, Greg Fleming/NLHydro@NLHYDRO, James

Description

Hi everyone,

Spoke with Stan on getting this team together to discuss the following with respect to upcoming cost update:

1. Updated dates to be used in update / model (Transmission / Generation by unit / full commissioning)
2. Level of Labrador energy anticipated to be able to flow through transmission by month to determine pre-commissioning revenue available for mitigation
3. Overview of timing of deliverables for necessary shareholder / board / Canada (IE) approvals and public announcement

Thanks
Auburn

Personal Notes



Muskrat Falls Monthly Update

Thu 05/18/2017 2:00 PM - 3:00 PM (Repeats)

[Hide Details](#)

Attendance is **required** for Paul Harrington

Chair: **Cathy Ghaney/NLHydro**

Rooms: **LVL6BRD1/Hydro Place@NLHydro**

No Location Information



This entry has an alarm. The alarm will go off 5 minutes before the entry starts.

Required:	Gilbert Bennett/NLHydro@NLHydro, Lance Clarke/NLHydro@NLHydro, Paul Harrington/NLHydro@NLHydro, Stan Marshall/NLHydro@NLHYDRO
Repeats:	This entry repeats <input checked="" type="checkbox"/> View Dates

Description

*Meeting w/ CEO to Brief
CEO/AVP of P75 QPA
REOURS.*

Personal Notes



Westney
Consulting Group

PRESENTED TO CEO
18 May 2017.
+ SPREADSHEET.

Lower Churchill Project

Muskrat Falls Generation - Updated Risk Assessment

Discussion document

May 2017

PRIVILEGED AND CONFIDENTIAL IN CONTEMPLATION OF LITIGATION

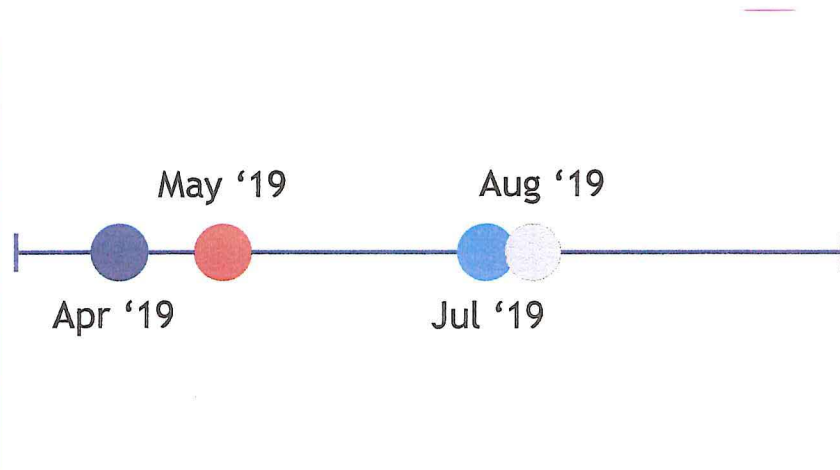
Predictive schedule ranges show slight improvement

● Current schedule
 ● Current forecast
 ● Bottom of Predictive Range (P25)
 ● Top of Predictive Range (P75)

Range of outcomes

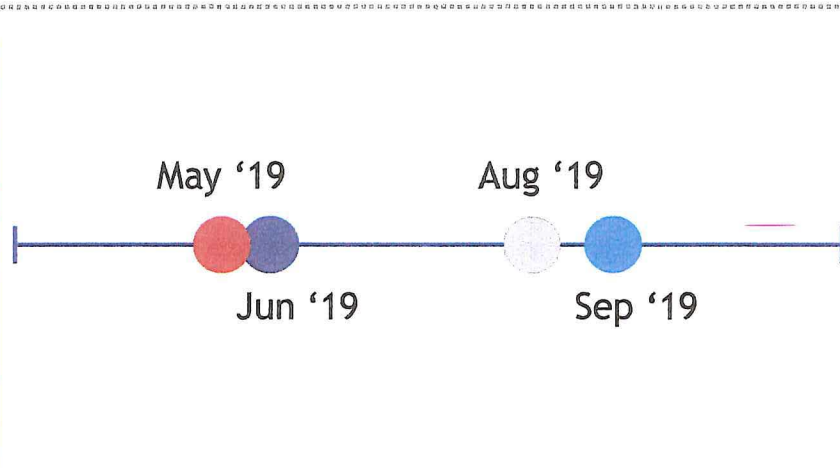
Details

Schedule for first power



- Good progress by Astaldi since last summer and positive readiness review of progress potential, improves confidence in First Power date despite delays from protest last Fall.

Schedule for first power Andritz lag not changed



- A month or more in First Power can be saved by negotiating the removal of a lag creating by Andritz planning to install the intake gates sequentially as opposed to a shorter schedule if installed in more parallel mode

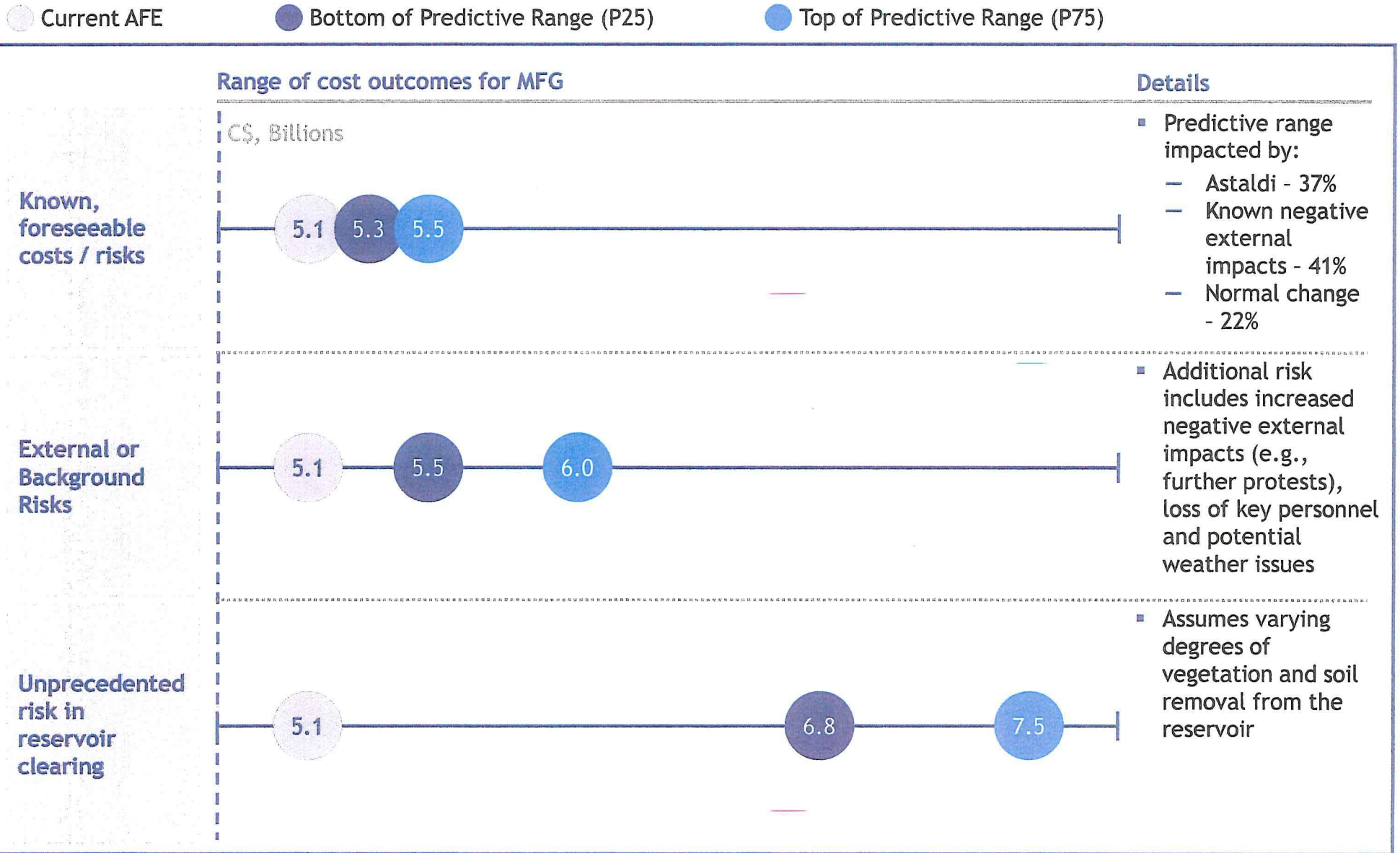
Impact of contingency will likely increase cost for MFG to approximately C\$5.5 billion at P75

Category	Mean impact C\$ Millions	Best case-worst case C\$ Millions	Details
Un-risked cost (AFE Rev. 4)		5,071 -235 (contingency) 4,836	<ul style="list-style-type: none"> Includes direct cost of Astaldi agreement Excludes full indirect impact of Astaldi and contingency
Astaldi impact (schedule delay)		130 - 280	<ul style="list-style-type: none"> Captures time extension and resequencing impact on other key contractors (e.g., Andritz)
Known negative external impacts		150 - 300	<ul style="list-style-type: none"> Includes risk aversion of contractors (e.g., unwillingness to accept productivity risk, opportunistic claims)
Normal project change		50 - 190	<ul style="list-style-type: none"> Regular change allowance for this stage of the project
P25 to P75 Cost including calculated contingency		5,290 - 5,500	

An additional C\$100-C\$500 may be required to address external or background risks to the project

External risks	Mean impact C\$ Millions	Best case-worst case C\$ Millions	Details
Extended site shutdown	160	0 - 300	<ul style="list-style-type: none"> Includes impact of additional protests up to ~2 month site shutdown
Additional negative external impacts	110	10 - 200	<ul style="list-style-type: none"> Includes additional contractor apathy (e.g., claims, lower productivity), project team distraction and potential turnover of key project leadership
Other risks	80	0 - 150	<ul style="list-style-type: none"> Includes impact of weather (e.g., flooding) or other catastrophic events (e.g., cofferdam failure, fire)
Additional risk excluding known contingency (P25 to P75)		140 - 520	

Range of potential cost outcomes for MFG driven by the impact of various risks



Disclaimer

The analysis in this report was developed by Westney Consulting Group (Westney) in concert with the project team using project documents and interviews.

Westney has had varying levels of involvement on this project since 2008, providing us with good general knowledge of the project.

For probabilistic analysis, the Westney Risk Resolution® process and proprietary distributions were used.

Any expressed opinions or recommendations expressed by Westney herein are the product of the experience of the Westney consultant(s) and are provided as input and information for decisions; any reliance upon or decisions made from the information is the sole judgment/ decision of the user of the information.

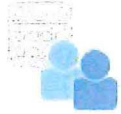
Risk Resolution

Muskrat Falls Cost-Risk Ranging

Risk Description	AFE Rev. 4	Best Case	Worst Case
Construction of Intake, Powerhouse, Spillway and Trans. Dams	1,900.5	1,913.5	1,933.5
Construction of North and South Dams	302.3	392.8	453.4
Supply and Install Turbines and Generators	221.5	230.0	260.0
Supply and Install Balance of Plant	228.8	260.0	300.0
Supply and Install Powerhouse Hydro-mechanical equipment	246.6	278.0	320.0
MFG Camp Expansion	0.0	10.8	11.8
Site Services	385.5	433.6	521.2
Owner Cost / Vehicles / Helicopter / Feasibility eng. / Etc.	640.7	739.4	784.4
Project Insurance	8.3	23.3	24.3
All Other Packages	901.4	884.8	919.0
Contingency	235.8	0.0	0.0
Total MFG	5,071.4	5,166.3	5,527.7

Best Case Over AFE	Worst Case Over AFE	Notes	Westney P75
13.0	33.0	• 13M-33M growth allowance for regular project change and interface.	
90.5	151.1	• 27M-28M for U/S cofferdam repair • 14M-30M schedule impact due to Astaldi • 50M-76M labour productivity • 0M-17M regular project change and interface	
8.5	38.5	• 8M-15M extension of time EOT due to Astaldi • 0M-15M project negativity (claims) • 0M-8M regular project change and interface	
31.2	71.2	• 20M-55M pricing due to project negativity • 11M-16M regular project change and interface	
31.4	73.4	• 10M-37M overall project negativity • 22M-28M extension of time due to Astaldi • 0M-8M regular project change and interface	
10.8	11.8	New commitment package due to Astaldi delays to expand existing accommodations.	
48.1	135.6	March to Sep 2020 and to support scope packages (Astaldi delay)	
98.7	143.7	March to Sep 2020 and to support scope packages (Astaldi delay)	
15.0	16.0	15M-16M additional (75% due to extension of time due to Astaldi and 25% due to overall cost increase)	
-16.6	17.7		
-235.8	-235.8		
94.9	456.3		5,500.0

428.6



**Cost Update messaging call 8772164736 code 7619917943
Calendar Entry**

**Wed 05/17/2017 11:30 AM - 12:30
PM**

Location: TBN - worst case - my office- lunch will be provided

Required:	George Chehab/NLHydro@NLHYDRO, Gilbert Bennett/NLHydro@NLHydro, James Meaney/NLHydro@NLHYDRO, Lance Clarke/NLHydro@NLHydro, Tanya Power/NLHydro@NLHYDRO
Optional:	Derrick Sturge/NLHydro@NLHydro
FYI:	Trina LeRoux/LCP/NLHydro@NLHYDRO

Description

AFE Rev 5 – Muskrat Falls Generation (MFG)

May 18, 2017

Boundless Energy



Site \$/month

Project Unrest (already publicly stated)

Total cost impact:	\$270M
Included in June 2016 AFE contingency:	\$0M
Additional Budget Required:	\$270M

- Market Impact on Contractor claims, ie. Andritz (forecasted – contains risk)
- Market Impact on Balance of Plant Award (including productivity – forecasted – contains risk)
- Other Labour Productivity Impacts – Dams (some has already occurred) [forecasted]

Site Services and Owner's Cost (forecasted)

- Contingency allowance for additional 3 months of Site Services and Owner's Cost (staffing)
- Extension of insurance policies
- MF Camp Expansion (*incurred*).

- Impacts on River Impoundment execution strategy and schedule (already occurred)

- Direct site disruption costs (already occurred)

Project Delay (already publicly stated)

<i>Total cost impact:</i>	<i>\$220M</i>
<i>Included in June 2016 AFE contingency:</i>	<i>\$120M</i>
<i>Additional Budget Required:</i>	<i>\$100M</i>

Site Services and Owner's Cost

- *Contingency allowance for additional 3 months of Site Services and Owner's Cost (staffing) [forecasted]*
- *Extension of insurance policies (forecasted)*
- *MF Camp Expansion (already done)*

Knock-on impacts/claims from other contractors

- *Budget and contingency allowance for settlement of claims received subsequent to June 2016, Dams, Turbines, Gates (extremely sensitive commercially) [forecasted – contains risk]*

'Normal' Scope Change (\$50-60M)

<i>Total cost impact:</i>	<i>\$180M</i>
<i>Included in June 2016 AFE contingency:</i>	<i>\$130M</i>
<i>Additional Budget Required:</i>	<i>\$50M</i>

- *Cofferdam Repairs and Protection Works (25 – 30m) [already done]*
- *Contingency for future scope changes; all packages (forecasted)*

Sharing our ideas in an open and supportive manner to achieve excellence.

Teamwork

Open Communication

Fostering an environment where information moves freely in a timely manner.

Honesty and Trust

Being sincere in everything we say and do.

Relentless commitment to protecting ourselves, our colleagues, and our community.

Respect and Dignity

Appreciating the individuality of others by our words and actions.

Safety

Leadership

Empowering individuals to help, guide and inspire others.

Holding ourselves responsible for our actions and performance.

Accountability