

CI 50518

HYD Ruth Falls Main Dam Refurbishment

ATO

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November 29, 2024



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UARB APPROVAL SHEET

Project Title: HYD Ruth Falls Main Dam Refurbishment

CI Number: 50518

Date: October 11, 2024

Expenditure Profile			Type of Filing	
Year	Budget Amount	Project Estimate	☐	Capital Project Authorization
2017	125,191	125,191	☐	Unforeseen and Unbudgeted (U&U)
2018	201,467	86,643	☐	Planned & Advanced (P&A)
2019	1,561,074	490,360	☐	Subsequent Approval Item
2020	5,334,095	638,963	☒	Authorization to Overspend (ATO)
2021	22,595	1,207,160		
2022		1,521,159		
2023		126,306		
2024		23,917		
2025		9,453,281	☐	Scope Change
2026		1,772,528	☐	Final Cost (FIN)
Total	\$7,244,422	\$15,445,508		

COMMENTS

Approved	\$7,244,422
Current Submission	\$15,445,508
ATO Variance	\$8,201,086

Submitted on behalf of NOVA SCOTIA POWER INCORPORATED

Authorized Signatory
Dave Pickles
Chief Operating Officer

DATE

October 10, 2024

Approved on behalf of NOVA SCOTIA UTILITY AND REVIEW BOARD

DATE

CI Number: 50518

Title: HYD Ruth Falls Main Dam Refurbishment

Start Date: 2017/02
In-Service Date: 2026/03
Final Cost Date: 2026/09
Function: Hydro
Forecast Amount: \$15,445,508

DESCRIPTION:

The project involves the refurbishment of the Ruth Falls Main Dam water-retaining structures (embankments, spillway and sluiceway) to address the structural and freeboard deficiencies and to meet the requirements of the Canadian Dam Association (CDA) Guidelines.

Summary of Related CIs +/- 2 years:

Pursuant to Section 11.2 of the Detailed CEJC, related CIs for Hydro projects include “work completed on the same generating unit and dam structures, but not necessarily the same asset.”

- 2017 CI 47551 Sheet Harbour Controls Upgrade \$1,749,212
- 2018 CI 49943 Ruth Falls Facility Refurbishment \$1,234,931

Depreciation Class: Hydraulic Production Plant - Sheet Harbour

Estimated Life of the Asset: 50 Years

Retirement Information:

- Categorization of Retirement: Accounting Policy 6420 - Retirement and Disposal of Capital Assets
- Percentage of Asset Pool: 3.43%

JUSTIFICATION:

Justification Criteria: Health & Safety

Why do this project?

The most recent Dam Safety Review (Kleinschmidt, 2015) concluded that the Ruth Falls Main Dam embankment was in satisfactory condition with the exception of the upstream riprap slope protection, which was observed to be inconsistent along the length of the dam. The embankment structures did not meet the slope stability requirements for all loading conditions. The spillway and sluiceway were in fair physical condition. The spillway structure did not meet the stability requirements for the Inflow Design Flood (IDF) loading condition. The sluiceway structure did not meet the stability requirements for the IDF and earthquake loading conditions.

The Ruth Falls Main Dam was classified as High hazard as part of the 2015 Flood Study/Dam Safety Review. According to the CDA Guidelines, the dam is classified as a High hazard dam due to a permanent Population At Risk (PAR) and a potential loss of life being 10 or fewer in the event of a dam breach. For a high classification dam, the IDF is 1/3 between the 1/1,000-year flood and Probable Maximum Flood (PMF).

Why do this project now?

This project was identified as a high priority within NS Power’s dam safety risk prioritization due to the deteriorated condition of the concrete structures and the stability deficiencies in the embankment and spillway/sluiceway structures. The refurbishment of the dam is scheduled to begin in 2019 with the procurement of the rubber dams and vertical lift gates, followed by construction in 2020.

Why do this project this way?

Preliminary engineering was undertaken to determine the most economic option to correct the deficiencies in the Ruth Falls Main Dam water-retaining structures (embankments, spillway and sluiceway) and to complete the designs required to meet the requirements of the CDA Guidelines.

As part of the conceptual design phase, five alternatives were reviewed for the refurbishment of the dam, spillway and sluiceway. The following options were reviewed:

Option 1 - Replace the existing stoplogs with screw stem vertical lift gates;

Option 2 - Replace approximately half of the existing stoplog bays and construct an uncontrolled overflow section, and replace the remaining stoplog bays with screw stem vertical lift gates;

Option 3 - Replace approximately half of the existing stoplog bays and construct an uncontrolled labyrinth spillway, and replace the remaining stoplog bays with screw stem vertical lift gates;

Option 4 - Remove the stoplog bays and install rubber dams on the left portion of the dam, looking downstream, and install an uncontrolled overflow spillway and rubber dams on the right portion of the dam. The existing sluiceway gates, located in the central portion of the dam, would be replaced with screw stem vertical lift gates;

Option 5 - Construct a new dam immediately downstream of the existing dam. This design option would be similar to Option 4 with an uncontrolled overflow section, deep sluice gates, and a rubber dam section.

For each of the vertical lift gate options, the options/costs for screw stem operators and hydraulic operators were considered. The screw stem operators were the more economic option.

Option 4 was selected as the preferred alternative as it is the most cost effective. Option 4 is approximately \$500,000 less costly than the next closest option. Option 4 also meets the operational requirements to manage system and the design flows.

Reason for Variance - ATO

The increase of approximately \$8.2 million compared to the approved 2019 ACE Plan budget of \$7,244,422 is due to increased environmental permitting requirements, extended construction timeline, and costs associated with Mi'kmaq Engagement.

1. **Environmental Permitting Requirements** – Additional project costs of approximately \$4.4 million are directly attributable to the additional work required to obtain the necessary environmental permits from Fisheries and Oceans Canada (DFO), Nova Scotia Department of Environment and Climate Change (NSECC), as well as an authorization in accordance with Transport Canada's Navigation Protection Program to temporarily lower the Ruth Falls Reservoir by approximately 18 feet while constructing the new dam.

Subsequent to the approval of the original filing, NS Power was required to obtain a Fisheries Act Authorization (FAA) for the work from DFO, which was not required at the time of original filing. This FAA contained new conditions around fish passage requirements as well as requirements for NS Power to implement an Environmental Offsetting Program. The costs associated with the required studies, design, and construction of fish passage per the FAA were approximately \$3 million and the project costs associated with the Environmental Offsetting Program were approximately \$1.3 million.

NS Power applied for the Watercourse Alteration Permit on December 17, 2019 and received the Permit Approval on June 30, 2024. The Company applied for an authorization in accordance with Transport Canada's Navigation Protection Program on April 30, 2021. The Watercourse Alteration Permit was received on July 30, 2024.

NS Power applied for the FAA from DFO on June 24, 2020 and received four incomplete letters from DFO between August 4, 2020 and September 11, 2023. Each incomplete letter received by NS Power contained

additional requests for information from DFO that had not been requested as part of previous incomplete letters. The additional requests, and any work associated with them, were not known at the time the original Project budget was developed and submitted to the Board. The costs associated with the additional studies, design, construction and Environmental Offsetting, as required by DFO resulted in increases to Project costs.

A summary of the correspondence between NS Power and DFO on NS Power's FAA application is summarized in Attachment 1.

2. **Extended Construction Timeline** – As a result of the additional work required to address environmental permitting requirements, the construction timeline was extended leading to increased project costs of approximately \$2 million. The project costs submitted as part of the original Application were established in 2018; however, as a result of the additional environmental permitting requirements, construction is now deferred until 2025 and 2026. There have been substantial pricing shifts in concrete and steel commodity markets since 2018, resulting in increased costs. There have also been increases in the amount of project support labour, technical support labour, and term environmental support labour as a result of the extended construction timeline.
3. **Archaeology and Mi'kmaq Engagement** – Further engagement with the Mi'kmaq of Nova Scotia and archaeological investigation was required to understand and meaningfully address concerns associated with the protection of pre-contact First Nations archaeological sites and other environmental issues associated with the lowering of the Ruth Falls Reservoir 18 feet below the minimum operating level. This has led to additional costs of approximately \$400,000.

Please refer to the Account Variance sheet for further details.

Although the costs of the Project have increased since receiving Board approval, the primary justification of the Project remains the same: refurbishment of the Ruth Falls Main Dam water-retaining structures (embankments, spillway and sluiceway) is required to address the structural and freeboard deficiencies and meet current CDA Guidelines.

CI Number	: 50518-H792	- HYD - Ruth Falls Main Dam Refurbishment	Project Number	50518-H792	CI 50518 Page 4 of 10
Parent CI Number	: Reserv	-			
Asset Location	: 1359	- 1359 Ruth Falls Common Property	Budget Version	ATO Submission Revision	

Capital Item Accounts

Exp. Type	Utility Account	Forecast Amount
Additions	2800 - HGP - Dams & Spillways	14,759,503
Retirements	2800 - HGP - Dams & Spillways	686,005
Total Cost:		15,445,508
Original Cost:		1,279,623

CI # 50518 - HYD Ruth Falls Main Dam Refurbishment				
Account	UARB Approved	ATO Submission	Variance	Reason for Variance
Regular Labour	175,293	619,734	444,441	Additional project management support & environmental services labour required due to the extended timeline to secure the necessary environmental permits to continue the construction works and implement the conditions of the environmental permits.
Term Labour	1,759	96,609	94,851	
Overtime Labour	-	6,186	6,186	
Travel expenses	17,074	28,819	11,744	Additional travel required for managing the sequenced construction approach and construction of Rubber Dam Controls building in 2022. Additional travel required for NS Power Environmental Services to perform tasks to ensure compliance with the conditions contained within the environmental permits.
Materials	1,520,000	2,928,689	1,408,689	Additional costs of construction materials (steel, concrete) due market fluctuations as a result of execution deferral to 2025 caused by delays with obtaining approval of environmental permitting. Additional materials costs due to the new scope of work introduced by DFO (modifications to the upstream fishway and fish passage weirs, upgrade of the existing fish diversion louvre system, and installation of the new upstream eel ramp). Increased raw material costs due to the extended project schedule beyond the control of the various suppliers.
Contracts	3,652,031	6,247,833	2,595,803	Additional scope to implement the conditions of the new environmental permits required to execute the project. Increased commodity costs due market fluctuations as a result of execution deferral to 2024. Additional site supervision dictated by the delays in project execution. Increased labour costs due to the extended project schedule beyond the control of the various contractors supporting the project. Additional costs to provide security for the exposed pre-contact First Nations archaeological sites on the reservoir. Additional pumping, mobilization and demobilization cofferdam costs.
Freight/Postage/Delivery	-	17,440	17,440	Freight costs associated with delivery of rubber bladders and sluice gates
Consulting	246,562	1,877,234	1,630,672	Offsetting costs as dictated by the Fisheries Act Authorization. Additional costs for studies associated with confirmation of the improvements to the fish ladder/louvres/eel ramp and post-construction monitoring required to secure the approval of environmental permits. Cost to investigate and develop detailed engineering designs for the fish passage upgrades including 3D modelling as dictated by the environmental permits. Costs to develop and implement wetland and fish passage monitoring programs, fish entrainment study, drawdown monitoring plan as required by NS Environment and DFO. Costs to perform archaeological assessments and mitigation efforts as agreed during the Crown consultation process with the Mi'kmaq to secure the required environmental permits to execute the project scope of work.

CI # 50518 - HYD Ruth Falls Main Dam Refurbishment				
Account	UARB Approved	ATO Submission	Variance	Reason for Variance
Legal	-	141	141	Corporate Legal fee - lien search for PID and review; search for judgements / builders liens filed at Land Registration Office.
Meals	5,378	8,074	2,696	
Personal Equipment	-	4,743	4,743	
Equipment Rental	-			Rental of the office trailer and boom truck during Rubber Dam Controls Building construction in 2022.
Mi'kmaw Engagement	-			Continued Mi'kmaw engagement costs associated with the extended project schedule. Addition of the member of the Mi'Kmaq community observe the drawdown and archaeological work in 2025
Other Goods & Services (Contingency)	842,715	1,342,714	499,999	The original contingency amount remains unchanged, however additional contingency has been added to cover uncertainty around the amount of offsetting costs required by DFO, which has yet to be confirmed and has the potential to vary significantly.
Administrative Overhead	72,085	413,588	341,503	Increase in AO is due to increased internal labour and changes in AO rates, as original filing estimated AO for future periods using 2020 AO rates, while ATO filing includes actual AO incurred and 2024 AO rates for estimating AO in future periods.
Contractor Administrative Overhead	438,973	724,985	286,012	Increase in Contractor AO is due to increased Contracts costs due to the increased project scope and extended project timeline caused by environmental permitting.
AFUDC Interest	272,553	884,768	612,215	Increase in AFUDC is due to higher project costs, increased project scope, and a longer project timeline.
Total	7,244,422	15,445,508	8,201,086	

Capital Project Detailed Estimate

Location: Hydro						
CI# : 50518						
Title: HYD Ruth Falls Main Dam Refurbishment						
Execution Year: 2025						
DescriptionUnitQuantityUnit EstimateTotal Estimate					Cost Support Reference	Completed Similar Projects (FP#'s)
Regular Labour						
Project Support - Engineering	lot	1	\$ 619,734	\$ 619,734		
				\$ -		
			Sub-Total	\$ 619,734		
OT Labour						
Project Support - Engineering	lot	1	\$ 6,186	\$ 6,186		
				\$ -		
				\$ -		
				\$ -		
			Sub-Total	\$ 6,186		
Term Labour						
Project Support - Environmental	lot	1	\$ 96,609	\$ 96,609		
				\$ -		
				\$ -		
			Sub-Total	\$ 96,609		
Travel Expense						
Travel	lot	1	\$ 28,819	\$ 28,819		
				\$ -		
			Sub-Total	\$ 28,819		
Materials						
Supply of gates and actuators	lot	1	\$ 193,640	\$ 193,640		
Supply of rubber dams	lot	1	\$ 525,187	\$ 525,187		
Backup generator during winter construction	lot	1	\$ 15,450	\$ 15,450		
Generator for Compressor Building	lot	1	\$ 125,000	\$ 125,000		
Supply of insultaed storage containers	lot	1	\$ 15,487	\$ 15,487		
Concrete, Steel, Electrical, Piping, Rebar	lot	1	\$ 1,387,144	\$ 1,387,144		
Fish passage ugrades including eel ramp	lot	1	\$ 666,781	\$ 666,781		
				\$ -		
			Sub-Total	\$ 2,928,689		
Contracts						
General Contract - LNTF	lot	1	\$ 1,136,916	\$ 1,136,916		
Mobilization / Demobilization	lot	1	\$ 125,000	\$ 125,000		
Environmental Management	lot	1	\$ 25,000	\$ 25,000		
Water Controls	lot	1	\$ 60,000	\$ 60,000		
Concrete Works	lot	1	\$ 1,033,440	\$ 1,033,440		
Rubber Dam Installation	lot	1	\$ 225,000	\$ 225,000		
Verical Lift Gates Installation	lot	1	\$ 150,000	\$ 150,000		
Earthworks, retaining wall	lot	1	\$ 25,000	\$ 25,000		
Rubber Dam Inspection	lot	1	\$ 37,520	\$ 37,520		
Wiring electrical to Compressor Building	lot	1	\$ 61,801	\$ 61,801		
Pre-clearing nesting bird survey	lot	1	\$ 9,336	\$ 9,336		
Concrete testing	lot	1	\$ 45,332	\$ 45,332		
Escalation costs due to execution deferral	lot	1	\$ 612,787	\$ 612,787		
Archaeology related costs	lot	1	\$ 232,573	\$ 232,573		
Vegetation removal	lot	1	\$ 67,738	\$ 67,738		
New Upstream Eel Ramp	lot	1	\$ 368,658	\$ 368,658		
Upstream Fishway upgrades	lot	1	\$ 995,722	\$ 995,722		
Downstream Louvre System upgrades	lot	1	\$ 265,658	\$ 265,658		
Construction supervision	lot	1	\$ 374,451	\$ 374,451		
Engineering support for envir. permitting	lot	1	\$ 15,443	\$ 15,443		
Construction demolition activities	lot	1	\$ 360,000	\$ 360,000		
Barn swallow nest removal	lot	1	\$ 10,735	\$ 10,735		
Bird habitat building construction	lot	1	\$ 9,725	\$ 9,725		
				\$ -		
			Sub-Total	\$ 6,247,833		
Freight/Postage/Delivery						
Rubber dams and components freight	lot	1	\$ 17,440	\$ 17,440		
				\$ -		
			Sub-Total	\$ 17,440		
Consulting						
Conceptual / Detailed design of refurb.	lot	1	\$ 231,374	\$ 231,374		
Juvenile Gaspereau Entrainment Study	lot	1	\$ 135,199	\$ 135,199		
Wetland deliniation and functional assessment	lot	1	\$ 22,971	\$ 22,971		
Wetland & Fish Habitat Monitoring	lot	1	\$ 55,405	\$ 55,405		
Archaeological Reconnaissance	lot	1	\$ 108,495	\$ 108,495		
Design of fish passage upgrades	lot	1	\$ 192,102	\$ 192,102		
Post-construction monitoring	lot	1	\$ 309,000	\$ 309,000		
Offsetting (West River Project)	lot	1	\$ 547,142	\$ 547,142		
3D Hydraulic Modelling	lot	1	\$ 117,545	\$ 117,545		
Environemental maintenance flow assesment	lot	1	\$ 1,539	\$ 1,539		
Electrical work on Compressor Building	lot	1	\$ 3,664	\$ 3,664		
Fish Count and review	lot	1	\$ 120,399	\$ 120,399		
Electrical work during construction	lot	1	\$ 32,400	\$ 32,400		
				\$ -		
			Sub-Total	\$ 1,877,234		

Capital Project Detailed Estimate

Description						Unit	Quantity	Unit Estimate	Total Estimate	Cost Support Reference	Completed Similar Projects (FP#s)
Legal											
Corporate Legal fee	lot	1	\$	141	\$	141					
					\$	-					
Sub-Total					\$	141					
Meals											
Meals	lot	1	\$	8,074	\$	8,074					
					\$	-					
Sub-Total					\$	8,074					
Personal Equipment											
Purchase of PPE	lot	1	\$	4,743	\$	4,743					
					\$	-					
Sub-Total					\$	4,743					
Other Goods & Services											
Previously approved contingency	lot	1	\$	842,715	\$	842,715					
Offsetting contingency	lot	1	\$	500,000	\$	500,000					
					\$	-					
Sub-Total					\$	1,342,714					
Equipment Rental											
Equipment Rental during 2022 construction	lot	1			\$	-					
Sub-Total											
Mi'kmaw Engagement											
KMKNO capacity agreement payments	lot	1									
Mi'kmaq observer during construction	lot	1									
					\$	-					
Sub-Total											
Interest Capitalized											
AFUDC	lot	1	\$	884,768	\$	884,768					
					\$	-					
Sub-Total					\$	884,768					
Administrative Overhead											
Labour AO	L.S.	1	\$	413,588	\$	413,588					
Contractor AO	L.S.	1	\$	724,985	\$	724,985					
	L.S.	1			\$	-					
Sub-Total					\$	1,138,573					
SUB-TOTAL (no AO, AFUDC)					\$	13,422,168					
TOTAL (AO, AFUDC included)					\$	15,445,508					
Original Cost					\$	1,279,623					

Note 1: The labour figures noted above are an average of salaries across a variety of jobs within similar classifications including fringe, and are used solely for budgeting purposes.

Note 2: Small differences in totals are attributable to rounding.

Note 3: Contingency for the original 2019 submission was determined using a combination of internal subject matter expert judgement and previous experience with hydro dam refurbishment projects. During the initial filing of the project as AACE Class 3 Estimate, this was meant to account for the risks related to water management during construction associated with upstream reservoir temporary drawdown, installation of the rubber dams and sluice gates, concrete works, and archaeological screening with possible mitigation. To date, the dam refurbishment activities have not started yet and are forecasted to commence in July 2025, therefore, this contingency is still required and remains appropriate. Consistent with the maturity matrix (65-100%, Class 1), this project does not require any increases to the base contingency amount.

In addition to contingency related to the construction items listed above, NS Power is including a secondary contingency to account for the increased offsetting requirements requested by DFO. Due to high uncertainty on the availability of the offsetting projects and the required restoration work that varies from project to project, NS Power expects the offsetting contingency to fall under AACE Class 5. Consistent with the Class 5, the selected contingency was 100%. This contingency will account for the risks of the increased restoration area and costs.



Instructions: Select option in Column B.
Columns C through G will auto-populate.

Document No: Please request from IM

Project Cost Estimate Input Checklist and Maturity Matrix						
Hydropower	Required fields:	Estimate Classification				
Project Name: HYD Ruth Falls Main Dam Refurbishment	Started or Preliminary	Class 5	Class 4	Class 3	Class 2	Class 1
Maturity Level of Project Definition Deliverables	Defined or Complete	0% to 2%	1% to 15%	10% to 40%	30% to 75%	65% to 100%
General Project Data						
A. Scope						
Project Scope of Work Description	Defined (D)	P	P	D	D	D
Site Infrastructure (Access, Construction Power, Camp, etc.)	Defined (D)	NR	P	D	D	D
B. Capacity						
Facility Output / Production Profile	Not Applicable (NA)					
Electrical Power Requirements (when not the primary capacity driver)	Defined (D)	NR	P	D	D	D
C. Project Location						
Plant and Associated Facilities	Not Applicable (NA)					
D. Requirements						
Codes and/or Standards	Defined (D)	NR	P	D	D	D
Communication Systems	Defined (D)	NR	P	D	D	D
Fire Protection and Life Safety	Defined (D)	NR	P	D	D	D
Environmental Monitoring	Defined (D)	NR	NR	P	P	D
E. Technology Selection						
Not Applicable						
F. Strategy						
Contracting/Sourcing	Defined (D)	NR	P	D	D	D
Escalation	Defined (D)	NR	P	D	D	D
G. Planning						
Regulatory Approval & Permitting	Defined (D)	P	P	D	D	D
Material Utilization (Borrow Sources)	Defined (D)	P	P	P/D	D	D
Logistics Plan	Defined (D)	P	P	P	D	D
Work Breakdown Structure (WBS)	Defined (D)	P	P	P/D	D	D
Decommissioning/Demolition Plan	Defined (D)	NR	P	D	D	D
Integrated Project Plan	Defined (D)	NR	P	D	D	D
Project Code of Accounts	Defined (D)	NR	P	D	D	D
Project Schedule	Defined (D)	NR	P	D	D	D
Risk Register	Defined (D)	NR	P	D	D	D
Stakeholder Consultation/Engagement/Management Plan	Defined (D)	NR	P	D	D	D
Start-up & Commissioning Plan	Defined (D)	NR	P	P/D	D	D
H. Studies						
Hydraulics	Defined (D)	P	P	D	D	D
Topography & Bathymetry	Defined (D)	P	P	P/D	D	D
Environmental Impact/Sustainability Assessment	Defined (D)	NR	P	D	D	D
Environment/Existing Conditions	Defined (D)	NR	P	D	D	D
Soils & Hydrology	Defined (D)	NR	P	D	D	D
Geotechnical Investigation	Defined (D)	NR	P	P/D	D	D
Technical Deliverables (Specifications and/or Drawings)						
Block Flow Diagrams	Not Applicable (NA)					
Hydraulic Design & Probable Maximum Flood (PMF)	Complete (C)	S	P	C	C	C
Equipment Data Sheets	Complete (C)	NR/S	P	C	C	C
Equipment Lists: Electrical	Complete (C)	NR/S	P	C	C	C
Equipment Lists: Process/Utility/Mechanical	Complete (C)	NR/S	P	C	C	C
Design Specifications	Complete (C)	NR	S/P	C	C	C
Electrical One-Line Drawings	Complete (C)	NR	S/P	C	C	C
General Equipment Arrangement Drawings	Not Applicable (NA)	NR				
Instrument List	Complete (C)	NR	S/P	C	C	C
Construction Permits	Preliminary (P)	NR	S/P	P/C		
Civil/Site/Structural/Architectural Discipline Drawings	Complete (C)	NR	S/P	P	C	C
Demolition Plans and Drawings	Complete (C)	NR	S/P	P	C	C
Erosion Control Plan & Drawings	Preliminary (P)	NR	S/P	P		
Fire Protection & Life Safety Drawings & Details	Not Applicable (NA)	NR				
Mitigation Measures (Aquatic, Terrestrial, Heritage, etc.)	Complete (C)	NR	P	P	C	C
Dam Design & Drawings	Complete (C)	NR	P	P	P/C	C
De-silting Basins	Not Applicable (NA)	NR				
Gates & Cranes Design & Drawings	Complete (C)	NR	P	P	P/C	C
Intake Design & Drawings	Not Applicable (NA)	NR				
Penstock Design & Drawings	Not Applicable (NA)	NR				
Power House Design & Drawings	Not Applicable (NA)	NR				
Spillway Design & Drawings	Complete (C)	NR	P	P	P/C	C
Turbine and Generator Design & Drawings	Not Applicable (NA)	NR				
Electrical Schedules	Not Applicable (NA)	NR	NR/S			
Instrument & Control Schedules	Not Applicable (NA)	NR	NR/S			
Instrument Data Sheets	Complete (C)	NR	NR/S	P	P/C	C
Spare Parts Listings	Not Applicable (NA)	NR	NR			
Electrical Discipline Drawings	Complete (C)	NR	NR	S/P	P/C	C
Facility Emergency Communication Plan & Drawings	Not Applicable (NA)	NR	NR			
Information Systems/Telecommunication Drawings	Not Applicable (NA)	NR	NR			
Instrumentation/Control System Discipline Drawings	Not Applicable (NA)	NR	NR			
Mechanical Discipline Drawings	Complete (C)	NR	NR	S/P	P/C	C
Auxiliary Electrical Design & Drawings	Not Applicable (NA)	NR	NR			
Auxiliary Mechanical Design & Drawings	Not Applicable (NA)	NR	NR			
Protection & Controls System Design & Drawings	Not Applicable (NA)	NR	NR			
Total # Deliverables for this Project		8	40	44	42	42
% Defined/Complete towards Class Estimate		100%	100%	100%	95%	95%

Comments:

The project cost estimate is at Class 1 maturity level with 95% of deliverables completed/defined towards this class of estimate. Items currently not defined at this point are Construction Permits (DFO FAA outstanding) and Development of Erosion Control plan (to be completed by the General Contractor prior to commencement of construction in Q2 2025).

Legend:

The maturity level is an approximation of the completion status of the deliverable. The completion is indicated by the following descriptors:

General Project Data:

- Not Required (NR): May not be required for all estimates of the specified class, but specific project estimates may require at least preliminary development.
- Preliminary (P): Project definition has begun and progressed to at least an intermediate level of completion. Review and approvals for its current status has occurred.
- Defined (D): Project definition is advanced, and reviews have been conducted. Development may be near completion with the exception of final approvals.

Technical Deliverables:

- Not Required (NR): Deliverable may not be required for all estimates of the specified class, but specific project estimates may require at least preliminary development.
- Started (S): Work on the deliverable has begun. Development is typically limited to sketches, rough outlines, or similar levels of early completion.
- Preliminary (P): Work on the deliverable is advanced. Interim, cross-functional reviews have usually been conducted. Development may be near completion except for final reviews and approvals.
- Complete (C): The deliverable has been reviewed and approved as appropriate.

Inclusions

For the purposes of this document, the term *hydropower industries* is assumed to include private and public utilities involved with the production of electrical power, exclusive of transmission and distribution, using natural gravitational force of falling or flowing water, excluding tidal forces, to drive a turbine that powers a generator.

The common thread among private and public utilities (for the purpose of estimate classification) is their reliance on user requirements, statement of objectives, design reports (i.e. geotechnical investigations, sourcing borrow materials and hydraulic design/modeling) and/or environmental data collection and studies as primary scope defining documents. These documents are key deliverables in determining the degree of project definition, and thus the extent and maturity of estimate input information.

Cost estimates for hydropower facilities are typically composed of key features such as:

- Reservoir area preparation (e.g., clearing, removal of structures and earthmoving).
- River management (e.g., cofferdams, diversion channels or tunnels, sediment management plans, environmental monitoring programs).
- Principal structures (e.g., dams, dykes, intakes, penstocks, powerhouse(s), low level outlet(s), power tunnel(s), de-silting basin(s), and spillway structure(s)).
- Permanent infrastructure (e.g., access roads, railroads, bridges, offices, warehouse and housing).
- Temporary infrastructure (e.g., construction camp, site access roads, airport, workshops, construction power etc).
- Environmental mitigation features (e.g. fish ladder(s), water bypass and creation of new fish or wildlife habitat).
- Owner's costs (e.g., stakeholder involvement, licensing, studies and investigations, administration and overhead, catering.).

Some, but not all, of these features are unique to the hydropower industries.

Typical hydropower facilities may include: turbines, generators, exciters, governors, transformers, gates for intake, spillway and draft tubes, and supporting electrical, mechanical, telecom, protection, and control systems. The water storage reservoir is typically required to support the operations of the hydropower facility.

DFO Communication to NS Power	Date Received	Supplemental Information Requested by DFO	NS Power Follow up Actions and Response to DFO	NS Power Response Date
Letter requiring Fisheries Application Authorization	March 13, 2020	In response to NS Power's request for review submitted December 2, 2019 DFO letter stated authorization in accordance with the Fisheries Act was required for the Project	Submission of FAA application and supporting information	June 24, 2020
Supplemental Information Requested	August 4, 2020	NS Power Application considered incomplete by DFO. DFO requested additional information including details of fish habitat available during drawdown, offsetting plan, normal operating procedures and construction site access requirements	Responded to information requests Development of offsetting plan (Confederacy of Mainland Mi'kmaq) Development of drawdown monitoring plan	May 8, 2021
Supplemental Information Requested	July 8, 2021	DFO indicated that due to a change in scope of the project, they will not be providing comments on NS Power's May 8, 2021 submission until an updated construction execution plan is provided to DFO.	On July 12, 2021 NS Power submitted an application for watercourse alteration to NSECC to complete a portion of the Ruth Falls project separately from the larger refurbishment project. Approval was received October 22, 2021, and work completed September 22, 2022. NS Power resubmitted an updated supporting information document to DFO to clarify the scope of the broader Ruth Falls Project and the intent to remove the smaller portion of the work to take place in 2022. Updated supporting information document included a third-party wetland monitoring plan, and third party juvenile gaspereau/habitat characterization/entrainment monitoring plan to support the drawdown	Application Resubmitted January 21, 2022

DFO Communication to NS Power	Date Received	Supplemental Information Requested by DFO	NS Power Follow up Actions and Response to DFO	NS Power Response Date
Supplemental Information Requested	May 5, 2022	NS Power Application considered incomplete by DFO. DFO requested additional information including: results of historical fish passage studies performed at Ruth Falls	Summary report of downstream eel tracking study Fish ladder counts completed	Application Resubmitted July 10, 2023
		Professional assessment on potential impacts of dam design and operation to upstream and downstream fish passage for all species likely migrating in the area	Overarching evaluation completed by consultant	
			3D hydraulic modelling completed by consultant	
		Upstream fish passage plan (including American Eel)	Evaluation of existing fishway Conceptual and detailed designs completed by consultant	
		Downstream fish passage plan	Evaluation of existing louver/downstream bypass system Conceptual and detailed designs completed by consultant	
		Post-construction monitoring plan to evaluate upstream and downstream passage	Development of post-construction monitoring plan including tracking studies and instream sampling	
		Further clarification on construction execution	Revision of supporting information document	
		Further clarification on wetland fish habitat monitoring plan	Revision to third party wetland monitoring plan completed by consultant	
		Further clarification on habitat characterization/entrainment monitoring plan	Revision to third party entrainment monitoring plan completed by consultant	
Supplemental Information Requested	September 11, 2023	NS Power Application considered incomplete by DFO. DFO requested additional information	Revision to Post-Construction Monitoring Plan	December 7, 2023

DFO Communication to NS Power	Date Received	Supplemental Information Requested by DFO	NS Power Follow up Actions and Response to DFO	NS Power Response Date
		including clarifications on Post-Construction Monitoring Plan		
		Additional detailed design drawings of the existing fishway	Drawings developed by a consultant	
		Additional clarifications on third party wetland monitoring plan	Revision to wetland monitoring plan	
		Additional clarifications on third party fish entrainment monitoring plan	Revision to entrainment plan	
		Additional offsetting for death of fish	Updates to original offsetting plans by the Confederacy of Mainland Mi'kmaq (CMM)	
Complete Letter	January 29, 2024	DFO noted "Other considerations that still must be addressed which may result in modifications to NS Power's proposal"	-	
Email	June 6, 2024	DFO indicated feedback was received from the Mi'kmaq of NS regarding NS Power's proposed application. Feedback was in relation to NS Power's proposed offsetting plan. DFO also provided additional information requests and requested further clarification on NS Power's proposed monitoring plan submitted as part of the December 7, 2023 submission.	Assessment/scoping for additional offsetting for the Project (Confederacy of Mainland Mi'kmaq/NS Salmon Association)	
			Development of site-specific archaeological plan	
			Assessment of temporary fish passage measures during construction	
			Revisions to post-construction monitoring plan	