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ORDER NUMBER G-263-24

IN THE MATTER OF the Utilities Commission Act, RSBC 1996, Chapter 473

and

British Columbia Hydro and Power Authority Ladore Spillway Seismic Upgrade Project and Strathcona Discharge Upgrade Project Application

BEFORE:

A. K. Fung, KC, Panel Chair W. M. Everett KC, Commissioner M. Kresivo, KC, Commissioner

on October 22, 2024

ORDER

WHEREAS:

- A. On June 14, 2023, British Columbia Hydro and Power Authority (BC Hydro) filed an application (Application) with the British Columbia Utilities Commission (BCUC) pursuant to section 44.2(3) of the Utilities Commission Act (UCA) for acceptance of each of the schedules of capital expenditures BC Hydro anticipates making for implementation of the Ladore Spillway Seismic Upgrade Project (Ladore Project) and the Strathcona Discharge Upgrade Project (Strathcona Project) (together, the Projects);
- B. The Ladore and Strathcona facilities form part of the Campbell River system, which comprises dams, reservoirs, and generating facilities that are located along the Campbell River on Vancouver Island. BC Hydro submits the Projects are required to address dam safety deficiencies related to the Ladore and Strathcona facilities' seismic withstand and water discharge capacity that could lead to overtopping and failure of the dams during an earthquake;
- C. By Order G-189-23 dated July 18, 2023, the BCUC established a written hearing process and a regulatory timetable. The regulatory timetable was subsequently amended by the following Orders: G-303-23 dated November 9, 2023; G-328-23 dated December 1, 2023; G-352-23 dated December 14, 2023; and G-25-24 dated January 30, 2024;
- D. On May 30, 2024, BC Hydro provided an updated cost estimate for the Ladore Project (Updated Project Cost Estimate) and stated it has not yet determined whether a similar update would be necessary for the Strathcona Project. BC Hydro requested that the regulatory process for the Strathcona Project be adjourned, and that the Ladore Project proceed independently to argument. In the Updated Project Cost Estimate, BC Hydro stated the authorized cost of the Ladore Project is \$379.0 million;

- E. By Order G-163-24, dated June 18, 2024, the BCUC issued an amended regulatory timetable for the Ladore Project and adjourned the process to review the Strathcona Project pending an update on cost information on or before October 31, 2024;
- F. British Columbia Old Age Pensioners' Organization et al; Commercial Energy Consumers Association of British Columbia; and Residential Consumer Intervener Association registered as interveners in the proceeding; and
- G. The BCUC has considered the Application, evidence and submissions in this proceeding and finds that the following determinations are warranted.

NOW THEREFORE for the reasons outlined in the decision accompanying this order and pursuant to section 44.2(3) of the UCA, the BCUC orders as follows:

- 1. BC Hydro's expenditure schedule for the Ladore Project with an authorized cost of \$379.0 million is accepted.
- 2. BC Hydro is directed to file project reports as outlined in Section 9 of the decision accompanying this order.

DATED at the City of Vancouver, in the Province of British Columbia, this 22nd day of October, 2024.

BY ORDER

Original signed by:

A.K. Fung, K.C. Commissioner

British Columbia Hydro and Power Authority Ladore Spillway Seismic Upgrade Project and Strathcona Discharge Upgrade Project Application

DECISION

Table of Contents

Execu	tive Sum	mary	i	
1.0	Introdu	luction1		
	1.1	Background		
	1.2	Regulatory Process	2	
	1.3	Legislative and Regulatory Framework	3	
		1.3.1 Utilities Commission Act	3	
		1.3.2 Clean Energy Act	3	
		1.3.3 Guidelines	4	
	1.4	Scope and Structure of Decision	4	
2.0	Project	oject Need and Justification		
	2.1	Ladore Facility	5	
	2.2	BC Hydro's Assessment of Seismic Deficiencies	7	
	2.3	Consequences of Ladore Spillway Gates System Failure	8	
3.0	Evaluat	tion of Alternatives9		
	3.1	Project Alternatives	9	
	3.2	Decision Making Process	10	
	3.3	Selection of Preferred Alterative	10	
4.0	Project	Description	.14	
	4.1	Project Schedule	15	
	4.2	Procurement Approach	15	
	4.3	Risk and Risk Management	16	
5.0	Project	Cost Estimate and Rate Impact	.17	
	5.1	Updated Project Cost Estimate	18	
	5.2	Rate Impact	18	
6.0	Project	Consultation and Engagement	.20	
	6.1	Indigenous Consultation and Engagement	20	
		6.1.1 Indigenous Consultation Approach	20	
		6.1.2 Potential Project Impacts	21	
		6.1.3 Indigenous Consultation Process	22	
	6.2	Public Consultation and Engagement	23	

7.0	Releva	ant Considerations for Acceptance of Expenditures Pursuant to the UCA	25
	7.1	British Columbia's Energy Objectives	25
	7.2	Application of Section 19 of the Clean Energy Act and Demand Side Measures	26
	7.3	BC Hydro's Integrated Resource Plan	27
8.0	Overa	Il Panel Determinations	28
9.0	Projec	t Reporting	29

APPENDICES

APPENDIX A	LIST OF ACRONYMS
APPENDIX B	EXHIBIT LIST

Executive Summary

On June 14, 2023, British Columbia Hydro and Power Authority (BC Hydro) filed an application (Application) with the British Columbia Utilities Commission (BCUC) pursuant to section 44.2(3) of the *Utilities Commission Act* (UCA) for acceptance of each of the schedules of capital expenditures BC Hydro anticipates making for implementation of the Ladore Spillway Seismic Upgrade Project (Ladore Project) and the Strathcona Discharge Upgrade Project (Strathcona Project) (together, the Projects).

The Ladore and Strathcona facilities, along with the John Hart dam, are the three main components of BC Hydro's hydroelectricity system located on the Campbell River on Vancouver Island (Campbell River System). The Campbell River System generates an average of 1,287 gigawatt-hours (GWh) of energy annually, supplying about 10% of Vancouver Island's peak load. BC Hydro notes that the Campbell River System is located in one of the most seismically active regions in Canada.

The BCUC established a regulatory timetable for review of the Application, which included public notification, and two rounds of information requests. Three interveners registered in the proceeding: Residential Consumer Intervener Association, Commercial Energy Consumers Association of British Columbia, and British Columbia Old Age Pensioners' Organization et al. A letter of comment was also received from the Strathcona Regional District.

On December 12, 2023, BC Hydro requested an adjournment of the proceeding pending a status update on cost information for the Projects. On May 30, 2024, BC Hydro provided an updated cost estimate for the Ladore Project (Updated Project Cost Estimate) and requested that the regulatory process for the Ladore Project proceed independently to argument and the process to review the Strathcona Project be adjourned until BC Hydro has determined whether a cost update on the Strathcona Project will be necessary.

The BCUC established a further regulatory process for the review of the Ladore Project. The Panel adjourned the regulatory process to review the Strathcona Project and BC Hydro was directed to provide an update on the cost estimate for the Strathcona Project by October 31, 2024.

The authorized cost for the Ladore Project in the Updated Project Cost Estimate is \$379.0 million and the inservice date is anticipated to be April 2028.

The Panel is satisfied that the evidence BC Hydro has provided in this proceeding supports the need for the Ladore Project to address dam safety, reliability and environmental risks associated with deficiencies in the Ladore facility's seismic withstand and water conveyance. The Panel notes in particular BC Hydro's evidence that these safety deficiencies could result in flooding in the City of Campbell River and First Nations communities, with a potential for loss of life and long-term adverse environmental and economic impacts. Such consequences would be catastrophic for the Campbell River System.

The Panel finds that BC Hydro's analysis of project alternatives including the selection of the preferred option is reasonable. Furthermore, the Panel finds the preferred alternative carries the least risk of cost increase and the additional benefits of improved public safety, enhanced operational worker safety and avoidance of environmental impacts.

The Panel is satisfied that BC Hydro has appropriately identified the risks relating to the execution of the Ladore Project and put in place adequate mitigation measures to reduce those risks to an acceptable level. The Panel finds the Updated Project Cost Estimate to be reasonable, including the expected and authorized amounts which are based on the Ladore Project's preliminary level design and consistent with an Association for the Advancement of Cost Engineering International (AACEI) Class 3 cost estimate. The Panel also finds that the cumulative incremental rate impact to be reasonable and acceptable, particularly when viewed in light of the dam safety benefits that the Ladore Project is designed to address.

The Panel finds BC Hydro's Indigenous consultation with respect to the Ladore Project has been adequate to date, as evidenced by the support for the project from the We Wai Kai Nation, Wei Wai Kum First Nation, and K'ómoks First Nation. Furthermore, the Panel finds public consultation has been adequate.

The Panel also finds that the Ladore Project aligns with the applicable of British Columbia's energy objectives and considers it is consistent with BC Hydro's Updated 2021 Integrated Resource Plan.

For these reasons, the Panel accepts BC Hydro's proposed expenditure schedule for the Ladore Project as being in the public interest. The Panel directs BC Hydro to provide project progress reports, material change reports and a final report as detailed in Section 9.0 of this Decision.

1.0 Introduction

1.1 Background

On June 14, 2023, British Columbia Hydro and Power Authority (BC Hydro) filed an application (Application) with the British Columbia Utilities Commission (BCUC) pursuant to section 44.2(3) of the *Utilities Commission Act* (UCA) for acceptance of each of the schedules of capital expenditures BC Hydro anticipates making for implementation of the Ladore Spillway Seismic Upgrade Project (Ladore Project) and the Strathcona Discharge Upgrade Project (Strathcona Project) (together, the Projects).

The Ladore and Strathcona facilities, along with the John Hart dam, are the three main components of BC Hydro's hydroelectricity system located on the Campbell River on Vancouver Island, within the Strathcona Regional District and the City of Campbell River (Campbell River System). The main facilities were originally constructed in the 1940s and the 1950s.¹ The system generates an average of 1,287 gigawatt-hours (GWh) of energy annually, supplying about 10 percent of Vancouver Island's peak load and has a combined nameplate generating capacity of approximately 253 megawatts (MW) and dependable capacity of about 231 MW.² BC Hydro notes that the Campbell River System is located in one of the most seismically active regions in Canada. Canada's largest recorded earthquake, which occurred in 1946, centered near Forbidden Plateau, 30 kilometers south of the John Hart dam.³

BC Hydro is implementing a long-term risk reduction and phased investment strategy for the Campbell River System to ensure its safe operation for the next 50 to 75 years. Over the past two decades, BC Hydro has conducted various studies to assess the system's condition, which culminated in the development of BC Hydro's phased investment strategy for the system. BC Hydro first presented this strategy to the BCUC in 2012 with the John Hart Generating Station Replacement Project application,⁴ and as further detailed in the recent John Hart Dam Seismic Upgrade Project application.⁵ BC Hydro states that the Projects are a continuation of this strategy, further supporting BC Hydro's phased approach to addressing safety issues related to the Campbell River System.⁶

BC Hydro submits the Projects are required to address dam safety deficiencies related to their seismic withstands and water discharge capability that could result in overtopping and failure of the dams which could lead to flooding in the City of Campbell River and nearby First Nations communities, after an earthquake.⁷

¹ Exhibit B-1, p. 2-5.

² lbid., p. 2-3

³ Ibid., p. 2-5.

⁴ Decision and Order C-2-13.

⁵ John Hart Dam Seismic Upgrade Project proceeding, Exhibit B-1, Section 2.5; Decision and Order G-107-23.

⁶ Exhibit B-1, pp. 1-1, 1-2.

⁷ Ibid., pp. 3-1, 8-1.

The expected cost for the Ladore Project is \$326.7 million⁸ and the project in-service date is now anticipated to be April 2028.⁹ The authorized cost of the Ladore Project, including project reserves, is \$379.0 million.¹⁰ BC Hydro seeks BCUC acceptance of the expenditure schedule for the Ladore Project as being in the public interest, pursuant to section 44.2 of the UCA. As detailed below, the process to review acceptance of the Strathcona Project expenditure schedule is adjourned pending an update on the cost estimate to be filed by BC Hydro by October 31, 2024.

1.2 Regulatory Process

By Order G-189-23 dated July 18, 2023, the BCUC established a written hearing process and a regulatory timetable for the review of the Application, consisting of notice, intervener registration and one round of information requests. The regulatory timetable was subsequently amended by Order G-303-23 dated November 9, 2023, and by Order G-328-23 dated December 1, 2023.

On December 12, 2023, BC Hydro requested an adjournment of the proceeding pending a status update on cost information for the Projects. On December 14, 2023, the BCUC adjourned the proceeding, and directed BC Hydro to provide an update on project cost information on or before January 25, 2024.¹¹ On January 25, 2024, BC Hydro submitted its intent to prepare an updated cost estimate for the Ladore Project. The BCUC further adjourned the proceeding on January 30, 2024 and directed BC Hydro to provide an update on the status of cost information for the Projects by May 31, 2024.¹²

On May 30, 2024, BC Hydro provided an updated cost estimate for the Ladore Project (Updated Project Cost Estimate) and stated it had not yet determined whether a similar cost update would be necessary for the Strathcona Project.¹³ BC Hydro requested that the regulatory process for the Ladore Project proceed independently to argument and the process to review the Strathcona Project be adjourned until BC Hydro has determined whether a cost update on the Strathcona Project will be necessary.¹⁴

On June 18, 2024, the BCUC established a further regulatory process for the review of the Ladore Project and adjourned the regulatory process for the Strathcona Project. BC Hydro was directed to provide an update on the cost estimate for the Strathcona Project by October 31, 2024.¹⁵

The following interveners participated in this proceeding:

- British Columbia Old Age Pensioners Association et al (BCOAPO);
- The Commercial Energy Consumers Association (the CEC); and
- Residential Consumer Intervener Association (RCIA).

¹⁰ Ibid., p. 4.

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<sup>15</sup> Order G-163-24.
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⁸ Exhibit B-14, p. 4.

⁹ Ibid., p. 14.

¹¹ Order G-352-23.

¹² Order G-25-24.

¹³ Exhibit B-14, p. 1.

¹⁴ Ibid., p. 2.

The BCUC received one letter of comment from the Strathcona Regional District.¹⁶

1.3 Legislative and Regulatory Framework

1.3.1 Utilities Commission Act

Section 44.2(1)(b) of the UCA provides that a public utility may file an expenditure schedule with the BCUC containing a statement of capital expenditures the public utility has made or anticipates making during the period addressed by the schedule.¹⁷ The BCUC must accept an expenditure schedule filed under section 44.2 of the UCA if the BCUC considers that making the expenditures referred to in the schedule would be in the public interest.¹⁸ The BCUC may also accept or reject a part of a schedule.¹⁹

Section 44.2(5.1) of the UCA further provides that in considering whether to accept an expenditure schedule filed by

BC Hydro, the BCUC, in addition to considering the interests of persons in British Columbia who receive or may receive service from BC Hydro, must consider:

- a) British Columbia's energy objectives,
- b) The most recent of the following documents:
 - i. an integrated resource plan approved under section 4 of the *Clean Energy Act* before the repeal of that section;
 - ii. a long-term resource plan filed by BC Hydro under section 44.1 of the UCA;
- c) The extent to which the schedule is consistent with the requirements under section 19 of the *Clean Energy Act*; and
- d) If the schedule includes expenditures on demand-side measures, the extent to which the demand-side measures are cost-effective within the meaning prescribed by regulation, if any.

1.3.2 Clean Energy Act

Section 2 of the Clean Energy Act defines British Columbia's energy objectives.²⁰

Section 19 of the *Clean Energy Act*, which applies to BC Hydro, addresses clean and renewable resources and provides as follows:

19(1) to facilitate the achievement of British Columbia's energy objective set out in section 2 (c), a person to whom this subsection applies:

- a) must pursue actions to meet the prescribed targets in relation to clean or renewable resources, and
- b) must use the prescribed guidelines in planning for

¹⁶ Exhibit D-1.

¹⁷ Section 44.2(1)(b) of the UCA.

¹⁸ Section 44.2(3) of the UCA.

¹⁹ Section 44.2(4) of the UCA.

²⁰ Clean Energy Act, section 2.

- i. the construction or extension of generation facilities, and
- ii. energy purchases.

1.3.3 Guidelines

This Application engages the following BCUC guidelines:

BC Hydro's 2018 Capital Filing Guidelines

BC Hydro has submitted this Application in accordance with its 2018 Capital Filing Guidelines.²¹ These guidelines commit BC Hydro to filing applications under section 44.2 of the UCA for capital projects that are not extensions or end-of-life facility replacements, and that have a cost estimate that exceeds \$100 million.²²

BCUC's Certificate of Public Convenience and Necessity (CPCN) Guidelines

The CPCN Guidelines provide general guidance regarding the information that should be included in a CPCN application and the flexibility for an application to reflect the specific circumstances of the applicant, the size and nature of the project and the issues raised by the application.²³

Although BC Hydro aims to follow the CPCN Guidelines when filing section 44.2 applications for BCUC acceptance of capital expenditures, it states that these guidelines do not strictly apply as this Application is not a CPCN application under section 45 of the UCA.²⁴

BCUC's First Nations Information Filing Guidelines for Crown Utilities

The BCUC's 2010 First Nations Information Filing Guidelines for Crown Utilities apply to this Application. These guidelines identify the information that must be filed by Crown Utilities (of which BC Hydro is one) to allow the BCUC to assess whether the Crown's duty to consult First Nations has been fulfilled.²⁵

1.4 Scope and Structure of Decision

The Panel reviews the Ladore Project expenditure schedule in the remainder of this decision, as follows:

- Section 2 addresses the need and justification for the Ladore Project;
- Section 3 explores the Ladore Project alternatives;
- Section 4 reviews the Ladore Project description, including the scope of the project;

²¹ The Panel acknowledges that at the time of the Application filing, a separate proceeding was underway to review BC Hydro's updates to the 2018 Guidelines to escalate expenditure thresholds for three types of capital projects. Updated 2024 Capital Project Filing Guidelines were approved at the conclusion of that proceeding by Order G-218-24.

²² BCUC Order G-313-19, dated December 2, 2019, BC Hydro Review of the Regulatory Oversight of Capital Expenditures and Projects; <u>https://www.ordersdecisions.bcuc.com/bcuc/orders/en/453713/1/document.do.</u>

²³ Appendix A to Order G-20-15, dated February 12, 2025, BCUC 2015 Certificate of Public Convenience and Necessity Guidelines (CPCN Guidelines), p. 1. Available at https://docs.bcuc.com/documents/Guidelines/2015/DOC 25326_G-20-15_BCUC-2015-CPCN-Guidelines.pdf.

²⁴ Exhibit B-1, p. 1-32.

²⁵ Appendix A to Order G-51-10, dated March 18, 2010, BCUC 2010 First Nations Information Filing Guidelines for Crown Utilities, p. 3. Available at <u>https://docs.bcuc.com/documents/Guidelines/2010/DOC_25327_G-51-10_2010-First-Nations-Information-FilingGuidelines.pdf</u>.

- Section 5 focuses on the cost of the Ladore Project and rate impact;
- Section 6 highlights First Nations consultation and public engagement for the project;
- Section 7 assesses the Ladore Project's alignment with British Columbia's energy objectives, BC Hydro's long term resource plan and the *Clean Energy Act*;
- Section 8 sets out the Panel's overall determination on the Ladore Project; and
- Section 9 details the Ladore Project reporting requirements.

Relevant evidence and submissions from the applicant and interveners are summarized in each section.

2.0 Project Need and Justification

This section discusses the need for the Ladore Project and provides an overview of the Ladore facility, BC Hydro's assessment of seismic deficiencies and the consequences of a Ladore spillway gate failure. BC Hydro's stated objective for the Ladore Project is to address identified deficiencies related to the facility's seismic withstand.

2.1 Ladore Facility

The Ladore facility was completed in 1957. It is the central facility in the Campbell River System (between the Strathcona and John Hart facilities) and includes the Ladore dam, powerhouse, switchyard and the Lower Campbell reservoir. The Quinsam River Diversion, a smaller facility, contributes additional flow to the Lower Campbell reservoir.²⁶

The Ladore dam is a concrete gravity structure, consisting of a left non-overflow section, a three-bay gated spillway section, a power intake section with two operating gates, and a right non-overflow section. The dam's water passage facilities include a power intake, a spillway gate system, and a low-level outlet, which has been out of service since 1980 due to concerns that debris could prevent the valve from closing.²⁷ Figure 1 below provides a photograph of the Ladore dam, identifying the key components.

²⁶ Exhibit B-1, p. 3-2.
²⁷ Ibid., p. 3-4.

Figure 1: Ladore Dam and Key Components



The Ladore spillway gates system (Spillway Gates System) includes the spillway gates, the hoist tower structure, the hoist system, and the power and controls systems.²⁸ Each spillway gate is operated by a pair of screw-stem hoists mounted on a steel bridge spanning across each bay. When the reservoir is full, each spillway gate has an individual discharge capacity of approximately 490 cubic metres per second (m³/s). The spillway discharge flows into the Campbell River, which leads past the Ladore powerhouse, and into the John Hart reservoir.²⁹

BC Hydro conducted an economic analysis of the Ladore facility on a stand-alone basis, which indicated that the Ladore facility has a net present value (NPV) of \$340 million.³⁰ Further, various sensitivity scenarios were performed and show that the Ladore facility has a positive NPV across all of the considered scenarios.³¹ Based on this, BC Hydro submits that continued investment in the Ladore facility is justified and beneficial to ratepayers.³²

BC Hydro states that in addition to its importance to the electricity supply portfolio for Vancouver Island, the Ladore facility also provides several reliability and environmental benefits. BC Hydro explains that the Ladore dam must balance flows between the Strathcona facility and the John Hart facility to maintain the John Hart reservoir within suitable operating limits. Additionally, the Ladore dam provides opportunities for flood management as well as continued water conveyance for downstream flow needs during times that the Strathcona facility may be unable to pass flows. BC Hydro also states that these flow requirements support the Campbell River salmon fisheries.³³

²⁸ Exhibit B-1, p. 3-5.

²⁹ Ibid., p. 3-5.

³⁰ Ibid., p. 2-64.

³¹ Ibid., p. 2-64.

³² Ibid., p. 2-66.

³³ Ibid., p. 3-10.

2.2 BC Hydro's Assessment of Seismic Deficiencies

To ensure the proper operation, maintenance, surveillance, and asset management of its dams, BC Hydro has implemented a Dam Safety Program to meet the duty of care imposed on owners of dams by the *Dam Safety Regulation.*³⁴ The *Dam Safety Regulation* requires that all dams in the province be classified in different categories based on their size, hazard potential and downstream impact. The classification system is used to determine the level of safety required and to ensure appropriate safety measures are in place for each dam. In 2011, the Comptroller of Water Rights³⁵ revised the classification of the Ladore dam to an 'extreme consequence' dam, which means, in the event of dam failure, the population at risk is more than 100 persons and there is potential for major environmental impacts and extremely high economic and infrastructure impacts.³⁶

Both BC Hydro and the Comptroller of Water Rights primarily refer to the Canadian Dam Association's Dam Safety Guidelines³⁷ to determine what constitutes the exercise of reasonable care as required by the *Dam Safety Regulation*. The Dam Safety Guidelines recommend that a dam and all its major components should be able to withstand a certain level of seismic event, without uncontrolled release of the reservoir, based on the consequence classification of the dam. The Dam Safety Guidelines establish that an 'extreme consequence' dam, such as Ladore, should be able to withstand ground motions that are expected to occur at the dam site, on average, once every 10,000 years. This is referred to as the Maximum Design Earthquake for the dam.³⁸

BC Hydro conducted hazard analyses, deficiency investigations, and engineering studies to evaluate seismic deficiencies at the Ladore dam. The most recent safety review, completed in 2016, examined previous deficiency investigations and upgrades, confirming that the spillway gates and hoist structure lack the capacity to withstand the Maximum Design Earthquake. Table 1 lists the seismically deficient³⁹ components of the Ladore dam, with deficiencies below the Maximum Design Earthquake Annual Exceedance Frequency of 1/10,000.⁴⁰

Ladore Dam Element	Current Seismic Withstand (Annual Exceedance Frequency)
Spillway Gates	1/750
Spillway Gates Hoist Tower Structure ¹⁹	1/750
Spillway Gates Power and Controls ²⁰	1/475
Ladore Dam Spillway Piers	Stability analysis included in the Preliminary Design confirmed further reinforcement is required for the spillway piers to withstand the Maximum Design Earthquake, without providing a seismic withstand assessment.

³⁴ BC Regulation 40/2016, issued under the Water Sustainability Act, SBC 2014, c 15.

³⁵ the government agency responsible for administering the *Dam Safety Regulation*.

³⁶ Exhibit B-1, p. 2-11.

³⁷ Canadian Dam Association, *Dam Safety Guidelines 2007 (Revised 2013):* <u>https://cda.ca/publications/cda-guidance-documents/dam-safety-publications</u>.

³⁸ Exhibit B-1, pp. 2-12 – 2-13.

³⁹ The "seismic withstand" of a component is the Annual Exceedance Frequency associated with the magnitude of an earthquake that the component is able to endure.

⁴⁰ Exhibit B-1, p. 3-14, Table 3-1.

Based on its analysis, BC Hydro concluded that investments are required to address the seismically deficient components of the Ladore dam.⁴¹

2.3 Consequences of Ladore Spillway Gates System Failure

BC Hydro explains certain components of the Ladore Spillway Gates System could be damaged or deformed during the Maximum Design Earthquake, preventing the gates from opening or closing and resulting in an uncontrolled release of the Lower Campbell reservoir into the John Hart reservoir.⁴² BC Hydro states that, in turn, this could result in the overtopping and failure of the downstream John Hart dam and flooding in Campbell River and First Nations communities, with a potential for loss of life, along with long-term adverse environmental and economic impacts.⁴³

BC Hydro has conducted flood simulation and inundation modelling, as well as an assessment of the population at risk for a range of hypothetical dam failure scenarios following an earthquake. The modelling indicates that a failure of the Ladore Spillway Gates System following a seismic event would lead to overtopping and potential failure of the John Hart dam. The modelling predicts a peak water flow of 15,000 m³/s below the John Hart dam, and an estimated population at risk of more than 4,500 persons. Areas in Campbell River and surrounding First Nations communities would be flooded within about 30 minutes to two hours from the start of the failure.⁴⁴ In addition to risk of loss of life, BC Hydro states that an uncontrolled release could adversely impact downstream fish habitat and damage components of Campbell River's drinking water system.⁴⁵

Positions of the Parties

BC Hydro submits it has determined, as a result of modelling and flood simulation, that the Ladore Spillway Gates System would not withstand a major seismic event without the potential for uncontrolled release of water, which could result in overtopping and failure of the John Hart dam and flooding in Campbell River and First Nations communities.⁴⁶

The CEC submits that reliability and seismic withstand improvements to the Ladore facility are necessary and in the public interest.⁴⁷

RCIA supports the need for the Ladore Project as it addresses dam safety, reliability, and environmental risks.⁴⁸

Panel Determination

The Panel is satisfied that the evidence BC Hydro has provided in this proceeding supports the need for the Ladore Project to address dam safety, reliability and environmental risks associated with deficiencies in the Ladore facility's seismic withstand and water conveyance. The Panel particularly notes BC Hydro's evidence

⁴¹ Exhibit B-1, p. 3-15.

⁴² Ibid., p. 1-11.

⁴³ Ibid., p. 3-22.

⁴⁴ Ibid.

⁴⁵ Ibid.

⁴⁶ BC Hydro Final Argument, p. 18.

⁴⁷ CEC Final Argument, p. 5.

⁴⁸ RCIA Final Argument, PDF p. 8.

regarding flooding in Campbell River and First Nations communities in the event of a major earthquake, with a potential for loss of life, along with long-term adverse environmental and economic impacts.⁴⁹ Such consequences would be catastrophic for the Campbell River System. The Panel further notes that none of the interveners question the need for the Ladore Project.

3.0 Evaluation of Alternatives

This section summarizes the design alternatives that BC Hydro evaluated for the Ladore Project, along with the decision-making process and rationale used to identify its preferred option.

BC Hydro sought expert advice on the Ladore Project from professional engineers at Klohn Crippen Berger + Hatch and BC Hydro's Dam Safety Advisory Board.⁵⁰ The Dam Safety Advisory Board, established by BC Hydro, consists of four independent experts with extensive experience in the development and management of large hydroelectric dams, including expertise in dam seismic design and earthquake defence.⁵¹

3.1 **Project Alternatives**

BC Hydro identified three alternatives to address the seismic deficiencies associated with the Ladore Spillway Gates System. Each alternative involves either refurbishing or replacing the deficient components to resolve the known issues, as summarized below:

- The refurbish alternative (Refurbish) involves the refurbishment of the existing spillway gates, hoist system and reinforcement of the existing hoist tower structure as well as the installation of new motors, breaks, and screw stems on the existing hoist system.⁵²
- 2. The replace spillway gates and refurbish hoist alternative (Replace Spillway Gates and Refurbish Hoist) involves the replacement of the spillway gates, the refurbishment of the existing hoist system and the reinforcement of hoist tower structure. This alternative would include new vertical lift spillway gates designed to meet the Maximum Design Earthquake.⁵³
- 3. The replace alternative (Replace) involves replacement of both the spillway gates, and hoist system and a hoist tower structure featuring new steelwork and base anchors, a new stair access tower and replacement of the existing screw stem hoist system with a new wire rope hoist system.⁵⁴

In addition to the scope of work listed above, each alternative also includes upgrades to the power and control systems at the Ladore facility to ensure reliable operation of the spillway gates.⁵⁵

⁴⁹ Exhibit B-1, p. 3-22.

⁵⁰ Exhibit B-1-2, Appendix B-1, pp. 1-4.

⁵¹ Exhibit B-1, p. 1-24.

⁵² Ibid., p. 4-4.

⁵³ Ibid., p. 4-5.

⁵⁴ Ibid., p. 4-5.

⁵⁵ Ibid., pp. 4-3 – 4-4.

3.2 Decision Making Process

BC Hydro explains that it applied a Structured Decision Making (SDM) approach to evaluate and compare the alternatives for the Ladore Project and determine the preferred option. According to BC Hydro, the SDM methodology provides a framework for assessing both the financial and non-financial aspects of each alternative. The process involves five key steps: defining the problem; specifying decision objectives and measures; generating alternatives; assessing the consequences of each alternative; and clarifying the trade-offs.⁵⁶

BC Hydro submits that throughout its SDM process, decision makers for each step of the process must assess the project's risk levels as plotted on its corporate risk matrix (Corporate Risk Matrix) and ensure the appropriate organization levels are consulted.⁵⁷ BC Hydro explains that its Corporate Risk Matrix is a governance tool which specifies the level to which a risk must be escalated within the organization.⁵⁸ The Corporate Risk Matrix is not intended to be used to convert measures or considerations into financial terms, but it provides a standard representation of the results of risk analysis for use in the evaluation and communication of risks within BC Hydro.⁵⁹

3.3 Selection of Preferred Alterative

To evaluate the alternatives and identify a preferred option, BC Hydro set out the Ladore Project objectives with accompanying criteria.⁶⁰ BC Hydro provides the following consequence table to illustrate the results of its alternatives analysis following the application of its SDM process:

⁵⁶ Exhibit B-1, pp. 4-6 – 4-7.

⁵⁷ Exhibit B-6, BCOAPO IR 1.22.1 Attachment 1, p.1.

⁵⁸ Exhibit B-6, BCOAPO IR 1.22.1 Attachment 1, p. 7.

⁵⁹ Exhibit B-6, RCIA IR 1.12.4.

⁶⁰ Exhibit B-1, p. 4-8.

Decision	Criteria	Measure	Alternative 1	Alternative 2	Alternative 3
Objectives			Refurbish Spillway Gates System	Replace Spillway Gates, Refurbish Hoist System	Replace Spillway Gates System
1. Minimize Public Safety Risk	Post-seismic operability ⁹	Major/Some/ None No repairs is better	Major (Operable, but major repairs required after a Maximum Design Earthquake)	Some (Operable, but some repairs required after a Maximum Design Earthquake)	None (Operable with no repairs expected after a Maximum Design Earthquake)
2. Minimize Ladore Project Cost	Expected ¹⁰ capital cost	\$ million	97	97	108
3. Minimize Cost Increase Risks	Number of Prefabricated components designed to meet onsite specifications	0, 1, 2 Higher is better	0	1	2
4. Minimize Operational Worker Safety Risk	Replacement of the Hoist System to incorporate safety by design	Yes/No Yes, is better	No	No	Yes
5. Minimize Environmental Impacts	Number of components refurbished on site	0, 1, 2 Lower is better	2	1	0
Colour Legend	Same	Better	Worse		Point of Comparison

Table 2: Consequence Table: Alternatives Analysis Results⁶¹

BC Hydro's cost estimates for comparing the three alternatives are based on Association of Cost Engineering International (AACEI) Class 5 cost estimates, which were prepared in 2017.⁶² The cost estimate for the Replace Spillway Gates System alternative (Alternative 3) was subsequently refined to an AACEI Class 3 estimate.⁶³

BC Hydro selected Alternative 3 as the preferred alternative for the Ladore Project. It explains that Alternative 3 is comparable or better than the Refurbish alternative and the Replace Spillway Gates and Refurbish Hoist alternative on all criteria.⁶⁴ BC Hydro acknowledges that while the estimated cost for Alternative 3 is \$11 million higher based on the original Class 5 cost estimates prepared in 2017, this difference is relatively minor in the

⁶¹ Exhibit B-1, p. 4-11.

⁶² Ibid., p. 4-14.

⁶³ Ibid., p. 4-15.

⁶⁴ BC Hydro Final Argument, p. 34.

context of the overall Ladore Project cost.⁶⁵ Additionally, BC Hydro states that Alternative 3 has the least cost risk, as it avoids refurbishing unforeseen and undetected defects in the Spillway Gates System components, which could otherwise cause delays and increased costs.⁶⁶ Further, BC Hydro highlights additional trade-offs to justify the higher cost of Alternative 3, such as improved public safety, enhanced operational worker safety and avoidance of environmental impacts.⁶⁷

Positions of Parties

BC Hydro submits that the selection of Alternative 3 as the preferred alternative is appropriate and reasonable.⁶⁸

The CEC submits that it typically prefers a fully quantitative analysis to understand the relative weightings between alternatives. However, it does accept that the application of BC Hydro's SDM analysis can be appropriate when there are only a small number of alternatives, the preferred alternative is clear, and the cost differences are low.⁶⁹ Nonetheless, the CEC does not accept BC Hydro's use of the number of components refurbished on site as an appropriate measure of environmental impacts. The CEC is of the view that a better measure for environment impacts would be major environmental flooding impacts after a seismic event and minimizing impact during construction.⁷⁰ Nevertheless, the CEC submits that BC Hydro's alternatives analysis is acceptable.⁷¹

RCIA notes that it has concerns regarding BC Hydro's SDM process and its transparency, objectivity and sufficiency. RCIA submits that BC Hydro's assessment of the risks for each alternative deviates from BC Hydro's Corporate Risk Matrix, which RCIA states, "is designed to provide a standardized approach for evaluating risks" and that it also quantifies consequences.⁷² In RCIA,'s view, BC Hydro's SDM assessment of the risks among the alternatives introduces subjectivity as it lacks specific, direct and measurable assessments of risk severity and likelihood.⁷³ However, RCIA submits that despite perceived flaws in BC Hydro's SDM process, it does not object to the alternative selected by BC Hydro but recommends that BC Hydro be directed to use an objective risk assessment for all future CPCN applications.⁷⁴

BCOAPO views BC Hydro's SDM process to be a useful tool for comparing the alternatives, particularly when many of the measures associated with the objectives cannot be readily translated into dollars.⁷⁵ However, BCOAPO submits that it considers that BC Hydro has overstated the differences in public safety risk in its consequence table when comparing alternatives. Nevertheless, BCOAPO agrees with BC Hydro that Alternative 3 is the preferred alternative.⁷⁶

⁶⁵ Ibid., p. 35.

⁶⁶ Exhibit B-1, p. 4-18.

⁶⁷ Exhibit B-1, p. 4-10; Exhibit B-4, BCUC IR 1.7.3.

⁶⁸ BC Hydro Final Argument, p. 37.

⁶⁹ CEC Final Argument, p. 7.

⁷⁰ Ibid., pp. 7-8.

⁷¹ Ibid., p. 9.

⁷² RCIA Final Argument, p. 13.

⁷³ Ibid., pp. 13-14.

⁷⁴ Ibid., pp. 14-15.

⁷⁵ BCOAPO Final Argument, p.14.

⁷⁶ Ibid., p. 18.

In reply, BC Hydro submits that it undertakes quantitative analysis to inform project alternative decisions when it is beneficial and feasible to do so, but when the effort required to complete a quantification would outweigh the benefits, providing a quantitative analysis is not justified.⁷⁷ BC Hydro determines that the process required to quantify the risks associated with undetected defects and the extent of as-found conditions would require BC Hydro to dismantle the gates and would "…essentially require BC Hydro to undertake the project." BC Hydro argues that the time and effort required for such work exceed any benefit a quantitative analysis would provide and that its SDM process provides an appropriate level of analysis to determine the benefits and disadvantages of each alternative.⁷⁸

BC Hydro further disagrees that the SDM process introduces bias toward any alternative. BC Hydro explains that the suitability of component refurbishment was assessed on a project-by-project basis to ensure that it can meet project objectives without posing unacceptable risks.⁷⁹ BC Hydro also submits that its Corporate Risk Matrix is not intended to be used to convert measures or considerations with respect to project objectives into financial terms. BC Hydro explains that its Corporate Risk Matrix is a tool used by management to provide a standard representation of the results of risk analysis for use in its internal evaluation and communication of risks.⁸⁰

Panel Determination

The Panel finds that BC Hydro's analysis of project alternatives including the selection of Alternative 3 as the preferred option using its SDM process to be reasonable.

The SDM process is a decision-making tool that BC Hydro has commonly used to evaluate alternatives for its capital projects that have been brought forward for BCUC review. While some interveners have noted what they consider deficiencies in the SDM process and have recommended future refinements, all of the interveners support BC Hydro's selection of Alternative 3 as the preferred option. Although BC Hydro's assessment that the potential \$11 million dollar increase based on the original Class 5 cost estimate for Alternative 3 is a very rough estimate, the Panel agrees with BC Hydro that this is not a significant difference considering the overall cost of the Ladore Project at \$379.0 million. Furthermore, the Panel agrees with BC Hydro's assessment that Alternative 3 carries the least risk of cost increase and the additional benefits of improved public safety, enhanced operational worker safety and avoidance of environmental impacts which adequately offset that increased cost over the next best alternative.⁸¹

With respect to the criticism on the part of some interveners about the lack of specific quantifiable measures within the SDM process, the Panel accepts that not all project selection criteria are capable of precise quantification. However, this does not mean that the entire selection process is inherently flawed or its outcome should be deemed suspect. Project evaluation is as much art as science and involves the exercise of informed judgment. Furthermore, the Panel notes that BC Hydro's selection of the preferred alternative is supported by its expert engineering consultants and the BC Hydro Dam Safety Advisory Board.

⁷⁷ BC Hydro Reply Argument, p. 4.

⁷⁸ Ibid., p. 4.

⁷⁹ Ibid., p. 5.

⁸⁰ Ibid., p. 6.

⁸¹ Exhibit B-1, p. 4-10; Exhibit B-4, BCUC IR 1.7.3.

The Panel observes that BC Hydro's SDM process is one that is familiar to interveners in BC Hydro's capital project applications. If, based on experience, further refinements are needed to the SDM process, the Panel is confident that BC Hydro will make adjustments as needed. Based on the parties' overall endorsement of the results of the SDM analysis in support of the Ladore Project as the preferred alternative, the Panel sees no need to provide any specific directives on BC Hydro's use of the SDM process in future applications.

With respect to RCIA's recommendation that BC Hydro use an objective risk assessment, like its Corporate Risk Matrix, instead of SDM, to assess project alternatives from a risk basis for all future CPCN applications, the Panel rejects that recommendation. As the Panel has already noted above, not all risks can be objectively quantified. The Panel views that empirical risk assessments can give a false sense of precision to a process that is ultimately as much informed by judgment as science. More specifically, the Panel rejects the use of BC Hydro's Corporate Risk Matrix as a potential tool for assessing feasible project alternatives. As BC Hydro correctly notes that matrix is an internal corporate risk tracking tool which is designed to report risks up to BC Hydro senior management on a systematic basis. It is not and was not meant to be a substitute for the SDM process which is designed as a tool to assist BC Hydro in assessing feasible project alternatives based on defined project objectives and selection criteria.

4.0 Project Description

The Ladore Project aims to upgrade key components of the Ladore Spillway Gates System to address seismic deficiencies. This includes installing three new spillway gates, replacing spillway stoplogs, adding a new monorail lifting system and replacing the hoist structure and system.⁸² Additionally, the project will stabilize the spillway piers and add post-tensioned anchors and enhanced reinforcement.⁸³ Improvements to power systems and auxiliary work will include constructing a new main control building, a backup control building and a diesel generator building. The upgrades will also enable remote operation of the spillway gate system, replace the protection and alarm panels, install new battery systems, upgrade electrical cabling, add a 25 kilovolt distribution line, and construct a boat launch.⁸⁴

BC Hydro submits that upon completion of the Ladore Project the Ladore Facility will meet the following technical and safety requirements:⁸⁵

- Seismic withstand of a Maximum Design Earthquake corresponding to a seismic event with an Annual Exceedance Frequency of 1/10,000;
- Flood protection to allow for the conveyance of a flood with an 1/10,000 or better Annual Exceedance Frequency; and
- A design life of 75 years for the structural components, 50 years for the wire rope hoist system and rotating parts of the new spillway gates and 25 years for the electrical and instrumentation systems with 20 years for the new spillway gate wire ropes.

⁸² Exhibit B-1, pp. 5-5 – 5-12.

⁸³ Exhibit B-14, p. 8.

⁸⁴ Exhibit B-1, pp. 5-12 – 5-16.

⁸⁵ Ibid., p. 5-19.

4.1 Project Schedule

BC Hydro submits that the schedule for the Ladore Project was developed targeting an in-service date of March 2029, with project activities, including the final project completion report, to be completed by January 2030.⁸⁶ BC Hydro subsequently filed an updated project schedule, based on the selected bid received in response to the request for proposals for the civil contract and updated schedule risk analysis. The updated schedule moves the in-service date forward by 11 months to April 2028 and total project completion date forward 13 months to November 2028.⁸⁷

The key project schedule milestones are shown in Table 3 below:

Component	Target Milestone from Application (Table 5-1)	Updated Target Milestone
BCUC Application Filed	June 2023	June 2023 (Ladore Project Cost Estimate Update filed May 31, 2024)
BCUC Decision on the Application	June 2024	October 2024
Definition Phase Complete / BC Hydro Board Authorization to Proceed to Implementation Phase	October 2024	October 2024
Spillway Gate 3 Replacement In-Service	February 2027	September 2026
Spillway Gate 2 Replacement In-Service	December 2027	July 2027
Spillway Gate 1 Replacement In-Service and Ladore Project In-Service Date	March 2029	April 2028
Ladore Project Completion and Evaluation Report Accepted by Board of Directors	January 2030	November 2028
Ladore Project Closure	July 2030	April 2029

Table 3: Ladore Project Schedule Milestones (Updated)⁸⁸

4.2 Procurement Approach

BC Hydro identified design and construction as key elements of its procurement strategy and follows a Design-Bid-Build development method for the Ladore Project.⁸⁹ In addition to the Design-Bid-Build development method, BC Hydro has implemented an early contractor involvement process for the project's construction contract. With the early contractor involvement process, BC Hydro is seeking to incorporate industry expertise and directly involve the contractor to jointly identify risks, establish risk allocation/treatment plans, confirm pricing structures, finalize the work schedule through detailed construction planning including emergency response planning, construction methodology, logistics and other considerations.⁹⁰

⁸⁶ Exhibit B-1, p. 5-25.

⁸⁷ Exhibit B-14, p 14.

⁸⁸ Ibid., p. 14, Table 4.

⁸⁹ Exhibit B-8, BCUC IR 2.42.2.

⁹⁰ Exhibit B-1, p. 5-30.

BC Hydro has awarded the construction contract to the AECON-EBC Ladore General Partnership⁹¹ which is composed of two companies, AECON and EBC. The two companies have formed a similar but wholly separate partnership to work on the civil works portion of the BCUC approved John Hart Dam Seismic Upgrade Project.⁹²

4.3 Risk and Risk Management

BC Hydro submits that its project management practices dictate that risks and the associated risk mitigation treatments have and will be identified, analyzed, monitored and reviewed over the life of the Ladore Project.⁹³

BC Hydro has identified one material risk to dam safety and public/worker safety during construction. This risk involves an uncontrolled release through the spillway or damage to the in-construction works caused by a flood or earthquake during construction. BC Hydro's risk treatment includes the development of a Dam Safety Risk Management Plan, temporary support structures being designed to withstand construction level earthquakes, moving construction barges during high flow conditions and ensuring that the seismic withstand of the Ladore Facility is maintained during construction. Following risk treatment, BC Hydro has determined that the residual risk probability is reduced to very unlikely.⁹⁴

BC Hydro has identified one material risk related to cost and schedule which is associated with the Ladore Project's in-water activities. Due to the requirement to isolate the spillway bays from water inflow/leakage during the spillway gate replacement, there is a risk that the spillway bay does not seal correctly during construction. If materialized, this risk would require effort by the contractor to isolate the spillway bay resulting in schedule delays and increased construction costs. BC Hydro's risk treatment will involve the replacement of existing stoplogs with new stoplogs and testing the new stoplogs for effectiveness. Following risk treatment, BC Hydro has determined that the residual risk probability to the cost and schedule will be reduced to a remote probability.⁹⁵

BC Hydro identified three material financial risks. The risks include: operation of the spillway during construction, equipment delivery delays and contractor availability, and cost escalation rates. BC Hydro's risk treatments include completion of the spillway gate replacements sequentially, ensuring two gates are always operable, facilitation of an Early Contractor Involvement process during contract execution and including a special reserve in the Ladore Project cost estimate to address cost escalations. Following risk treatment, the residual risks probability for the three financial material risks will be as follows: operation of the spillway during construction risk is mitigated to probability of "possible", equipment delivery delays and contractor availability risk is mitigated to a probability of "remote" and project cost escalation risk probability remains unchanged at "likely", as BC Hydro identifies the risk as a market-based risk.⁹⁶

⁹¹ Exhibit B-15, BCUC IR 3.49.1.

⁹² Ibid., BCUC IR 3.49.2.

⁹³ Exhibit B-1, p. 7-1.

⁹⁴ Ibid., pp. 7-13.

⁹⁵ Ibid., p. 7-15.

⁹⁶ Ibid., pp. 7-16, 7-18, 7-19.

Positions of the Parties

BC Hydro submits that the Ladore Project schedule is appropriate to address the deficiencies at the Ladore facility. BC Hydro further submits that with the proposed project schedule, public safety will gradually increase over time as elements of the Ladore Project will come into service before the final in-service date.⁹⁷

BCOAPO has no issues with the proposed schedule.98

The CEC submits that all savings related to a shortened scheduled should be pursued to the extent possible and is pleased to note that the Ladore Project closure is expected to advance from July 2030 to April 2029.⁹⁹

The CEC submits that the utilization of a Design-Bid-Build delivery model with an early contractor involvement process will assist in managing cost impacts from given risks and allocating risks to the appropriate parties.¹⁰⁰ The CEC states that BC Hydro's evaluation of potential effects and risk mitigation is comprehensive and acknowledges the value of Klohn Crippen Berger + Hatch's expertise in BC Hydro's quantitative risk assessment.¹⁰¹

BC Hydro submits that its management of risk for the Project remains the most cost-effective manner to address the seismic withstand and water conveyance deficiencies at the Ladore dam.¹⁰²

Panel Determination

The Panel is satisfied that BC Hydro has appropriately identified the risks relating to the execution of the Ladore Project and put in place adequate mitigation measures to reduce those risks to an acceptable level. With respect to the project schedule, the Panel notes that BC Hydro has now advanced its project completion schedule to an earlier date, but has done so with the expectation of increased cost savings resulting from the shortened schedule.

With respect to the probability that the project cost escalation risk will remain unchanged at "likely", BC Hydro identifies the risk as a market-based risk. Given that market risk is beyond BC Hydro's control, the Panel is satisfied that this level of risk is acceptable. The Panel also notes that the project reporting requirements (discussed in section 9 of this decision) require BC Hydro to report on project costs and allows the BCUC to monitor this cost escalation risk as the project progresses. This should enable BC Hydro to take timely mitigation measures as may be required.

5.0 Project Cost Estimate and Rate Impact

On May 30, 2024, BC Hydro provided an Updated Project Cost Estimate for the Ladore Project from the original estimate set out in the Application, which included:¹⁰³

⁹⁷ BC Hydro Final Argument, p. 39.

⁹⁸ BCOAPO Final Argument, p. 20.

⁹⁹ CEC Final argument, p. 14.

¹⁰⁰ Ibid., p. 11.

¹⁰¹ Ibid., pp. 10-11.

¹⁰² BC Hydro Final Argument, p. 40.

¹⁰³ Exhibit B-14, cover letter pp. 3-4.

- Updated cost and schedule assumptions to reflect the proposal received and accepted from the lead proponent;
- Updated loadings (escalation, interest during construction and capital overhead) to reflect current rate assumptions;
- Review of cost and schedule risks to recalculate appropriate contingencies and project reserves; and
- Updated design information to reflect progression of design work from the preliminary design to the request for proposal stage.

The following sections discuss the Updated Project Cost Estimate and its impact on rates.

5.1 Updated Project Cost Estimate

In BC Hydro's initial Application, the Ladore Project had an expected cost of \$267.3 million and an authorized cost of \$344.1 million. This resulted in a project cost range of \$224.8 million to \$344.1 million. The expected cost estimate was based on the preliminary level design and conformed to an Association for the Advancement of Cost Engineering International (AACEI) Class 3 cost estimate.¹⁰⁴

BC Hydro's Updated Project Cost Estimate includes an expected cost of \$326.7 million and an authorized cost of \$379.0 million. The expected cost includes life to date costs, forecast direct and indirect construction costs, escalation, contingency, corporate overhead, and interest during construction. The authorized cost represents the sum of the expected cost and reserves.¹⁰⁵

The cost increases in the Updated Project Cost Estimate are due to the lead proponent's proposal that BC Hydro ultimately accepted for the Ladore Project, a change in market conditions, and project design progression between the filing of the Application and the Updated Project Cost Estimate. The Updated Project Cost Estimate also includes cost reductions for management and engineering costs, contingencies, and reserves. These cost reductions are due to greater certainty regarding project design progression since the Application filing date as well as the shortened project schedule. BC Hydro, however, notes that the expected cost, after the Updated Project Cost Estimate, still falls within the accuracy range of the previous estimate.¹⁰⁶

5.2 Rate Impact

The Ladore Project will affect operating costs, amortization, and finance charges within BC Hydro's annual revenue requirements.¹⁰⁷ Figure 2 illustrates the cumulative incremental rate impact of the Ladore Project following the Updated Project Cost Estimate and, for comparison, the rate impacts set out in the Application.

¹⁰⁴ Exhibit B-1, Section 5.6, pp. 5-32 - 5-33.

¹⁰⁵ Exhibit B-1, Section 5.6, p. 5-32. The expected cost in based on the P50 cost estimate whereas the authorized cost is based on the P90 cost estimate plus any special reserve amounts. P50 is defined as the cost estimate that will not be exceeded 50% of the time. P90 is defined as the cost estimate that will not be exceeded 90% of the time. ¹⁰⁶ Exhibit B-14, p. 4.

¹⁰⁷ Exhibit B-1, Section 5.7, p. 5-38.





Based on the updated expected cost, the increase in BC Hydro's revenue requirements from the Ladore Project would be highest in dollar amount in fiscal 2029 at an estimated \$17.5 million which equates to a cumulative incremental rate impact of 0.29 percent. For the updated authorized cost, the increase in BC Hydro's revenue requirements from the Ladore Project would be highest in dollar amount in fiscal 2030 at an estimated \$19.9 million which equates to a cumulative incremental rate impact of 0.32 percent.¹⁰⁹

Positions of Parties

BC Hydro submits the Updated Project Cost Estimate and project schedule demonstrate that the proposed expenditure schedule for the Ladore Project is appropriate to ensure the levels of safety and water conveyancing improvements the Ladore Project is designed to provide. BC Hydro further submits that it has reasonably and appropriately estimated the cost for the Ladore Project and that the necessity of addressing the dam safety issues at the Ladore dam by implementing the improvements included in the Ladore Project vastly outweighs the impact on ratepayers in British Columbia.¹¹⁰ Accordingly, BC Hydro submits that it is in the public interest for the BCUC to accept the project expenditure schedule for the Ladore Project.

BCOAPO has no issue with BC Hydro's rate impact analysis, but notes that the analysis does not include net salvage expenses given that BC Hydro is required to submit a proposal on net salvage rates as part of its next revenue requirements application.¹¹¹

¹⁰⁸ Exhibit B-14, Figure 1, p. 16.

¹⁰⁹ Ibid., p. 15.

¹¹⁰ BC Hydro Final Argument, pp. 38–39.

¹¹¹ BCOAPO Final Argument, p. 20; BC Hydro Fiscal 2023 to Fiscal 2025 Revenue Requirements Application, Decision and Order G-91-23 dated April 21, 2023, p. 222.

In the CEC's view, the Updated Project Cost Estimate is comprehensive and well-supported and recommends that the BCUC find it acceptable for the Ladore Project.¹¹²

The CEC considers BC Hydro's calculations related to rate impact to be reasonable. The CEC submits that the cumulative bill impact is not excessive given the significance of the Ladore Project and the Campbell River System as a whole to BC Hydro's ratepayers.¹¹³ The CEC submits that continued investment in the Ladore Project and the Campbell River System is clearly beneficial for BC Hydro's ratepayers.¹¹⁴

Panel Determination

The Panel notes that no interveners took issue with the Updated Project Cost Estimate or its cumulative incremental rate impact.

The Panel finds the Updated Project Cost Estimate to be reasonable, including the Expected and Authorized Amounts which are based on the Project's preliminary level design and consistent with an AACE International Class 3 cost estimate.

The Panel also finds the cumulative incremental rate impact to be reasonable and acceptable, particularly when viewed in light of the dam safety benefits that the Ladore Project is designed to address.

As BCOAPO correctly notes, pursuant to an earlier BCUC directive, BC Hydro is required to submit a proposal on net salvage rates relating to its capital projects as part of its next revenue requirements application.¹¹⁵

6.0 Project Consultation and Engagement

The following subsections provide an overview of BC Hydro's consultation and engagement activities relating to the Ladore Project with potentially affected Indigenous communities, local governments and the public.

6.1 Indigenous Consultation and Engagement

As part of the project Initiation phase in 2016, BC Hydro reviewed several information sources to identify the consultative boundaries of the Ladore Project. Based on the BC Consultative Area Database, the Ladore Project is located within the consultative boundaries of three potentially affected Indigenous Nations: We Wai Kai Nation, Wei Wai Kum First Nation, and K'ómoks First Nation¹¹⁶ (Project Nations).

6.1.1 Indigenous Consultation Approach

BC Hydro states its duty to consult aims to advance the process of reconciliation and is grounded in the honour of the Crown and section 35 of the *Constitution Act*, *1982*.¹¹⁷ The consultation framework is further informed by

¹¹² The CEC Final Argument, p. 14.

¹¹³ Ibid., p. 14.

¹¹⁴ Ibid., p. 16.

¹¹⁵ BCOAPO Final Argument, p. 20; BC Hydro Fiscal 2023 to Fiscal 2025 Revenue Requirements Application, Decision and Order G-91-23 dated April 21, 2023, p. 222.

¹¹⁶ Exhibit B-1, p. 6-4.

¹¹⁷ Constitution Act, 1982, being Schedule B to the Canada Act 1982 (UK), 1982, c 11.

the Supreme Court of Canada's decision in *Haida Nation v. British Columbia Minister of Forests (Haida)*¹¹⁸ and the cases following it, which established key principles that continue to guide the fulfillment of the duty to consult.¹¹⁹ BC Hydro states it has also considered the BCUC's *2010 First Nations Information Filing Guidelines for Crown Utilities* together with developments in the law as they have evolved over the ensuing period.¹²⁰

BC Hydro states it has undertaken an in-depth process of consultation with We Wai Kai, Wei Wai Kum, and K'ómoks First Nations at a level commensurate with their interests, concerns in respect of project impacts, and consistent with the requirements of applicable agreements with the Nations.¹²¹ BC Hydro explains that its consultation efforts focused on working collaboratively with the Project Nations to: a) understand their use of the land in the vicinity of the Ladore Project, both historically and currently, and how the project may impact the exercise of Aboriginal rights and title; and b) explore ways to mitigate or avoid the impacts of the project and ways in which they can benefit from the project, including through participation in employment, training, and procurement opportunities.¹²²

With respect to strength of claim, BC Hydro assessed the claims of the Project Nations as having a reasonable basis in fact and law and proceeded on the basis that the claims were valid for the purpose of undertaking consultation on the Ladore Project. BC Hydro considered it unnecessary to identify the preliminary strength of claim assessment of each Project Nation for the purpose of this Application, due to the potential negative impact on BC Hydro's relationship with the Project Nations. Instead, BC Hydro states that its approach to consultation sought to exceed minimum requirements and engage at the level that corresponded to each Project Nation's interest, which in this case resulted in consent being sought and obtained from them.¹²³

6.1.2 Potential Project Impacts

BC Hydro notes the following areas of concern raised by the Project Nations regarding potential impacts of the Ladore Project: historical and cumulative effects of the Ladore Project in the Campbell River watershed;¹²⁴ continued access of their members to the territory for traditional uses such as hunting, gathering and fishing;¹²⁵ and archaeological potential of the project area.¹²⁶

BC Hydro assesses that the Ladore Project will have an overall low impact on the rights and title of the First Nations because it involves upgrades to existing infrastructure on and around the existing Ladore dam. BC Hydro states that with the implementation of the recommended mitigation measures and management plans, which were developed in consultation with the Project Nations, the impacts on wildlife, vegetation, fish and fish habitat resources are expected to be negligible.¹²⁷

- ¹²⁰ Ibid., p. 6-8.
- ¹²¹ Ibid., p. 6-10.
- ¹²² Ibid., pp. 6-9 6-10.
- ¹²³ Ibid., p. 6-10.
- ¹²⁴ Ibid., pp. 6-15 6-16.
- ¹²⁵ Ibid., p. 6-18.
 ¹²⁶ Ibid., p. 6-19.

¹¹⁸ [2004] 3 SCR 511.

¹¹⁹ Exhibit B-1, pp. 6-8 – 6-9.

¹²⁷ Ibid., pp. 6-1, 6-20.

To date, no recorded archaeological sites have been identified in the project area and no negative residual effects are anticipated for archaeology and heritage resources. However, as the Project Nations have identified the area surrounding the Ladore facility as having archaeological potential, BC Hydro states it will follow its Archaeological Chance Find Procedure if an unrecorded archaeological site is discovered during construction.¹²⁸ The Archaeological Chance Find Procedure outlines the actions to be taken by BC Hydro's employees or contractors if previously unknown heritage resources are encountered during construction activities.

6.1.3 Indigenous Consultation Process

BC Hydro submits that its approach to consultation on the Ladore Project follows the successful consultation process with the same communities for the John Hart Generating Station Replacement which started in 2007, and that the Project Nations agreed to continue using this approach for the Ladore Project, as well as for the Strathcona Discharge Upgrade Project and the John Hart Seismic Upgrade Project, all in the Campbell River watershed.¹²⁹

The consultation on the Ladore Project started in 2016 and BC Hydro has provided a record of the consultation as of August 2023.¹³⁰ The engagement process was supported with capacity funding agreements signed with the three Project Nations at the commencement of each project phase: a) introduction and identification of alternatives; b) feasibility design stage for preferred alternative; and c) definition phase. In addition, at the request of K'ómoks First Nation, funding was provided to augment their traditional use data.¹³¹

Positions of the Parties

BC Hydro submits it has engaged in an in-depth consultation process with the Project Nations. In 2019, BC Hydro and each of the Project Nations signed Relationship Agreements that included Consultation Protocols. These agreements are intended to provide structure and consistency to the engagement process and create economic benefits for the Project Nations on all proposed projects within their respective territories.¹³²

BC Hydro states that, as of the date of this Application, its consultation with We Wai Kai, Wei Wai Kum and K'ómoks Nations has been reasonable and adequate and has upheld the honour of the Crown in accordance with section 35 of the *Constitution Act*.¹³³ Since filing the Application, BC Hydro submits that it has and will continue to consult with the Project Nations to address any concerns that may be raised.¹³⁴ The consultation on the Ladore Project has included providing capacity funding to support engagement, seeking input on remediation options, gathering of traditional use information to inform assessments and decision making, the review and discussion of procurement opportunities, and the review and discussion of environmental, social and heritage impacts.¹³⁵

¹²⁸ Exhibit B-1, pp. 5-55, 6-19 - 6-20.

¹²⁹ Ibid., p. 6-21.

¹³⁰ Exhibit B-1-2, Appendix B-9; Exhibit B-4, BCUC IR 1.19.4.

¹³¹ Exhibit B-1, p. 6-22.

¹³² Ibid., p. 6-11.

¹³³ Ibid., p. 6-45.

¹³⁴ Exhibit B-4, BCUC IR 1.19.4; BC Hydro Final Argument, p. 48.

¹³⁵ BC Hydro Final Argument, p. 46.

While BC Hydro states the Ladore Project incremental impacts have been assessed as low, it has nevertheless engaged with the Project Nations at a level that corresponds to the high end of the *Haida* spectrum.¹³⁶ On December 23, 2021, BC Hydro entered into a Project Agreement with We Wai Kai and Wei Wai Kum First Nations jointly. On December 5, 2022, BC Hydro signed a Project Agreement with K'ómoks First Nation.¹³⁷ Through the Ladore Project Agreements the three Project Nations have consented to the project and confirmed that consultation and accommodation on the Ladore Project have been adequate, subject to a continuing right to meaningfully participate in permitting and regulatory processes for the Ladore Project, including proposing additional measures to mitigate and avoid impacts.¹³⁸

BCOAPO and the CEC recommend that the BCUC find BC Hydro's consultation with First Nations to be adequate.¹³⁹ The CEC further submits that adequate consultation can be expected to continue, and the procurement and employment opportunities will continue to add value to the affected First Nations.¹⁴⁰

RCIA submits that BC Hydro's responses on Indigenous Nations consultation are satisfactory.¹⁴¹

6.2 Public Consultation and Engagement

BC Hydro has, since 2007, increased its public consultation and engagement with the community in the Campbell River System area on its facilities and operations, such as the Ladore Project.¹⁴²

Since 2015, BC Hydro has engaged the public on project planning at the individual, community and local government level through presentations to various parties and venues. These include the Campbell River City Council and the Strathcona Regional District Board, the Campbell River Hydroelectric Facilities Liaison Committee,¹⁴³ the Campbell River Hydroelectric Facilities Discovery Centre; the McIvor Lake/Lower Campbell Reservoir cabin owners/homeowners; via local and regional media coverage, Project overview videos, presentations, posting of project related information on the BC Hydro project website, the Campbell River and District Chamber of Commerce website, as well as social media, and e-mails.¹⁴⁴

Since December 2014, BC Hydro, in collaboration with the City of Campbell River and the Strathcona Regional District, has been providing ongoing and proactive notice to the community on the interim downstream risks in the event of a major earthquake and potential Strathcona dam and John Hart dam failure. This activity was postponed in 2020 and 2021 due to the COVID-19 pandemic, and took place to a limited degree in 2022.

¹³⁶ Ibid., p. 46.

¹³⁷ Exhibit B-1, pp. 6-27, 6-38 - 6-39.

¹³⁸ Exhibit B-1, p. 6-45.

¹³⁹ BCOAPO Final Argument, p. 22; CEC Final Argument, p. 16.

¹⁴⁰ CEC Final Argument, p. 17.

¹⁴¹ RCIA Final Argument, p. 11.

¹⁴² Exhibit B-1, p. 6-47.

¹⁴³ The Committee includes government agencies, local government, stakeholder groups and the public, such as BC Parks, DFO, the B.C. Ministry of Forests, Lands and Natural Resource Operations and Rural Development (MFLNRO), Office of Member of the Legislative Assembly (MLA) Michele Babchuk, the City of Campbell River, Strathcona Regional District, Campbell River & District Chamber of Commerce, North Island Employment Foundations Society, Destiny River Adventures, Campbell River Environmental Committee, Greenways Land Trust, Campbell River Salmon Foundation, Strathcona Park Lodge, North Vancouver Island Aboriginal Training Society, and others.

¹⁴⁴ Exhibit B-1, pp. 6-48- 6-50.

BC Hydro states that there is strong public support for the Ladore Project, as demonstrated by stakeholder feedback from seven organizations and individuals including the City of Campbell River, Strathcona Regional District, North Island MLA, Campbell River Downtown Business Improvement Association, Campbell River and District Chamber of Commerce, Campbell River Environmental Committee, and Campbell River Salmon Foundation.¹⁴⁵ The letters indicate general support for the Ladore Project as well as issues raised, including the following:¹⁴⁶

- Potential impacts to fish habitat and wildlife habitat;
- Traffic to and from the Ladore Project site along McIvor Lake Road; and
- Economic opportunities.

BC Hydro submits it has undertaken steps to address or mitigate these issues.¹⁴⁷

In response to information requests, BC Hydro provided updates on community engagement activities as of August 2023, including past and planned meetings with the Campbell River System Hydroelectric Facilities Liaison Committee, activities at the Campbell River Hydroelectric Facilities Discovery Centre, and media updates to the community.¹⁴⁸

Positions of the Parties

BC Hydro submits that it has engaged with public stakeholders including the local government, community and individuals with respect to the Ladore Project and that there is wide-spread public support for the project, including letters of support from individuals and organizations.¹⁴⁹

BC Hydro notes that although some letters raise concerns about issues such as the closure of recreational areas, public access to roads, the protection of water quality, and economic opportunities, BC Hydro has appropriately mitigated all of these concerns through the proposed mitigating measures included in the Application.¹⁵⁰

In addition, BC Hydro submits that it has made commitments to provide updates and continue engagement activities with identified stakeholders as the Ladore Project progresses.¹⁵¹

BCOAPO considers BC Hydro's public engagement has been appropriate as the evidence indicates BC Hydro has engaged in broad public consultations and BC Hydro has asserted that there is public support for the Ladore Project. In addition, BCOAPO notes that issues raised by stakeholders relate to impacts during the project construction, but not the outcome of the project itself.¹⁵²

¹⁴⁵ Exhibit B-1, p. 6-50.

¹⁴⁶ Ibid., p. 6-51.

¹⁴⁷ Ibid., p. 6-51.

¹⁴⁸ Exhibit B-4, BCUC IR 1.21.1.

¹⁴⁹ BC Hydro Final Argument, p. 49.

¹⁵⁰ Ibid., pp. 49-50.

¹⁵¹ Ibid., p. 50.

¹⁵² BCOAPO Final Argument, p. 22.

The CEC is satisfied that BC Hydro has adequately consulted with the public and that the Ladore Project enjoys reasonable community support.¹⁵³

RCIA submits that BC Hydro's responses on public engagement are satisfactory.¹⁵⁴

Panel Determination

The Panel finds BC Hydro's Indigenous consultation with respect to the Ladore Project has been adequate to date, as evidenced by the Project Nations' support for the project. The Panel further finds that public consultation has been adequate, as evidenced by BC Hydro's public consultation process, its ongoing public engagement activities, the strong public support and the interveners' support for the project in this proceeding.

7.0 Relevant Considerations for Acceptance of Expenditures Pursuant to the UCA

Section 44.2(5.1) of the UCA provides <u>that in considering whether to accept an expenditure schedule filed by BC</u> <u>Hydro, the BCUC, in addition to considering the interests of persons in British Columbia who receive or may</u> <u>receive service from BC Hydro, must consider</u>:

- a) British Columbia's energy objectives;
- b) The most recent of the following documents:
 - i. An integrated resource plan approved under section 4 of the *Clean Energy Act* before the repeal of that section;
 - ii. A long-term resource plan filed by BC Hydro under section 44.1 of the UCA;

c) The extent to which the schedule is consistent with the requirements under section 19 of the *Clean Energy Act*; and

d) If the schedule includes expenditures on demand-side measures, the extent to which the demandside measures are cost-effective within the meaning prescribed by regulation, if any.

[Emphasis added]

7.1 British Columbia's Energy Objectives

BC Hydro states that the Ladore Project expenditure schedule, as summarized in the table below, aligns with the following seven of British Columbia's energy objectives, set out in section 2 of the *Clean Energy Act*:¹⁵⁵

¹⁵³ CEC Final Argument, p. 17.

¹⁵⁴ RCIA Final Argument, p. 11.

¹⁵⁵ Exhibit B-1, pp. 1-51 to 1-53.

Table 4: British Columbia's Energy Objectives

Energy Objective	Discussion
2(a) To achieve electricity self-sufficiency;	The Ladore Facility is a significant part of BC Hydro's generation capability and allows BC Hydro to cost-effectively meet its self-sufficiency obligations.
2(c) To generate at least 93% of the electricity in British Columbia, other than electricity to serve demand from facilities that liquefy natural gas for export by ship, from clean or renewable resources and to build the infrastructure necessary to transmit that electricity;	The Ladore Facility relies on water from the Lower Campbell River Reservoir, which is impounded by the Ladore Dam, to generate clean and renewable hydro-electric power.
2(e) To ensure the authority's ratepayers receive the benefits of the heritage assets and to ensure the benefits of the heritage contract under the BC Hydro Public Power Legacy and Heritage Contract Act54 continue to accrue to the authority's ratepayers;	The Ladore Facility is a heritage asset. The Project will address the seismic withstand deficiencies and improve reliability of the Spillway Gates System; therefore, helping to ensure that BC Hydro's ratepayers continue to receive the benefit of these assets.
2(f) To ensure the authority's rates remain among the most competitive of rates charged by public utilities in North America;	The Campbell River System and the Ladore Facility both have positive Net Present Value to ratepayers. By addressing the seismic withstand deficiencies and improving reliability of the Spillway Gates System of the Ladore Facility, the Project will help to maintain the Campbell River System so that BC Hydro's rates remain competitive.
2(k) To encourage economic development and the creation and retention of jobs;	The Ladore Project will result in contracting opportunities and positive economic benefits.
2(m) To maximize the value, including the incremental value of the resources being clean or renewable resources, of British Columbia's generation and transmission assets for the benefit of British Columbia; and	The Campbell River System and the Ladore Facility both have a positive Net Present to ratepayers. The Project will aid in maximizing the value to ratepayers from the Campbell River System generation and transmission assets.
2(o) To achieve British Columbia's energy objectives without the use of nuclear power.	The Ladore Facility does not use nuclear power.

7.2 Application of Section 19 of the *Clean Energy Act* and Demand Side Measures

Section 19 of the *Clean Energy Act*, which applies to BC Hydro, addresses clean and renewable resources. However, BC Hydro states that subsections 44.2(5.1)(c) and (d) of the UCA, which the BCUC is required to consider in determining whether to accept the Ladore Project expenditure schedule, do not apply in these circumstances because there are no prescribed targets or guidelines under section 19 of the *Clean Energy Act*, and the Ladore Project expenditure schedule does not include demand-side measures.¹⁵⁶

7.3 BC Hydro's Integrated Resource Plan

BC Hydro's Updated 2021 Integrated Resource Plan was filed on June 15, 2023 and accepted by the BCUC on March 6, 2024.¹⁵⁷ BC Hydro states that under the revised reference forecast considered in the Updated 2021 Integrated Resource Plan, when existing and committed resources are considered, BC Hydro has a need for new energy resources in fiscal 2027 and a need for new capacity resources on Vancouver Island in fiscal 2034.¹⁵⁸ BC Hydro further explains that the Ladore Project is required to address seismic deficiencies at the Ladore facility, to enable the continued use of the Ladore, Strathcona and John Hart generating stations, which are included in the 2021 Integrated Resource Plan as existing resources.¹⁵⁹

Positions of the Parties

BC Hydro submits that the Ladore Project supports BC's energy objectives in the *Clean Energy Act*, as outlined in the Application, and that Section 19 of the *Clean Energy Act* and the Demand Side Measures are not applicable to the application.¹⁶⁰ In addition, BC Hydro submits the Ladore Project fits within the Updated 2021 Integrated Resource Plan filed on June 15, 2023.¹⁶¹

Interveners made no submissions on these issues.

Panel Determination

The Panel has considered British Columbia's energy objectives and finds that the Ladore Project is aligned with those objectives as identified by BC Hydro. The Panel further notes that no intervener has raised any issues regarding BC Hydro's evidence of the Ladore Project's alignment with British Columbia's energy objectives.

The Panel has not considered subsections 44.2(5.1) (c) and (d) of the UCA. The Panel finds these sections are not applicable to this Application because there are no prescribed targets or guidelines under section 19 of the CEA, and the Updated Project Cost Estimate does not include expenditures related to demand-side measures.

In addition, the Panel considers that the Ladore Project is consistent with BC Hydro's Updated 2021 Integrated Resource Plan because the project will enable the continued use of the Ladore dam which together with the two other dams on the Campbell River System are included in that plan as an existing resource to meet the need for future capacity on Vancouver Island.

¹⁵⁶ Exhibit B-1, p. 1-51.

¹⁵⁷ BCUC Order G-58-24, dated March 6, 2024.

¹⁵⁸ BC Hydro Final Argument, p. 45.

¹⁵⁹ Exhibit B-1, p. 1-53.

¹⁶⁰ BC Hydro Final Argument, p. 45.¹⁶¹ Ibid.

8.0 Overall Panel Determinations

In this section, the Panel summarizes the parties' positions with respect to the Application and our overall findings.

Positions of the Parties

BC Hydro asserts that making the capital expenditures for the Ladore Project is in the public interest.¹⁶²

Interveners generally agree that the Ladore Project is in the public interest and recommend that the BCUC accept the updated project expenditure schedule. BCOAPO submits that the Ladore Project and the proposed expenditure schedule are in the public interest and should be accepted by the BCUC.¹⁶³ The CEC commends BC Hydro for providing a thorough Application and recommends that the BCUC approve the Ladore Project.¹⁶⁴ RCIA states that it generally supports the Ladore Project because it addresses dam safety, reliability, and environmental risks.¹⁶⁵

Panel Determination

The Panel accepts the updated expenditure schedule as filed by BC Hydro for the Ladore Project as being in the public interest pursuant to section 44.2 of the UCA. The Panel makes this determination on the basis of its earlier findings that: BC Hydro has identified a need to address dam safety, reliability risks; it has appropriately identified the Ladore Project as the preferred project alternative to address this need; it has assessed the risks related to this project and put in place appropriate mitigation measures; the project cost estimate and cumulative rate impacts are reasonable; the project is consistent with applicable BC energy objectives and BC Hydro's IRP, and; consultation on the project has been adequate to date. The Panel further notes that all of the parties in this proceeding support the acceptance of this expenditure schedule on the basis that it addresses dam safety, reliability and environmental risks related to known deficiencies in the Ladore facility on the Campbell River System, thereby ensuring the continued ability of the facility to serve capacity needs on Vancouver Island.

¹⁶² BC Hydro Final Argument, p. 5.

¹⁶³ RCIA Final Argument, p. 22.

¹⁶⁴ CEC Final Argument, p. 2.

¹⁶⁵ RCIA Final Argument, pdf p. 6.

9.0 Project Reporting

The Panel directs BC Hydro to provide the following reports for the Ladore Project:

1. Annual Progress Reports

Each annual report is required to detail:

- Actual costs incurred to date compared to the Ladore Project cost breakdown table estimate provided in Table 5-2 of Appendix 2 of the Updated Project Cost Estimate, including the use of Project Reserve, if accessed, highlighting variances with an explanation of variances greater than 30 percent for any row number or line item;
- Updated forecast of costs, highlighting the reasons for costs that are forecast to have variances greater than 30 percent for any row number or line item; and
- The status of identified risks noted in Chapter 7 of the Application, highlighting the status of identified risks, changes in and additions to risks, the options available to address the risks, the actions that BC Hydro is taking to deal with the risks and the likely impact on the Ladore Project's schedule and cost.

BC Hydro must file annual progress reports within 45 days of the end of each annual reporting period, with the first report covering the period ending September 30, 2025.

2. Material Change Reports

A material change (Material Change) is a change in BC Hydro's plan for the Ladore Project that would reasonably be expected to have a significant impact on the schedule, cost or scope, such that:

- Schedule there is a delay in the forecast project in-service date of April 2028 provided in Table 4 of the Updated Project Cost Estimate;
- Cost the Authorized Cost of the Ladore Project is forecast to exceed the BC Hydro Authorized Amount of \$379.0 million provided in row 17 of Table 5-2 of Appendix 2 of the Updated Project Cost Estimate; or
- Scope there are one or more changes to the Ladore Project deliverables and the work required to create those deliverables or the main components of the Ladore Project scope detailed in Chapter 5 of the Application.

In the event of a Material Change, BC Hydro must file a Material Change report with the BCUC explaining the reasons for the Material Change, BC Hydro's consideration of the Ladore Project risk and the options available, and actions BC Hydro is taking to address the Material Change. BC Hydro must file the Material Change report within 30 days of the Material Change occurring or within 30 days of the appropriate approval authority within BC Hydro being informed of a potential material change, whichever is earlier.

3. Final Report

A Final Report is due the earlier of one month after review by BC Hydro's Board of Directors, or 24 months after the project in-service date. The report is to include:

- The final cost of the Ladore Project, including a breakdown of the final costs; and
- A comparison of the final costs to the estimates provided in Table 5-2 of the Updated Project Cost Estimate and an explanation for any material cost variances that exceed 10 percent for any of the cost items provided in Table 5-2 of Appendix 2 of the Update.

DATED at the City of Vancouver, in the Province of British Columbia, this 22nd day of October, 2024.

Original signed by:

A. K. Fung, KC Panel Chair/Commissioner

Original signed by:

W. M. Everett, KC Commissioner

Original signed by:

M. Kresivo, KC Commissioner British Columbia Hydro and Power Authority Ladore Spillway Seismic Upgrade Project

LIST OF ACRONYMS

Acronym	Description	
AACEI	Association for the Advancement of Cost Engineering International	
Application	BC Hydro's application for acceptance of the schedules of capital expenditures BC Hydro anticipates making for implementation of the Ladore Spillway Seismic Upgrade Project and the Strathcona Discharge Upgrade Project	
BC Hydro	British Columbia Hydro and Power Authority	
BCOAPO	British Columbia Old Age Pensioners Association et al.	
BCUC	British Columbia Utilities Commission	
Campbell River System	BC Hydro's hydroelectricity system located on the Campbell River on Vancouver Island, within the Strathcona Regional District	
CEC	The Commercial Energy Consumers Association	
Corporate Risk Matrix	A governance tool which specifies the level to which a risk must be escalated within the organization	
CPCN	Certificate of Public Convenience and Necessity	
GWh	Gigawatt hours	
Ladore Project	Ladore Spillway Seismic Upgrade Project	
MW	Megawatts	
NPV	Net present value	
Project Nations	We Wai Kai Nation, Wei Wai Kum First Nation, and K'ómoks First Nation	
Projects	Collectively, the Ladore Project and the Strathcona Project	
RCIA	Residential Consumer Intervener Association	

APPENDIX A

SDM	Structured decision making
Spillway Gates System	Ladore spillway gates system including the spillway gates, the hoist tower structure, the hoist system, and the power and controls systems
Strathcona Project	Strathcona Discharge Upgrade Project
UCA	Utilities Commission Act

British Columbia Hydro and Power Authority Ladore Spillway Seismic Upgrade Project

EXHIBIT LIST

Exhibit No.	Description
Commission L	DOCUMENTS
A-1	Letter dated June 28, 2023 – BCUC panel appointment for the review of the Ladore Spillway and Strathcona Discharge Upgrade Projects
A-2	Letter dated July 18, 2023 – BCUC Order G-189-23 establishing a regulatory timetable with Reasons for Decision
A-3	Letter dated August 29, 2023 – BCUC Information Request No. 1 to BC Hydro
A-4	CONFIDENTIAL - Letter dated August 29, 2023 – BCUC Confidential Information Request No. 1 to BC Hydro
A-5	Letter dated November 9, 2023 – BCUC Order G-303-23 establishing a further regulatory timetable
A-6	Letter dated November 16, 2023 – BCUC Information Request No. 2 to BC Hydro
A-7	CONFIDENTIAL - Letter dated November 16, 2023 – BCUC confidential Information Request No. 2 to BC Hydro
A-8	Letter dated December 1, 2023 – BCUC Order G-328-23 amending the regulatory timetable
A-9	Letter dated December 14, 2023 – BCUC Order G-352-23 adjourning the proceeding
A-10	Letter dated January 30, 2024 – BCUC Order G-25-24 providing adjournment update
A-11	Letter dated June 18, 2024 – BCUC Order G-163-24 establishing an amended regulatory timetable
A-12	June 27, 2024 – BCUC Information Request No. 3 to BC Hydro

APPLICANT DOCUMENTS

- B-1 **BC HYDRO AND POWER AUTHORITY (BC HYDRO) PUBLIC** Ladore Spillway Seismic Upgrade Project and Strathcona Discharge Upgrade Project Application dated June 14, 2023
- B-1-1 **PUBLIC** Letter dated June 14, 2023 BC Hydro submitting Ladore Spillway Seismic Upgrade Project and Strathcona Discharge Upgrade Project Application Appendix A
- B-1-2 **PUBLIC** Letter dated June 14, 2023 BC Hydro submitting Ladore Spillway Seismic Upgrade Project and Strathcona Discharge Upgrade Project Application Appendix B
- B-1-3 **PUBLIC** Letter dated June 14, 2023 BC Hydro submitting Ladore Spillway Seismic Upgrade Project and Strathcona Discharge Upgrade Project Application Appendix C1 and C2
- B-1-4 **PUBLIC** Letter dated June 14, 2023 BC Hydro submitting Ladore Spillway Seismic Upgrade Project and Strathcona Discharge Upgrade Project Application Appendix C3 Part 1
- B-1-5 **PUBLIC** Letter dated June 14, 2023 BC Hydro submitting Ladore Spillway Seismic Upgrade Project and Strathcona Discharge Upgrade Project Application Appendix C3 Part 2
- B-1-6 **PUBLIC** Letter dated June 14, 2023 BC Hydro submitting Ladore Spillway Seismic Upgrade Project and Strathcona Discharge Upgrade Project Application Appendix C3 Part 3
- B-1-7 **PUBLIC** Letter dated June 14, 2023 BC Hydro submitting Ladore Spillway Seismic Upgrade Project and Strathcona Discharge Upgrade Project Application Appendix C3 Part 4
- B-1-8 **PUBLIC** Letter dated June 14, 2023 BC Hydro submitting Ladore Spillway Seismic Upgrade Project and Strathcona Discharge Upgrade Project Application Appendix C3 Part 5
- B-1-9 **PUBLIC** Letter dated June 14, 2023 BC Hydro submitting Ladore Spillway Seismic Upgrade Project and Strathcona Discharge Upgrade Project Application Appendix C3 Part 6
- B-1-10 **PUBLIC** Letter dated June 14, 2023 BC Hydro submitting Ladore Spillway Seismic Upgrade Project and Strathcona Discharge Upgrade Project Application Appendix C3 Part 7
- B-1-11 **PUBLIC** Letter dated June 14, 2023 BC Hydro submitting Ladore Spillway Seismic Upgrade Project and Strathcona Discharge Upgrade Project Application Appendix C3 Part 8
- B-1-12 **PUBLIC** Letter dated June 14, 2023 BC Hydro submitting Ladore Spillway Seismic Upgrade Project and Strathcona Discharge Upgrade Project Application Appendix C3 Part 9
- B-1-13 PUBLIC Letter dated June 14, 2023 BC Hydro submitting Ladore Spillway Seismic
 Upgrade Project and Strathcona Discharge Upgrade Project Application Appendix C3
 Part 10
- B-1-14 PUBLIC Letter dated June 14, 2023 BC Hydro submitting Ladore Spillway Seismic
 Upgrade Project and Strathcona Discharge Upgrade Project Application Appendix C3 Part
 11

- B-1-15 **PUBLIC** Letter dated June 14, 2023 BC Hydro submitting Ladore Spillway Seismic Upgrade Project and Strathcona Discharge Upgrade Project Application Appendix C4 to C10
- B-1-16 **PUBLIC** Letter dated October 16, 2023 BC Hydro submitting Errata No. 1 to the Application
- B-2 **CONFIDENTIAL** Letter dated June 14, 2023 BC Hydro submitting Ladore Spillway Seismic Upgrade Project and Strathcona Discharge Upgrade Project Application
- B-2-1 **CONFIDENTIAL** Letter dated June 14, 2023 BC Hydro submitting Ladore Spillway Seismic Upgrade Project and Strathcona Discharge Upgrade Project Application Appendix A
- B-2-2 **CONFIDENTIAL** Letter dated June 14, 2023 BC Hydro submitting Ladore Spillway Seismic Upgrade Project and Strathcona Discharge Upgrade Project Application Appendix B
- B-2-2-1 **CONFIDENTIAL** Letter dated October 16. 2023 BC Hydro submitting Errata No. 1 to Confidential Application Appendix B
- B-2-3 **CONFIDENTIAL** Letter dated June 14, 2023 BC Hydro submitting Ladore Spillway Seismic Upgrade Project and Strathcona Discharge Upgrade Project Application Appendix C
- B-2-3-1 **CONFIDENTIAL** Letter dated October 16. 2023 BC Hydro submitting Errata No. 1 to Confidential Application Appendix C
- B-2-4 **CONFIDENTIAL** Letter dated October 16, 2023 BC Hydro submitting Errata No. 1 to the Confidential Application
- B-3 Letter dated July 31, 2023 BC Hydro submitting proof of public notice in compliance with Order G-189-23
- B-4 **PUBLIC** Letter dated October 17, 2023 BC Hydro submitting redacted responses to BCUC Information Request No. 1
- B-4-1 **CONFIDENTIAL** Letter dated October 17, 2023 BC Hydro submitting confidential responses to BCUC Information Request No. 1
- B-5 **CONFIDENTIAL** Letter dated October 17, 2023 BC Hydro submitting confidential responses to BCUC Confidential Information Request No. 1
- B-6 **PUBLIC** Letter dated October 17, 2023 BC Hydro submitting redacted responses to Interveners Information Requests No. 1
- B-6-1 **CONFIDENTIAL** Letter dated October 17, 2023 BC Hydro submitting confidential responses to Interveners Information Requests No. 1
- B-7 Letter dated November 29, 2023 BC Hydro submitting extension request to file responses to BCOAPO Information Requests No. 2

- B-8 **PUBLIC** Letter dated December 7, 2023 BC Hydro submitting responses to BCUC public Information Request No. 2
- B-9 **CONFIDENTIAL** Letter dated December 7, 2023 BC Hydro submitting responses to BCUC Confidential Information Request No. 2
- B-10 Letter dated December 7, 2023 BC Hydro submitting responses to Interveners Information Requests No. 2
- B-11 Letter dated December 12, 2023 BC Hydro submitting Cost Estimate Update and request for adjournment
- B-12 Letter dated December 14, 2023 BC Hydro submitting responses to BCOAPO Information Requests No. 2
- B-13 Letter dated January 25, 2024 BC Hydro submitting update on the status of project cost information in compliance with Order G-352-23
- B-14 **PUBLIC** Letter dated May 30, 2024 BC Hydro submitting redacted update on the status of project cost information in compliance with Order G-25-24
- B-14-1 **CONFIDENTIAL** Letter dated May 30, 2024 BC Hydro submitting confidential update on the status of project cost information in compliance with Order G-25-24
- B-15 **PUBLIC** Letter dated July 18, 2024 BC Hydro submitting responses to BCUC and Intervener Information Requests No. 3
- B-15-1 **CONFIDENTIAL** Letter dated July 18, 2024 BC Hydro submitting confidential responses to Intervener Information Requests No. 3

INTERVENER DOCUMENTS

C1-1	RESIDENTIAL CONSUMER INTERVENER ASSOCIATION (RCIA) - Letter dated August 9, 2023 – Request to intervene by Abdulrahman Abomazid
C1-2	Letter dated August 9, 2023 – RCIA submitting Confidentiality Declaration and Undertakings
C1-3	Letter dated September 6, 2023 – RCIA submitting Information Request No. 1 to BC Hydro
C1-4	Letter dated November 23, 2023 – RCIA submitting Information Request No. 2 to BC Hydro
C1-5	CONFIDENTIAL - Letter dated June 27, 2024 – RCIA submitting confidential Information Request No. 3 to BC Hydro

C2-1	BRITISH COLUMBIA OLD AGE PENSIONERS' ORGANIZATION, DISABILITY ALLIANCE BC, COUNCIL OF SENIOR CITIZENS' ORGANIZATIONS OF BC, AND THE TENANT RESOURCE AND ADVISORY CENTRE (BCOAPO) – Letter dated August 16, 2023 – Request to intervene by Leigha Worth
C2-2	Letter dated September 6, 2023 – BCOAPO submitting Information Request No. 1 to BC Hydro
C2-3	Letter dated November 23, 2023 – BCOAPO submitting Information Request No. 2 to BC Hydro
C2-4	Letter dated June 27, 2024 – BCOAPO submitting confidential Information Request No. 3 to BC Hydro
C2-5	Letter dated July 26, 2024 – BCOAPO submitting Confidentiality Declaration and Undertakings
C3-1	COMMERCIAL ENERGY CONSUMERS ASSOCIATION OF BRITISH COLUMBIA (CEC) Letter dated August 18, 2023 – Request to intervene by David Craig and Christopher Weafer
C3-2	Letter dated August 23, 2023 – CEC submitting Confidentiality Declaration and Undertakings
C3-3	Letter dated September 6, 2023 – CEC submitting Information Request No. 1 to BC Hydro
C3-4	Letter dated November 23, 2023 – CEC submitting Information Request No. 2 to BC Hydro

LETTERS OF COMMENT

D-1 Strathcona Regional District (Strathcona Regional District) – Letter of Comment dated May 31, 2023