Lower Churchill Project

Muskrat Falls Generation - Updated Risk Assessment

DRAFT

Discussion Document

June 2018

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Summary for Muskrat Falls Generation (MFG)

Westney Consulting Group (Westney), assisted by the LCMC project team, completed a risk-adjusted view of cost and schedule for Muskrat Falls Generation (MFG).

- Cost predictive range (P25 – P75), including known items, is C$5.44 to C$5.67 billion compared to the current AFE of C$5.50 billion
- Schedule predictive range (P25 – P75) for first power is July to October 2019, compared to a project team forecast of November 2019

Cost-risk remains.

- The P75 cost outcome, including known items, has increased primarily due to factors outside of the project team's control (e.g., government directives, judicial inquiry, wetland capping)
- External risks (e.g., additional minimum wetland capping, site shutdown due to protest) could add another C$200 million
- Cost outcomes do not consider the impact of any reservoir clearing

As indicated in the schedule ranges above, there is a high degree of confidence that First Power will be delivered in 2019.

- Predictive range shown assumes that intake gate schedule acceleration is pursued
- If it is not pursued, an additional ~2 months is added to the predictive range, putting first power at risk for 2019

Several mitigations are required to reduce risk-exposure.

- Continue monitoring Astaldi's (package CH0007) financial position and be prepared act expeditiously
- Ensure commercial/contractual arrangements are completed to adjust current intake gate schedule to align with impoundment and First Power target
- Continue focus on integration/interface management across contractors in the powerhouse

An updated, risk-adjusted view of cost and schedule was requested for the Lower Churchill Project (LCP) for 2018

Background

- LCMC is in the construction phase of the Lower Churchill Project, which includes Muskrat Falls Generation (MFG), Labrador Transmission Assets (LTA), and Labrador Island Transmission Link (LITL)
- Westney Consulting Group (Westney) has completed cost and schedule risk analyses at several Lower Churchill Project milestones
- An updated cost and schedule analysis was requested to understand how the potential cost and schedule outcomes have evolved

Objectives

Westney, in conjunction with LCMC, was tasked to:

1. Develop a cost-risk analysis for the MFG, LTA, and LITL sub-projects, including identification and quantification of risks most likely to affect the projects
2. Develop a time-risk analysis for MFG
3. Identify and recommend potential mitigations to identified risks, as appropriate

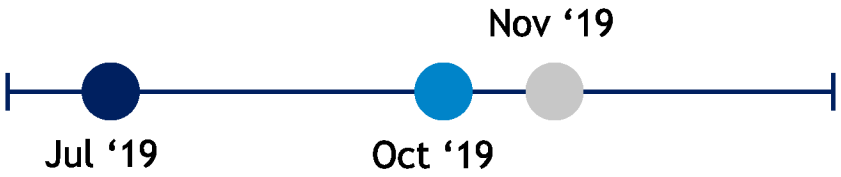
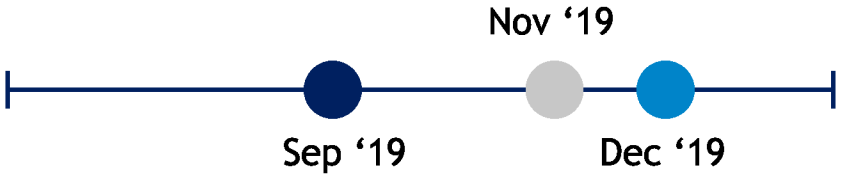
This report covers the MFG portion of the Lower Churchill Project only. The LTA/LITL portion is covered in a separate report.

MFG project status

	Details
Focus of 2017 analysis	▪ The 2017 quantitative risk analysis focused primarily on the secondary impacts of the delay of the main civil works contractor, Astaldi (package CH0007), as well as the impacts of project unrest (e.g., contractor claims, site disruption)
2017 accomplishments and key events	▪ Overall construction progress to-date on MFG reached ~81% at the end of April 2018, representing an ~20% increase in the past 13 months ▪ Key 2017 accomplishments include: – Achievement of target concrete placement volumes by Astaldi – Powerhouse enclosed / intake 1 structure completed – South Dam completed / North RCC Dam 57% completed – Unit 1 T&G embedments installation completed – Intake gate manufacturing completed / Draft tube embedments commenced / BOP contract awarded – North Spur scope completed – Continued implementation of methyl mercury program ▪ Judicial inquiry called
Key remaining activities impacting 2018 analysis	▪ Judicial inquiry and associated forensic audit ▪ Methyl mercury remediation – IEAC Recommendations / Gov't. directives ▪ Contractor performance on powerhouse civil construction, T&G installation, BOP scope, intake and draft tube guides and gates installation, North Dam completion ▪ Target "ready to impound" date of early 2019

Expected cost likely to increase to ~C$5.67 billion at P75; Predictive schedule range confirms First Power of Nov 2019 is achievable

Current AFE/schedule Bottom of Predictive Range (P25) Top of Predictive Range (P75)

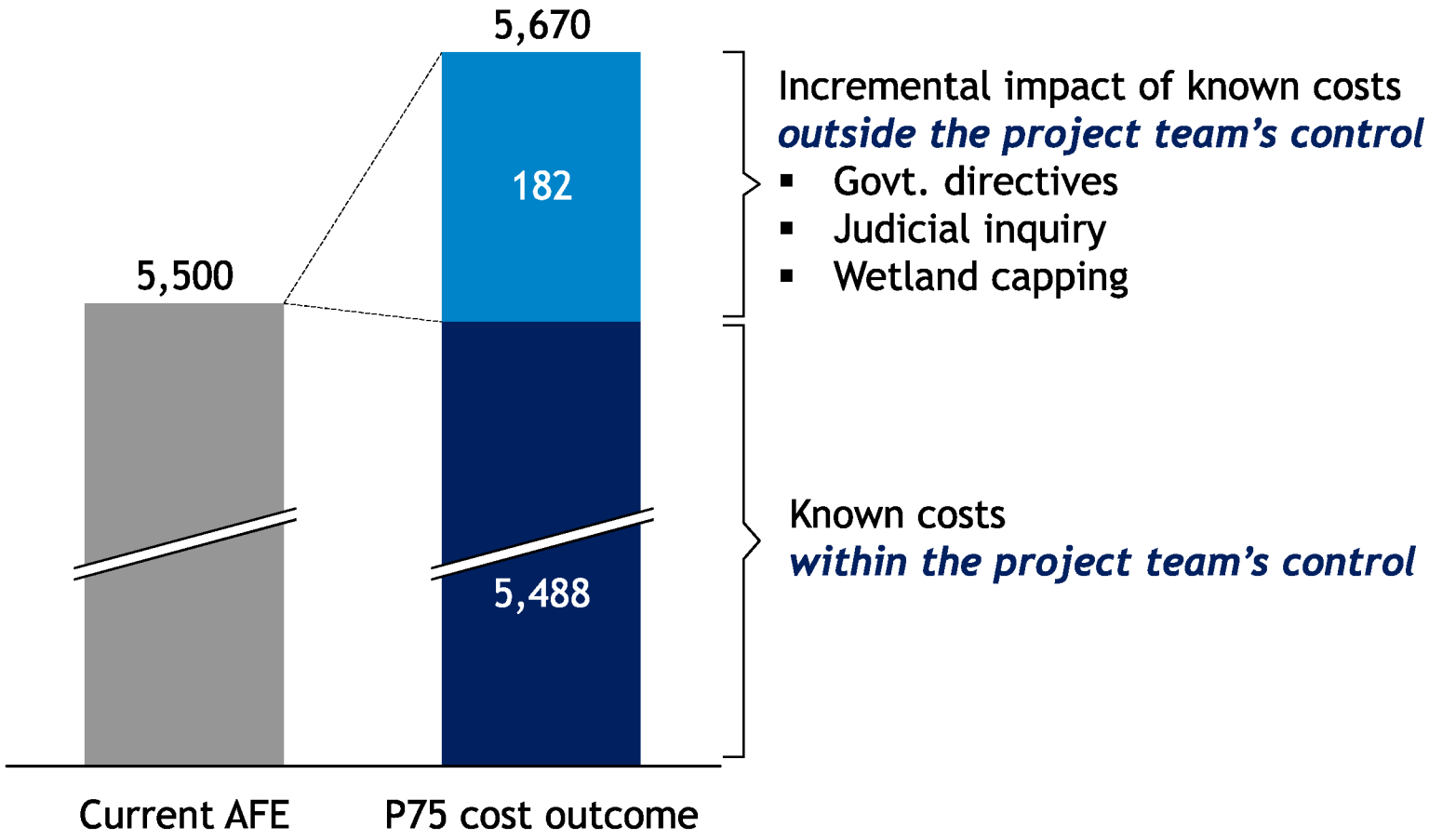
	Range of outcomes	Details
Expected cost including known items (excluding external risks)		▪ MFG expected project cost is C$5.67 billion (P75 cost outcome has increased due to factors outside the project team's control) ▪ External risks could add C$200 million more (above the C$5.67 billion)
Schedule for First Power (assuming accelerated intakes)[1]		▪ Assumes intake gate work is accelerated, putting T&G unit 1 installation on the critical path ▪ Includes potential delay due to judicial inquiry and/or wetland capping impact
Schedule for First Power (without accelerated intakes)		▪ Without intake gate acceleration, civil construction for units 3 and 4 and hydromechanical installation is on the critical path ▪ Includes potential delay due to judicial inquiry and/or wetland capping impact

1 Corresponds to the time-risk model shown in the Appendix

MFG expected project cost inclusive of all known cost impacts is C$5.67 billion (P75 cost outcome)

Cost outcomes for MFG

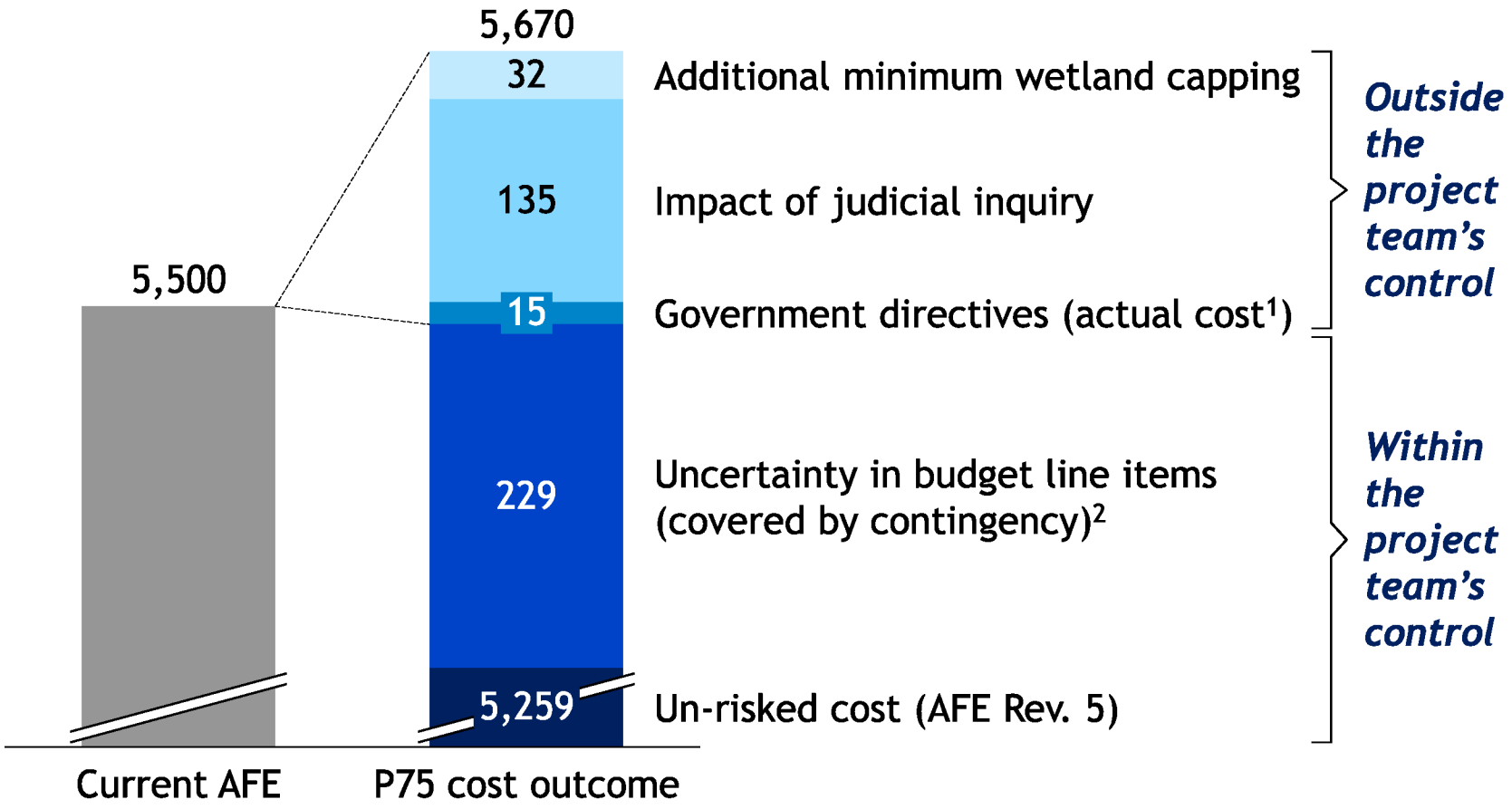
C$ Millions



Known costs outside of the project team's control include wetland capping and impact of the judicial inquiry

Cost outcomes for MFG

C$ Millions



1 Actual costs incurred since 2017 QRA

2 Does not include potential opportunity to accelerate T&G installation

Westney

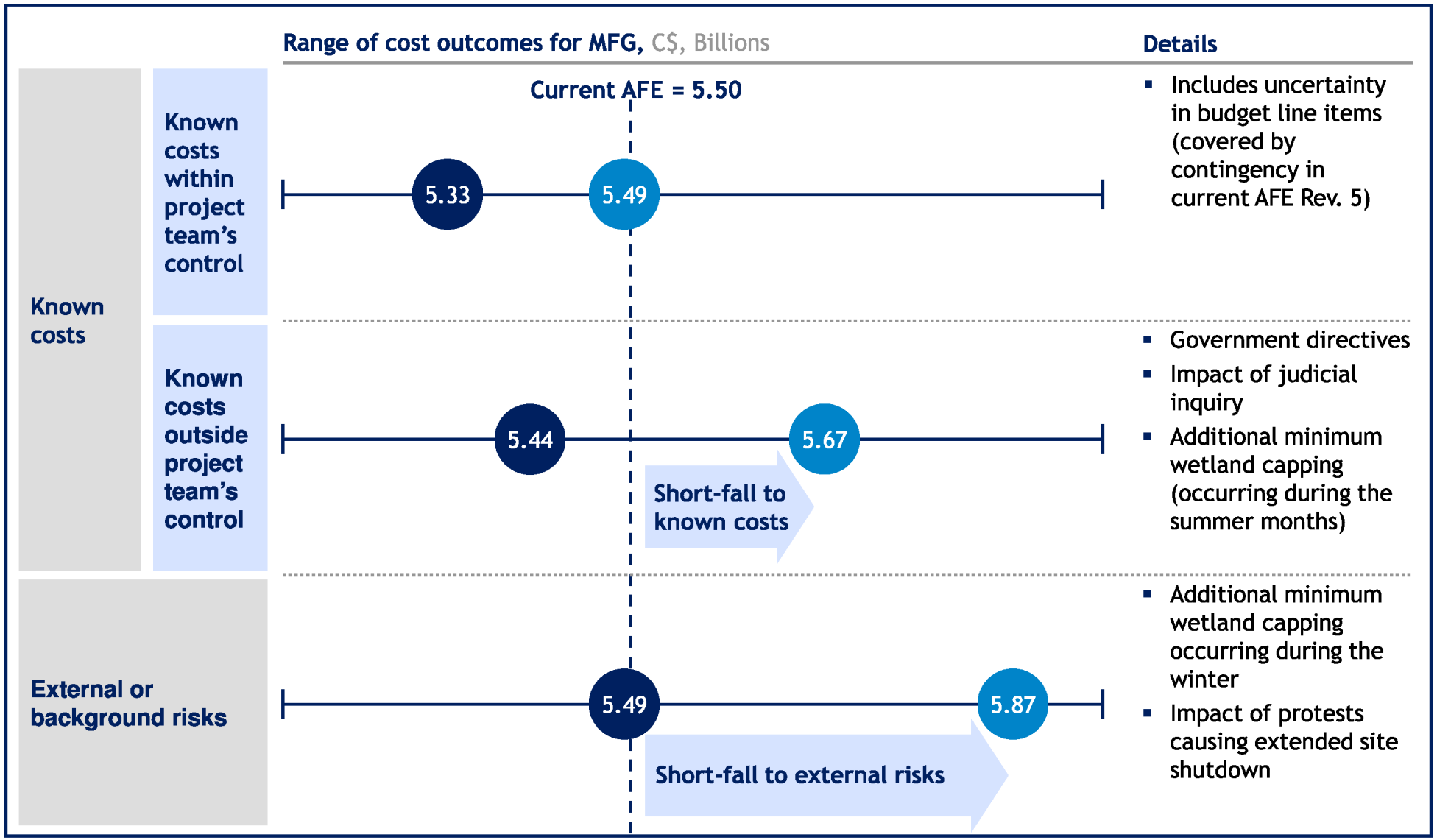
Inquiry impacts are already being realized

	Negative impacts typical of external project investigations	Realized by LCP to-date	How increased cost is realized
Project team	▪ Distraction/loss of focus	✓	▪ Increased hours and duration due to inefficiency, mistakes due to distraction, and staff discontinuity
	▪ Loss of motivation	✓	
	▪ Slowed decision-making	✓	
	▪ Resignations	✓	
Contractors	▪ Loss of relationships with project team	✓	▪ Loss of focus on project completion and delay
	▪ Reluctance to support	✓	
	▪ Apathy	✓	
	▪ Opportunistic behaviors	✓	
External	▪ Executive and corporate paralysis	✓	▪ Claims due to decision delay and inefficiency
	▪ Inquiry scope growth / forensic audit	✓	
	▪ Damaged aboriginal relationships		
	▪ Protests encouraged		

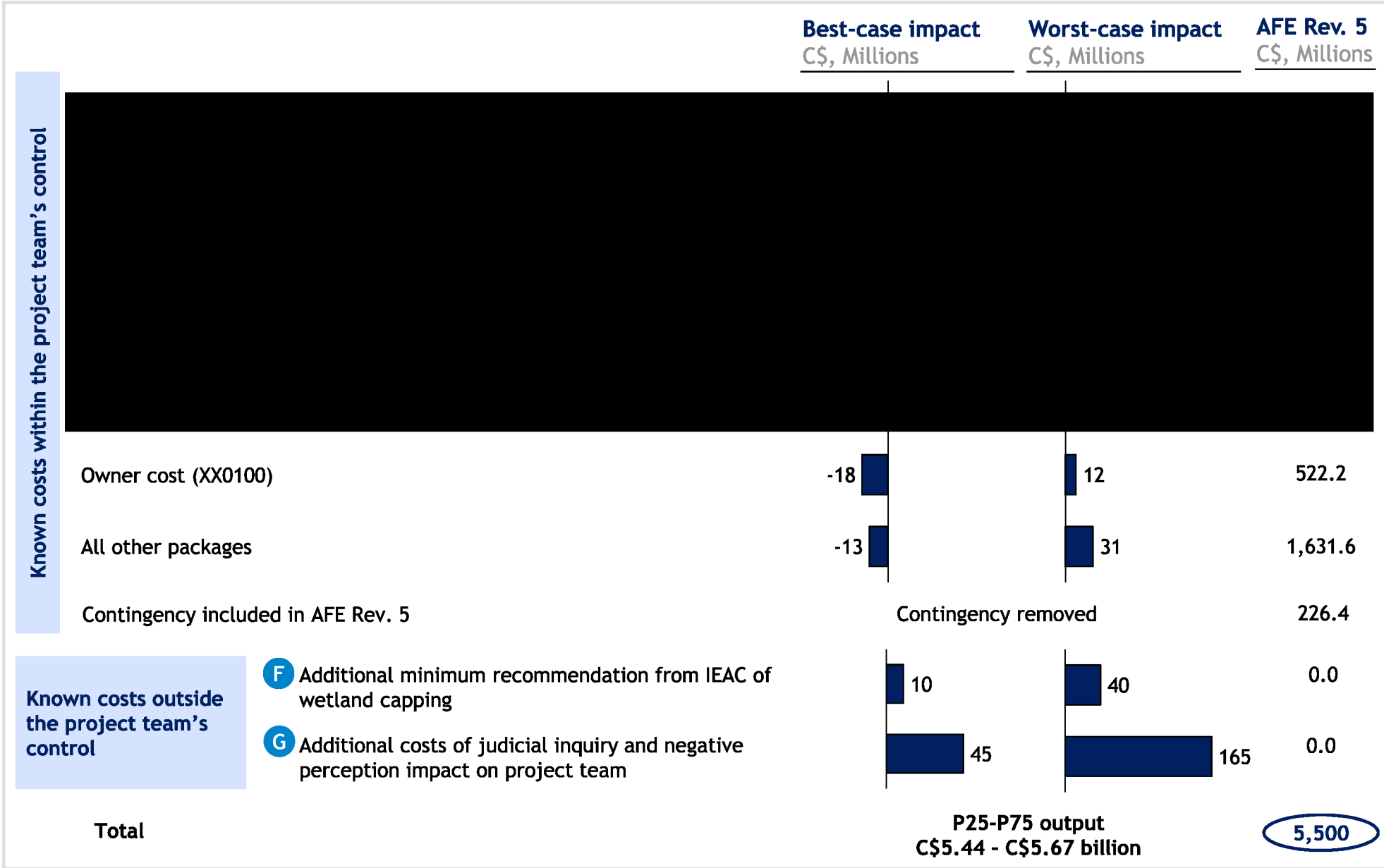
Overall impact of C$45 to C$165 million (best and worst case)

External risks could add C$200 million beyond known costs

--- Current AFE ● Bottom of Predictive Range (P25) ● Top of Predictive Range (P75)



Detailed cost ranging by contract package



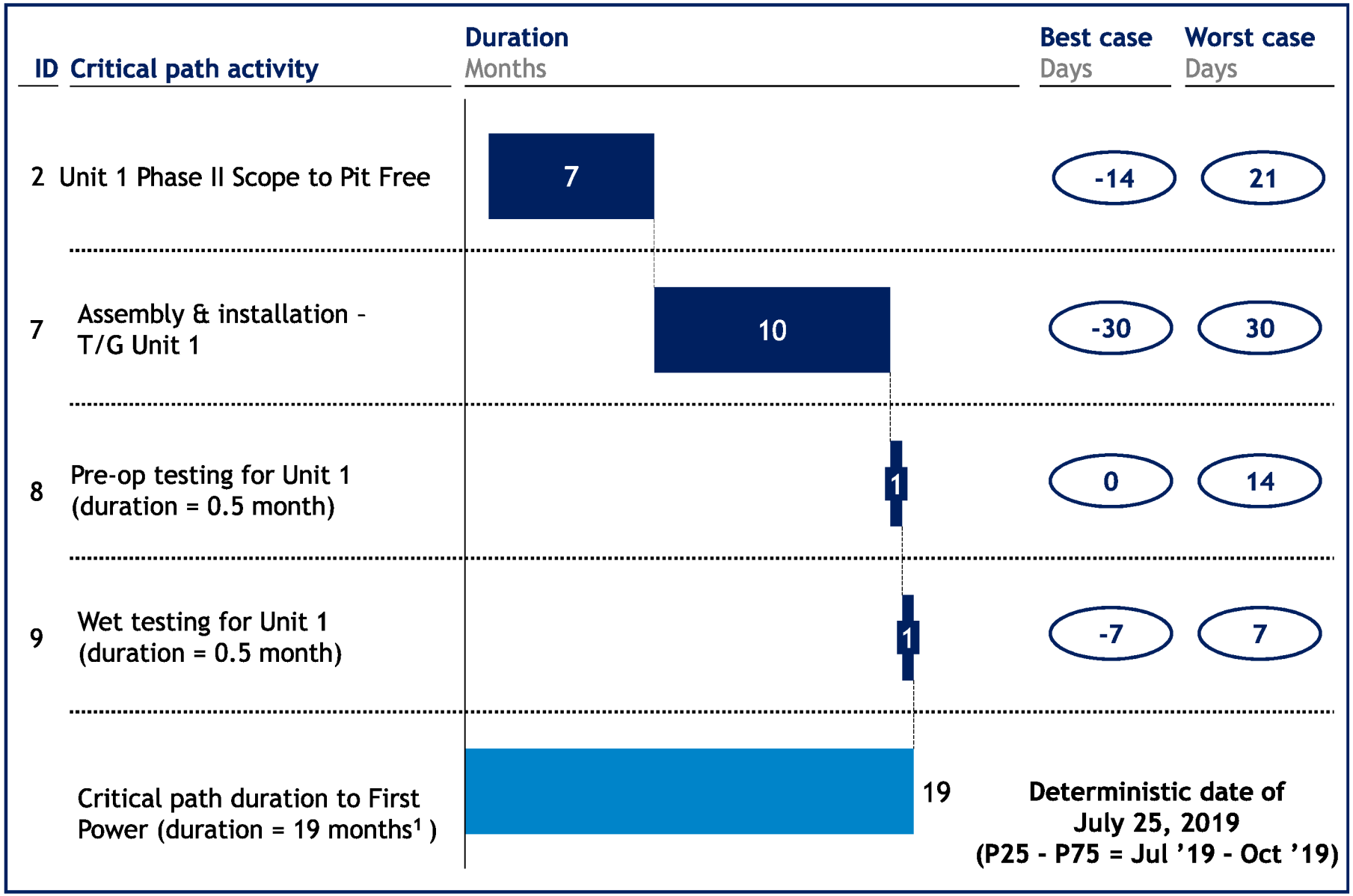
Primary critical path is through the Powerhouse with key activities shifting from civil to mechanical and electrical

Key activities included in the time-risk model to First Power

		Activity description	Critical path[2]	Task ID[1]
Power-house	Civil	▪ Unit 1 Phase II Scope to Pit Free	✓	2
	Mechanical and electrical	▪ Assembly/testing Slave Crane		4
		▪ Balance of plant to support Unit 1 operations		5,6
		▪ Assembly & installation T/G – Unit 1	✓	7
	Completions and testing	▪ Pre-op testing for Unit 1	✓	8
		▪ Wet testing for Unit 1	✓	9
Intake		▪ Civil construction – Intakes 3-4		22,23
		▪ Hydromechanical – Intakes 1-4		24-27
Reservoir		▪ Place stoplogs Spillway Bays 2-4		19
		▪ Impound Reservoir to el. 39 m		20
Other		▪ North dam construction		11-16
		▪ Rollway construction		35-37

1 Corresponds to the time-risk model shown in the Appendix 2 Assumes that intake gate acceleration occurs

Primary critical path encompasses 4 key activities



1 Assuming a time-risk model start date of January 2018

Mitigations can reduce cost- and time-risk (many are already underway)

Low potential Med. potential High potential

		Cost-risk	Time-risk	Risk mitigations
Known costs within the project team's control	A Intake, powerhouse, spillway, and transition dams (CH0007)	Med.	Med.	▪ Continue monitoring Astaldi's financial position and be prepared act expeditiously ▪ Ensure focus and visibility on production plan to meet milestones ▪ Continue high-level dialogue and engagement with Astaldi corporate leadership ▪ Ensure timely analysis and closure of commercial matters
	B North dam (CH0009)	Low	Low	▪ Ensure closure of commercial matters around BPLP's revised schedule which aligns with impoundment target ▪ Aggressively oversee the go-forward work with the goal of reducing indirect labor cost exposure ▪ Use 'levelling concrete' in lieu of RCC in adverse weather
	C Turbines and generators (CH0030)	Low	Low	▪ Push for decision on accelerating T&G installation to deliver earlier First Power ▪ Ensure continuous management of interface/integration plan for Andritz, Astaldi (CH0007), and balance of plant contractor (CH0031)
	D Mechanical and electrical auxiliaries (CH0031)	Low	Low	▪ Continue implementation of optimized work program for earlier First Power and manage interfaces/work coordination risks ▪ Aggressively oversee the work going forward with the goal of reducing indirect labor cost exposure
	E Hydro-mech. equipment (CH0032)	Med.	Med.	▪ Ensure commercial/contractual arrangements are completed to adjust current intake gate schedule to align with impoundment target ▪ Actively manage new contractual arrangement(s) (i.e., reimbursable labor)
Known costs outside the project team's control	F G	High	High	▪ Ensure clear communication and direction from inquiry commission to Nalcor ▪ Educate all associated parties on the potential impact of the judicial inquiry ▪ Try to ensure inquiry process is fair and efficient ▪ Wait to conduct the portion of the inquiry that impacts execution until after the project is complete ▪ Assess and manage project team health to the extent possible (e.g., take steps to minimize the impacts on the project team)

A CH0007 focus is on monitoring Astaldi's financial situation to ensure contract completion

Key risk: CH0007 - Intake, powerhouse, spillway, and transition dams civil works

Status

- 2017 concrete placement met or exceeded Westney's projections
- Powerhouse is enclosed
- Pit concrete activity is well underway on all 4 units
- Intake near completion
- Spillway rollways construction to commence in June 2019

Remaining risks

- Astaldi financial situation / corporate stability
- Ability / willingness to complete
- Potential to 'hold Nalcor hostage' / non-cooperation
- Potential to seek additional compensation for extras or interface claims
- Safety incident or external event that creates a unplanned site shutdown

Mitigations

- Continue monitoring Astaldi's financial position and be prepared to act expeditiously
- Ensure focus and visibility on production plan to meet milestones on schedule
- Continue high-level dialogue and engagement with Astaldi corporate leadership
- Ensure timely analysis and closure of commercial matters
- Leverage and financially motivate Astaldi to work with the interface constraints

Potential risk impact

AFE Rev. 5

[redacted]

Incurred

C$1,680.4M[1]

Risk exposure

Best

Worst

[redacted]

1 As of March 2018

B CH0009 risk mitigation includes focusing on productivity

Key risk: CH0009 - North and South dams

Status

- South Dam completed
- North RCC dam 57% completed in 2017 and ahead of schedule
- 2018 program underway to complete North RCC
- Contractor (BPLP) is aligned with schedule de-risking initiative to deliver early 2019 impoundment

Remaining risks

- Extension of time claim
- Weather impacts
- Potential labor productivity issues
- Other claims

Mitigations

- Ensure closure of commercial matters around BPLP's revised schedule which aligns with impoundment target
- Aggressively oversee the work going forward with the goal of reducing indirect labor cost exposure
- Use of 'levelling concrete' in lieu of RCC in adverse weather

Potential risk impact

AFE Rev. 5

[redacted]

Incurred

C$288.4M[1]

Risk exposure

Best

[redacted]

Worst

1 As of March 2018

C Solid plan for CH0030 in place; risks for additional claims remain

Key risk: CH0030 - Supply and install turbines and generators

Status

- All powerhouse embedded parts installed including:
  - Stay rings
  - Pit liners
- Commercial settlement in 2017 (due to Astaldi delay)
- Re-preservation activity ~80% complete
- Stator bar manufacturing recommenced following fire at factory
- Solid execution plan and competent team in place, that is supported by a readiness plan for mobilization

Remaining risks

- Interface and work coordination with CH0007 leading to further delay claims and/or rework (will seek opportunistic claims)
- Understand effectiveness of T&G installation program and impact on path forward schedule

Mitigations

- Continue to engage Andritz at CEO level in order to align on a reasonable path forward
- Further evaluate cost-benefit of pushing for early T&G installation to deliver early First Power date
- Seek additional opportunities to improve on schedule
- Engage expert machining company to participate in re-preservation program

Potential risk impact

AFE Rev. 5

[redacted]

Incurred

C$182.1M[1]

Risk exposure

Best

[redacted]

Worst

1 As of March 2018

D CH0031 contractor is being flexible to work around Andritz (CH0030/32) and Astaldi (CH0007)

Key risk: CH0031 - Supply and install mechanical and electrical auxiliaries

Status

- Contract awarded and effective mobilization and progress in 2017
- Interface management working and effective
- Engineering and procurement on schedule
- Detailed integration schedule developed and implement for all contractor activities within the Powerhouse, including CH0031 scope

Remaining risks

- Continued management of labor productivity
- Interface management

Mitigations

- Validate current design in order to identify opportunities to scale systems to only those required for First Power
- Evaluate opportunities to leverage CH0031 contractor to support LCMC as the overall integrator
- Continue to implement optimized work program for First Power and manage the interfaces/work coordination risks
- Aggressively oversee the work going forward with the goal of reducing indirect labor cost exposure

Potential risk impact

AFE Rev. 5

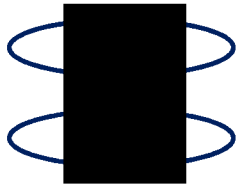
[redacted]

Incurred

C$24.4M[1]

Risk exposure

Best



Worst

1 As of March 2018

E Additional claims are also possible for CH0032

Key risk: CH0032 - Supply and install powerhouse mechanical equipment

Status

- Commercial settlement in 2017 due to Astaldi delay
- Intake gate manufacturing completed in 2017
- Draft tube embedments completed and draft tube crane installed allowing tailrace excavation to commence in June/July
- Intake embedded parts installation underway

Remaining risks

- Ability to achieve commercial settlement for intake gate acceleration to meet impoundment and First Power schedule target
- Willingness to be commercially reasonable in reaching a settlement
- Potential claims associated with handover delays from Astaldi

Mitigations

- Manage new contractual arrangement(s) (i.e., reimbursable labour)
- Ensure continuous management of integration plan for Andritz, Astaldi (CH0007), and balance of plant contractor (CH0031)

Potential risk impact

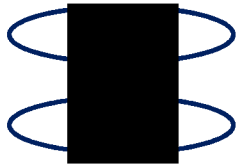
AFE Rev. 5

[redacted]

Incurred

C$217.3M[1]

Risk exposure



1 As of March 2018

F Much uncertainty exists with the path forward with potential wetland capping

Key risk: Wetland capping

Status

- C$15M expended since spring 2017
- IEAC has recommended full clearing of soil from reservoir
- Awaiting gov't. directive regarding exact scope
- Increased protest activity related to methyl mercury

Remaining risks

- Requirement to execute work in reservoir, with attendant cost and schedule impact
- Potential for impoundment date to be adversely affected
- Further directives from external sources leading to unanticipated consequences
- Distraction(s) to PMT

Mitigations

- Continue to participate in IEAC activity
- Establish AFE to accommodate externally-driven costs
- Conduct any wetland capping in summer 2018
- Minimize externally driven costs and adverse schedule impacts

Potential risk impact

AFE Rev. 5

C$0.0M

Incurred

C$15M

Risk exposure

Best +10M

Worst +40M

G Judicial inquiry impacts should be mitigated to the extent possible

Key risk: Inquiry Impacts

Status

- Judicial inquiry called in November 2017
- Forensic audit called in February 2018
- Various law firms engaged
- Significant document requests
- PMT heavily involved with information requests and interviews
- Key contractors and SNC Lavalin documentation summoned, and interviews scheduled
- Staff turnover increasing

Remaining risks

- Distraction to PMT
- Further staff turnover of key personnel
- Contractors taking advantage of situation
- Inquiry hearings coincident with critical site activities including commissioning
- Additional legal and consulting costs

Mitigation

- Take steps to minimize impacts on PMT. Pursue efficient, impartial process
- Educate all associated parties on the potential impact of the inquiry
- Wait to conduct the portion of the inquiry that impacts execution until after the project is complete
- Ensure clear communication and direction frim Inquiry commission to Nalcor project team and assess and manage project team health to the extent possible

Potential risk impact

AFE Rev. 5

C$0.0M

Incurred

<C$10M

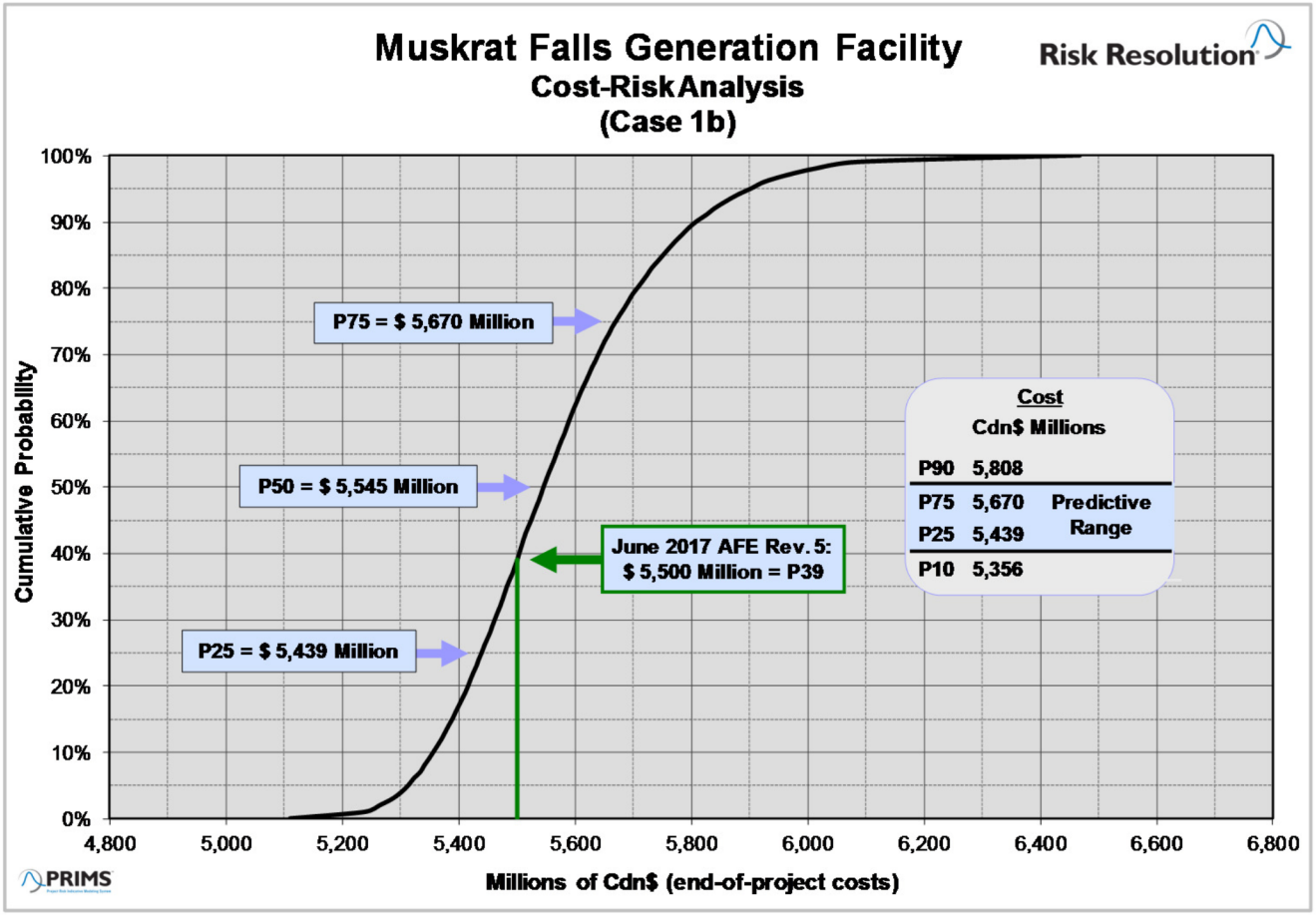
Risk exposure

Best +45M

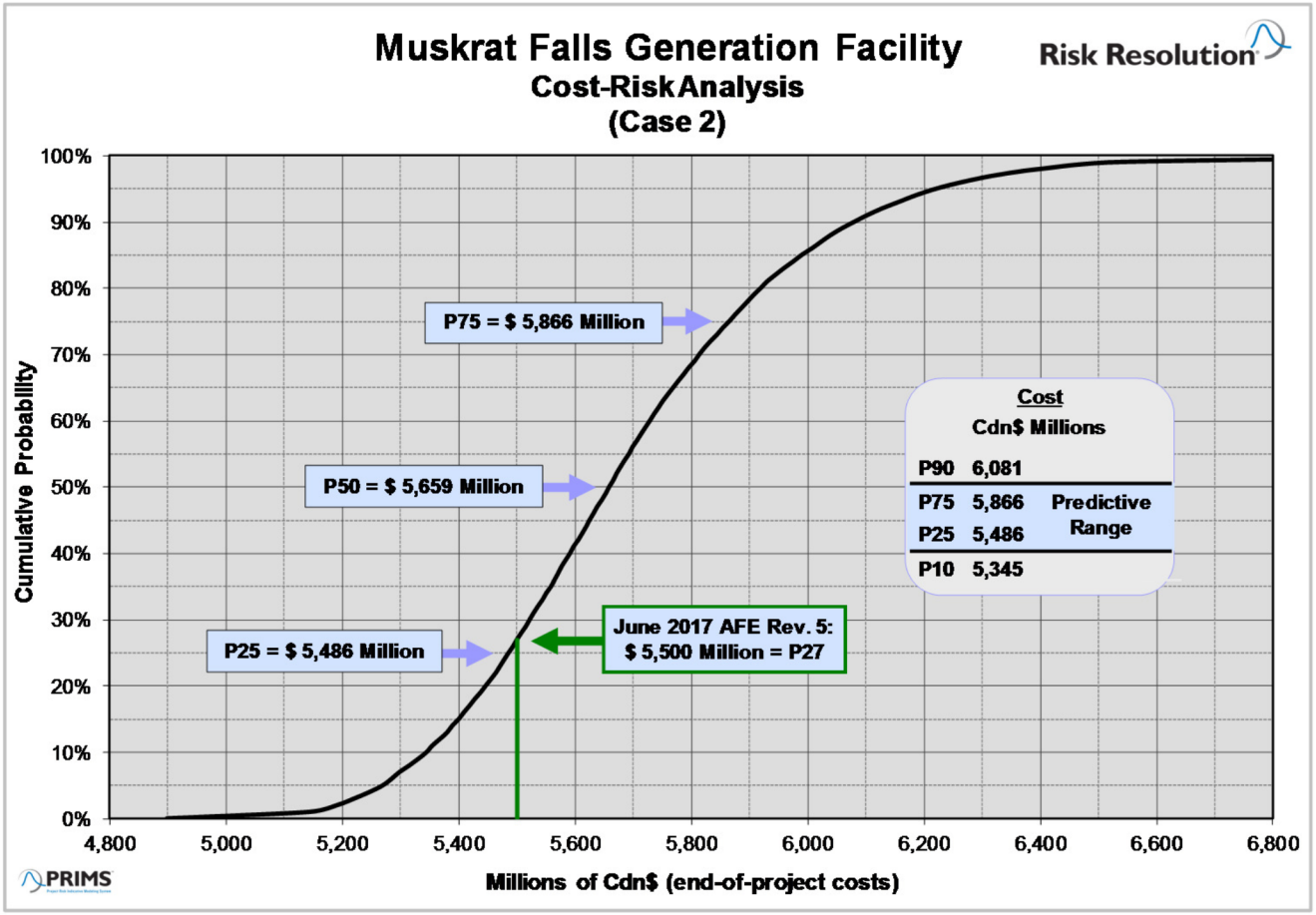
Worst +165M

Appendix

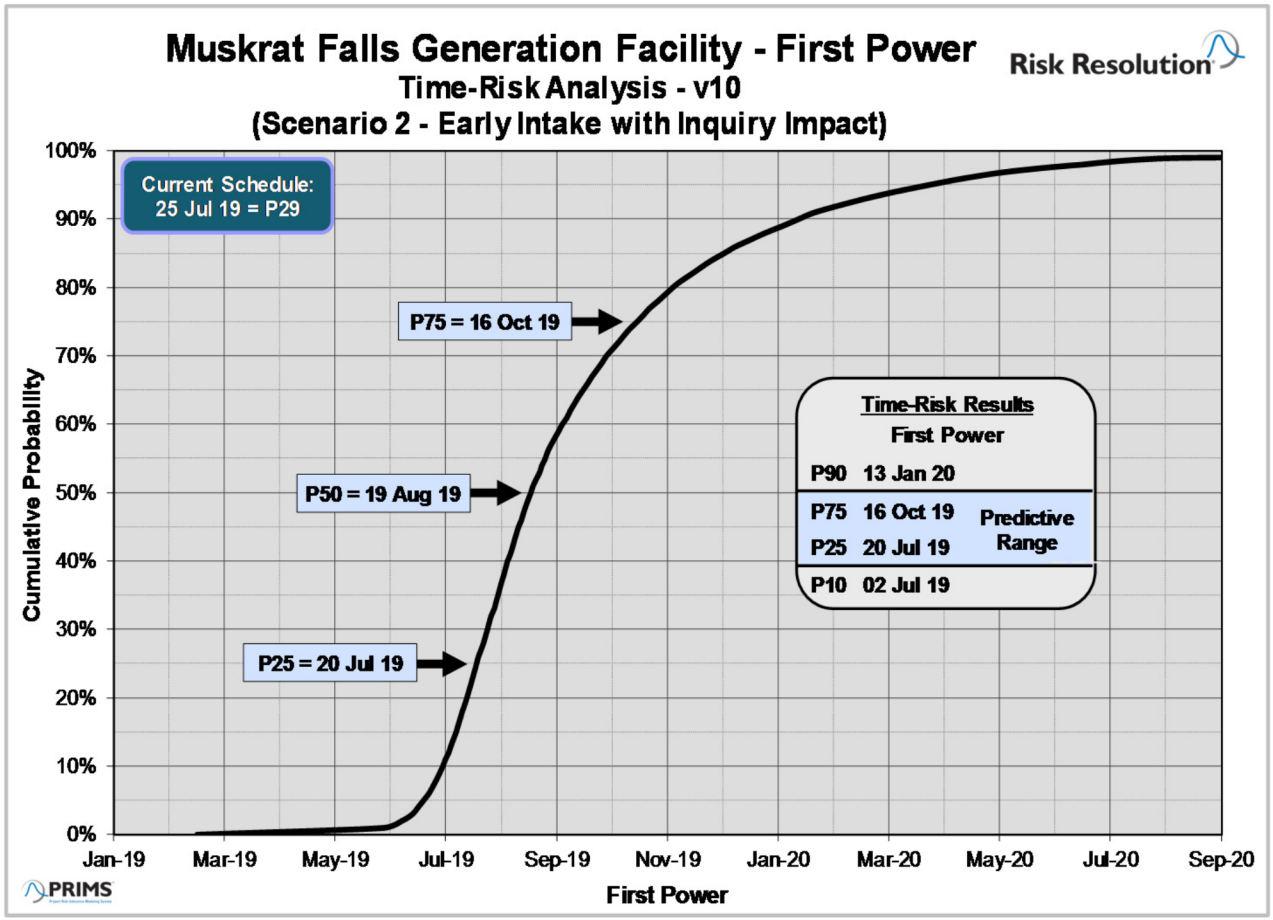
Cost-risk curve: Expected cost including known contingencies



Cost-risk curve: Expected cost including known contingencies and external risks



Time-risk curve: Accelerated intake



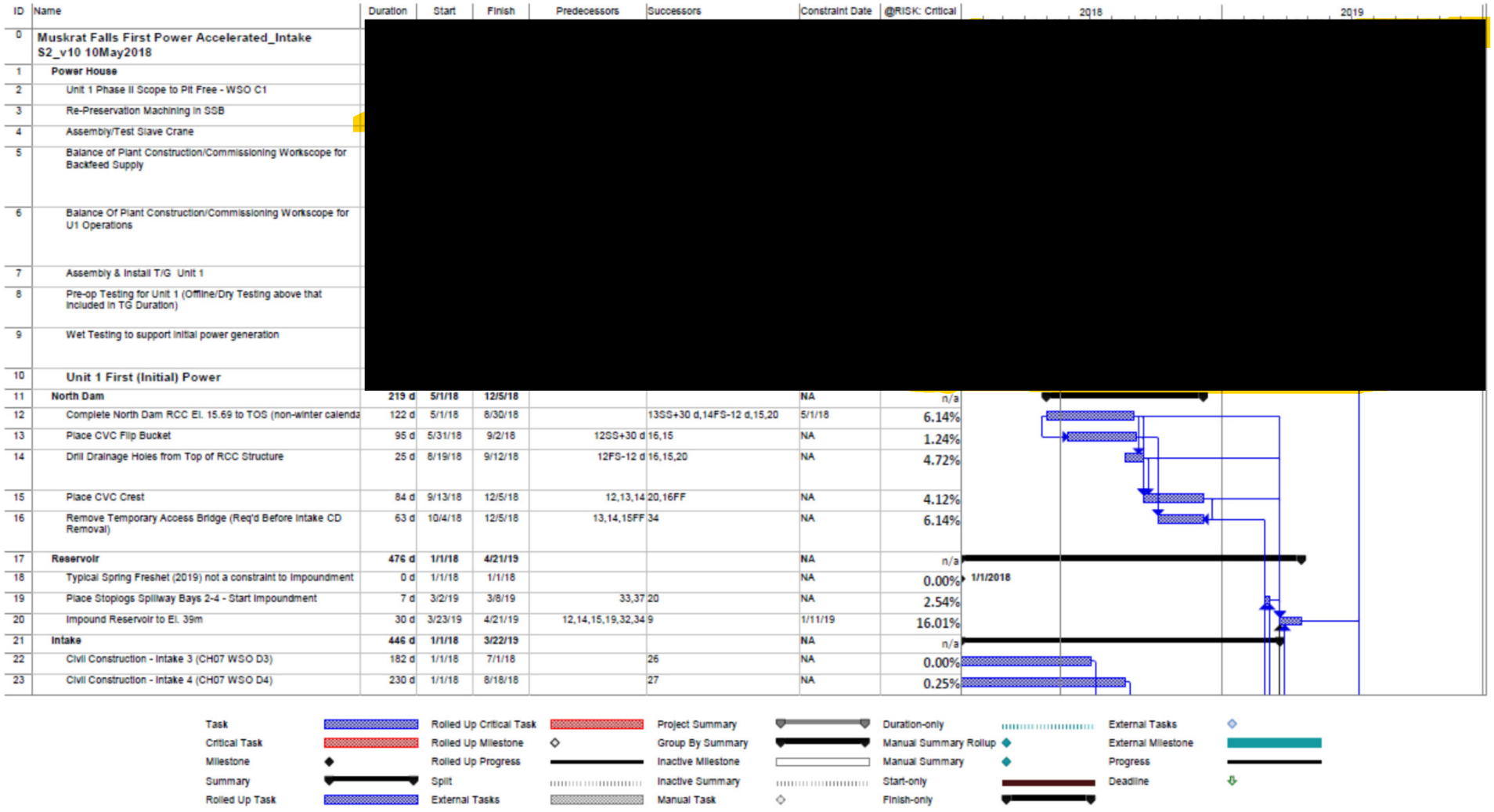
Time-risk model (1/2)

Muskrat Falls Generation Facility - First Power

Risk Resolution®

Time Risk Model

ID	Name	Duration	Start	Finish	Predecessors	Successors	Constraint Date	@RISK: Critical
0	**Muskrat Falls First Power Accelerated_Intake S2_v10 10May2018**							
1	**Power House**							
2	Unit 1 Phase II Scope to Pit Free - WSO C1							
3	Re-Preservation Machining in SSB							
4	Assembly/Test Slave Crane							
5	Balance of Plant Construction/Commissioning Workscope for Backfeed Supply							
6	Balance Of Plant Construction/Commissioning Workscope for U1 Operations							
7	Assembly & Install T/G Unit 1							
8	Pre-op Testing for Unit 1 (Offline/Dry Testing above that included in TG Duration)							
9	Wet Testing to support initial power generation							
10	**Unit 1 First (Initial) Power**							
11	**North Dam**	**219 d**	**5/1/18**	**12/5/18**			**NA**	n/a
12	Complete North Dam RCC El. 15.69 to TOS (non-winter calenda	122 d	5/1/18	8/30/18		13SS+30 d,14FS-12 d,15,20	5/1/18	6.14%
13	Place CVC Flip Bucket	95 d	5/31/18	9/2/18	12SS+30 d	16,15	NA	1.24%
14	Drill Drainage Holes from Top of RCC Structure	25 d	8/19/18	9/12/18	12FS-12 d	16,15,20	NA	4.72%
15	Place CVC Crest	84 d	9/13/18	12/5/18	12,13,14	20,16FF	NA	4.12%
16	Remove Temporary Access Bridge (Req'd Before Intake CD Removal)	63 d	10/4/18	12/5/18	13,14,15FF	34	NA	6.14%
17	**Reservoir**	**476 d**	**1/1/18**	**4/21/19**			**NA**	n/a
18	Typical Spring Freshet (2019) not a constraint to Impoundment	0 d	1/1/18	1/1/18			NA	0.00%
19	Place Stoplogs Spillway Bays 2-4 - Start Impoundment	7 d	3/2/19	3/8/19	33,37	20	NA	2.54%
20	Impound Reservoir to El. 39m	30 d	3/23/19	4/21/19	12,14,15,19,32,34	9	1/11/19	16.01%
21	**Intake**	**446 d**	**1/1/18**	**3/22/19**			**NA**	n/a
22	Civil Construction - Intake 3 (CH07 WSO D3)	182 d	1/1/18	7/1/18		26	NA	0.00%
23	Civil Construction - Intake 4 (CH07 WSO D4)	230 d	1/1/18	8/18/18		27	NA	0.25%



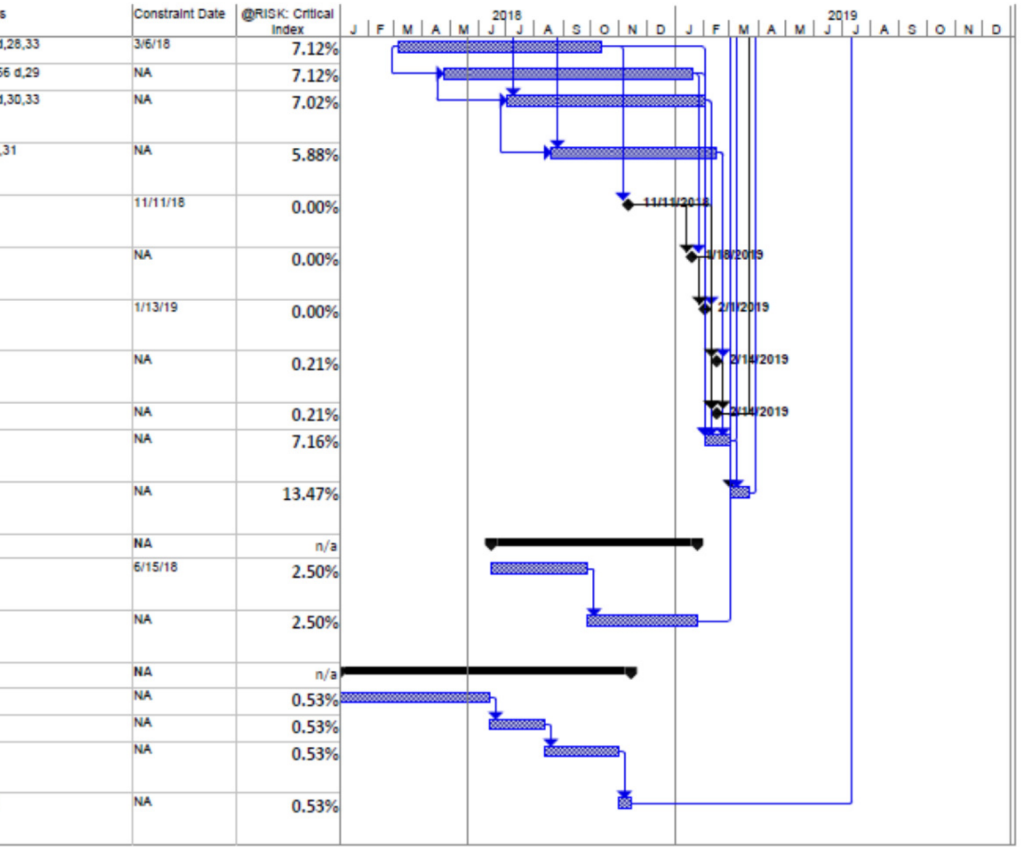
Time-risk model (2/2)

Muskrat Falls Generation Facility - First Power

Risk Resolution®

Time Risk Model

ID	Name	Duration	Start	Finish	Predecessors	Successors	Constraint Date	@RISK: Critical Index
24	HydroMechanical Embedments Intake 1	220 d	3/6/18	10/11/18		25SS+49 d,28,33	3/6/18	7.12%
25	Hydromechanical Embedments Intake 2	270 d	4/24/18	1/18/19	24SS+49 d	33,26SS+56 d,29	NA	7.12%
26	Hydromechanical Embedments Intake 3 (Incl holiday)	215 d	7/2/18	2/1/19	22,25SS+56 d	27SS+42 d,30,33	NA	7.02%
27	Hydromechanical Embedments Intake 4 (Incl holidays)	180 d	8/19/18	2/14/19	26SS+42 d,23	33FS-14 d,31	NA	5.88%
28	Gate/Stoplog Installation & Testing - Unit 1 (Incl Above)	0 d	11/11/18	11/11/18	24	29,32	11/11/18	0.00%
29	Gate/Stoplog Installation & Testing - Unit 2 (Incl Above)	0 d	1/18/19	1/18/19	28,25	30,32	NA	0.00%
30	Gate/Stoplog Installation & Testing - Unit 3 (Incl Above)	0 d	2/1/19	2/1/19	29,26	31,32	1/13/19	0.00%
31	Gate/Stoplog Installation & Testing - Unit 4 (Incl Above)	0 d	2/14/19	2/14/19	30,27	32	NA	0.21%
32	Intake Ready for Water	0 d	2/14/19	2/14/19	31,28,29,30	34,20	NA	0.21%
33	Demob/Cleanup Intake/Lower Intake Cofferdam	28 d	2/2/19	3/1/19	25,27FS-14 d,24,26	34,19	NA	7.16%
34	Flood Intake Channel/Test Gates/Remove Intake Cofferdam	21 d	3/2/19	3/22/19	16,33,32	20	NA	13.47%
35	**Rollways**	**224 d**	**6/15/18**	**1/24/19**			NA	n/a
36	Construct Rollways - Bays 1 & 5 (Incl Hydromechanical)	105 d	6/15/18	9/27/18		37	6/15/18	2.50%
37	Construct Rollway - Bay 3 (Incl Hydromechanical)	119 d	9/28/18	1/24/19	36	19	NA	2.50%
38	**Tailrace**	**317 d**	**1/1/18**	**11/13/18**			NA	n/a
39	Draft Tube Hydromechanical Works	163 d	1/1/18	6/12/18		40	NA	0.53%
40	Remove Tailrace Channel Backfill	60 d	6/13/18	8/11/18	39	41	NA	0.53%
41	Lower Tailrace Cofferdam & Minimize Rock Plug	80 d	8/12/18	10/30/18	40	42	NA	0.53%
42	Flood Tailrace and open plug for channel flow	14 d	10/31/18	11/13/18	41	9FS+30 d	NA	0.53%



Task
Critical Task
Milestone
Summary
Rolled Up Task
Rolled Up Critical Task
Rolled Up Milestone
Rolled Up Progress
Split
External Tasks
Project Summary
Group By Summary
Inactive Milestone
Inactive Summary
Manual Task
Duration-only
Manual Summary Rollup
Manual Summary
Start-only
Finish-only
External Tasks
External Milestone
Progress
Deadline

Time-risk ranging (1/2)

					Team Review Duration Change Estimate	
ID	Name	Duration	Start	Finish	Best	Worst
1	**Power House**	[redacted]				
2	Unit 1 Phase II Scope to Pit Free - WSO C1					
3	Re-Preservation Machining in SSB					
4	Assembly/Test Slave Crane					
5	Balance of Plant Construction/Commissioning Workscope for Backfeed Supply					
6	Balance Of Plant Construction/CommissioningWorkscope for U1 Operations					
7	Assembly & Install T/G Unit 1					
8	Pre-op Testing for Unit 1 (Offline/Dry Testing above that included in TG Dur'n)					
9	Wet Testing to support initial power generation					
10	Unit 1 first (Initial) Power					
11	Full Wet Testing (Incl Trial Run & Generator Performance Tests)					
12	Unit 1 Full Commercial Power per CH30 Contract Req't					
13	**North Dam**	**219 d**	**May 1 '18**	**Dec 5 '18**	-	-
14	Complete North Dam RCC El. 15.69 to TOS	122 d	May 1 '18	Aug 30 '18	0	+6w
15	Place CVC Flip Bucket	95 d	May 31 '18	Sep 2 '18	-1m	+1m
16	Drill Drainage Holes from Top of RCC Structure	25 d	Aug 19 '18	Sep 12 '18	0	+35d
17	Place CVC Crest	84 d	Sep 13 '18	Dec 5 '18	0	+6w
18	Remove Temporary Access Bridge (Req'd Before Intake CD Removal)	63 d	Oct 4 '18	Dec 5 '18	0	+6w
19	**Reservoir**	**96 d**	**Mar 12 '19**	**Jun 15 '19**	-	-
20	Typical Spring Freshet (2019)	32 d	May 15 '19	Jun 15 '19	-1w	0
21	Place Stoplogs Spillway Bays 2-4 - Start Impoundment (POST FLOOD)	7 d	Mar 12 '19	Mar 18 '19	-4d	0

Time-risk ranging (2/2)

					Team Review Duration Change Estimate	
Id	Name	Duration	Start	Finish	Best	Worst
22	Impound Reservoir to El. 39m	30 d	Apr 2 '19	May 1 '19	-2w	+2w
23	**Intake**	**456 d**	**Jan 1 '18**	**Apr 1 '19**	-	-
24	Civil Construction - Intake 3 (CH07 WSO D3)	182 d	Jan 1 '18	Jul 1 '18	0	+2w
25	Civil Construction - Intake 4 (CH07 WSO D4)	230 d	Jan 1 '18	Aug 18 '18	-2w	0
26	HydroMechanical Embedments Intake 1	220 d	Mar 6 '18	Oct 11 '18	0	+2w
27	Hydromechanical Embedments Intake 2	270 d	Apr 24 '18	Jan 18 '19	0	+2w
28	Hydromechanical Embedments Intake 3 (incl holiday)	215 d	Jul 2 '18	Feb 1 '19	0	+2w
29	Hydromechanical Embedments Intake 4 (incl holidays)	180 d	Aug 19 '18	Feb 14 '19	0	+1m
30	Gate/Stoplog installation & Testing - Unit 1 (incl Above)	0 wks	Oct 11 '18	Oct 11 '18	0	0
31	Gate/Stoplog installation & Testing - Unit 2 (incl Above)	0 wks	Jan 23 '19	Jan 23 '19	0	0
32	Gate/Stoplog installation & Testing - Unit 3 (incl Above)	0 wks	Feb 11 '19	Feb 11 '19	0	0
33	Gate/Stoplog installation & Testing - Unit 4 (incl Above)	0 wks	Jan 22 '19	Jan 22 '19	0	0
34	Intake Ready for Water	0 d	Feb 11 '19	Feb 11 '19	-	-
35	Demob/Cleanup Intake/Lower Intake Cofferdam	4 wks	Feb 12 '19	Mar 11 '19	-1w	+2w
36	Flood Intake Channel/Test Gates/Remove Intake Cofferdam	3 wks	Mar 12 '19	Apr 1 '19	0	+2w
37	**Rollways**	**224 d**	**Jun 15 '18**	**Jan 24'19**	-	-
38	Construct Rollways - Bays 1 & 5 (Incl Hydromechanical)	15 wks	Jun 15 '18	Sep 27 '18	-1m	+3w
39	Construct Rollway - Bay 3 (Incl Hydromechanical)	17 wks	Sep 28 '18	Jan 24 '19	-8w	+4w
40	**Tailrace**	**380 d**	**Oct 30 '17**	**Nov 13 '18**	-	-
41	Draft Tube Hydromechanical Works	226 d	Oct 30 '17	Jun 12 '18	-1m	+1m
42	Remove Tailrace Channel Backfill	2 months	Jun 13 '18	Aug 11 '18	-2w	+2w
43	Lower Tailrace Cofferdam & Minimize Rockplug	80 d	Aug 12 '18	Oct 30 '18	-2w	+1m
44	Flood Tailrace and open plug for channel flow	2 wks	Oct 31 '18	Nov 13 '18	0	+2w

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.