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December 14, 2023

Patrick Wruck
Commission Secretary and Manager
Regulatory Services
British Columbia Utilities Commission
Suite 410, 900 Howe Street
Vancouver, BC V6Z 2N3

Dear Patrick Wruck:

RE: Project No. 1599288
British Columbia Utilities Commission (BCUC or Commission)
British Columbia Hydro and Power Authority (BC Hydro)
John Hart Dam Seismic Upgrade Project (the Project)
Semi-Annual Progress Report No. 1 - May to October 2023

BC Hydro writes in compliance with Commission Order No. G-235-23, to provide the Public Semi-Annual Report No.1 for the Project.

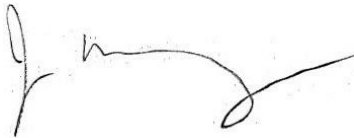
Confidential Version of Report

Commercially sensitive and contractor-specific information has been redacted from the public version of the Report. A confidential version of the Report is being filed with the BCUC only, under separate cover.

BC Hydro seeks this confidential treatment pursuant to section 42 of the Administrative Tribunals Act and Part 4 of the Commission's Rules of Practice and Procedure.

For further information, please contact Joe Maloney at
bchydroregulatorygroup@bchydro.com.

Yours sincerely,



(for) Chris Sandve
Chief Regulatory Officer

bh/ll

Enclosure

John Hart Dam Seismic Upgrade Project

Semi-Annual Progress Report No. 1

Six Month Period

May 1, 2023 to October 31, 2023

PUBLIC

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1 **Background**

2 The objective of the John Hart Dam Seismic Upgrade Project (**Project**)¹ is to
3 strengthen the Dam, Spillway, and Spillway Gates System so that the John Hart
4 Dam can withstand a severe earthquake and continue to provide downstream public
5 safety. The John Hart Dam is classified by the Comptroller of Water Rights as an
6 “Extreme” consequence dam. Per the Canadian Dam Association Dam Safety
7 Guidelines, the corresponding expectation is for the dam to resist a Maximum
8 Design Earthquake with an Annual Exceedance Frequency of 1/10,000. This target
9 has been adopted by the John Hart Dam Seismic project.

10 The Project will significantly improve the safety and reliability of John Hart Dam by
11 addressing the seismic, spillway gate operational reliability, and flow imbalance
12 deficiencies, enabling BC Hydro to meet its obligations with regards to dam safety;
13 to follow good dam safety industry practices and to minimize the risk of damage to
14 property and infrastructure, potential loss of life, or damage to the environment. The
15 Project scope is summarized in section 5.2 of the John Hart Dam Seismic Upgrade
16 Project Section 44(2) Application (**Application**).

17 The BCUC issued Order G-107-23, pursuant to section 44.2 of the *Utilities*
18 *Commission Act*, accepting that the Expenditure Schedule for the Project with the
19 Expected Cost² of \$748.3 million and the Authorized Cost of \$922.7 million as
20 described in the Application dated December 20, 2021, and detailed in the Updated
21 Project Cost Estimate filed on October 25, 2022, is in the public interest.

22 In Order G-107-23, the BCUC directed BC Hydro to file semi-annual progress
23 reports to include the following information:

¹ Unless otherwise noted, the defined terms in this report have the same meaning as in BC Hydro's Application for Orders regarding the John Hart Dam Seismic Upgrade Project.

² Expected / Authorized Cost is the same as the Expected / Authorized Amount noted in the Updated Project Cost Estimate.

- 1 • Actual costs incurred to date compared to the Project cost breakdown table
2 estimate provided in the Updated Expenditure Schedule, Table 5-2 of
3 Appendix 2A to the Updated Project Cost Estimate, including the use of Special
4 Reserves, if accessed, highlighting variances with an explanation of significant
5 variances;
- 6 • Updated forecast of costs, highlighting the reasons for significant changes in
7 Updated Project Cost Estimate costs anticipated to be incurred; and
- 8 • The status of identified risks noted in Chapter 7 of the Application, including
9 applications for all permits, approvals, and authorizations necessary to
10 complete the Project, highlighting the status of identified risks, changes in and
11 additions to risks, the options available to address the risks, the actions that
12 BC Hydro is taking to mitigate the risks, and the likely impact on the Project's
13 schedule and cost.

14 BC Hydro files the Progress Report No. 1 (**Report**), which provides the updated
15 information on the Project, as directed, for the period from May 1, 2023, to
16 October 31, 2023 (**Reporting Period**). During the Reporting Period, there were no
17 material changes to report pursuant to Order G-107-23.

18 **2 Project Status**

19 [Table 1](#) below provides a high-level status update for the Project as of the end of this
20 Reporting Period.

21

1 **Table 1 Project Status Dashboard³**

Green: No Concerns; Amber: Some Concerns but in Control; Red: Serious Concerns

Status as of:		October 31, 2023
Project	G	The Project rating of Green is based on the rating of Scope, Schedule, and Cost noted below.
Scope	G	No material scope risk has been identified.
Schedule	G	The Project is not forecasting to miss any major milestones in the Implementation phase. The forecast In-Service date remains July 2029.
Cost	G	The estimate at completion for the Implementation phase is within the BC Hydro-approved Authorized Cost.

2 **3 Project Schedule**

3 As of the end of this Reporting Period, the Project in-service date forecast remains
4 July 2029.

5 [Table 2](#) below provides the forecast dates for the Project’s Major Milestones as of
6 October 31, 2023, and a comparison to the estimated dates provided in Updated
7 Project Schedule in Table 5-4 of Appendix 4A in Exhibit B-18 – Updated Project
8 Cost Estimate (**Updated Project Schedule**) dated October 25, 2022.

9 **Table 2 Project Major Milestones as of October 31, 2023**

Row No.	Description of Major Milestone	Updated Project Schedule	Actual Date / Current Forecast	Status and Comments
1	BCUC Application Filed	December 2021	December 2021	Complete
2	Issue Request for Proposal (Civil Contract)	December 2021	December 2021	Complete
3	Issue Request for Proposal (Hydromechanical Contract)	TBD in Implementation Phase	March 2025	On Track
4	Definition Phase Complete / BC Hydro Board Authorization to Proceed to Implementation Phase	June 2023	June 2023	Complete
5	Early Contractor Involvement (Civil Contract)	November 2022 to April 2023	June 2023	Complete

³ The presented key performance indicators are indicators of scope, schedule, and cost at the end of the reporting period that reflect performance against BC Hydro-approved scope, schedule, and cost.

Row No.	Description of Major Milestone	Updated Project Schedule	Actual Date / Current Forecast	Status and Comments
6	Early Contractor Involvement (Hydromechanical Contract)	TBD in Implementation Phase	August 2026	On Track
7	Construction Contract Award - Civil	July 2023	July 2023	Complete
8	Construction Contract Award - Hydromechanical	TBD in Implementation Phase	November 2026	On Track
9	North Earthfill Dam In-Service	February 2025	February 2025	On Track
10	Intake Dam In-Service	October 2026	October 2026	On Track
11	Middle Earthfill Dam In-Service	August 2026	August 2026	On Track
12	Concrete Dam In-Service (includes Free Flow Spillway)	December 2025	December 2025	On Track
13	Spillway Gate No. 1 In-Service	January 2028	January 2028	On Track
14	Spillway Gate No. 2 In-Service	July 2028	July 2028	On Track
15	Spillway Gate No. 3 and Overall Project In-Service	July 2029	July 2029	On Track
16	Total Project Completion	December 2030	December 2030	On Track

3.1 Schedule Variance Explanation

This section provides the reasons for the variances of six months or greater between the Updated Project Schedule and the Actual Current Forecast as of October 31, 2023. There are no schedule variances of six months or greater.

4 Project Costs

On March 2, 2023, BC Hydro's Board of Directors approved Implementation Funding for the Project subject to the BCUC's acceptance of the capital expenditure schedule. There was no variance between the Authorized Cost filed in the Updated Project Cost Estimate and the amount approved by the Board.

[Table 3](#) below provides the actual costs incurred to the end of the Reporting Period (October 31, 2023). The table also provides the Project's forecast Expected Cost and Authorized Cost as of October 31, 2023, and a comparison to the Project Cost Range Breakdown provided in the Updated Expenditure Schedule in Table 5-2 of

1 Appendix 2A in Exhibit B-18 – Updated Project Cost Estimate (**Updated**
2 **Expenditure Schedule**).

3 As of the end of the Reporting Period, the actual costs incurred total \$133.3 million.
4 The forecast Expected Cost as of the end of the Reporting Period is remains
5 \$748.3 million and the forecast Authorized Cost remains \$922.7 million.

6 Variances greater than \$5.0 million between the Project Cost Range Breakdown
7 provided in the Updated Expenditure Schedule ([Table 3](#), column A) and the Project's
8 forecast cost as of October 31, 2023 ([Table 3](#), column B) are explained in
9 section [4.1](#).

Table 3 Project Cost Summary Table as of October 31, 2023⁴

Row No.	Description	A Updated Expenditure Schedule filed October 25, 2022 (\$Million)	B Current Forecast as of October 31, 2023 (\$Million)	C Variance to Application (\$Million)	D Variance to Application % (%)	E Actuals to October 31, 2023 (\$Million)	F % of Current Forecast (%)	G % of Application (%)
				B-A	C/A		E/B	E/A
1	Pre-Full Implementation Phase Costs							
	Excludes Interest During Construction and Capital Overhead							
	Implementation Phase Costs							
	Direct Construction Costs							
2	Spillway Gates System							
3	Concrete Main Dam							
4	Training Walls (Downstream of Concrete Main Dam)							
5	North Earthfill Dam							
6	Middle Earthfill Dam							
7	Intake Dam							
8	Additional Work Areas							
9a	Marine Access & Temporary Works							
9b	Owner Controlled Insurance							
10	Construction & Contract Management							
11	Equipment Removals							
12	Fuel & Steel Price Adjustment							
13	Total Direct Construction Costs							
	Indirect Construction Costs							

⁴ Due to the use of rounded numbers, certain columns and rows may not calculate precisely to the numbers provided.

Row No.	Description	A	B	C	D	E	F	G
		Updated Expenditure Schedule filed October 25, 2022 (\$Million)	Current Forecast as of October 31, 2023 (\$Million)	Variance to Application (\$Million)	Variance to Application % (%)	Actuals to October 31, 2023 (\$Million)	% of Current Forecast (%)	% of Application (%)
				B-A	C/A		E/B	E/A
14	Project Management							
15	Engineering & Design							
16	Indigenous Relations							
17	Environment, Stakeholders & Properties							
18	Procurement and Quality Management							
19	Total Indirect Construction Costs							
20	Total Implementation Phase Costs (Before Contingency & Loadings)							
21	Contingency							
22	Capital Overhead							
23	Interest During Construction							
24	BC Hydro Expected Cost	748.3	748.3	0.0	0%	139.0	19%	19%
25	Project Reserve	131.2	131.2	0.0	0%	0.0	0%	0%
26	Special Reserve #1 - Escalation	33.1	33.1	0.0	0%	0.0	0%	0%
27	Special Reserve #2 – Replacement of Deck & Piers Blocks 5 to 9	10.1	10.1	0.0	0%	0.0	0%	0%
28	BC Hydro Authorized Cost	922.7	922.7	0.0	0%	139.0	15%	15%

4.1 Project Cost Forecast Variance Explanation

[Table 4](#) below provides the reasons for the variances between the Updated Expenditure Schedule and the forecast as of the end of the Reporting Period, for variances greater than \$5 million.

Table 4 Project Cost Forecast Variance Explanation as of October 31, 2023

Row in Table 3	Explanation	Total Variance (\$Million)
4	<ul style="list-style-type: none"> Not a cost variance, rather a reallocation of civil contract estimated costs between different work packages based on construction contract specifications and payment terms. A portion of the forecast costs for the Training Walls have been moved to Marine Access and Temporary Works and Steel and Fuel Price Adjustment to align with the contract structure. 	
7	<ul style="list-style-type: none"> Not a cost variance, rather a reallocation of civil contract estimated costs between different work packages based on construction contract specifications and payment terms. A portion of the forecast costs have been moved from the Intake Dam to Marine Access and Temporary Works and Steel and Fuel Price Adjustment to align with the contract structure. 	
8	<ul style="list-style-type: none"> Not a cost variance, rather a reallocation of civil contract estimated costs between different work packages based on construction contract specifications and payment terms. A portion of the forecast costs have been moved from Additional Work Areas to Marine Access and Temporary Works and Steel and Fuel Price Adjustment to align with the contract structure. 	
9a	<ul style="list-style-type: none"> Not a cost variance, rather a reallocation of civil contract estimated costs between different work packages based on contract specifications and payment terms. A portion of the forecast costs have been moved from the six construction areas (Concrete Main Dam, Training Walls, North Earthfill Dam, Middle Earthfill Dam, Intake Dam, and Additional Work Areas) to Marine Access and Temporary Works. The costs in this line item include work on all six construction areas noted above. 	
12	<ul style="list-style-type: none"> NEW: A forecast price adjustment was included in the original estimate split under each of the six construction areas. This was then negotiated with the contractor as a one-time price adjustment under the new line item: Steel and Fuel Price Adjustment. A portion of the forecast costs have been moved from the six construction areas (Concrete Main Dam, Training Walls, North Earthfill Dam, Middle Earthfill Dam, Intake Dam, and Additional Works Areas) to Steel and Fuel Price Adjustment. The costs in this line item include adjustments on all six construction areas noted above. 	

Row in Table 3	Explanation	Total Variance (\$Million)
13	<ul style="list-style-type: none"> Increase in direct construction costs primarily due to civil contract change orders [REDACTED], additional costs for spillway gate system [REDACTED] due to inflation, and additional costs for Owner Controlled Insurance [REDACTED]. 	
20	<ul style="list-style-type: none"> Increase in Implementation phase costs primarily due to an increase in direct construction costs as noted above. 	
21	<ul style="list-style-type: none"> Contingency has been allocated to address cost increases in the Implementation phase costs and Interest During Construction. 	
23	<ul style="list-style-type: none"> Due to higher interest rates, the Interest During Construction (IDC) has increased. 	

1 **4.2 Actual Costs Incurred: Update on Project Activities**

- 2 (i) Contract Management: The civil construction contractor is advancing work
3 through the construction stage, and the contract remains on budget and on
4 schedule. Klohn Crippen Berger Ltd. and Hatch Energy Inc. (**KCB+H**) have
5 been retained to deliver engineering services for the Project;
- 6 (ii) Construction Management: Construction work is underway and is progressing
7 as planned. The installation of silt curtains at the North Earthfill Dam is
8 complete. Construction of dredgeate storage, initial work at the Concrete Main
9 Dam, and preparatory works for the Plastic Concrete Cutoff Wall (**PCCW**) are in
10 progress;
- 11 (iii) Procurement and Quality Assurance: The contract for Civil, Structural, and
12 Geotechnical Work was awarded on November 30, 2022. The contract for
13 clearing and grubbing was awarded to a We Wai Kai and We Wai Kum
14 designated company on September 12, 2022. The contract for relocation of
15 Power Line and Fibre was awarded to a K'omoks designated company on
16 September 14, 2022;
- 17 (iv) Engineering and Design: The engineering and design work has progressed
18 considerably and the focus is on the development of construction drawings;
19 participation in the Early Contractor Involvement process; contractor submittal

1 review; and technical oversight during construction. At this time there are no
2 major concerns;

3 (v) Environment and Heritage: Environmental and heritage aspects of the Project
4 are being successfully managed as per requirements in the Construction
5 Environmental Management Plan. No environmental and heritage concerns;

6 (vi) First Nations: BC Hydro is currently working with We Wai Kai to address their
7 request for screening of dredgeate material for potential archaeological
8 material. All three Nations are actively engaged in the construction of the
9 Project through procurement, training, and employment opportunities. The
10 contract with our civil contractor includes a requirement for a minimum of
11 [REDACTED] in subcontracting opportunities to designated First Nations
12 businesses. The contractor has exceeded their commitment and will continue to
13 look for additional opportunities as construction progresses. No new concerns
14 were raised by We Wai Kai, Wei Wai Kum and K'ómoks;

15 (vii) Public Stakeholder Engagement: No new concerns were raised by public
16 stakeholders. We continue to inform and engage with the community about the
17 Project through construction reports, media stories, the majorprojects.ca
18 website, the Discovery Centre, and the Liaison Committee;

19 (viii) Safety: No significant safety incidents; and

20 (ix) Regulatory, Permits, and Authorizations: In August 2023, the first Leave to
21 Commence Construction was issued by the Comptroller of Water Rights. In
22 July 2023, BC Hydro obtained a Park Use Permit amendment to authorize the
23 Project. In June 2023 the Project received *Fisheries Act* Authorization for the
24 Project. In May 2023 the Project received *Species at Risk Act* Permit for
25 potential Project impacts. In December 2022 the Project obtained a short-term
26 water use permit for construction use under the *Water Sustainability Act*.

1 **5 Project Risks**

2 This section describes the material⁵ Project risks that have potential to impact the
3 Project. Over the life of the Project, risks and associated risk treatments are and will
4 be identified, analyzed, monitored, and reviewed, in accordance with BC Hydro's
5 project management practices and procedures.

⁵ BC Hydro defines "material" in this case to be any risk with a pre-treatment risk level in the Executive Risk zone, as identified in the Project Delivery Risk Matrix.

1

Table 5 Summary of Material Project Risks and Treatments

From Application dated December 20, 2021						Updated for Reporting Period ending October 31, 2023		
1	2	3	4	5	6	7	8	9
Section in Application	Risk Status	Description of Risk Event and Consequence	Consequence Type	Risk Level	Residual Risk Level	Risk Status	Risk Treatments (Identified in the Application or New)	Residual Risk Level
7.3.1	Identified	Due to the construction activity planned within Elk Falls Provincial Park, there is a risk that during the Park Use Permit amendment application review process, BC Parks will require design changes or request additional mitigation and compensation, which may result in a lengthy park permitting process, change in construction methods, or a delay in issuing approval which could cause a delay in construction and increased Project costs.	Financial Loss	10 Probability: Possible (L6) Severity: \$10 million to \$100 million (S4)	7 Probability: Remote-May Occur (L5) Severity: \$100,000 to \$1 million (S2)	Closed	Complete - Engaging with BC Parks early and often to understand their concerns.	Not Applicable
							Complete - Choosing construction options that avoid or minimize the impact on park land.	
7.4.1	Identified	Due to construction activities, including excavation occurring near the John Hart Dam, there is an increased risk of dam safety incidents which could result in consequences to worker and public safety, damage to BC Hydro assets and reputational impacts to BC Hydro.	Safety	12 Probability: Possible (L6) Severity: Fatality (S6)	11 Probability: Remote – May Occur (L5) Severity: Fatality (S6)	Active	Complete - Closure of the Project site to the public, including the portion of Brewster Lake Road which runs atop the John Hart Dam, for the duration of the construction period.	11 Probability: Remote – May Occur (L5) Severity: Fatality (S6)
							Complete - Designed dam upgrades so that during all stages of their construction, the overall seismic withstand of the John Hart Dam meets or exceeds a prescribed construction level earthquake, which is equivalent to the dam's current overall withstand level. Technical specifications will require that the contractor's temporary works also meet or exceed a prescribed construction level earthquake.	
							Ongoing - Development of a comprehensive, Project and scope specific "Interim Dam Safety Risk Management Plan."	
							Ongoing - Implementing and following safe work procedures in accordance with BC Hydro and WorkSafeBC requirements.	
							Planned - Completing installation of the new Plastic Concrete Cutoff Wall prior to dredging in the John Hart Reservoir at the Middle Earthfill Dam.	
							Planned - Completing placement of fill upstream and downstream of the Intake Dam in a staged manner.	
7.4.1	Identified	Risk of unplanned release of John Hart Reservoir downstream via Spillway Gates System during operation and construction leading to serious injury and loss of life.	Safety	9 Probability: Very Unlikely (L4) Severity: Fatality (S5)	9 Probability: Very Unlikely (L4) Severity: Fatality (S5)	Active	Ongoing - Completion of a reliability assessment on the new Spillway Gates System design and use of notifications, warning systems, and signage, to protect against unplanned release of the reservoir.	9 Probability: Very Unlikely (L4) Severity: Fatality (S5)
7.4.1	Identified	Risk of safety hazards at the Project site because of difficult to access work areas such as accessing sill and lateral embedded parts at the Spillway Gates System which could create unsafe work conditions such as falling from heights.	Safety	9 Probability: Very Unlikely (L4) Severity: Fatality (S5)	9 Probability: Very Unlikely (L4) Severity: Fatality (S5)	Active	Ongoing - Requiring contractors to develop and implement appropriate safety plans.	9 Probability: Very Unlikely (L4) Severity: Fatality (S5)
							Ongoing - Providing workers with the necessary personal protection equipment and tools to complete work efficiently and effectively.	
							Ongoing - Planning and providing for safe access to the working areas.	
							Planned - Installing new stoplogs with ladders on the downstream side towards the beginning of construction for the Spillway Gates System scope of the Project to provide safer access and to reduce the likelihood of falls from heights when workers need to work on the Spillway Gates structures.	

From Application dated December 20, 2021						Updated for Reporting Period ending October 31, 2023		
1	2	3	4	5	6	7	8	9
Section in Application	Risk Status	Description of Risk Event and Consequence	Consequence Type	Risk Level	Residual Risk Level	Risk Status	Risk Treatments (Identified in the Application or New)	Residual Risk Level
7.4.1	Identified	There is a risk that a resource or resources working on the Project contracts and/or transmits COVID-19. This could have a negative impact on the health of workers or contractors assigned to the Project. Sick or isolating workers may result in delays in completing critical Project activities.	Safety	10 Probability: Likely (L7) Severity: Temporary Disability (S3)	8 Probability: Remote (L5) Severity: Temporary Disability (S3)	Active	<p>Complete - Requiring all employees and contractors to be fully vaccinated by January 10, 2022.</p> <p>Complete - Following BC Hydro's Pandemic Response Plan which complies with the Government of B.C. and Government of Canada guidelines and requirements.</p> <p>Complete - Sharing BC Hydro's Pandemic Response Plan with First Nations, local governments, stakeholders, and the public.</p> <p>Ongoing - Proactively keeping Project resources, First Nations, local governments, stakeholders, and the public informed about BC Hydro's response to the pandemic and plans for critical and supporting functions.</p>	8 Probability: Remote (L5) Severity: Temporary Disability (S3)
7.4.2	Identified	Due to potential changes or developments in understanding of the seismic hazards of the Project, there is a risk of cost increase due to changes in Project design scope and requirements.	Financial Loss	10 Probability: Possible (L6) Severity: \$10 million to \$100 million (S4)	9 Probability: Remote-May Occur (L5) Severity: \$10 million to \$100 million (S4)	Active	<p>Complete - Consulting with project engineers and staff from other major capital projects, including the Ruskin Dam and Powerhouse Upgrade, John Hart Generating Station Replacement, Coquitlam Dam Upgrade, and Site C projects with regard to risk identification and mitigation treatment strategies, particularly with regard to geotechnical risks.</p> <p>Complete - Conducting risk workshops as the Project proceeded through the Definition phase to identify and consider risks and select risk mitigation strategies as appropriate. As part of this process, BC Hydro conducted focused risk workshops to identify geotechnical and construction risks and risk mitigation plans.</p> <p>Complete - Conducting an independent third-party review of the draft contract specifications, for input on potential technical gaps and to identify potential exposure to contractor claims. BC Hydro has completed this process for the civil contract specifications and will undertake the review for the hydromechanical contract specifications (for the Spillway Gates System) when the draft specifications are prepared during the Project Implementation phase.</p> <p>Ongoing - Recognizing and incorporating uncertainties in the Project design through the design lifecycle as appropriate, identifying and communicating changes and their estimated impacts across the Project team, and addressing any changes that are required in the scope or schedule of the Project. The Project Cost Estimate includes Contingency and Project Reserve to account for uncertain items which may impact the cost and schedule of the Project.</p> <p>Ongoing - Engaging an expert Advisory Board to review the Project and provide input and recommendations on the Project design. BC Hydro will continue to engage with the Advisory Board through Project Implementation.</p>	9 Probability: Remote-May Occur (L5) Severity: \$10 million to \$100 million (S4)
7.4.3	Identified	There is a risk that geotechnical conditions may be more complex than expected, resulting in Project delays and/or scope change, both of which could result in cost increases. This risk item includes four key geotechnical project risks: (i) Densification of the North Earthfill Dam;	Financial Loss	10.5 Probability: Likely (L6.5) Severity: \$10 million to \$100 million (S4)	10 Probability: Possible (L6) Severity: \$10 million to \$100 million (S4)	Identified	Complete - To reduce risk associated with this item, the specification for this item will be performance-based, requiring the contractor to propose suitable methods subject to acceptance by BC Hydro. This item will be discussed in more detail with the preferred proponent and specialty subcontractors during Early Contractor Involvement.	10 Probability: Possible (L6) Severity: \$10 million to \$100 million (S4)
7.4.3	Identified	(ii) The sealing of the cofferdams at the Concrete Main Dam;	Financial Loss	10.5 Probability:	10 Probability:	Identified	Complete - Understanding lessons learned from recent projects involving similar cofferdams, such as were constructed for the Ruskin Dam and Powerhouse Upgrade Project and the Salmon River Diversion Ceasing of Operations project.	10 Probability:

From Application dated December 20, 2021						Updated for Reporting Period ending October 31, 2023		
1	2	3	4	5	6	7	8	9
Section in Application	Risk Status	Description of Risk Event and Consequence	Consequence Type	Risk Level	Residual Risk Level	Risk Status	Risk Treatments (Identified in the Application or New)	Residual Risk Level
				Likely (L6.5) Severity: \$10 million to \$100 million (S4)	Possible (L6) Severity: \$10 million to \$100 million (S4)		<p>Complete - Developing a reference design for the upstream cofferdam to be incorporated in the Request for Proposal.</p> <p>Complete – Completing a survey of the downstream rock surfaces to be included in the Request for Proposal.</p> <p>Complete - Providing clear requirements for both the upstream and downstream cofferdams in the scope specifications in the Request for Proposal.</p> <p>Complete - Including a mandatory site visit as part of the Request for Proposal process to improve awareness of the site conditions prior to bids being submitted.</p> <p>Complete - Reviewing the design and construction methodology proposed by the preferred proponent for both upstream and downstream cofferdams as part of the Early Contractor Involvement approach.</p>	Possible (L6) Severity: \$10 million to \$100 million (S4)
7.4.3	Identified	(iii) Upstream excavation by dredging;	Financial Loss	10.5 Probability: Likely (L6.5) Severity: \$10 million to \$100 million (S4)	10 Probability: Possible (L6) Severity: \$10 million to \$100 million (S4)	Identified	<p>Complete - Undertaking a dive and probing survey of multiple locations within the proposed work areas at the North Earthfill Dam and Middle Earthfill Dam as well as geophysical surveys to gather site specific data to assess reservoir bed soil conditions and to estimate the extent of remaining tree stumps and large rocks.</p> <p>Complete - Engaging in discussions with three dredging contractors with local experience to seek their input and share their experience and expertise.</p> <p>Complete - Seeking input from Klohn Crippen Berger + Hatch marine engineers, who have extensive dredging experience.</p> <p>Complete - Selecting pre-determined bottom elevation and slopes for dredging excavation based on extensive data and analysis.</p> <p>Complete - Developing the design of dredge cuts considering the constructability impact on the existing dam and dam safety.</p> <p>Ongoing - Conducting field drilling investigation and sampling of lakebed materials using different techniques to understand the characteristics of these materials.</p>	10 Probability: Possible (L6) Severity: \$10 million to \$100 million (S4)
7.4.3	Identified	(iv) Steel H-Piling at the Middle Earthfill Dam toe;	Financial Loss	10.5 Probability: Likely (L6.5) Severity: \$10 million to \$100 million (S4)	10 Probability: Possible (L6) Severity: \$10 million to \$100 million (S4)	Identified	<p>Complete - Specification requires contractor to undertake probing to investigate the presence of roots and obstructions at pile locations.</p> <p>Complete - Cost estimate for this work assumes that some piles will be prematurely refused (due to contact with tree roots, etc.).</p> <p>Planned - Installing the H-piles to the point of refusal and specifying an adequate total length for the pile.</p> <p>Planned - Beginning piling in a test area to assess the driveability of piles and ground conditions, including the presence of tree roots or large rocks and to select refusal criteria.</p> <p>Planned - Installing remedial piles at an adjacent location, if pilings cannot be successfully installed at a particular location because of underlying tree roots buried between the surface and bedrock. Spare piles in addition to the planned quantity have been included in the cost estimate.</p> <p>Planned - Advancing a design that can accommodate variations in the pile locations and does not fix the absolute location of each pile so that the contractor has flexibility to adjust the locations to avoid tree roots, as necessary.</p>	10 Probability: Possible (L6) Severity: \$10 million to \$100 million (S4)

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Section in Application	Risk Status	Description of Risk Event and Consequence	Consequence Type	Risk Level	Residual Risk Level	Risk Status	Risk Treatments (Identified in the Application or New)	Residual Risk Level
7.4.4	Identified	Due to unforeseen changes in market conditions during the planned construction period, there is a risk of experienced/ qualified contractors not being available, which may result in reduced quality, schedule delays, and cost increases.	Financial Loss	10 Probability: Possible (L6) Severity: \$10 million to \$100 million (S4)	9 Probability: Remote – May Occur (L5) Severity: \$10 million to \$100 million (S4)	Active	Complete - Discussions with Infrastructure BC regarding potential procurement approaches. Ongoing - Undertaking initial market sounding activities, which will continue up to the Request for Proposals stage so that the market is aware of, and remains interested in, the Project, and so that contractors have the capacity to undertake the work required Ongoing - Procuring one civil works general contractor, and one hydromechanical contractor (for the Spillway Gates System), separately, with unique evaluation criteria and weightings so that both contractors are highly qualified in their specific area of expertise.	9 Probability: Remote – May Occur (L5) Severity: \$10 million to \$100 million (S4)
7.4.4	Identified	Due to the civil and hydromechanical contractors needing to manage multiple specialists/subcontractors, which requires coordination and increases the overall construction complexity, there is a risk of a longer construction duration and claims with less experienced subcontractors, which may result in the main contractors including in a risk premium in their proposals.	Financial Loss	10 Probability: Possible (L6) Severity: \$10 million to \$100 million (S4)	9 Probability: Remote – May Occur (L5) Severity: \$10 million to \$100 million (S4)	Active	Ongoing - Developing and implementing a comprehensive Contracting Plan, including a Request for Proposals process, which will provide details of the evaluation methodology (including evaluation and acceptance criteria for the civil and hydromechanical subcontractors) and assessment of a suitable cost contingency for both contracts. Ongoing - Establishing Request for Proposal questionnaire and evaluation criteria so that selected contractors, including proposed subcontractors and key personnel meet key criteria. Planned - Sequencing hydromechanical work (for Spillway Gates System) to proceed six months after civil work is completed to provide a buffer in case of schedule over-run on the Civil Works contract.	9 Probability: Remote – May Occur (L5) Severity: \$10 million to \$100 million (S4)
7.4.5	Identified	Due to the large number of construction activities planned in the small area at the Project site at the same time, there is a high risk of construction conflicts between the contractor and their specialist sub-contractors, which may result in potential safety issues, longer construction duration, and possible claims, particularly with less experienced subcontractors.	Financial Loss	11 Probability: Likely (L7) Severity: \$10 million to \$100 million (S4)	9 Probability: Possible (L6) Severity: \$1 million to \$10 million (S3)	Active	Complete - Developing a bottom-up contract and construction management plan so that the makeup and size of the BC Hydro construction team is appropriate, with provisions included for legal support, expert reviews and claims management. Complete - Designing the procurement and construction management activities to avoid conflicts and coordinate construction. Complete - Providing adequate schedule contingency and flexibility in the construction schedule by including a six-month float between the completion of the civil work and the mobilization of the hydro-mechanical contractor and by retaining the ability to reschedule some hydro mechanical work, if required. Ongoing - Using the Early Contractor Involvement approach during contract execution. This will provide a thorough understanding of contractor knowledge, planning, scheduling, executing, and costing of works, and a thorough review of contractor risk identification and management plans. Planned - Conducting a contractor schedule workshop with Ontario Power Generation to exchange experience and lessons learned in managing the schedule on large contracts.	9 Probability: Possible (L6) Severity: \$1 million to \$10 million (S3)
7.4.5	Identified	There is a risk of supplier performance not meeting the required quality or level of service, resulting in costly rework, reduced design life, project delays, and greater asset risk exposure.	Financial Loss	10 Probability: Likely (L7) Severity: \$1 million to	8.5 Probability: Fairly Likely (L6.5) Severity:	Active	Complete - Designing and incorporating a change management review and approval process into the construction management plan so that consistent change management principles are applied to minimize the likelihood of construction plan changes leading to contractor claims. Complete - Developing an owner's project quality plan to monitor contractor performance, review submitted contractor quality plans for all assets and perform	8.5 Probability: Fairly Likely (L6.5) Severity:

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Section in Application	Risk Status	Description of Risk Event and Consequence	Consequence Type	Risk Level	Residual Risk Level	Risk Status	Risk Treatments (Identified in the Application or New)	Residual Risk Level
				\$10 million (S3)	\$0.1 million to \$1 million (S2)		surveillance on, and audits of, contractors based on those plans, both off-site and during construction. Ongoing - Using primarily fixed unit rates in contracts to provide an effective means of managing contractor production risk. Ongoing - Identifying and acquiring specific skillsets and experience for the construction management team at the Project site to support construction. Ongoing - Updating the risk management and construction management plans by undertaking additional constructability review activities and risk response planning, as more information on construction details become available. Ongoing - Including an adequate description of technical requirements and process controls in all contracts, including a contractor quality management system, appropriate design review checkpoints, and submittal reviews. Ongoing - Performing additional quality activities described in contract management plans, the construction management plan, and the design plan such as submittal reviews and engineering field reviews.	\$0.1 million to \$1 million (S2)
7.4.6	Identified	Construction activities in the vicinity of the Campbell River drinking water supply infrastructure in the John Hart Reservoir means that there is the possibility of silty water leaving the containment zone during construction of the Middle Earthfill Dam upstream berm and entering the City of Campbell River water intake. This could result in increased water turbidity, above the threshold for drinking water supply, which could in turn result in boil water advisories and/or a requirement for additional protection measures.	Environmental	10.5 Probability: Fairly Likely (L6.5) Severity: High (S4)	8 Probability: Very Unlikely (L4) Severity: High (S4)	Active	Complete - The conceptual design was based on input from three dredging contractors as well as Kohn Crippen + Hatch marine engineers with experience in dredging work using silt curtains on past local projects. Complete - The design is a double impermeable silt curtain arrangement. This design will provide redundancy for protection of the reservoir water quality at the City of Campbell River's freshwater intake. Ongoing - Install and use silt curtains to control the turbidity levels at the City of Campbell River freshwater intake and within the reservoir outside the silt curtains. The silt curtains will be used to contain turbid water during the upstream dredging and fill placement works. Each curtain will be separated by a minimum of 1.5 metres. This arrangement will allow the curtain to be repaired without risking contamination of the reservoir if an issue occurs with either the interior or exterior one silt curtain. Ongoing - For additional turbidity control, a 'moonpool' arrangement connected to the dredge barge is expected to be used. Planned - If the silt curtain is damaged and/or fails and turbid water enters the City of Campbell River water intake, BC Hydro will cease all in-reservoir dredging work. A communication protocol with the City of Campbell River will be established prior to construction and will be followed in the event of a water quality exceedance at the drinking water intake.	8 Probability: Very Unlikely (L4) Severity: High (S4)