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February 12, 2026

Keshni Nand  
Registrar  
British Columbia Utilities Commission  
Suite 410, 900 Howe Street  
Vancouver, BC V6Z 2N3

Dear Keshni Nand:

**RE: British Columbia Utilities Commission (BCUC or Commission)  
British Columbia Hydro and Power Authority (BC Hydro)  
Site C Lessons Learned Report  
Responses to BCUC Staff Information Request No. 1**

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BC Hydro writes in compliance with [Exhibit A-10](#) dated December 16, 2025 to provide its responses to BCUC Staff Round 1 information requests.

The documents specified above are provided as follows:

- Responses to BCUC Staff IRs.

For further information, please contact Bridget McNulty at [bchydroregulatorygroup@bchydro.com](mailto:bchydroregulatorygroup@bchydro.com).

Yours sincerely,



Chris Sandve  
Chief Regulatory Officer

wc/sb

Enclosure

**1.0 A. LESSONS LEARNED**  
**Reference: BC HYDRO SITE C LESSONS LEARNED REPORT**  
**Site C Lessons Learned Report Executive Summary, p. 2;**  
**Site C Lessons Learned Report**  
**Lessons Learned Challenges and Successes**

1.1.1 For each of the 29 lessons learned, please identify whether the lesson was learned from a success or a challenge on the Project. In the response, please explain the success or challenge experienced and the circumstances under which it arose.

**RESPONSE:**

As discussed in section 3 of the Lessons Learned Report, the 29 lessons learned are the result of a significant number of datapoints collected over the course of the Project’s 10-year construction phase and are often the result of multiple factors. The following response focusses on the primary challenge(s) or success(es), as applicable, that informed each of the 29 lessons learned.

In summary, of the 29 lessons learned, approximately half were learned from challenges and half from successes, as outlined in the table below:

Topic area	Lessons learned from successes	Lessons learned from challenges	Lessons learned from both successes and challenges
Contract management	1	5	
Risk management	2	5	
Geotechnical risks	2		2
Project governance	1	3	
Indigenous consultation	4		
Community engagement	4		
<b>Totals:</b>	<b>14</b>	<b>13</b>	<b>2</b>

As discussed further in the table below, the lessons learned from challenges on the Site C Project have provided insight into where actions are needed to improve BC Hydro’s Project and Portfolio Management framework so that future projects can anticipate these challenges and be better prepared to avoid them. The lessons learned from successes have highlighted what worked well on the Site C Project, with the aim of replicating these actions on future projects, where appropriate. These actions are detailed further in BC Hydro’s response to BCUC Staff IR 1.1.2.

The table below identifies and explains the primary success or challenge, or both, that gave rise to each of the 29 lessons learned identified in the Lessons Learned Report.

Lesson Learned	Discussion
CM1	Lesson CM1 primarily reflects challenges encountered with the consortium that was awarded the Main Civil Works contract, which was the first major contract to be awarded on the Project. The challenges included issues interpreting and complying with regulations and difficulties attracting and retaining a workforce at a remote, non-urban site and resulted in early delays to the Main Civil Works scope.
CM2	Lesson CM2 primarily reflects the challenges the Project encountered in managing the substantial number of contracts and contractor interfaces required. Specifically, while fewer contract packages were selected to reduce interface risks, the Project's complexity meant that there were still several critical workfront interfaces between contract packages. Despite implementing processes to manage these interfaces and budgeting for associated risks, significant challenges emerged. The COVID-19 pandemic further compounded these issues by altering work sequences, interface timing, and schedules, resulting in additional claims.
CM3	Lesson CM3 primarily reflects challenges arising from the pace at which the Project scaled up its resources. Specifically, during the initial years of construction, the Project did not keep pace with the number and complexity of contractor claims for changes and could have more proactively scaled up its commercial resources at the outset of construction.
CM4	Lesson CM4 primarily reflects the challenges associated with the Project's unprecedented size relative to other BC Hydro capital projects. Site C required enhanced training, tools, and processes beyond the standard Project and Portfolio Management practice.
CM5	Lesson CM5 primarily reflects the successes the Project achieved in implementing an integrated project schedule, and the Project team's ability to evaluate schedule variances and changes across the large independent scopes of work. The Project team developed a detailed project schedule that identified critical path work, float available for near critical path activities, and the key interactions between contractors. The Project used a monthly progression cycle, schedule baselines, and formal change control procedures.
CM6	Lesson CM6 primarily reflects early challenges the Project faced due to strained relationships with certain contractors. BC Hydro sought to involve contractors early and consistently in the planning of construction activities. However, during the Project's early stages, some relationships became strained when some contractors required longer than anticipated to prepare and obtain acceptance of critical pre-construction submissions.

Lesson Learned	Discussion
<b>RM1 &amp; RM2</b>	<p>Lessons RM1 and RM2 primarily reflect the initial challenges the Project experienced in adapting its risk management processes to meet the demands of a project with the size and complexity of Site C.</p> <p>BC Hydro's existing risk management framework required enhancement for the Site C Project. This presented challenges in the early years of the Project as enhancements to the processes, tools, and systems had to be developed concurrently with ongoing construction.</p> <p>Over time, with input from the governing bodies, Ernst &amp; Young, the Independent Oversight Advisor, and Mr. Peter Milburn, enhancements to the risk management process were identified and implemented.</p>
<b>RM3</b>	<p>Lesson RM3 primarily reflects the early challenges the Project faced due to not scaling up its risk management resources proactively.</p> <p>Although the Project included a risk management team early on, staffing levels were not increased early enough to meet the extensive risk management requirements associated with a project as large and complex as Site C. Following the 2021 Milburn report, the addition of further resources strengthened the risk management team's capacity to implement the Project's comprehensive risk management practices and processes. Establishing the Site C Project Risk Committee in mid-2018 further strengthened the Project's risk management governance and this committee served as a key decision making body for risk related issues.</p>
<b>RM4 &amp; RM5</b>	<p>Lessons RM4 and RM5 primarily reflect the early challenges in adapting the existing risk management processes to the scale and complexity of the Project.</p> <p>Risk management processes required enhancement to meet the demands of the Site C Project. The large number of Project risks made it challenging to provide a broad view of all of the Project risks while presenting a manageable number of key risks to governing bodies. Over time, and with input from Ernst &amp; Young and Mr. Peter Milburn, enhancements to risk reporting were identified and implemented.</p>
<b>RM6</b>	<p>Lesson RM6 primarily reflects the successes the Project achieved in developing the expertise of both internal and external resources through on-the-job mentorship and training. Throughout construction, the Project actively sought opportunities to strengthen staff capabilities, including through collaboration with external engineering consultants with experience on similar major projects.</p>
<b>RM7</b>	<p>Lesson RM7 primarily reflects the successes the Project achieved in applying BC Hydro's Project and Portfolio Management practices with respect to early planning. This contributed to improved cost and schedule outcomes and supported the Project's strong safety record by enabling early identification and mitigation of key safety risks.</p>

Lesson Learned	Discussion
GR1	<p>Lesson GR1 primarily reflects the successes the Project achieved by engaging geotechnical experts early and continuously throughout the project lifecycle. The Project benefitted from the involvement of a broad range of internal and external experts who provided guidance throughout the Project.</p>
GR2	<p>Lesson GR2 reflects both successes and challenges related to the Project's geotechnical conditions. The successes included the extensive geotechnical studies and investigations around the damsite, which provided a detailed geotechnical model. This model informed the location, layout, and design of major project assets. Despite this comprehensive work, the Project encountered substantial geotechnical challenges during construction. These challenges had material impacts to the Project's budget and schedule and included the two tension cracks on the left bank. Although the early design decisions and geotechnical studies helped to limit the geotechnical risk exposure, they could not eliminate the risk of as-found geotechnical conditions varying from expectations, which only became known once excavations and construction activities on the Project had begun.</p>
GR3	<p>Lesson GR3 reflects both the challenges and successes the Project achieved through development of a detailed geological model, which informed the evolving design requirements of the Project. The successes included the continuous data collection and iterative updates to the geotechnical model that ensured any design changes were based on the most current and accurate information. Unfortunately, the Project encountered challenges based on model results which then had to be mitigated and resulted in material impacts to the Project's budget and schedule.</p>
GR4	<p>Lesson GR4 primarily reflects the successes the Project achieved through early engagement of the Technical Advisory Board and other specialized independent external technical experts. These experts provided timely advice, both upfront and then through the construction of the Project, for addressing key geotechnical risks and assessing technical solutions to the geotechnical challenges.</p>
PG1, PG2 & PG3	<p>Lessons PG1, PG2, and PG3 primarily reflect the governance challenges the Project faced, as well as the two significant budget increases, due to the unprecedented size and complexity of the Project.</p> <p>While BC Hydro has a well-developed Project and Portfolio Management governance practice, the scale of the Site C Project required a higher level of project governance and oversight, independent review, external expert support, and regulatory oversight.</p> <p>BC Hydro, in consultation with the Government of B.C., engaged Ernst &amp; Young as the Independent Oversight Advisor in 2017. In 2018, the Site C Project Assurance Board was established, reporting to the BC Hydro Board of Directors, and replacing the previous Site C Project Board that had been functioning since 2013. In 2020, the Government of B.C. appointed a special advisor, Mr. Peter Milburn, to undertake an independent review of the Project. In 2021, the Commercial Sub-Committee of the Project Assurance Board was</p>

Lesson Learned	Discussion
	<p>created to provide more focussed Project oversight related to key construction, schedule, cost reporting, claims management, and other commercial matters.</p>
<p><b>PG4</b></p>	<p>Lesson PG4 primarily reflects the successes the Project achieved in developing and implementing successful processes, tools and reporting across the Project, providing governing bodies with effective and timely reporting. Some examples of these successful processes, tools, and reporting include: project dashboards developed across the major work fronts, monthly Project accountability meetings, and having key leadership roles based at site.</p>
<p><b>IC1 &amp; IC2</b></p>	<p>Lessons IC1 and IC2 primarily reflect the successes the Project achieved by engaging Indigenous Nations from an early stage in the Project and throughout the construction. Consultations with Indigenous Nations regarding the Project began in 2007 and continued over the entire lifecycle of the Project.</p>
<p><b>IC3</b></p>	<p>Lesson IC3 primarily reflects the successes the Project achieved in building support for Indigenous procurement opportunities.</p> <p>Building support for Indigenous procurement opportunities proved to be a valuable aspect of the Project's relationship with Indigenous Nations, and a way to provide economic benefits. Indigenous Nations were able to secure contracts and build capacity which enabled them to take on more complex work as construction progressed and bid on other non-BC Hydro work.</p>
<p><b>IC4</b></p>	<p>Lesson IC4 primarily reflects the successes the Project achieved by establishing training and employment opportunities for Indigenous workers in the Project's development and construction.</p> <p>Fostering awareness of Indigenous concerns created a supportive and respectful workplace. The Project took steps to establish training and employment opportunities for Indigenous workers early in Project development and construction.</p>
<p><b>CE1</b></p>	<p>Lesson CE1 primarily reflects the successes the Project achieved because of early, consistent, and continuous engagement with stakeholders.</p> <p>The Project's community engagement activities started during the environmental review process prior to construction and continued throughout the construction phase of the Project. These proactive efforts served to reduce the number of public complaints and concerns.</p>
<p><b>CE2</b></p>	<p>Lesson CE2 reflects the successes the Project achieved by adapting its organizational structures for stakeholder engagement to the evolving scale and duration of the Project.</p> <p>The Project's significant and complex scope, multiple construction areas, and long construction duration required dedicated community relations and social mitigation teams. A senior Communications Lead was part of the Project's Leadership Team which fostered strong collaboration across</p>

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Lesson Learned	Discussion
	<p>Project delivery groups and supported proactive stakeholder engagement, and enabled timely and effective resolution of issues.</p>
<p><b>CE3</b></p>	<p>Lesson CE3 primarily reflects the successes the Project achieved by adopting varied and responsive communication channels.</p> <p>The Project adapted to evolving communication trends, including the increased use of social media following the COVID-19 pandemic, while also maintaining other more traditional communication methods. The Regional Community Liaison Committee provided a forum for transparent communications and issues resolution with local communities.</p>
<p><b>CE4</b></p>	<p>Lesson CE4 primarily reflects the successes the Project achieved by using technology and tools to enhance stakeholder engagement.</p> <p>The Project implemented a Customer Relationship Management System that helped to coordinate responses and build a useful knowledge base. Digital media was also widely used across the Project to create exhibits to provide residents with updates and to address inquiries. This was especially effective during the COVID-19 pandemic when the Project was not able to accommodate site tours.</p>

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1.0 A. **LESSONS LEARNED**  
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**Lessons Learned Challenges and Successes**

1.1.2 For each of the 29 lessons learned, please clearly define both near-term and long-term actions and changes to internal processes as a result of the lesson. For each action or change identified, please identify: (i) the implementation timeline; (ii) the person(s) responsible for ensuring execution of said action; and (iii) how BC Hydro will measure the effectiveness of the action moving forward.

**RESPONSE:**

This response also answers BCUC Staff IR 1.1.2.1.

Please see Attachments 1 and 2 to this response. Since BC Hydro delivers projects via our Project and Portfolio Management framework, the responses explain how we will incorporate the lessons within that framework, where appropriate.

The table below summarizes the actions that BC Hydro has identified under each lesson and the status of their incorporation into the Project and Portfolio Management framework. Currently, 110 of 123 actions have been incorporated into the Project and Portfolio Management framework, largely because BC Hydro has been incorporating lessons from the Site C Project throughout the implementation of the project. For more discussion on how BC Hydro reviews lessons, incorporates them into the Project and Portfolio Management framework, and audits the framework for compliance, please refer to BC Hydro's response to BCUC Staff IRs 1.4.1, 1.4.2, and 1.4.6. When updates to the Project and Portfolio Management framework are made BC Hydro communicates the changes to the impacted users via several communication and training channels, including intranet website communication, monthly practice change notifications, monthly Project Management practice update meetings, and monthly lunch & learn sessions.

Lesson Learned	Summary of Actions			
	Total Actions	Implemented	Partially Implemented	Planned
CM1	2	2	0	0
CM2	4	2	1	1
CM3	4	4	0	0
CM4	12	12	0	0
CM5	5	5	0	0
CM6	11	10	1	0
RM1	3	3	0	0
RM2	3	3	0	0
RM3	3	3	0	0
RM4	3	3	0	0
RM5	2	2	0	0
RM6	2	1	0	1
RM7	3	3	0	0
GR1	2	2	0	0
GR2	2	2	0	0
GR3	6	6	0	0
GR4	4	4	0	0
PG1	5	0	4	1
PG2	2	0	1	1
PG3	3	2	1	0
PG4	3	3	0	0
IC1	7	7	0	0
IC2	4	4	0	0
IC3	5	4	1	0

Lesson Learned	Summary of Actions			
	Total Actions	Implemented	Partially Implemented	Planned
IC4	4	4	0	0
CE1	8	8	0	0
CE2	4	4	0	0
CE3	4	4	0	0
CE4	3	3	0	0
<b>Total</b>	<b>123</b>	<b>110</b>	<b>9</b>	<b>4</b>

With regards to measuring the effectiveness of actions, BC Hydro considers that improved outcomes will be the result of multiple actions and project factors, as they are inevitably interrelated. Accordingly, rather than attempting to isolate or measure impacts of specific actions, we will focus on improvement to overall outcomes such as improved planning, decision making and risk management. These outcomes will contribute to the on-time and on-budget performance of our portfolios of projects, which will continue to be measured and reported.

For the purposes of this response we have assigned applicability of the lessons learned into three categories of projects.

Large and Complex projects are defined as projects exceeding \$150 million. However, cost is not the only determining factor; this category may include projects of lesser value that are highly complex projects, requiring complicated integration, or introducing complex novel technology.

Medium-sized projects, which can be defined as projects between \$50 million and \$150 million. Similar to the previous category, cost is not the sole criterion; it can also encompass projects of lower value that possess some complexities.

Smaller projects, which are defined as projects costing less than \$50 million, are typically considered standard or routine system work.

## Attachment 1 to BCUC Staff IR 1.1.2

### Implementation Timeline

Near term – Fiscal 2027

Long term – Fiscal 2028 – Fiscal 2030

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## 01 – CONTRACT MANAGEMENT

<p><b>Subject Area and Lesson Number:</b>  <b>Contract Management, CM1</b></p>			
<p><b>Description of Lesson:</b>                  Establish criteria for evaluating consortium bidders on major contracts, with special consideration to their capacity and capability to ramp up delivery across all required work fronts.</p>			
<b>Actions</b>	<b>Responsible Role(s)</b>	<b>Implementation Timeline</b>	<b>Status</b>
<p><b>CM1.1:</b> Request consortium submissions to provide detailed experience on large projects in Canada or British Columbia</p>	<p>Procurement Practice Lead</p>	<p>Near Term</p>	<p><b>IMPLEMENTED:</b>                      If BC Hydro needs consortium bidding on BC Hydro work, we will leverage the lessons learned database information to trigger the request for detailed experience, including consideration for capacity and capability.</p>
<p><b>CM1.2:</b> Request a consortium integration plan as part of submission requirements to assess collaboration</p>	<p>Procurement Practice Lead</p>	<p>Near Term</p>	<p><b>IMPLEMENTED:</b>                      Collaboration assessments are part of the procurement process on applicable projects, for example West End Substation.                       If BC Hydro needs the use of a consortium integration plan, we will leverage the lessons learned database information for applicable projects.</p>
<p><b>Expected Outcomes</b></p> <ul style="list-style-type: none"> <li>Reduction in number of major contracts with consortium bidders that face capacity or capability challenges during the project life cycle.</li> </ul>			
<p><b>Impact on Projects underway and future:</b>                  All projects with consortiums will potentially be impacted because the identified lessons learned are included in the Lessons Learned database and are reviewed and applied throughout the project lifecycle.</p> <p><b>Applicability on Projects</b></p> <ul style="list-style-type: none"> <li><b>Large and Complex Projects: <i>Most likely</i></b>                      Consortiums are most likely to bid on major contracts for very large, complex projects and possibly large projects.</li> <li><b>Medium Projects: <i>Less Likely</i></b>                      It is less likely that consortiums will bid on medium projects given the size of contracts.</li> <li><b>Small Projects: <i>Not Applicable</i></b>                      It is not expected that a consortium will bid on smaller projects.</li> </ul>			

<b>Subject Area and Lesson Number:</b> Contract Management, CM2			
<b>Description of Lesson:</b> Assess and manage the impact of numerous work front interfaces among contractors to optimize performance and minimize potential claims.			
<b>Actions</b>	<b>Responsible Role(s)</b>	<b>Implementation Timeline</b>	<b>Status</b>
<b>CM2.1:</b> Standardize interim handover processes by consolidating walkdowns and using milestone handover memos to improve accountability.	Construction and Contract Management Practice Lead	Near Term	<b>PLANNED:</b> Included in the Fiscal 27 Project and Portfolio Management Practice Update enhancement plan.
<b>CM2.2:</b> Implement enhanced planning tools like laydown maps and GIS mapping and proactively manage handovers to prevent space conflicts and delays.	Construction and Contract Management Practice Lead	Near Term	<b>PARTIALLY IMPLEMENTED:</b> Enhanced planning tools and handover checklists are utilized where applicable as part of the Project and Portfolio Management Practice. Further enhancements for large and complex projects will be implemented as part of the Fiscal 27 Portfolio Management Practice Update enhancement plan.
<b>CM2.3:</b> Consider having BC Hydro as prime contractor in shared areas and adjust review periods based on complexity to ensure smooth operations and compliance.	Construction and Contract Management Practice Lead	Near Term	<b>IMPLEMENTED:</b> Prime Contractor assignment is part of Project and Portfolio Management practices. The recommendation for frequency of reviews depends on the number of interfaces.
<b>CM2.4:</b> Establish an escalation process for complex interface issues to enable timely and authoritative decision-making throughout the project lifecycle.	Construction and Contract Management Practice Lead	Near Term	<b>IMPLEMENTED:</b> Escalation processes are part of standard practice for complex interface issues on projects.

<p><b>Expected Outcomes</b></p> <ul style="list-style-type: none"> <li>Reduction of claims for projects with numerous work front interfaces among contractors.</li> </ul>
<p><b>Impact on Projects underway and future:</b></p> <p>All projects with numerous work front interfaces among contractors will potentially be impacted because the identified lessons learned are included in the Lessons Learned database and will be incorporated into the Portfolio and Project Management practices and reviewed and applied throughout the project lifecycle.</p> <p><b>Applicability on Projects</b></p> <ul style="list-style-type: none"> <li><b>Large and Complex Projects: <i>Most Likely</i></b> Numerous work front interfaces among contractors is most likely to occur on a large complex project where we have multiple work front contractors. For example, the North Coast Transmission Line Projects will implement these some of these actions.</li> <li><b>Medium Projects: <i>Likely</i></b> It is less likely to have several work front contractors or shared work areas on medium-sized projects.</li> <li><b>Small Projects: <i>Rarely</i></b> Smaller projects will rarely have multiple work front contractors on site.</li> </ul>

<p><b>Subject Area and Lesson Number:</b></p> <p>Contract Management, CM3</p>			
<p><b>Description of Lesson:</b></p> <p>Implement processes and involve senior leadership early to set expectations for timely assessment and resolution of contractor claims, avoiding significant cost claims at contract completion.</p>			
<b>Actions</b>	<b>Responsible Role(s)</b>	<b>Implementation Timeline</b>	<b>Status</b>
<p><b>CM3.1:</b> Integrate contract monitoring practices to ensure continuous alignment with project goals and resolve claims in a timely manner. This includes daily field reports, field instructions, change processes and amendments settlements to better manage complexity, reduce risk and align with evolving goals.</p>	<p>Construction &amp; Contract Management Practice Lead</p>	<p>Near Term</p>	<p><b>IMPLEMENTED:</b> Incorporated into Project and Portfolio Management Practice.  Scaled up based on the specific project needs.</p>

<p><b>CM3.2:</b> Ramp up contract and commercial management teams earlier in the project lifecycle, with representation on the project leadership team, to support claims administration and manage contractor relationships.</p>	<p>Construction &amp; Contract Management Practice Lead</p>	<p>Near Term</p>	<p><b>IMPLEMENTED:</b> Incorporated into the Project and Portfolio Management Practice.  Scaled up based on the specific project needs.</p>
<p><b>CM3.3:</b> Add strategic resources to support claims avoidance, such as dedicated labor relations and quality control personnel, and assign legal resources with project-specific expertise.</p>	<p>Construction &amp; Contract Management Practice Lead</p>	<p>Near Term</p>	<p><b>IMPLEMENTED:</b> Incorporated into the Project and Portfolio Management Practice.  Scaled up based on the specific project needs.</p>
<p><b>CM3.4:</b> Consider addressing claims as quickly as possible and not leaving them to the end of the project close-out. Consider seeking settlement, and release of disputes and claims up to the date of settlement, with limited exclusions remaining for the future.</p>	<p>Construction and Contract Management Practice Lead</p>	<p>Near Term</p>	<p><b>IMPLEMENTED:</b> This is incorporated into Project and Portfolio Management Practice.  Scaled up based on the specific project needs.</p>

**Expected Outcomes**

- Reduction in claims at contract completion caused by not assessing and resolving contractor claims in a timely manner.

**Impact on Projects underway and future:**

All large and medium projects will potentially be impacted because the identified lessons learned are incorporated into the Portfolio and Project Management practice, which are applied throughout the project lifecycle.

**Applicability on Projects:**

- **Large and Complex Projects: *More Likely***  
Implementing processes to avoid significant cost claims (in absolute value) at contract completion is more likely to occur on larger projects. For example, this would apply on the North Coast Transmission Line Projects Phases 1 and 2, which will assign a dedicated commercial manager and claims team within the Construction and Contract Management team to monitor contractor progress and manage claims.
- **Medium Projects: *Rarely***  
Medium-sized projects will rarely have the potential for significant cost claims (in absolute value) at the end of the contract. Standard Project & Portfolio Management practices and oversight are used to monitor timely claims processing.

- Small Projects: Not Applicable**  
 Smaller projects will not have the potential for significant cost claims (in absolute value), given their relatively small size. Standard Project & Portfolio Management practices and oversight are used to monitor timely claims processing.

<b>Subject Area and Lesson Number:</b> Contract Management, CM4			
<b>Description of Lesson:</b> Develop and provide project teams with the training, tools, and processes - including production tracking - to support consistent contract management across the scope and duration of the project.			
Actions	Responsible Role(s)	Implementation Timeline	Status
<b>CM4.1:</b> Prioritize early and ongoing training programs for contract management, document management systems, and reporting tools.	Construction & Contract Management Practice Lead	Near Term	IMPLEMENTED: Incorporated into our Project and Portfolio Management Practices.
<b>CM4.2:</b> Invest in mentorship and leadership development for junior staff to build long-term organizational resilience.	HR Business Partner	Near Term	IMPLEMENTED: Incorporated into our Project and Portfolio Management Practices.
<b>CM4.3:</b> Apply contract management best practices early in the project lifecycle, including clear roles, workflows, and templates for change management.	Construction & Contract Management Practice Lead	Near Term	IMPLEMENTED: Incorporated into our Project and Portfolio Management Practices.
<b>CM4.4:</b> Tailor training to different roles, focusing on contract interpretation, milestone tracking, interface coordination, and issue resolution.	Construction & Contract Management Practice Lead	Near Term	IMPLEMENTED: Incorporated into our Project and Portfolio Management Practices.

<p><b>CM4.5:</b> Provide digital tools such as GIS mapping, standardized handover memos, and production tracking dashboards to the prime contractor.</p>	<p>Construction &amp; Contract Management Practice Lead</p>	<p>Near Term</p>	<p><b>IMPLEMENTED</b>                  Incorporated into our Project and Portfolio Management Practices. Construction progress (Production tracking dashboards and other tools) are in use and applicable for large, complex projects.                  Digital tools and technologies are implemented (see CM4.9).                  A centralized team has been established to develop and maintain construction progress tracking on select projects such as the North Coast Transmission Line Projects Phase 1 and 2 and the Strathcona Discharge Upgrade project.</p>
<p><b>CM4.6:</b> Establish consistent documentation standards and escalation protocols for efficient and transparent decision-making.</p>	<p>Construction &amp; Contract Management Practice Lead</p>	<p>Near Term</p>	<p><b>IMPLEMENTED:</b>                  Incorporated into our Project and Portfolio Management Practices.</p>
<p><b>CM4.7:</b> Foster cross-collaboration among internal project delivery entities (e.g., Engineering) for alignment on contracts and claims management.</p>	<p>Construction &amp; Contract Management Practice Lead</p>	<p>Near Term</p>	<p><b>IMPLEMENTED:</b>                  Incorporated into our Project and Portfolio Management Practices.</p>
<p><b>CM4.8:</b> Ensure digital platform integration is well understood at project outset and detailed in contract terms where possible.</p>	<p>Document &amp; Records Management Practice Lead</p>	<p>Near Term</p>	<p><b>IMPLEMENTED:</b>                  Incorporated into our Project and Portfolio Management Practices through ongoing training, contractor onboarding, and digital reviews and approvals.</p>

<p><b>CM4.9:</b> Integrate digital tools and technologies (e.g., 3D modeling, drones, surveillance cameras) for project tracking and site monitoring.</p>	<p>Construction &amp; Contract Management Practice Lead</p>	<p>Near Term</p>	<p><b>IMPLEMENTED:</b> Some digital tools and technologies are currently implemented on work sites and select projects, such as Prince George to Terrace Capacitor Stations, Newell Substation, Strathcona Discharge Upgrade, and John Hart Seismic Upgrade Project. Others are planned for future projects where applicable such as the North Coast Transmission Line Projects and the West End Substation Project.</p>
<p><b>CM4.10:</b> Tailor contract templates to the complexity of the work to streamline processes and reduce inefficiencies.</p>	<p>Construction &amp; Contract Management Practice Lead</p>	<p>Near Term</p>	<p><b>IMPLEMENTED:</b> Incorporated into our standard form contracts and Contract Document Governance and Sustainment Committee.</p>
<p><b>CM4.11:</b> Consider contractor-specific Environmental Protection Plans where appropriate.</p>	<p>Environment Practice Lead</p>	<p>Near Term</p>	<p><b>IMPLEMENTED:</b> Incorporated into our Project and Portfolio Management Practices.</p>
<p><b>CM4.12:</b> Incorporate standard workforce reporting requirements for contractors at project start.</p>	<p>Construction &amp; Contract Management Practice Lead</p>	<p>Near Term</p>	<p><b>IMPLEMENTED:</b> Workforce reporting for contractors is in place for select projects and will be applied on North Coast Transmission Line Projects.</p>
<p><b>Expected Outcomes</b></p> <ul style="list-style-type: none"> <li>• Consistent contract management across multiple contracts within a project, such as training, tools, and processes including production tracking.</li> </ul>			
<p><b>Impact on Projects underway and future:</b></p> <p>All large and medium projects with multiple contractors will potentially be impacted because the identified lessons learned are incorporated into the Portfolio and Project Management practice, which are applied throughout the project lifecycle.</p>			

**Applicability on Projects:**

- Large and Complex Projects: *More Likely***  
 Training, tools, and processes, including production tracking, to support consistent contract management across multiple contractors is most relevant on large, multi-year projects. This will apply to the North Coast Transmission Line Projects, where we will utilize these production tracking digital tools.
- Medium Projects: *Unlikely***  
 Medium-sized projects are unlikely to require consistent contract management across multiple contractors to the level outlined in the Site C Lessons Learned. However, a scaled version of training, tools and processes may be used based on business needs.
- Small Projects: *Not Applicable***  
 Smaller projects will not require consistent contract management across multiple contractors to the level outlined in the Site C Lessons Learned.

**Subject Area and Lesson Number:**

**Contract Management, CM5**

**Description of Lesson:**

Establish and maintain an integrated project schedule across all contracts to evaluate schedule variances and changes across a large complex project.

Actions	Responsible Role(s)	Implementation Timeline	Status
<p><b>CM5.1:</b> Use an integrated site construction schedule during pre-construction to review major work activities for interdependencies and sequence them to clearly indicate the critical path.</p>	<p>Scheduling &amp; Cost Practice Lead</p>	<p>Near Term</p>	<p>IMPLEMENTED:                      Incorporated into our Project and Portfolio Management Practices.</p>
<p><b>CM5.2:</b> Merge individual contractor schedules into the Integrated Construction Schedule upon contract award for comprehensive site-wide analysis.</p>	<p>Scheduling &amp; Cost Practice Lead</p>	<p>Near Term</p>	<p>IMPLEMENTED:                      Incorporated into our Project and Portfolio Management Practices.</p>

<p><b>CM5.3:</b> Conduct schedule sensitivity analyses and updates for critical milestones and events, including the use of Schedule Risk Analysis for managing uncertainty.</p>	<p>Scheduling &amp; Cost Practice Lead</p>	<p>Near Term</p>	<p><b>IMPLEMENTED:</b> Incorporated into our Project and Portfolio Management Practices for all major projects, with increased focus on integrated cost and schedule risk analysis on our large capital projects.</p>
<p><b>CM5.4:</b> Perform regular quality assurance and control checks before establishing schedule baselines, including monthly reporting, lookahead reports, and variance analysis.</p>	<p>Scheduling &amp; Cost Practice Lead</p>	<p>Near Term</p>	<p><b>IMPLEMENTED:</b> Incorporated into our Project and Portfolio Management Practices.</p>
<p><b>CM5.5:</b> Require contractors to provide detailed, resource-loaded baseline schedules at contract start and ensure ongoing submission of compliant schedules throughout the project lifecycle.</p>	<p>Scheduling &amp; Cost Practice Lead</p>	<p>Near Term</p>	<p><b>IMPLEMENTED:</b> Incorporated into practices with enhanced schedule requirements and updated templates.</p>
<p><b>Expected Outcomes</b></p> <ul style="list-style-type: none"> <li>Reduction of project schedule delays caused by the lack of integrated project schedules for large complex projects.</li> </ul>			
<p><b>Impact on Projects underway and future:</b> All large and medium projects will potentially be impacted because the identified lessons learned are included in the Lessons Learned database and will be incorporated into the Portfolio and Project Management practices and reviewed and applied throughout the project lifecycle.</p> <p><b>Applicability on Projects:</b></p> <ul style="list-style-type: none"> <li><b>Large and Complex Projects: <i>More Likely</i></b> Integrated scheduling and robust schedule management are most relevant for large, complex projects with multiple contracts and interdependent work fronts. For example, the North Coast Transmission Line Projects will develop schedule requirements with our contractors and have the details to support an integrated site construction schedule.</li> <li><b>Medium Projects: <i>Unlikely</i></b> Medium-sized projects will unlikely use integrated schedules to the level outlined in the Site C lessons learned (the lessons learned is for large complex projects), but may use integrated schedules based on business need.</li> </ul>			

- **Small Projects: *Not Applicable***  
Smaller projects will not require the use of integrated schedules to the level outlined in the Site C lessons learned (the lessons learned is for large complex projects).

<b>Subject Area and Lesson Number:</b>			
Contract Management, CM6			
<b>Description of Lesson:</b>			
Establish processes early to support early and continuous engagement with contractors, facilitate early contractor and owner relationship expectations, and manage the relationship throughout the project lifecycle.			
<b>Actions</b>	<b>Responsible Role(s)</b>	<b>Implementation Timeline</b>	<b>Status</b>
<b>CM6.1:</b> Encourage early contractor involvement during the procurement process.	Construction & Contract Management Practice Lead	Near Term	<b>IMPLEMENTED:</b> Incorporated into our Project and Portfolio Management Practices. Early engagement is now part of the early Contractor Involvement phase and is applied to complex/high-risk projects.
<b>CM6.2:</b> Promote collaboration on aggregate, quarry, and materials management, monitoring, and planning during construction to avoid surprises and ensure materials are not depleted faster than expected.	Construction & Contract Management Practice Lead	Near Term	<b>PARTIALLY IMPLEMENTED:</b> Incorporated into of our Project and Portfolio Management Practices.  For large complex civil projects where BC Hydro owns the risk of materials quality and quantity, we will also implement a process for monitoring the depletion before additional sources are released for contractor use. Included in the Fiscal 27 Portfolio Management Practice Update enhancement plan.
<b>CM6.3:</b> Facilitate joint relationship-building sessions between owner and contractor teams to collaboratively meet safety, quality, and production targets.	Construction & Contract Management Practice Lead	Near Term	<b>IMPLEMENTED:</b> Incorporated into our practices on contract management. Relationship building between owner and contractor teams is in place and applied with a scaled approach to projects, with facilitated sessions applied as required.

<b>CM6.4:</b> Hold regular, in-person representative-to-representative meetings between contractor and project team to keep communication channels open, especially during challenges.	Construction & Contract Management Practice Lead	Near Term	<b>IMPLEMENTED:</b> Incorporated into our practices on contract management, engagement, and the contract changes approach.
<b>CM6.5:</b> Collaborate at contract start to jointly prepare and approve critical submittals, setting expectations early to avoid delays.	Construction & Contract Management Practice Lead	Near Term	<b>IMPLEMENTED:</b> Incorporated into our practices on contract management, engagement, and the contract changes approach.
<b>CM6.6:</b> Consider creating a Labour Committee to support collaboration between the project team and contractors, especially for large projects.	Construction & Contract Management Practice Lead	Near Term	<b>IMPLEMENTED:</b> Available in the Lessons learned database and will be applied selectively for large/complex projects.
<b>CM6.7:</b> Align project goals with contractor motivations to foster a cooperative environment and achieve shared objectives.	Construction & Contract Management Practice Lead	Near Term	<b>IMPLEMENTED:</b> Incorporated into our current contract management, engagement, and contract changes approach.  Furthermore, for select projects, such as West End Substation, collaborative coaching support is used to strengthen the collaboration amongst contractors and BC Hydro.
<b>CM6.8:</b> Prioritize relationship-building at project outset to establish trust and enable smoother project execution.	Construction & Contract Management Practice Lead	Near Term	<b>IMPLEMENTED:</b> Incorporated into our current contract management, engagement, and contract changes approach.
<b>CM6.9:</b> For partners delivering highways or other components, consider cooperative agreements for mutual benefit.	Construction & Contract Management Practice Lead	Near Term	<b>IMPLEMENTED:</b> Available in the lessons learned database.

<p><b>CM6.10:</b> Use financial instruments (e.g., performance incentives, advance payments) to manage contractor engagement and cash flow.</p>	<p>Construction &amp; Contract Management Practice Lead</p>	<p>Near Term</p>	<p><b>IMPLEMENTED:</b> Available in the lessons learned database. Applied as appropriate, based on project needs and contract type.</p>
<p><b>CM6.11:</b> Structure overhead payment line items to mirror work profile cashflow and reduce administrative burden.</p>	<p>Construction &amp; Contract Management Practice Lead</p>	<p>Near Term</p>	<p><b>IMPLEMENTED:</b> Available in the lessons learned database. Applied as appropriate, based on project needs and contract type.</p>
<p><b>Expected Outcomes</b></p> <ul style="list-style-type: none"> <li>• Strong relationships with contractors through processes to support early and continuous engagement with contractors throughout the life cycle.</li> </ul>			
<p><b>Impact on Projects Underway and future:</b> All large and medium projects will potentially be impacted because the identified lessons learned are included in the Lessons Learned database and will be incorporated into the Portfolio and Project Management practices and reviewed and applied throughout the project lifecycle.</p> <p><b>Applicability on Projects:</b></p> <ul style="list-style-type: none"> <li>• <b>Large and Complex Projects: <i>More Likely</i></b> Large and complex projects are more likely to benefit from early and continuous engagement with contractors with structured relationship-building and collaborative processes. For example, the John Hart Seismic Upgrade Project (please refer to Attachment 2) and the North Coast Transmission Line Projects are engaging in early relationship-building for contractor construction work.</li> <li>• <b>Medium Projects: <i>Unlikely</i></b> Medium-sized projects require strong contractor relationships and BC Hydro uses early contractor engagement and communication processes based on project needs but unlikely to the level as outlined in the lessons learned from Site C.</li> <li>• <b>Small Projects: <i>Not Applicable</i></b> Smaller projects typically also require strong contractor relationships and BC Hydro uses basis engagement and communication processes, but not to the level as outlined in the lessons learned from Site C.</li> </ul>			

## 02 – RISK MANAGEMENT

<p><b>Subject Area and Lesson Number:</b>  <a href="#">Risk Management, RM1</a></p>			
<p><b>Description of Lesson:</b>                  Consolidate and enhance risk registers to improve cost risk estimates and provide more consistent analysis.</p>			
<b>Actions</b>	<b>Responsible Role(s)</b>	<b>Implementation Timeline</b>	<b>Status</b>
<p><b>RM1.1:</b> Adopt a single and central Risk Register across the project.</p>	<p>Risk Management Practice Lead</p>	<p>Near Term</p>	<p><b>IMPLEMENTED:</b>                  Incorporated into our Project and Portfolio Management Practices. All project risks are tracked in a central register.</p>
<p><b>RM1.2:</b> Make the Risk Register available to all project team members.</p>	<p>Risk Management Practice Lead</p>	<p>Near Term</p>	<p><b>IMPLEMENTED:</b>                  Incorporated into our Project and Portfolio Management Practices. Risk Register access is provided via SharePoint or an equivalent platform.</p>
<p><b>RM1.3:</b> Ensure the Risk Register contains appropriate fields to support complete, transparent, and effective risk categorization, quantification, and reporting to governing bodies.</p>	<p>Risk Management Practice Lead</p>	<p>Near Term</p>	<p><b>IMPLEMENTED:</b>                  Incorporated into our Project and Portfolio Management Practices. Enhanced fields are in place to support enhanced reporting.</p>
<p><b>Expected Outcomes</b></p> <ul style="list-style-type: none"> <li>Each project has a single consolidated risk register.</li> </ul>			
<p><b>Impact on Projects underway and future:</b>                  All projects will be impacted because the identified lessons learned are incorporated into the Portfolio and Project Management practice, which are applied throughout the project lifecycle.</p> <p><b>Applicability on Projects:</b></p> <ul style="list-style-type: none"> <li><b>Large and Complex Projects: Fully Applicable</b>                  A single consolidated risk register is in place and accessible for all project team members on large complex projects. The use of the enhanced risk registers is more likely needed to manage higher complex projects with a large volume of risks, to support better decision-making and governance. For example, this would apply to the North Coast Transmission Line Projects, as described in BC Hydro's response to BCUC Staff IR 1.3.3. Please also refer to our</li> </ul>			

response to BCUC Staff IR 1.10.9, where we explain in more detail how we will use an enhanced risk management framework generally.

- Medium Projects: Fully Applicable**  
 A single consolidated risk register is in place and accessible for all project team members on medium projects. Medium projects may have the potential for the use of an enhanced risk register.
- Small Projects: Fully Applicable**  
 A single consolidated risk register is in place and accessible for all project team members on smaller projects.

<b>Subject Area and Lesson Number:</b> Risk Management, RM2			
<b>Description of Lesson:</b> For very large complex projects, implement cost risk analysis and schedule risk analysis processes that are complete and transparent and include effective methods to quantify risks.			
Actions	Responsible Role(s)	Implementation Timeline	Status
<b>RM2.1:</b> Implement Cost Risk Analysis and Schedule Risk Analysis processes that are complete, transparent, and include effective methods to quantify risks.	Risk Management Practice Lead	Near Term	<b>IMPLEMENTED:</b> Incorporated into our Project and Portfolio Management Practices. Will be applied based on a project's needs.
<b>RM2.2:</b> Ensure the Risk Register includes input and output information for Cost and Schedule Risk Analysis to increase traceability, efficiency, and consistency.	Risk Management Practice Lead	Near Term	<b>IMPLEMENTED:</b> Incorporated into our Project and Portfolio Management Practices. Enhanced fields were recently added to risk registers for use going forward.
<b>RM2.3:</b> If the project governance includes an Independent Oversight Advisor, the advisor should be included as part of these analyses to ensure independent review of the processes and to provide more effective governance and oversight.	Risk Management Practice Lead	Near Term	<b>IMPLEMENTED:</b> Available in the lessons learned database and will be applied based on a project's needs.

<p><b>Expected Outcomes</b></p> <ul style="list-style-type: none"> <li>For large and complex projects cost risk analysis and schedule risk analysis processes are established, and include effective methods to quantify risks.</li> </ul>
<p><b>Impact on Projects underway and future:</b></p> <p>All large and complex projects will potentially be impacted because the identified lessons learned are included in the Lessons Learned database or the Portfolio and Project Management practices and reviewed and applied throughout the project lifecycle.</p> <p><b>Applicability on Projects:</b></p> <ul style="list-style-type: none"> <li><b>Large and Complex Projects: <i>More Likely</i></b> Quantitative cost and schedule risk analyses are more likely to be used in managing project uncertainty and supporting decision-making in large, complex projects. For example, the John Hart Seismic Upgrade Project (refer to Attachment 2), and the North Coast Transmission Line Projects will complete this analysis and present it to decision-making committees for transparency. Ongoing analysis will be revised as necessary.</li> <li><b>Medium Projects: <i>Rarely</i></b> The Site C lesson learned is applicable to large and complex projects, medium-sized projects will rarely require this level of risk analysis. Standard Project &amp; Portfolio Management practices are used.</li> <li><b>Small Projects: <i>Not Applicable</i></b> The Site C lesson learned is applicable to large and complex projects, smaller projects will not require this level of risk analysis. Standard Project &amp; Portfolio Management practices are used.</li> </ul>

<p><b>Subject Area and Lesson Number:</b></p> <p>Risk Management, RM3</p>			
<p><b>Description of Lesson:</b></p> <p>Organize and size the project risk team for the complexity of the project and ensure it includes qualified resources with the appropriate knowledge, experience, and expertise.</p>			
Actions	Responsible Role(s)	Implementation Timeline	Status
<p><b>RM3.1:</b> Assess the project's size, complexity, and risk management requirements during early project planning.</p>	<p>Risk Management Practice Lead</p>	<p>Near Term</p>	<p>IMPLEMENTED: Incorporated into our Project and Portfolio Management Practices.  Ongoing for all major projects.</p>

<p><b>RM3.2:</b> Ensure sufficient, qualified risk management resources are available, including Risk Owners, Risk Delegates, and centralized Risk Management Team members.</p>	<p>Risk Management Practice Lead</p>	<p>Near Term</p>	<p><b>IMPLEMENTED:</b> Incorporated into our Project and Portfolio Management Practices.  Scalable effort based on project size and complexity.</p>
<p><b>RM3.3:</b> Implement effective Project and Portfolio Management risk management processes, procedures, and supporting systems, scaled to the needs of the project, and consider establishing a Project Risk Committee.</p>	<p>Risk Management Practice Lead</p>	<p>Near Term</p>	<p><b>IMPLEMENTED:</b> Incorporated into our Project and Portfolio Management Practices.  Documented a scalable effort based on project complexity and enhanced risk management framework from the Site C Project, including establishing additional governance and oversight, which will be applied based on a project's needs.</p>
<p><b>Expected Outcomes</b></p> <ul style="list-style-type: none"> <li>• Risk management structure and team setup appropriately to project size and complexity, staffed with qualified personnel.</li> </ul>			
<p><b>Impact on Projects underway and future:</b> All projects with a dedicated risk management team will potentially be impacted because the identified lessons learned are incorporated into the Portfolio and Project Management practice, which are applied throughout the project lifecycle.</p> <p><b>Applicability on Projects:</b></p> <ul style="list-style-type: none"> <li>• <b>Large and Complex Projects: <i>More Likely</i></b> These actions are most relevant for very large, complex projects where dedicated and qualified risk management resources are essential for managing the volume and complexity of risks. For example, the North Coast Transmission Line Projects intend to apply this, as further described in BC Hydro's response to BCUC Staff IR 1.11.02.</li> <li>• <b>Medium Projects: <i>Not Applicable</i></b> Medium-sized projects will not have a dedicated risk management team. Standard Project and Portfolio management practices and teams will be leveraged.</li> <li>• <b>Small Projects: <i>Not Applicable</i></b> Smaller projects will not have a dedicated risk management team. Standard Project and Portfolio management practices and teams will be leveraged.</li> </ul>			

<p><b>Subject Area and Lesson Number:</b>  <b>Risk Management, RM4</b></p>			
<p><b>Description of Lesson:</b>                  Ensure risk reporting is clear and timely and provides early visibility to the potential for low-probability, high-consequence events.</p>			
<b>Actions</b>	<b>Responsible Role(s)</b>	<b>Implementation Timeline</b>	<b>Status</b>
<p><b>RM4.1:</b> Provide clear and timely project risk reporting that offers a broad view of risks while limiting the number presented to governing bodies to a manageable level.</p>	<p>Risk Management Practice Lead</p>	<p>Near Term</p>	<p>IMPLEMENTED:                      Incorporated into our Project and Portfolio Management Practices.                      Regular risk reporting is in place.</p>
<p><b>RM4.2:</b> Improve risk reporting to provide early visibility into low-probability, high-impact events.</p>	<p>Risk Management Practice Lead</p>	<p>Near Term</p>	<p>IMPLEMENTED:                      Incorporated into our Project and Portfolio Management Practices.                      Enhancements include increased reporting to governing bodies on low-probability, high-consequence events.</p>
<p><b>RM4.3:</b> Report risks based on both objective criteria (e.g., cost, risk level) and subjective criteria (e.g., likelihood of becoming a major risk).</p>	<p>Risk Management Practice Lead</p>	<p>Near Term</p>	<p>IMPLEMENTED:                      Incorporated into our Project and Portfolio Management Practices.                      Reporting on risks is based on objective criteria per the Risk practice guidelines and Risk Zones and has flexibility for subjective reporting as needed.</p>
<p><b>Expected Outcomes</b></p> <ul style="list-style-type: none"> <li>• Risk reporting on low probability, high impact events will be communicated to governing bodies on a timely basis.</li> </ul>			
<p><b>Impact on Projects underway and future:</b>                  All projects will potentially be impacted because the identified lessons learned are incorporated into the Portfolio and Project Management practice, which are applied throughout the project lifecycle.</p>			

**Applicability on Projects:**

- Large and Complex Projects: Fully Applicable**  
 Clear and timely risk reporting for managing complex risk profiles and ensuring leadership is aware of emerging threats is more relevant to large and complex projects. For example, North Coast Transmission Line Projects will apply this as further described in BC Hydro’s response to BCUC Staff IR 1.12.03.
- Medium Projects: Fully Applicable**  
 Medium-sized projects will require risk reporting of low-probability, high-impact events to governing bodies as per the standard Project & Portfolio Management practices.
- Small Projects: Fully Applicable**  
 Smaller projects will require risk reporting of low-probability, high-impact events to governing bodies as per the standard Project & Portfolio Management practices.

**Subject Area and Lesson Number:**

Risk Management, RM5

**Description of Lesson:**

Ensure project governing bodies are aware of the low-probability, high-consequence risks for the project, and that they fully understand budget and schedule impacts if these risks materialize.

Actions	Responsible Role(s)	Implementation Timeline	Status
<p><b>RM5.1:</b> Inform project governing bodies of any low-probability, high-consequence risks listed in the Risk Register</p>	<p>Risk Management Practice Lead</p>	<p>Near Term</p>	<p>IMPLEMENTED                      Incorporated into our Project and Portfolio management regular reporting.</p>
<p><b>RM5.2:</b> Clarify to project governing bodies that while risks are recorded in the Risk Register, their full cost and schedule impacts—should they materialize—are not included in the approved project budget or schedule.</p>	<p>Risk Management Practice Lead</p>	<p>Near Term</p>	<p>IMPLEMENTED:                      Incorporated into our Project and Portfolio Management Practices.                       Included in risk reporting are the most critical risks to capture. Risks that are not included in the cost and schedule impact analysis are only reported based on project governing requests.</p>

**Expected Outcomes**

- Governing bodies fully understand budget and schedule impacts of the low-probability, high-consequence risks.

**Impact on Projects underway and future:**

All large and complex projects will potentially be impacted because the identified lessons learned are incorporated into the Portfolio and Project Management practice, which are applied throughout the project lifecycle.

**Applicability on Projects:**

- Large and Complex Projects: *Fully Applicable***  
 Governing bodies for large, complex, or novel projects understand the cost and schedule implications of low-probability, high-consequence risks for informed decision-making and contingency planning. For example, North Coast Transmission Line Projects Phase 1 and 2 will apply this as further described in BCUC Staff IR 1.12.03.
- Medium Projects: *Less Likely***  
 Medium-sized projects are unlikely to require the budget and schedule risk analysis and reporting of low probability high impact risk events, but it may be provided based on the business needs.
- Small Projects: *Not Applicable***  
 Smaller projects will not require the budget and schedule risk analysis and reporting of low probability high impact risk events, given the small project size.

**Subject Area and Lesson Number:**

Risk Management, RM6

**Description of Lesson:**

Capitalize on knowledge and expertise developed through large complex projects to strengthen future project delivery.

Actions	Responsible Role(s)	Implementation Timeline	Status
<p><b>RM6.1</b> Ensure that future major capital projects capitalize on the enhanced knowledge, skills, and experience of BC Hydro resources, as well as consultants and contractors.</p>	<p>Risk Management Practice Lead and Project Management Practice Lead</p>	<p>Near Term</p>	<p>IMPLEMENTED: Available through the Lessons Learned database and using input from experienced resources. For example, as of today, we have incorporated 293 Site C resources into BC Hydro teams, with another 129 remaining as they roll off the project, for a total of 422. These resources will be leveraged for other major capital projects.</p> <p>Resource skills strategy is determined on a project-by-project basis and based on identified needs.</p>

<p><b>RM6.2:</b> Ensure that future projects draw on more knowledgeable and experienced consultants and contractors when external resources are required, particularly during peak workload periods.</p>	<p>Risk Management Practice Lead and Project Management Practice Lead</p>	<p>Near Term</p>	<p><b>PLANNED:</b> Practice updates included in the Fiscal 27 Portfolio Management Practice Update enhancement plan in either Risk Management or Project Management will include a prompt for consideration to engage with knowledgeable external contractors and resources with novel or new technology.  For example, knowledgeable external contractors and resources are engaged on projects, such as engineering consultants for the delivery of the Battery Energy storage projects.</p>
<p><b>Expected Outcomes</b></p> <ul style="list-style-type: none"> <li>Retention of knowledge and expertise developed through large complex projects to strengthen future project delivery.</li> </ul>			
<p><b>Impact on Projects underway and future:</b> All projects will potentially be impacted because the identified lessons learned are included in the Lessons Learned database or the Portfolio and Project Management practices and reviewed and applied throughout the project lifecycle.</p> <p><b>Applicability on Projects:</b></p> <ul style="list-style-type: none"> <li><b>Large and Complex Projects: <i>Fully Applicable</i></b> Large and complex projects are more likely to benefit from structured organizational learning, and knowledge transfer from other previous large and complex projects, as well as timely access to experienced resources. For example, John Hart Seismic Upgrade Project leveraged Site C and other major completed generation projects' resource knowledge for design and planning purposes. The North Coast Transmission Line Projects utilized resources that possess the necessary knowledge and experience from Site C and other major completed lines projects. Additionally, lessons learned review sessions are held to support knowledge transfer between projects.</li> <li><b>Medium Projects: <i>Applicable</i></b> Medium projects are unlikely to require this level of knowledge transfer, but they will leverage lessons learned from the database and Project and Portfolio Management practices, which will inherently include the knowledge and expertise from Site C.</li> <li><b>Small Projects: <i>Applicable</i></b> Smaller projects are unlikely to require this level of knowledge transfer, but they will leverage lessons learned from the database and Project and Portfolio Management practices, which will inherently include the knowledge and expertise from Site C.</li> </ul>			

<p><b>Subject Area and Lesson Number:</b>  <a href="#">Risk Management, RM7</a></p>			
<p><b>Description of Lesson:</b>                  Implement effective early project planning to mitigate or reduce project cost and schedule impacts.</p>			
<b>Actions</b>	<b>Responsible Role(s)</b>	<b>Implementation Timeline</b>	<b>Status</b>
<p><b>RM7.1:</b> Provide effective safety training and clear, detailed safety procedures to mitigate safety risks.</p>	<p>Construction &amp; Contract Management Practice Lead</p>	<p>Near Term</p>	<p><b>IMPLEMENTED:</b>                  Incorporated into our Project and Portfolio Management Practices.                  Ongoing for all projects.</p>
<p><b>RM7.2:</b> Consider if BC Hydro should take the role as Prime Contractor to manage complex interfaces in work areas that include several contractors.</p>	<p>Construction &amp; Contract Management Practice Lead</p>	<p>Near Term</p>	<p><b>IMPLEMENTED:</b>                  Incorporated into our Project and Portfolio Management Practices.                  Determined during project planning and will be applied based on a project's needs.</p>
<p><b>RM7.3:</b> Develop clear guidelines and plan early for NERC requirements in the delivery of work.</p>	<p>Project Governance Practice Lead</p>	<p>Near Term</p>	<p><b>IMPLEMENTED:</b>                  Incorporated into our Project and Portfolio Management Practices.                  Incorporated into project planning and compliance processes, with the current revision implemented in 2021.</p>
<p><b>Expected Outcomes</b></p> <ul style="list-style-type: none"> <li>Minimal impacts to cost and schedule resulting from lack of early planning in regard to Safety, Prime Contracting, and Mandatory Reliability Standards requirements.</li> </ul>			
<p><b>Impact on Projects underway and future:</b>                  All projects will be impacted because the identified lessons learned are incorporated into the Portfolio and Project Management practice, which are applied throughout the project lifecycle.</p> <p><b>Applicability on Projects:</b></p> <ul style="list-style-type: none"> <li><b>Large and Complex Projects: Fully Applicable</b>                  The standard Project and Portfolio Management framework has practice, processes and training to address safety, Prime Contractor, and Mandatory Reliability Standards compliance requirements as part of early planning to avoid cost and schedule impacts.</li> </ul>			

- **Medium Projects: *Fully Applicable***  
The standard Project and Portfolio Management framework has practice, processes and training to address safety, Prime Contractor, and Mandatory Reliability Standards compliance requirements as part of early planning to avoid cost and schedule impacts.
- **Small Projects: *Fully Applicable***  
The standard Project and Portfolio Management framework has practice, processes and training to address safety, Prime Contractor, and Mandatory Reliability Standards compliance requirements as part of early planning to avoid cost and schedule impacts.

## 03 – GEOTECHNICAL RISK

<p><b>Subject Area and Lesson Number:</b>  <b>Geotechnical Risk, GR1</b></p>			
<p><b>Description of Lesson:</b>                  Identify and engage geotechnical experts early, particularly on complex issues, and maintain their involvement throughout design and major change processes.</p>			
Actions	Responsible Role(s)	Implementation Timeline	Status
<p><b>GR1.1:</b> Engage geotechnical experts early, long before construction starts.</p>	<p>Design Practice Lead</p>	<p>Near Term</p>	<p><b>IMPLEMENTED:</b>                  Incorporated into our Project and Portfolio Management Practices.</p> <p>PPM Lessons Learned will be available for future projects where this level of geotechnical expertise is required. PPM Lessons learned are reviewed by the technical discipline teams.</p>
<p><b>GR1.2:</b> Ensure that experts have relevant experience with the geology of the site.</p>	<p>Design Practice Lead</p>	<p>Near Term</p>	<p><b>IMPLEMENTED:</b>                  Incorporated into our Project and Portfolio Management Practices. Applied during consultant selection and project planning.</p> <p>PPM Lessons Learned will be available for future projects where this level of geotechnical expertise is required. PPM Lessons learned are reviewed by the technical discipline teams.</p>
<p><b>Expected Outcomes</b></p> <ul style="list-style-type: none"> <li>Projects with a geotechnical component have early engagement of geotechnical experts and maintain their involvement throughout design and major change processes.</li> </ul>			

**Impact on Projects underway and future:**

All projects with a geotechnical component will potentially be impacted because the identified lessons learned are included in the Lessons Learned database or the Portfolio and Project Management practices and reviewed and applied throughout the project lifecycle.

**Applicability on Projects:**

- **Large and Complex Projects: *More Likely***  
Early and continuous involvement of geotechnical experts is critical for managing complex ground conditions and reducing risk in large, complex infrastructure projects with a geotechnical component. For example, the John Hart Seismic Upgrade Project (refer to Attachment 2) and the North Coast Transmission Line Projects (refer to BC Hydro’s response to BCUC Staff IR 1.16.3), initiated early engagement with geotechnical expertise to identify areas of concern and mitigate issues throughout the project.
- **Medium Projects: *Less Likely***  
Medium-sized projects with geotechnical risks may initiate early geotechnical input and maintain their involvement throughout design and major change processes, based on the business needs.
- **Small Projects: *Unlikely***  
Smaller projects are unlikely require this level of early geotechnical input, but will still engage geotechnical expertise before construction begins based on business needs.

**Subject Area and Lesson Number:**

Geotechnical Risk, GR2

**Description of Lesson:**

Conduct thorough investigations to inform design considerations early and to frame baseline information.

Actions	Responsible Role(s)	Implementation Timeline	Status
<p><b>GR2.1:</b> Complete comprehensive studies and site investigations long before design and construction start to allow development of a detailed geological model.</p>	<p>Design Practice Lead</p>	<p>Near Term</p>	<p><b>IMPLEMENTED:</b> Incorporated into our Project and Portfolio Management Practices.  Will be applied based on a project's geotechnical needs.  PPM Lessons Learned will be available for future projects where this level of geotechnical expertise is required. PPM Lessons learned are reviewed by the technical discipline teams.</p>

<p><b>GR2.2:</b> Consider a wide variety of investigation types to ensure all relevant geotechnical risks are identified and understood.</p>	<p>Design Practice Lead</p>	<p>Near Term</p>	<p><b>IMPLEMENTED:</b>                  Incorporated into our Project and Portfolio Management Practices.                  Will be applied based on a project's geotechnical needs.                  PPM Lessons Learned will be available for future projects where this level of geotechnical expertise is required. PPM Lessons learned are reviewed by the technical discipline teams.</p>
<p><b>Expected Outcomes</b></p> <ul style="list-style-type: none"> <li>• Early completion of diverse geological investigations to frame baseline information.</li> </ul>			
<p><b>Impact on Projects underway and future:</b>                  All projects with a geotechnical component will potentially be impacted because the identified lessons learned are included in the Lessons Learned database or the Portfolio and Project Management practices and reviewed and applied throughout the project lifecycle.</p> <p><b>Applicability on Projects:</b></p> <ul style="list-style-type: none"> <li>• <b>Large and Complex Projects: <i>More Likely</i></b>                      Early and diverse geotechnical investigations to identify and develop risk mitigation measures for geotechnical risks. The John Hart Seismic Upgrade Project has implemented this lesson; refer to Attachment 2. The North Coast Transmission Line Projects have completed investigations and incorporated early geotechnical analysis into the structural decision-making analysis for route selection.</li> <li>• <b>Medium Projects: <i>Less Likely</i></b>                      Medium-sized projects with geotechnical risks may apply scaled geotechnical investigations to support risk identification and implementation of mitigation measures.</li> <li>• <b>Small Projects: <i>Unlikely</i></b>                      Small projects are unlikely to require this level of geotechnical investigation.</li> </ul>			

<b>Subject Area and Lesson Number:</b> <b>Geotechnical Risk, GR3</b>			
<b>Description of Lesson:</b> Develop robust geotechnical models to evaluate performance and proactively support required enhancements.			
<b>Actions</b>	<b>Responsible Role(s)</b>	<b>Implementation Timeline</b>	<b>Status</b>
<b>GR3.1:</b> Use a detailed geological model to develop the layout and design based on the known geotechnical conditions, and to minimize geotechnical risks to the project.	Design Practice Lead	Near Term	<b>IMPLEMENTED:</b> Incorporated into our Project and Portfolio Management Practices. Will be applied based on a project's geotechnical needs.
<b>GR3.2:</b> Install extensive instrumentation prior to and during construction to monitor geotechnical conditions and complete geological mapping during excavations to update and validate the geotechnical model.	Design Practice Lead	Near Term	<b>IMPLEMENTED:</b> Incorporated into our Project and Portfolio Management Practices. Will be applied based on a project's geotechnical needs.
<b>GR3.3:</b> Ensure a variety of instrumentation is used (e.g., inclinometers, extensometers, piezometers) to provide data on bedding plane movement, relaxation joints, and water pressure.	Design Practice Lead	Near Term	<b>IMPLEMENTED:</b> Incorporated into our Project and Portfolio Management Practices. Will be applied based on a project's geotechnical needs.
<b>GR3.4:</b> Use information obtained from instrumentation and geological mapping to update and validate the geotechnical model over the life of the project.	Design Practice Lead	Near Term	<b>IMPLEMENTED:</b> Incorporated into our Project and Portfolio Management Practices. Will be applied based on a project's geotechnical needs.

<p><b>GR3.5:</b> Identify interfaces and impacts on design and construction resulting from evolving geotechnical model updates.</p>	<p>Design Practice Lead</p>	<p>Near Term</p>	<p><b>IMPLEMENTED:</b> Incorporated into our Project and Portfolio Management Practices. Will be applied based on a project's geotechnical needs.</p>
<p><b>GR3.6:</b> Allow sufficient time for consultation with Indigenous Nations and stakeholders on construction impacts that arise from changes in the geotechnical model.</p>	<p>Indigenous Relations Lead</p>	<p>Near Term</p>	<p><b>IMPLEMENTED:</b> Incorporated into our Project and Portfolio Management Practices. Will be applied based on a project's needs.</p>
<p><b>Expected Outcomes</b></p> <ul style="list-style-type: none"> <li>Geotechnical designs will account for identified geotechnical conditions based on detailed geological mapping and modelling, including installation and monitoring of instrumentation throughout the project lifecycle.</li> </ul>			
<p><b>Impact on Projects underway and future:</b></p> <p>All projects that have complex geotechnical risks will potentially be impacted because the identified lessons learned are incorporated into the Portfolio and Project Management practice, which are applied throughout the project lifecycle.</p> <p><b>Applicability on Projects:</b></p> <ul style="list-style-type: none"> <li><b>Large and Complex Projects: <i>More Likely</i></b> Robust geotechnical models, instrumentation, and ongoing monitoring are more likely required for large, complex infrastructure projects with higher geotechnical risks. For example, this would apply to the John Hart Seismic Upgrade Project; refer to Attachment 2. The North Coast Transmission Line Projects are also using monitoring tools at specific locations identified as higher geotechnical risk areas. La Joie Dam improvement project has also developed a detailed geological model in the early Identification phase.</li> <li><b>Medium Projects: <i>Less Likely</i></b> Medium projects are less likely to require this level of modelling but may benefit from scaled-down instrumentation to mitigate moderate geotechnical risks based on business needs.</li> <li><b>Small Projects: <i>Rarely</i></b> Smaller projects typically do not have complex geotechnical risks that require this level of modelling.</li> </ul>			

<b>Subject Area and Lesson Number:</b>			
Geotechnical Risk, GR4			
<b>Description of Lesson:</b>			
Foster communication and collaboration with the Technical Advisory Board, engineering, geotechnical specialists, and contractors.			
<b>Actions</b>	<b>Responsible Role(s)</b>	<b>Implementation Timeline</b>	<b>Status</b>
<b>GR4.1:</b> Establish agreements with engineering consulting firms and contractors to source additional geotechnical resources when required.	Project Governance Practice Lead	Near Term	<p><b>IMPLEMENTED:</b> BC Hydro has Master Services Agreements with several established consultants and contractors, including both parties referenced in the Site C Lessons Learned report: the Master Services Agreement with Klohn Crippen Berger was executed in 2015 and the Master Service Agreement with Atkins Realis was renewed in 2024.</p> <p>BC Hydro also maintains knowledge of geotechnical experts in Canada and worldwide through membership and participation in relevant industry organizations such as the Canadian Dam Association and the International Committee on Large Dams.</p>
<b>GR4.2:</b> Include individuals with geotechnical expertise in key project governance and oversight roles.	Project Governance Practice Lead	Near Term	<p><b>IMPLEMENTED</b> The scope of PPM does not include governance of Technical Advisory Boards. BC Hydro will reference the Dam Safety Program materials to determine needs. Please refer to BC Hydro's response to BCUC Staff IR 1.16.2 where we explain when a Technical Advisory Board is appointed.</p>
<b>GR4.3:</b> Create visualization tools (e.g., dashboards, models, diagrams) to support communication of geotechnical information.	Project Governance Practice Lead and Design Practice Lead	Near Term	<p><b>IMPLEMENTED</b> The Design Procedure 'Managing Geotechnical Risks in BC Hydro Projects' includes discussion on the Communication &amp; Assessment of Geotechnical Risks, including reference to use of certain risk analysis techniques as visualization tools.</p>

<p><b>GR4.4:</b> Create a governance structure that allows the Technical Advisory Board to present directly to governing bodies.</p>	<p>Project Governance Lead / TAB Chair</p>	<p>Near Term</p>	<p><b>IMPLEMENTED</b>                  The scope of PPM does not include governance of Technical Advisory Boards. BC Hydro will reference the Dam Safety Program materials to determine needs.</p> <p>Under Dam Safety Program Materials, Technical Advisory Boards are assigned by and report to the Director of Dam Safety. The Director of Dam Safety is not a member of the engineering design team.</p>
<p><b>Expected Outcomes</b></p> <ul style="list-style-type: none"> <li>• Strong communication and collaboration with the Technical Advisory Board, engineering, geotechnical specialists, and contractors.</li> </ul>			
<p><b>Impact on Projects underway and future:</b>                  Only large, complex, Dam Safety projects will potentially be impacted because the identified lessons learned are incorporated into the Portfolio and Project Management practice, which are applied throughout the project lifecycle.</p> <p><b>Applicability on Projects:</b></p> <ul style="list-style-type: none"> <li>• <b>Large and Complex Projects: <i>More Likely</i></b>                      The lessons learned actions are most relevant for very large, complex Dam Safety projects. Please refer to BC Hydro’s response to BCUC Staff IR 1.16.2 where we explain when a Technical Advisory Board is appointed.</li> <li>• <b>Medium Projects: <i>Not Applicable</i></b>                      Medium-sized projects will not require a dedicated Technical Advisory Board and/or independent oversight advisors.</li> <li>• <b>Small Projects: <i>Not Applicable</i></b>                      Smaller projects will not require a dedicated Technical Advisory Board and/or independent oversight advisors.</li> </ul>			

## 04 – PROJECT GOVERNANCE

<b>Subject Area and Lesson Number:</b>			
Project Governance, PG1			
<b>Description of Lesson:</b>			
Evaluate project complexity and risk early, and for large, complex projects consider establishing an independent Project Board with highly skilled members whose skills align with project needs.			
<b>Actions</b>	<b>Responsible Role(s)</b>	<b>Implementation Timeline</b>	<b>Status</b>
<b>PG1.1:</b> Create a skills matrix early in the project life cycle that identifies the key skills needed on the Project Board (e.g., construction, engineering, commercial, safety, environmental, Indigenous Nations, community engagement).	Project Governance Lead	Near Term	<p><b>PARTIALLY IMPLEMENTED</b></p> <p>The Project Governance Practice identifies that some individual high cost/risk projects may trigger the assignment of a Project Board that operates at a strategic level and offers advice and direction to the project team. This will be applied based on a project's needs.</p> <p>The Project Governance Practice updates are included in the Fiscal 27 Portfolio Management Practice Update enhancement to include guidance on the development of a skills matrix to identify key skills required to support Project Board recruitment, as well as access to internal/external advisors.</p>
<b>PG1.2:</b> Assess the time required for governing bodies to complete due diligence and review governance materials. Consider establishing a dedicated Project Board that has sufficient time and focus to fully understand the project scope, issues, and potential solution.	Project Governance Lead	Near Term	<p><b>PARTIALLY IMPLEMENTED</b></p> <p>Refer to PG.1.1 response above</p>

<p><b>PG1.3:</b> Ensure the project governing bodies include members who have the skills, knowledge, and experience identified in the skills matrix. Consider forming a dedicated Project Board with internal and/or external members who are independent from other governing bodies where possible.</p>	<p>Project Governance Lead</p>	<p>Near Term</p>	<p>PARTIALLY IMPLEMENTED Refer to PG.1.1 response above</p>
<p><b>PG1.4:</b> Ensure the governing bodies have access to independent internal and external advisors who can offer expert advice as the project moves through construction or when specialized expertise is required to address complex issues.</p>	<p>Project Governance Lead</p>	<p>Near Term</p>	<p>PARTIALLY IMPLEMENTED Refer to PG.1.1 response above</p>
<p><b>PG1.5:</b> Engage an independent oversight advisor for large and complex projects if it would be beneficial. Ensure this advisor reports to the most appropriate governing body and develop a detailed Terms of Reference or Statement of Work outlining their responsibilities and required expertise.</p>	<p>Project Governance Lead</p>	<p>Near Term</p>	<p>PLANNED The Project Governance Practice updates are included in the Fiscal 27 Portfolio Management Practice Update enhancement plan and will be revised to include guidance on the consideration of independent oversight advisors, including developing detailed Terms of Reference or Statement of Work for their roles, responsibilities, and required expertise.</p>
<p><b>Expected Outcomes</b></p> <ul style="list-style-type: none"> <li>For very large, complex projects with high-level risk, an independent Project Board with highly skilled members is established based on business needs.</li> </ul>			
<p><b>Impact on Projects underway and future:</b></p> <p>Only very large, complex, or novel projects will potentially be impacted because the identified lessons learned are included in the Lessons Learned database and will be incorporated into the Portfolio and Project Management practices and reviewed and applied throughout the project lifecycle.</p>			

**Applicability on Projects:**

- **Large and Complex Projects: *Less Likely***  
Only for very large and complex projects, such as Site C and North Coast Transmission Line, we would consider a dedicated Project Board. For example, a North Coast Transmission Sub-Committee, a sub-committee to the Capital Projects and Programs Committee of the BC Hydro Board of Directors has been established, which provides dedicated governance for the North Coast Transmission Lines Projects portfolio and includes internal and external members with linear project expertise. Please refer to BC Hydro’s response to BCUC Staff IR 1.17.7 for more details.
- **Medium Projects: *Not Applicable***  
Medium-sized projects will not have dedicated Project Boards.
- **Small Projects: *Not Applicable***  
Smaller projects will not have dedicated Project Boards.

**Subject Area and Lesson Number:**

[Project Governance, PG2](#)

**Description of Lesson:**

Establish governance sub committees and engage special advisors or experts to supplement governing bodies’ knowledge and experience.

Actions	Responsible Role(s)	Implementation Timeline	Status
<p><b>PG2.1:</b> Engage external advisors, as required, to provide governing bodies with technical knowledge, expertise, guidance, and advice on complex or technical issues.</p>	<p>Project Governance Practice Lead</p>	<p>Near Term</p>	<p>PLANNED: Project Governance Practice updates are included in the Fiscal 27 Portfolio Management Practice Update enhancement plan to include governing bodies' considerations, including engaging external advisors when required, and will be applied based on a project's needs.</p>
<p><b>PG2.2:</b> Create governance sub committees during critical project phases, ensuring members have the required skills and knowledge to support effective and efficient governance and oversight.</p>	<p>Project Governance Practice Lead</p>	<p>Near Term</p>	<p>PARTIALLY IMPLEMENTED Refer to PG.1.1 response above.</p>

<p><b>Expected Outcomes</b></p> <ul style="list-style-type: none"> <li>• Governance sub-committee and special advisors to support governance bodies are established based on business needs.</li> </ul>
<p><b>Impact on Projects underway and future:</b></p> <p>Only very large, complex, or novel projects will potentially be impacted because the identified lessons learned are included in the Lessons Learned database and will be incorporated into the Portfolio and Project Management practices and reviewed and applied throughout the project lifecycle.</p> <p><b>Applicability on Projects:</b></p> <ul style="list-style-type: none"> <li>• <b>Large and Complex Projects: <i>Likely</i></b> Only on very large and complex projects, such as Site C and North Coast Transmission Line Projects, would we consider establishing governance sub-committees. For example, North Coast Transmission Line Projects will be supported by the North Coast Transmission Sub-Committee, a sub-committee to the Capital Projects and Programs Committee of the BC Hydro Board of Directors, as noted in our response to BCUC Staff IR 1.12.3. BC Hydro also engages special advisors or experts to inform governance bodies based on business needs.</li> <li>• <b>Medium Projects: <i>Not Applicable</i></b> Medium-sized projects are not expected to require additional governance sub-committees, or special advisors or experts to inform the governance bodies.</li> <li>• <b>Small Projects: <i>Not Applicable</i></b> Small-sized projects are not expected to require additional governance sub-committees, or special advisors or experts to inform the governance bodies.</li> </ul>

<p><b>Subject Area and Lesson Number:</b></p> <p><a href="#">Project Governance, PG3</a></p>			
<p><b>Description of Lesson:</b></p> <p>Ensure clear terms of reference and communication protocols for all governance bodies and advisors.</p>			
<b>Actions</b>	<b>Responsible Role(s)</b>	<b>Implementation Timeline</b>	<b>Status</b>
<p><b>PG3.1:</b> Establish and maintain clear Terms of Reference or Statements of Work for all governance bodies and external advisors, and review and update them periodically to reflect evolving project needs.</p>	<p>Project Governance Practice Lead</p>	<p>Near Term</p>	<p>IMPLEMENTED Terms of Reference or Statements of Work will be established and updated periodically for all governance bodies and external advisors, when required.</p>

<p><b>PG3.2:</b> Establish clear communication protocols for the governance bodies including the communication processes, agendas, and the meeting materials.</p>	<p>Project Governance Practice Lead</p>	<p>Near Term</p>	<p><b>PARTIALLY IMPLEMENTED</b> BC Hydro has clear communication protocols for existing governance bodies, including processes, agendas, and meeting material requirements.</p> <p>Project Governance Practice updates are included in the Fiscal 27 Portfolio Management Practice Update enhancement plan to include guidance on specific communication protocol requirements when specialized governing bodies are established.</p>
<p><b>PG3.3:</b> Build a collaborative working relationship with the Independent Oversight Advisor (if engaged) by integrating them into relevant meetings and seeking advice, feedback, and perspectives on key decisions, approvals, and analyses.</p>	<p>Project Governance Practice Lead</p>	<p>Near Term</p>	<p><b>IMPLEMENTED</b> Building a collaborative working relationship by incorporating an Independent Oversight Advisor, which will be applied based only on a project's needs.</p>
<p><b>Expected Outcomes</b></p> <ul style="list-style-type: none"> <li>• Terms of reference and communication protocols for all governance bodies and advisors are established.</li> </ul>			
<p><b>Impact on Projects underway and future:</b> Only very large, complex, or novel projects will potentially be impacted. The identified lessons learned are included in the Lessons Learned database and will be incorporated into the Portfolio and Project Management practices and reviewed and applied throughout the project lifecycle.</p> <p><b>Applicability on Projects:</b></p> <ul style="list-style-type: none"> <li>• <b>Large and Complex Projects: <i>More Likely</i></b> Only very large and complex projects, such as Site C, with dedicated Project Boards and/or independent oversight advisors, will have defined Terms of Reference and communication protocols for the governing bodies. For example, based on business needs, North Coast Transmission Line Projects will develop these communications and terms of reference materials for the sub-committee of the Capital Projects and Programs Committee of the Board.</li> <li>• <b>Medium Projects: <i>Not Applicable</i></b> Medium-sized projects do not have dedicated Project Boards and/or independent oversight,</li> </ul>			

and therefore will not have defined Terms of Reference and communication protocols for them. Terms and reference for governance bodies used for medium-sized projects are in place as part of the Project & Portfolio Management practices.

- **Small Projects: *Not Applicable***  
Small-sized projects do not have dedicated Project Boards and/or independent oversight, and therefore will not have defined Terms of Reference and communication protocols for them. Terms and reference for governance bodies used for small-sized projects are in place as part of the Project & Portfolio Management practices.

<b>Subject Area and Lesson Number:</b>			
Project Governance, PG4			
<b>Description of Lesson:</b>			
Establish processes, tools, and reporting to ensure governing bodies receive effective and timely information.			
<b>Actions</b>	<b>Responsible Role(s)</b>	<b>Implementation Timeline</b>	<b>Status</b>
<b>PG4.1:</b> Develop dashboards to consolidate key project information and provide governing bodies with timely, consistent, and easily interpretable updates.	Reporting Practice Lead	Near Term	<b>IMPLEMENTED:</b> Incorporated into our Project and Portfolio Management Practices. The Project Delivery dashboard reports support the reporting requirements.
<b>PG4.2:</b> Establish a monthly project wide “Accountability” meeting to review the progress and issues for each area of the project, provide opportunities for senior members of the project team to review the results, highlight issues, concerns, and risks, discuss interfaces between the different work activities, and consider future project work.	Project Management Practice Lead	Near Term	<b>IMPLEMENTED:</b> Incorporated into our Project and Portfolio Management Practices. Regular monthly, bi-monthly, and quarterly reporting to appropriate governing groups <b>from</b> the project team to that reviews the monthly performance of Work Packages and provide input to the team.

<p><b>PG4.3:</b> Maintain a significant and visible project team presence at construction site to improve situational awareness, support workforce coordination, and ensure governance bodies receive accurate, field-validated information.</p>	<p>Construction &amp; Contract Management Practice Lead</p>	<p>Near Term</p>	<p><b>IMPLEMENTED</b>                  Incorporated into our Project and Portfolio Management Practices. All projects require an on-site presence from construction management. Larger and more complex projects will have a greater site presence from the project team and are scaled as required.</p>
<p><b>Expected Outcomes</b></p> <ul style="list-style-type: none"> <li>Governance bodies receive effective and timely information.</li> </ul>			
<p><b>Impact on Projects underway and future:</b>                  All projects will be impacted because the identified lessons learned are incorporated into the Portfolio and Project Management practice, which are applied throughout the project lifecycle.</p> <p><b>Applicability on Projects:</b></p> <ul style="list-style-type: none"> <li><b>Large and Complex Projects: Fully Applicable</b>                      The standard Project and Portfolio Management framework includes standardized project performance dashboards, regularly pre-determined project accountability meetings with various governing bodies, and mandatory site visit requirements.</li> <li><b>Medium Projects: Fully Applicable</b>                      The standard Project and Portfolio Management framework includes standardized project performance dashboards, regularly pre-determined project accountability meetings with various governing bodies, and mandatory site visit requirements.</li> <li><b>Small Projects: Fully Applicable</b>                      The standard Project and Portfolio Management framework includes standardized project performance dashboards, regularly pre-determined project accountability meetings with various governing bodies, and mandatory site visit requirements.</li> </ul>			

## 05 – INDIGENOUS CONSULTATION

<p><b>Subject Area and Lesson Number:</b>  <b>Indigenous Consultation, IC1</b></p>			
<p><b>Description of Lesson:</b>                  Enable early consultation and streamline ongoing engagements, including use of permitting and environmental forums.</p>			
<b>Actions</b>	<b>Responsible Role(s)</b>	<b>Implementation Timeline</b>	<b>Status</b>
<p><b>IC1.1:</b> Leverage project update meetings to streamline engagement by providing Indigenous Nations with consistent, timely, and accessible information throughout the project.</p>	<p>Indigenous Relations Practice Lead</p>	<p>Near Term</p>	<p><b>IMPLEMENTED:</b>                      Incorporated into Project and Portfolio Management Practices.                      Will be applied based on a project's needs.</p>
<p><b>IC1.2:</b> Use multi-Nation forums—with clear terms of reference—to engage on environmental matters, cultural and heritage initiatives, and other shared interests where participating Nations agree that a multi-Nation approach is appropriate.</p>	<p>Indigenous Relations Practice Lead</p>	<p>Near Term</p>	<p><b>IMPLEMENTED:</b>                      Available in the Lessons learned database and will be applied selectively for large/complex/novel projects.                      A structured and formal multi-nation forum may be applied based on the size and complexity of the project's needs and agreement by nations.</p>
<p><b>IC1.3:</b> Support multi-Nation engagement forums through neutral facilitation when required to promote open dialogue and shared understanding among Nations.</p>	<p>Indigenous Relations Practice Lead</p>	<p>Near Term</p>	<p><b>IMPLEMENTED:</b>                      Available in the Lessons learned database and will be applied selectively for large/complex/novel projects.                      Neutral facilitation may be applied based on the size and complexity of the project's needs and with agreement by nations.</p>

<p><b>IC1.4:</b> Engage early on culturally sensitive sites to inform project planning and design, avoid unintentional impacts, and ensure respectful management of cultural values.</p>	<p>Indigenous Relations Practice Lead</p>	<p>Near Term</p>	<p><b>IMPLEMENTED:</b> Incorporated into the Project and Portfolio Management Practices.</p> <p>May be scaled due to the scale and sensitivity needs of the projects.</p>
<p><b>IC1.5:</b> Facilitate coordinated engagement across all relevant project teams to ensure consistent messaging, reduce duplication, and improve efficiency in interactions with Indigenous Nations.</p>	<p>Indigenous Relations Practice Lead</p>	<p>Near Term</p>	<p><b>IMPLEMENTED:</b> Incorporated into IR practices, a structured and formal forum may be assigned based on a project's size and complexity.</p>
<p><b>IC1.6:</b> Enhance communication using visual tools—such as rendered drawings and future-state visualizations—to help Indigenous Nations understand project impacts and support informed decision-making.</p>	<p>Indigenous Relations Practice Lead</p>	<p>Near Term</p>	<p><b>IMPLEMENTED:</b> Incorporated into projects based on a project's needs. As an example, La Joie Dam Improvements project used complex visualizations to inform consultation on project alternatives.</p>
<p><b>IC1.7:</b> Maintain frequent and transparent communication about project timelines, milestones, and anticipated activities to support timely planning by Indigenous Nations.</p>	<p>Indigenous Relations Practice Lead</p>	<p>Near Term</p>	<p><b>IMPLEMENTED:</b> Incorporated into IR practices, scaled to the needs of the project</p>
<p><b>Expected Outcomes</b></p> <ul style="list-style-type: none"> <li>• Scaled and appropriately applied practices to support early engagement and consultations with Indigenous Nations, with ongoing communications throughout the project lifecycle.</li> </ul>			
<p><b>Impact on Projects underway and future:</b></p> <p>All projects will potentially be impacted because the identified lessons learned are incorporated into the Portfolio and Project Management practice, which are applied throughout the project lifecycle.</p>			

**Applicability on Projects:**

- **Large and Complex Projects: *More Likely***

Projects that rely heavily on structured engagement processes to address significant Indigenous interests, environmental permitting requirements, or multi-year construction programs are more relevant to apply these actions. For example, the North Coast Transmission Line Projects have implemented early Indigenous engagement approaches informed by Site C lessons, and ongoing communication will be maintained throughout the project on environmental, cultural, and heritage matters.

- **Medium Projects: *Less Likely***

Medium projects with several Indigenous Nations or moderate potential impacts may implement a scalable version of processes, particularly early engagement and consistent communication.

- **Small Projects: *Not Applicable***

Small projects would not require thorough engagement from multi-Nation forums or structured updates, but will generally require notification.

**Subject Area and Lesson Number:**

Indigenous Consultation, IC2

**Description of Lesson:**

Create environmental and cultural monitoring programs from the start of the project.

Actions	Responsible Role(s)	Implementation Timeline	Status
<p><b>IC2.1:</b> Build early funding capacity to support Indigenous Traditional Use programs and fulfill Environmental Assessment Certificate conditions, ensuring Nations can meaningfully participate in environmental and cultural monitoring.</p>	<p>Indigenous Relations Practice Lead</p>	<p>Near Term</p>	<p><b>IMPLEMENTED:</b> Incorporated into the Project and Portfolio Management Practices.  Will be applied based on the size and complexity of the project.</p>

<p><b>IC2.2:</b> Implement a cultural monitoring program from project initiation, ensuring it is clearly communicated to all project teams and actively</p>	<p>Indigenous Relations Practice Lead</p>	<p>Near Term</p>	<p><b>IMPLEMENTED:</b> Incorporated into the Project and Portfolio Management Practices with a full cultural monitor program.  Will be applied based on the size and complexity of the project.</p>
<p><b>IC2.3:</b> Involve cultural monitors during field activities to identify, assess, and help address culturally significant materials and values encountered during construction.</p>	<p>Indigenous Relations Practice Lead</p>	<p>Near Term</p>	<p><b>IMPLEMENTED:</b> Incorporated into the Project and Portfolio Management Practices.  Will be applied based on the size and complexity of the project.</p>
<p><b>IC2.4:</b> Foster ongoing Indigenous involvement and meaningful input into environmental programs by establishing environmental forums that support information sharing and collaborative engagement.</p>	<p>Indigenous Relations Practice Lead</p>	<p>Near Term</p>	<p><b>IMPLEMENTED:</b> Incorporated into the Project and Portfolio Management Practices,  Will be applied based on the size and complexity of the project.</p>
<p><b>Expected Outcomes</b></p> <ul style="list-style-type: none"> <li>• Support Indigenous involvement and participation through the development and implementation of environmental and cultural monitoring program opportunities.</li> </ul>			
<p><b>Impact on Projects underway and future:</b> Only large and medium projects will potentially be impacted. The identified lessons learned are incorporated into the Portfolio and Project Management practice, which are applied throughout the project lifecycle.</p> <p><b>Applicability on Projects:</b></p> <ul style="list-style-type: none"> <li>• <b>Large and Complex Projects: <i>More Likely</i></b> Large and complex projects with significant environmental footprints or culturally sensitive areas would consider implementing these actions. For example, both the John Hart Seismic Upgrade Project and the North Coast Transmission Line Projects have implemented multiple cultural monitoring and guardian programs.</li> </ul>			

- Medium Projects: *Less Likely***  
 Medium projects are less likely to implement structured programs to this level, but may consider some streamlined monitoring programs tailored to their footprint.
- Small Projects: *Not Applicable***  
 Smaller projects will not require structured programs to this level and only require basic monitoring aligned with regulatory expectations.

<b>Subject Area and Lesson Number:</b> Indigenous Consultation, IC3			
<b>Description of Lesson:</b> Plan and build support for Indigenous procurement opportunities that align with project needs and Nation interests.			
Actions	Responsible Role(s)	Implementation Timeline	Status
<b>IC3.1:</b> Initiate early planning for Indigenous procurement strategies, opportunities, and processes	Indigenous Procurement Lead	Near Term	IMPLEMENTED: Incorporated into Indigenous Relations Procurement processes.  Will be applied based on the size and complexity of the project.
<b>IC3.2:</b> Invest in Indigenous Relations and Supply Chain resources to work directly with Indigenous Nations	Indigenous Procurement Lead	Near Term	IMPLEMENTED: Dedicated Indigenous Relations Project Leads will be established and assigned based on a project's needs. Practice and guidelines for Indigenous procurement are available.

<p><b>IC3.3:</b> Strengthen contractual provisions to help enforce contractor procurement commitments</p>	<p>Indigenous Procurement Lead</p>	<p>Near Term</p>	<p><b>PARTIALLY IMPLEMENTED:</b> Implemented the Custom Indigenous Engagement Appendix associated with large contracts having Indigenous Procurement set-asides.  Will continue to implement lessons learned from Site C and other projects. Ongoing practice improvements include developing the set-aside best practice document and library of Indigenous Engagement Appendices.</p>
<p><b>IC3.4:</b> Develop tools and communication processes to improve access to procurement opportunities by sharing project plans, mapping</p>	<p>Indigenous Procurement Lead</p>	<p>Near Term</p>	<p><b>IMPLEMENTED:</b> Incorporated into PPM Practices through Indigenous Relations Engagement and Supply Chain processes to support identification of opportunities for Indigenous Procurement.</p>
<p><b>IC3.5:</b> Align expectations, procurement opportunities, and Indigenous business capabilities by working collaboratively with Nations to understand interests, identify capacity gaps, and ensure approaches are mutually beneficial and realistic.</p>	<p>Indigenous Procurement Lead</p>	<p>Near Term</p>	<p><b>IMPLEMENTED:</b> Incorporated into PPM Practices through Indigenous Relations Engagement and Supply Chain processes to support identification of opportunities for Indigenous Procurement</p>

**Expected Outcomes**

- Strengthen Indigenous participation through the award of Indigenous-designated businesses in project procurement activities.

**Impact on Projects underway and future:**

All projects will potentially be impacted because the identified lessons learned are included in the Lessons Learned database and will be incorporated into the Portfolio and Project Management practices and reviewed and applied throughout the project lifecycle.

**Applicability on Projects:**

- **Large and Complex Projects: *Fully Applicable***  
For all projects BC Hydro assess opportunities for Indigenous procurement opportunities and internal monetary targets are established and monitored for procurement awards. Large and complex projects with long timelines and significant procurement volumes are more likely to benefit from early Indigenous procurement planning, providing opportunities for meaningful Nation participation. For example, the Campbell River system projects, including John Hart Dam Seismic Upgrade Project, have demonstrated success with relatively high Indigenous participation rates, suitable procurement opportunities, the direct award of contracts to FN Designated Businesses, and the inclusion of a minimum set-aside for First Nations Designated Businesses in contracts with general contractors. Furthermore, North Coast Transmission Line Projects have developed an Indigenous Participation Strategy as part of the overall project ownership agreements.
- **Medium Projects: *Fully Applicable***  
For all projects BC Hydro assess opportunities for Indigenous procurement opportunities and internal monetary targets are established and monitored for procurement awards.
- **Small Projects: *Fully Applicable***  
For all projects BC Hydro assess opportunities for Indigenous procurement opportunities and internal monetary targets are established and monitored for procurement awards.

<b>Subject Area and Lesson Number:</b> Indigenous Consultation, IC4			
<b>Description of Lesson:</b> Support Indigenous employment and training opportunities and ensure project personnel receive appropriate Indigenous awareness training.			
<b>Actions</b>	<b>Responsible Role(s)</b>	<b>Implementation Timeline</b>	<b>Status</b>
<b>IC4.1:</b> Develop a communication and engagement plan to promote opportunities for scholarship and bursary recipients and increase awareness of available training and educational supports.	Indigenous Relations Employment and Training Lead	Near Term	<b>IMPLEMENTED:</b> Available in the Lessons learned database and will be applied selectively for large/complex projects.
<b>IC4.2:</b> Promote mentorship opportunities that help introduce new Indigenous workers to the workplace, support skill development, and encourage long-term participation in project activities.	Indigenous Relations Employment and Training Lead	Near Term	<b>IMPLEMENTED:</b> Available in the Lessons learned database. Indigenous training to employment programs offered will be established and assigned based on a project's needs.
<b>IC4.3:</b> Assign on-site resources dedicated to developing training and employment opportunities for Indigenous workers and supporting them throughout the project.	Indigenous Relations Employment and Training Lead	Near Term	<b>IMPLEMENTED:</b> Available in the Lessons learned database. A resource focusing on Indigenous Employment training will be assigned as determined by the size, complexity, and needs of the project.

<p><b>IC4.4:</b> Provide mandatory Indigenous awareness training at the start of the project and during onboarding for new workers to promote cultural understanding and respectful engagement.</p>	<p>Indigenous Relations Employment and Training Lead</p>	<p>Near Term</p>	<p><b>IMPLEMENTED:</b> Indigenous Awareness Training 101 is now mandatory for all BC Hydro employees and highly encouraged for external contractors.  Contractors working in areas of high sensitivity may be asked to take BC Hydro's Indigenous training.</p>
<p><b>Expected Outcomes</b></p> <ul style="list-style-type: none"> <li>Strengthen Indigenous employment participation and employee cultural and Indigenous awareness.</li> </ul>			
<p><b>Impact on Projects underway and future:</b> All projects will potentially be impacted because the identified lessons learned are included in the Lessons Learned database and are reviewed and applied throughout the project lifecycle.</p> <p><b>Applicability on Projects:</b></p> <ul style="list-style-type: none"> <li><b>Large and Complex Projects: <i>More Likely</i></b> Large and complex projects with long construction durations and substantial workforce needs are more likely to provide formalized Indigenous training pathways, mentorship programs, on-site support, and mandatory awareness training. For example, the John Hart Seismic Upgrade Project supported training and employment opportunities. The North Coast Transmission Line Projects will also apply these actions to engage and employ Indigenous worker participation.</li> <li><b>Medium Projects: <i>Likely</i></b> Standard Project and Portfolio Management training includes Indigenous awareness for all BC Hydro employees. Medium projects are less likely to apply Indigenous employment participation to the level of Site C, but may consider scaled approaches, such as targeted mentorship and onboarding training, based on Indigenous participation opportunities. For example, projects such as the Enbridge Aspen Point Program and GMS Upgrade Projects.</li> <li><b>Small Projects: <i>Less Likely</i></b> Standard Project and Portfolio Management training includes Indigenous awareness for all BC Hydro employees. Smaller projects do not provide the level of on-site training and employment support compared to larger projects.</li> </ul>			

## 06 – COMMUNITY ENGAGEMENT

<b>Subject Area and Lesson Number:</b> Community Engagement, CE1			
<b>Description of Lesson:</b> Plan and implement responsive stakeholder engagement early and maintain it throughout the project lifecycle.			
<b>Actions</b>	<b>Responsible Role(s)</b>	<b>Implementation Timeline</b>	<b>Status</b>
<b>CE1.1:</b> Develop and implement a proactive and adaptive communication plan to support timely, clear, and consistent engagement with stakeholders.	Stakeholder Engagement Practice Lead	Near Term	IMPLEMENTED: Incorporated into our Project and Portfolio Management Practices.
<b>CE1.2:</b> Create checklists of internal and external stakeholders to ensure timely information sharing and reduce the risk of missed communications.	Stakeholder Engagement Practice Lead	Near Term	IMPLEMENTED: Incorporated into our Project and Portfolio Management Practices.
<b>CE1.3:</b> Establish response-time goals for stakeholder queries to support responsiveness and maintain trust.	Stakeholder Engagement Practice Lead	Near Term	IMPLEMENTED: Incorporated into our Project and Portfolio Management Practices.  Will be applied based on a project's needs.
<b>CE1.4:</b> Define, document, and understand baseline data to ensure engagement activities are grounded in accurate community information.	Stakeholder Engagement Practice Lead	Near Term	IMPLEMENTED: Incorporated into our Project and Portfolio Management Practices.
<b>CE1.5:</b> Adapt environmental monitoring locations when needed to better reflect community concerns and local conditions.	Stakeholder Engagement Practice Lead	Near Term	IMPLEMENTED: Incorporated into our Project and Portfolio Management Practices.
<b>CE1.6:</b> Use targeted and customized engagement approaches to address diverse stakeholder needs and communication preferences.	Stakeholder Engagement Practice Lead	Near Term	IMPLEMENTED: Incorporated into our Project and Portfolio Management Practices.  Determined during project planning. Will be applied based on a project's needs.

<p><b>CE1.7:</b> Engage subject matter experts and encourage collaboration with contractors to strengthen engagement efforts and ensure accurate information sharing.</p>	<p>Stakeholder Engagement Practice Lead</p>	<p>Near Term</p>	<p><b>IMPLEMENTED:</b> Incorporated into our Project and Portfolio Management Practices. Determined during project planning. Will be applied based on a project's needs.</p>
<p><b>CE1.8:</b> Ensure a comprehensive safety protocol is in place for all public events to protect both participants and project staff.</p>	<p>Stakeholder Engagement Practice Lead</p>	<p>Near Term</p>	<p><b>IMPLEMENTED:</b> Incorporated into our Project and Portfolio Management Practices. Determined during project planning. Will be applied based on a project's needs.</p>
<p><b>Expected Outcomes</b></p> <ul style="list-style-type: none"> <li>Reduction of community and stakeholder issues through early planning and ongoing stakeholder engagement throughout the project lifecycle.</li> </ul>			
<p><b>Impact on Projects underway and future:</b> All projects will potentially be impacted. The identified lessons learned are incorporated into the Portfolio and Project Management practice, which are applied throughout the project lifecycle.</p> <p><b>Applicability on Projects:</b></p> <ul style="list-style-type: none"> <li><b>Large and Complex Projects: <i>More Likely</i></b> Broad community impacts that require extensive stakeholder engagement are more likely to occur on large and complex projects. For example, the John Hart Seismic Upgrade Project planned and implemented responsive stakeholder engagement early and maintains this throughout the project lifecycle. The North Coast Transmission Line Projects will continue to hold open houses, provide public communication information sites, and maintain rotating local offices in the region for a greater presence.</li> <li><b>Medium Projects: <i>Less Likely</i></b> Medium-sized projects may have community interfaces but less likely require the level of stakeholder engagement as outlined in the Site C lesson learned. Standard Project &amp; Portfolio Management practices for community engagement are used and adjusted to business needs.</li> <li><b>Small Projects: <i>Not Applicable</i></b> Smaller projects typically have limited community interfaces and will not require the level of stakeholder engagement as outlined in the Site C lesson learned. Standard Project &amp; Portfolio Management practices for community engagement are used and adjusted to business needs.</li> </ul>			

<p><b>Subject Area and Lesson Number:</b>  <a href="#">Community Engagement, CE2</a></p>			
<p><b>Description of Lesson:</b>                  Adapt organizational structures for stakeholder engagement to the evolving scale and duration of the project.</p>			
<b>Actions</b>	<b>Responsible Role(s)</b>	<b>Implementation Timeline</b>	<b>Status</b>
<p><b>CE2.1:</b> Assess project needs and determine the appropriate scale of engagement resources, including when a dedicated engagement team may be required for complex or high-volume stakeholder activities.</p>	<p>Stakeholder Engagement Practice Lead</p>	<p>Near Term</p>	<p>IMPLEMENTED: Addressed in the PIQ (Project Information Questionnaire) process practice.</p>
<p><b>CE2.2:</b> Include a communications lead as part of the project leadership team to support consistent engagement planning, coordinated messaging, and integration of stakeholder considerations into project decision-making.</p>	<p>Stakeholder Engagement Practice Lead</p>	<p>Near Term</p>	<p>IMPLEMENTED: Incorporated into our Project and Portfolio Management Practice.</p>
<p><b>CE2.3:</b> Establish clear roles and responsibilities for stakeholder engagement—particularly where diverse community interests or mitigation requirements exist—to ensure accountability and effective coordination across project subgroups.</p>	<p>Stakeholder Engagement Practice Lead</p>	<p>Near Term</p>	<p>IMPLEMENTED: Incorporated into our Project and Portfolio Management Practice and outlined in the project stakeholder engagement plan.</p>
<p><b>CE2.4:</b> Promote proactive collaboration across project subgroups to ensure timely, consistent messaging and coordinated responses to community issues.</p>	<p>Stakeholder Engagement Practice Lead</p>	<p>Near Term</p>	<p>IMPLEMENTED: Incorporated into our Project and Portfolio Management Practice. Determined during project planning. Will be applied based on a project's needs.</p>
<p><b>Expected Outcomes</b></p> <ul style="list-style-type: none"> <li>Stakeholder Engagement plan and team setup appropriately to project size and complexity and maintained throughout the project lifecycle.</li> </ul>			
<p><b>Impact on Projects underway and future:</b>                  Only large and complex projects will potentially be impacted. The identified lessons learned are incorporated into the Portfolio and Project Management practice, which are applied throughout the project lifecycle.</p>			

**Applicability on Projects:**

- Large and Complex Projects: *More Likely***  
 The lessons learned actions are most relevant for very large, complex projects, where a dedicated and structured engagement team is required to manage the complex or high-volume of stakeholder activities. For example, the North Coast Transmission Line Projects have a dedicated communications lead, and ongoing communications are being scaled to the size and demands of the project. Campbell River systems projects have a dedicated communications/ stakeholder engagement representative and continue to hold regular meetings with stakeholders, regular updates in local newspapers, a website dedicated specifically for updates on BCH Campbell River projects with news, bi-monthly construction reports, and project videos.
- Medium Projects: *Not Applicable***  
 Medium-sized projects will not have a dedicated structured engagement team, and stakeholder plan will be scaled to the business needs of the project.
- Small Projects: *Not Applicable***  
 Small projects will not have a dedicated structured engagement team, and a stakeholder plan will be scaled to the business needs of the project.

**Subject Area and Lesson Number:**

Community Engagement, CE3

**Description of Lesson:**

Use a mix of communication channels to reach stakeholders effectively throughout the lifecycle of the project.

Actions	Responsible Role(s)	Implementation Timeline	Status
<p><b>CE3.1:</b> Plan early in the project lifecycle to identify and use a variety of communications channels appropriate to the project's scale, stakeholder needs, and anticipated engagement requirements.</p>	<p>Stakeholder Engagement Practice Lead</p>	<p>Near Term</p>	<p>IMPLEMENTED:                      Available in the Lessons learned database and will be applied selectively for large/complex projects                      Determined during project planning.</p>

<p><b>CE3.2:</b> Maintain awareness of existing communication channels and incorporate new or emerging channels where appropriate to enhance stakeholder reach and responsiveness.</p>	<p>Stakeholder Engagement Practice Lead</p>	<p>Near Term</p>	<p><b>IMPLEMENTED:</b> Available in the Lessons learned database and will be applied selectively for large/complex projects  Determined during project planning.</p>
<p><b>CE3.3:</b> Consider establishing a local project office to strengthen community accessibility, enhance visibility, and improve responsiveness where the scale of the project justifies it.</p>	<p>Stakeholder Engagement Practice Lead</p>	<p>Near Term</p>	<p><b>IMPLEMENTED:</b> Available in the Lessons learned database and will be applied selectively for large/complex projects  Determined during project planning.</p>
<p><b>CE3.4:</b> Facilitate community engagement committees where appropriate to maintain regular dialogue with community representatives and address evolving concerns.</p>	<p>Stakeholder Engagement Practice Lead</p>	<p>Near Term</p>	<p><b>IMPLEMENTED:</b> Part of our Project and Portfolio Management Practices and will be determined on a project-by-project basis.</p>
<p><b>Expected Outcomes</b></p> <ul style="list-style-type: none"> <li>Reduction of community and stakeholder issues through early communication channels planning and by maintaining ongoing communications and engagement throughout the project lifecycle.</li> </ul>			
<p><b>Impact on Projects underway and future:</b> All projects will potentially be impacted because the identified lessons learned are included in the Lessons Learned database or the Portfolio and Project Management practices and reviewed and applied throughout the project lifecycle.</p> <p><b>Applicability on Projects:</b></p> <ul style="list-style-type: none"> <li><b>Large and Complex Projects: <i>More Likely</i></b> Large and complex projects will most likely leverage diverse communication methods, including a mix of digital, in-person, and community-based channels, and establishing a local presence or structured community committees may be appropriate. For example, a local presence for Campbell River systems projects has a dedicated communications/ stakeholder engagement representative and continues to hold regular meetings with stakeholders, regular updates in local newspapers, a website dedicated specifically for updates on BCH Campbell River projects with news, bi-monthly construction reports, and projects' videos. Similarly, the</li> </ul>			

North Coast Transmission Line Projects is utilizing diverse communication methods and a local presence, as described in our response to BCUC Staff IR 1.20.03.

- Medium Projects: *Less Likely***  
 Medium-sized projects are less likely use the mix of communications channels to the level outlined in the Site C lessons learned, but may use a scaled communications mix, relying on existing community engagement practices.
- Small Projects: *Not Applicable***  
 Small projects will not require this level of communication outline in the Site C lessons learned and will rely on existing community engagement practices.

<b>Subject Area and Lesson Number:</b> Community Engagement, CE4			
<b>Description of Lesson:</b> Apply digital tools and technologies to strengthen communication, improve access to information, and support effective stakeholder engagement.			
<b>Actions</b>	<b>Responsible Role(s)</b>	<b>Implementation Timeline</b>	<b>Status</b>
<b>CE4.1:</b> Establish a customer relationship management system to support tracking of stakeholder interactions and ensure consistent engagement across the project.	Stakeholder Engagement Practice Lead	Near Term	<b>IMPLEMENTED:</b> Part of existing Project and Portfolio Management Practices, a suite of products is used to track stakeholder interactions, applied as appropriate.
<b>CE4.2:</b> Use new and emerging digital media technologies to broaden communication reach and provide accessible, timely project information to stakeholders.	Stakeholder Engagement Practice Lead	Near Term	<b>IMPLEMENTED:</b> Determined during project planning. Applied as appropriate.
<b>CE4.3:</b> Implement vehicle identification tools to support safe engagement during field activities and enhance stakeholder awareness during project-related presence in communities.	Stakeholder Engagement Practice Lead	Near Term	<b>IMPLEMENTED:</b> Part of existing Project and Portfolio Management Practice.

**Expected Outcomes**

- Reduce stakeholder and project impacts with the use of digital tools and technologies to strengthen communication and improved community access to project information.

**Impact on Projects underway and future:**

Only large, complex, and medium-sized projects will potentially be impacted. The identified lessons learned are incorporated into the Portfolio and Project Management practice, which are applied throughout the project lifecycle.

**Applicability on Projects:**

- **Large and Complex Projects: *More Likely Applicable***  
The use of Customer Relationship Management systems, and other advanced digital technology are more likely to occur on very large and complex projects. For example, the Campbell River projects are applying the use of new technology with the use of drones and stakeholder project videos.
- **Medium Projects: *Less Likely***  
Medium-sized projects are less likely to adopt this level of digital technology but may apply selective digital tools, such as targeted digital media or identification measures, based on the project needs and community interest.
- **Small Projects: *Not Applicable***  
Small projects do not require this level of technology and may require only basic digital communication tools.

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### 1 **7.2.3 BC Hydro Has Considered Project Characteristics and Learnings of** 2 **the Site C Project**

3 BC Hydro has considered the nature and experiences of the Site C Project to further  
4 understand and mitigate uncertainty and risk for the Project, particularly in the areas  
5 of design and geotechnical risks, procurement planning, construction scheduling,  
6 construction management and risk management. There are, however, significant  
7 differences between the Site C Project and the Project that must be considered with  
8 respect to the application of any lessons learned. These learnings and key  
9 differences are described below.

#### 10 **7.2.3.1 Project Design and Geotechnical Risks**

11 The important design considerations on the Site C Project relate to geotechnical  
12 risks such as the strength and other characteristics of foundation materials, the scale  
13 of the excavations required, the large size of the project footprint, and uncertainty  
14 with respect to the response of exposed excavation areas. In contrast, geotechnical  
15 risks and uncertainty for the Project primarily relate to quantity changes and  
16 construction methodology, as discussed further in section [7.4](#) below.

17 At the John Hart Dam, the foundation materials are a much stronger rock type than  
18 the foundation at Site C. In addition, the scale of the required excavations at  
19 John Hart Dam, and the planned newly exposed footprint of the Project are relatively  
20 small compared to the Site C Project.<sup>8</sup> Accordingly the site investigations for the  
21 Project in advance of the Implementation phase have been targeted and relatively  
22 extensive<sup>9</sup> compared to what was possible at Site C, due to the large footprint and  
23 the greenfield nature of that project.

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<sup>8</sup> The Project exposed footprint is smaller than the footprint of a typical greenfield hydroelectric construction project, and significantly smaller than the Site C Project footprint. The Site C Project is also much more complex, has different ground conditions, topography, and other characteristics than the Project.

<sup>9</sup> In addition to the earlier deficiency and seismic investigations undertaken at the John Hart Dam site prior to the Project which are discussed in section 3.3 of Chapter 3, BC Hydro has undertaken additional site investigation work, prior to completing the preliminary design of the Project, that has provided good confidence in the site characterization and risk identification. While the COVID-19 pandemic has limited site

1 For the Project, the final engineering solutions selected for the proposed upgrades  
2 involve mostly structural reinforcement, achieved by placing stabilization (buttress)  
3 berms, ground densification, and installation of a new cut-off wall and piles. This  
4 work will be carried out at target-confined areas, will involve relatively shallow  
5 excavations, and berm fill placement will be completed in a staged manner to  
6 minimize unbalanced loading. As a result, the loading conditions during and after  
7 construction are not significantly different than those that exist now. Therefore, the  
8 risk of major landslides and ground movement being generated by the construction  
9 activities is very low to non-existent.

10 In addition, many of the proposed works for the Project share similarities with,  
11 expand upon or utilize features of the works performed in the 1987-1988 John Hart  
12 Dam upgrade.<sup>10</sup> That project was carried out at the same site without any major  
13 geotechnical issues during construction. During that upgrade, a much larger  
14 excavation on the downstream side of the Middle Earthfill Dam was performed with  
15 the John Hart Reservoir at its normal level, with no adverse behaviour of the  
16 structure. Also, the scope of excavation work through dredging being undertaken by  
17 the Project is similar to what was undertaken in the 1987-1988 John Hart Dam  
18 upgrade from both a work method and depth perspective.

19 Lastly, the Project designs have been reviewed internally by BC Hydro staff and  
20 externally by the Klohn Crippen Berger + Hatch project engineering teams and are  
21 considered practical and constructible, using well established methods not requiring  
22 highly innovative or experimental processes to be developed by the contractor.

23 Accordingly, considering the Project's focused investigations, the small magnitude of  
24 construction loading and unloading compared to the construction design case, and

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visits in 2020, all major site investigation work was undertaken prior to the onset of COVID-19. During the COVID-19 pandemic, key Project personnel have continued to collaborate closely on the Project design.

<sup>10</sup> Section 3.3.1 of Chapter 3 which describes why the 1987-1988 seismic upgrade undertaken at the Dam did not provide the required seismic withstand for the John Hart Dam. Section 5.2.7 of Chapter 5 describes how the Project scope integrates with key Dam features installed during past upgrade projects.

1 the similarity of proposed upgrade techniques to those implemented in 1987-1988,  
2 no major changes to Project design are expected to result from geotechnical risks  
3 that could be encountered during construction.

#### 4 **7.2.3.2 Procurement and Construction Scheduling Risks**

5 The Site C project experienced construction impacts and construction claims arising  
6 from the sequential nature of some components of the construction (e.g., the need  
7 for certain activities, such as river closure and reservoir filling at a specific time of  
8 year) and the dependence of contractor schedules on the performance of preceding  
9 contractors. Unlike Site C, the Project does not have these constraints and therefore  
10 has greater flexibility to sequence work and accommodate changes.<sup>11</sup>

11 In addition, although there are certain limitations (e.g., on placing fine-grained fill and  
12 road surfacing during rainfall or in freezing conditions), there are no construction  
13 components which are critically dependent on weather. Also, there are no  
14 components of Project work that must be performed within a specific seasonal work  
15 window, so any delay in components of work beyond a specific target date would not  
16 result in a seasonal work stoppage, nor have a large impact to the overall Project  
17 schedule.

18 For the Project, the sequence of construction of various components has been  
19 scheduled to maximize stability of the John Hart Dam structure through the  
20 construction period, to minimize constructability and dam safety risk. For example:

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<sup>11</sup> As described in section 5.6.2 of Chapter 5, the Project schedule has been developed in consideration of the Project scope, constructability of the work being undertaken, site and access constraints, commonalities between work elements, contractor expertise and operational requirements. The Project plan includes two major contracts, with only one major contractor on site at a time, and with an appropriate lag in schedule between the two contracts. The scope of each contract is well defined and not dependent on performance of the other contractor.

- 1 • The Middle Earthfill Dam upstream berm will be constructed following  
2 installation of the plastic concrete cut-off wall to improve the robustness of the  
3 water seepage barrier during construction;
- 4 • The infill of the former penstock trench downstream of the Intake Dam will be  
5 performed before fills are placed adjacent to the Intake Dam (which could  
6 disrupt the seepage cut-off features beneath the Intake); and
- 7 • The Middle Earthfill Dam downstream upper slope excavation will be  
8 constructed prior to the Middle Earthfill Dam toe excavation to improve the  
9 stability of the downstream slope during construction.

10 The upgrades being proposed for the earthfill dams, Concrete Main Dam and Intake  
11 Dam are planned to be performed under one contract with upgrades to the Spillway  
12 Gates System performed under a separate contract. In the current Project schedule,  
13 there is a six-month lag between the start date for the Spillway Gates System  
14 upgrades, and the scheduled completion of the earthfill dams and Concrete Main  
15 Dam. This provides a buffer in case of schedule over-run on the civil works contract.

16 In addition, as discussed further in section 5.3.2 of chapter 5, BC Hydro's  
17 procurement approach for the Project allows for Early Contractor Involvement so  
18 that BC Hydro and Project contractors can review the scope of work in detail to  
19 identify and discuss potential site condition, design and construction issues and risks  
20 and collaboratively seek opportunities to mitigate, manage, and improve those  
21 issues and risks. This approach will include key subcontractors who will perform  
22 specialized work such as dredging, ground densification, and plastic concrete cut-off  
23 wall construction and is expected to result in greater knowledge of the site risks and  
24 design considerations for contractors and greater knowledge of contractor  
25 constructability issues and risks for BC Hydro. This will facilitate and support  
26 transparent and collaborative execution of the Project scope.

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### 1 **7.2.3.3 Project Risk and Cost Estimating**

2 BC Hydro has identified risks over the life of the Site C project and has reported on  
3 these risks as part of its annual and quarterly reporting to the BCUC.

4 BC Hydro has considered and applied lessons learned from the Site C Project to  
5 enhance risk management for the Project and the development of the Project Cost  
6 Estimate, which includes the Contingency and Project Reserve, to appropriately  
7 consider and reflect the Project risks.

8 Key lessons learned from the Site C Project regarding risk management and cost  
9 estimating that have been applied to the Project include:

- 10 • The need for sufficient risk specialist resources;
- 11 • The importance of performing both qualitative and quantitative analysis of risks  
12 included in the risk register;
- 13 • The need to prepare quantitative cost risk analysis and schedule risk analysis  
14 processes periodically during the Implementation phase, to understand the  
15 probability of achieving the Project cost and schedule objectives, and to support  
16 other decisions such as potential changes to the Project schedule; and
- 17 • The need to include both subjective and objective criteria in identifying the  
18 appropriate risks to include in reporting, and assessing and updating those risks  
19 where appropriate, particularly to meet senior management requirements.

20 BC Hydro sought the advice of a risk expert so that the Project Cost Estimate, and in  
21 particular the Contingency and Project Reserve, considered the risk factors unique  
22 to the Project. BC Hydro also engaged Validation Estimating LLC,<sup>12</sup> to undertake a  
23 review of the Project's methodology for quantitative risk analysis, which is used to

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<sup>12</sup> Validation Estimating LLC provides support to process, resource and infrastructure industries related to cost engineering and project control with an emphasis on cost estimating and risk analysis. Validation Estimating LLC's list of other utility infrastructure clients includes Hydro Quebec, Manitoba Hydro, Nalcor Energy, FortisBC, TransCanada and the US Department of Energy.

1 generate the Project contingency as part of the Project Cost Estimate, and  
2 recommend possible improvements.

3 Based on the advice provided, and as part of developing the Project Cost Estimate,  
4 BC Hydro:

- 5 • Identified and included all potential risks with potential cost and schedule  
6 impacts in a single risk register, and identified the probability of occurrence and  
7 residual impacts in terms of schedule delay and/or resource impacts of all risk  
8 items;
- 9 • Enhanced the quantitative risk analysis used to prepare the Project Cost  
10 Estimate to consider all risks identified in the risk register; and
- 11 • Performed an integrated cost/schedule risk analysis on the Project, including  
12 post-treatment risk response planning for critical risks, considering  
13 cost/schedule trade-offs.

14 To implement the recommendation for an integrated cost/schedule risk analysis,  
15 BC Hydro engaged the Global Director of Risk Management for Hatch Engineering.  
16 This work included:

- 17 • All the risk mitigation strategies identified through the design, procurement and  
18 construction management risk mitigation planning processes were reviewed.  
19 Risk workshops considered a wide range of potential construction risks, issues  
20 and difficulties that a contractor may need to deal with in this type of project;
- 21 • The workshops further refined the Project risks to be included in the Project risk  
22 register, including schedule ranging, cost ranging, and risk events. Project risks  
23 were analyzed and evaluated to determine consequences and associated  
24 probabilities and severity, and to inform appropriate risk treatments; and
- 25 • Risk workshops also considered the ranges in quantities of materials  
26 characteristic of this type of work, and these ranges were incorporated into the

1 cost estimating model using “At Risk” software to establish appropriate  
2 contingencies.

3 As described in section 5.4.1 of chapter 5, the Project Cost Estimate is based on a  
4 Preliminary Level Design and conforms to the activities required to complete an  
5 AACEI Class 3 cost estimate. Monte Carlo simulations were used to model the  
6 Project schedule, cost and risk events to develop the Project Cost Estimate.<sup>13</sup> The  
7 output of this process and analysis generated the full integrated Project Schedule  
8 and the Project Cost Estimate, which includes the Contingency and Project Reserve  
9 that are further described in section 5.4 of chapter 5.

#### 10 **7.2.3.4 Ongoing Risk Management Activities**

11 Risk management requirements will be developed and included in the  
12 documentation for Request for Proposals and bidding. The evaluation process for  
13 these submissions will include the involvement of a risk specialist, and other  
14 resources as required, to provide a technical evaluation of risk management and a  
15 quantitative risk assessment for each submission. The process will be similar to the  
16 quantitative risk analysis completed for the Project Cost Estimate but will now  
17 include cost and schedule data provided by bidders. The Early Contractor  
18 Involvement process, which is discussed further in section 5.3.2.1 of Chapter 5, will  
19 allow BC Hydro to work with the Contractor to jointly identify risk and risk treatment  
20 plans before the Full Construction contracts for both the Civil and Hydromechanical  
21 contracts are awarded.

22 Once contracts have been awarded, a risk specialist will continue to be involved to  
23 update quantitative risk analysis periodically during the Implementation phase.

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<sup>13</sup> As part of this process workshops were conducted to further define the project risk register risks, including schedule ranging, cost ranging, and risk events. Separate component models were developed for schedule risks, base cost estimate risks, and risk events, and the models were analysed using Monte Carlo simulation. Each component model was run 5,000 times to simulate the effect of executing the project 5,000 times. The output generated the full integrated project cost profile from 1% to 99% (P1 to P99), from which the P50 (Expected) and P90 (Authorized) estimates were selected.

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**1.0 A. LESSONS LEARNED**  
**Reference: BC HYDRO SITE C LESSONS LEARNED REPORT**  
**Site C Lessons Learned Report Executive Summary, p. 2;**  
**Site C Lessons Learned Report**  
**Lessons Learned Challenges and Successes**

1.1.2 For each of the 29 lessons learned, please clearly define both near-term and long-term actions and changes to internal processes as a result of the lesson. For each action or change identified, please identify: (i) the implementation timeline; (ii) the person(s) responsible for ensuring execution of said action; and (iii) how BC Hydro will measure the effectiveness of the action moving forward.

1.1.2.1 Please explain how all projects underway will be impacted by the implementation of each of the identified actions or changes.

**RESPONSE:**

**Please refer to BC Hydro’s response to BCUC Staff IR 1.1.2 where we explain how projects will be impacted by the implementation of the identified actions.**

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2.0 B. **PERFORMANCE ON SCOPE, SCHEDULE AND COST**  
 Reference: **BC HYDRO SITE C LESSONS LEARNED REPORT**  
**Lessons Learned Report, pp. 6, 8, 10–11; Table 3, p. 11;**  
**Section 4.4.5, p. 74; Section 6.1.3, p. 132**  
**Performance on Scope, Schedule and Cost**

1.2.1 Please confirm, or explain otherwise, that the Project budget of \$8.775 billion used for the Final Investment Decision in 2014 conformed to an Association for the Advancement of Cost Engineering International (AACEI) Class 4 cost estimate, and was the Feasibility Design Estimate. If not confirmed, please provide the AACEI class of the cost estimate, cost range and the level of design at the Final Investment Decision. Please provide the typical design estimate and class of cost estimate BC Hydro uses for Final Investment Decisions.

**RESPONSE:**

**Not confirmed. The Site C Project budget of \$8.775 billion used for the Final Investment Decision in 2014 was consistent with the Association for the Advancement of Cost Engineering International (AACEI) Class 3 Cost Estimate, had an estimated cost range of +15% / -10%, and was based on a preliminary level of design. This is the typical design estimate and class of cost estimate BC Hydro uses for Full Funding Approval (i.e., Final Investment Decisions) for capital projects.**

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**2.0 B. PERFORMANCE ON SCOPE, SCHEDULE AND COST**  
**Reference: BC HYDRO SITE C LESSONS LEARNED REPORT**  
**Lessons Learned Report, pp. 6, 8, 10–11; Table 3, p. 11;**  
**Section 4.4.5, p. 74; Section 6.1.3, p. 132**  
**Performance on Scope, Schedule and Cost**

1.2.2 Please explain how the Project contingency amount and any management reserves were determined and how the lessons learned on Site C will inform determination of contingency amounts on future projects.

**RESPONSE:**

The methodology used to determine the Site C Project contingency amount and any estimated project reserve amount evolved over the course of the Project. BC Hydro has described below the methodologies that were used for each of the 2014 Final Investment Decision, the 2018 Approved Budget, the 2021 Approved Budget, and the subsequent Cost Risk Analyses. The methodology used for the 2021 Approved Budget and the subsequent Cost Risk Analyses are the most applicable to future major capital projects, since they included substantial input from the Project’s governing bodies, Ernst & Young, Mr. Peter Milburn, and other external advisors, lessons learned, and changes in risk management estimating best practices over the construction period.

The table below details the Site C Project Final Investment Decision (2014), 2018 and 2021 Budget including Project contingency and reserve.

<b>\$ Millions</b>	<b>Final Investment Decision Budget</b>	<b>2018 Approved Budget</b>	<b>2021 Approved Budget</b>
<b>Expected Total Project Cost Before Contingency and Reserve</b>	<b>7,543</b>	<b>9,134</b>	<b>15,263</b>
<b>Contingency</b>	<b>792</b>	<b>858</b>	<b>737</b>
<b>Total Expected Cost</b>	<b>8,335</b>	<b>9,992</b>	<b>16,000</b>
<b>Project Reserve</b>	<b>440</b>	<b>708</b>	<b>-</b>
<b>Total Authorized Cost</b>	<b>8,775</b>	<b>10,700</b>	<b>16,000</b>

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## **Methodology Used to Determine Project Contingency and Reserve**

### ***Final Investment Decision December 2014***

The Project contingency was \$792 million, and the Project reserve was \$440 million, for a total approved budget of \$8.775 billion. The Project reserve was held by the Government of B.C.'s Treasury Board and any draws on the Project reserve required their approval.

As discussed in BC Hydro's response to BCUC Staff IR 1.2.1, the Final Investment Decision cost estimate aligned to BC Hydro's Project and Portfolio Management practices, was consistent with an Association for the Advancement of Cost Engineering International (AACEI) Class 3 Estimate, had an accuracy range of +15% / -10%, and was based on a preliminary level of design.

The total cost estimate (Total Expected Cost) was based on information known at the time including anticipated contract work packaging for the major construction activities such as main civil works, generation station and spillways, turbines and generators, Highway 29 realignment, transmission lines, the Site C substation, reservoir clearing, early works and worker accommodations.

The initial Site C capital cost estimate was developed in 2010. BC Hydro performed a Monte Carlo analysis to assess the Project risks to calculate the amount of Project contingency required for the Project. The estimated Project contingency was allocated to address risks that were reasonably within the control of the Project team and that could be addressed through timely mitigation measures. The analysis included an assessment of the adequacy of the Project contingency to address the potential of risks occurring as the Project progressed to the procurement and construction phases. BC Hydro also reviewed the uncertainty associated with the estimated cost of the direct cost work packages, with respect to scope changes, accuracy of estimate and labour cost fluctuations. The impact of variations in mark-up was also assessed as a total for the overall direct cost package. The 2010 cost estimate and the 2014 cost estimate update underwent an external independent review by KPMG LLP and validated the methodologies and assumptions used in the Final Investment Decision cost estimate.

In 2014, BC Hydro conducted a cost estimate refresh to inform a final investment decision. The Project contingency analysis was refreshed to reflect the more advanced stage of Project design and engineering. The cost estimate refresh showed that while some costs had increased, these were offset by savings, and the 2010 total Project cost estimate was still appropriate. BC Hydro performed an updated Monte Carlo analysis, similar to the one completed in 2010, to assess the updated Project risks, assess the adequacy of the contingency funds, and reviewed the major Project work packages with respect to scope changes, accuracy of estimate, and labour cost fluctuations. The analysis considered best

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and worst-case scenarios on each line item in the estimate.<sup>1</sup> The impact of variations in mark up was also assessed as a total for the overall direct cost package. The resulting Project contingency was also reviewed by the BC Hydro Estimating team.

In 2014, three external peer reviews were undertaken of the Project's cost estimates and risks, as follows:

- In October 2014, KPMG conducted a review of the updated 2014 cost estimate and concluded that:

“Overall, the BC Hydro Project Team has diligently assessed project risk events and allowed for Project Contingency to address such risks.”

“We have reviewed the Assumption development process, and it shows a level of care and diligence consistent with an infrastructure project about to enter the construction phase. Based on our review, it is our view that the Project Team has followed reasonable and appropriate processes for developing the Assumptions used in the Financial Model. ...Based on our review, we believe that the Assumptions have been properly transcribed into the Financial Model. The Financial Model also appears to have been constructed appropriately, insofar as its logic and arithmetic integrity is concerned.”

“Based on the input from the project team and our experience with other projects adopting a management reserve of at least 5% of the direct costs would be a reasonable practice.”

- Marsh Canada, a global expert in risk management, was also asked to review and comment on the risk management approach and framework adopted by the Project. The review was conducted to ensure that the Project's framework aligned with industry best practices in developing the Project contingency amounts. Marsh concluded:

“In our view, BC Hydro's Site C Risk Management team has done a very good job developing its project risk plan and is well positioned to implement risk management planning as the project continues to mature. ...A strong foundation for risk management has been developed for the Site C project.

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<sup>1</sup> Since 2022, AACEI recommends this practice (41R-08) and no longer recommends line item range estimating for contingency determination.

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**As the project evolves, the team is in a good position to sustain effective risk management.”**

- **An additional review of the Project’s estimate of construction costs was undertaken by a panel of four experienced independent contractors with 35 to 50 years of experience in management and construction of major capital projects, and their key findings were:**

**“Overall, it is the panel’s conclusion that the estimate is sufficient for the proposed scope and schedule of Site C. The estimate has an appropriate level of accuracy for making a final investment decision. Further, there are some opportunities for cost reduction available.”**

**“The direct cost estimate has been prepared to a higher level of detail than typical owner’s estimates and at a similar level of detail as a Contractor in the Private Sector.”**

**“The direct cost estimate appears to be sufficiently complete and adequate to cover all anticipated costs associated with constructing the works in the planned time schedule.”**

**“The approach used by BC Hydro on the larger contract packages where two independent estimates were consolidated into a single final estimate is consistent with the experience of the Panel. This methodology reduces the likelihood of error and improves the quality of the final estimate.”**

**“The estimate has sufficient allowances/contingency to cover any reasonable increase in cost resulting from design development or cost estimate uncertainty.”**

**For the estimated Project reserve, BC Hydro, with assistance from Partnerships BC, conducted a full assessment of risk events outside the control of the Project team in 2010 that included the most significant risks of extraordinary delays in the regulatory process and approvals, extraordinary incentives to attract labour, harsher than anticipated environmental assessment certificate requirements, exceptional fluctuations in interest rates, or diversion tunnel construction issues that the Project was exposed to, and calculated a Project reserve to address those risks. The estimated Project reserve was to address these risks that were largely outside the control of the Project team.**

**The estimated Project reserve analysis was also refreshed in 2014, due to changes in the risk events identified in the 2010 assessment with Partnerships BC that had materialized and had been absorbed into the 2014 Project cost estimate (e.g., schedule delays due to the regulatory process). The remaining risks outside the control of the Project team included higher interest rates, higher inflation, or a**

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critical path schedule delay during construction were determined to require a Project reserve of approximately 10% of the remaining direct construction costs.

### *2018 Approved Budget*

The Project contingency was \$858 million, and the Project reserve was \$708 million, for a total approved budget of \$10.7 billion. The Project reserve was held by the Government of B.C.'s Treasury Board and any draws on the Project reserve required their approval.

The 2018 Approved Budget Project cost estimate was developed using enhanced cost estimating methodologies, and processes and continued to align to AACEI standards and BC Hydro's Project and Portfolio Management practices.

The estimated Project contingency was to account for costs that could not be specifically identified and captured in the base cost estimate, but which could be foreseen to occur during the life of the Project with varying degrees of probability. The Project contingency was developed using the remaining Project risks and by determining the possible cost variations for the cost items in the base estimate and calculated on a sub-project level (e.g., Main Civil Works, Generation Station and Spillways, Turbines and Generators). A Monte Carlo risk analysis was used to calculate the Project contingency percentages at the P50<sup>2</sup> level. Contingency was not included for items subject to risks that were not under the control of the project, which was consistent with standard estimating practices and procedures.

The Project contingency required at the P50 level was used. The Project reserve amount was estimated largely based on the potential for river diversion to be delayed by one year and to be used as an additional amount to the total expected cost to cover known risk / scope items.

### *2021 Approved Budget*

The Project contingency was \$737 million and there was no Project reserve, for a total approved budget of \$16.0 billion.

The 2021 Approved Budget Project cost estimate was developed using enhanced cost estimating methodologies, and processes and continued to align to AACEI standards and BC Hydro's Project and Portfolio Management practices.

BC Hydro worked collaboratively with Ernst & Young, the Project's Independent Oversight Advisor, to agree on the enhanced, structured Cost Risk Analysis

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<sup>2</sup> P50 means that the actual cost is expected to be higher 50% of the time and lower 50% of the time.

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process that was used to determine the estimated Project contingency amount for the 2021 Approved budget.

This enhanced Cost Risk Analysis was a structured process used to evaluate financial risks by analyzing all open risks in the Risk Register that have a financial loss consequence if they were to occur. The Cost Risk Analysis was conducted by the Risk Management Team, with input from Risk Owners and the Estimating Team through the completion of risk documents which included the risk event description, scope, risk assumptions, three-point cost estimate<sup>3</sup>, risk probability, and a justification statement.

Once the Risk Management Team had identified all relevant risks from the Risk Register, and all necessary data had been captured and reviewed for quality, a Monte Carlo analysis was performed using risk management software to quantify the potential cost impacts and the results were then fed back into the Risk Register. This methodology aligned with BC Hydro's Project and Portfolio Management practices, as well as the ACEI standards.

The estimated Project contingency required at the P50 level was used.

A Project reserve was not established for the 2021 Approved budget because, at the time the budget was being approved, work was continuing on the 2021 Milburn Report recommendations and the Risk Management Enhancement Plan which could impact the methodology that would be used for future cost risk analysis. However, regular Project cost reporting was provided to the Treasury Board and because the Project has continued to forecast the Project would be delivered within the \$16 billion approved budget, no Project reserve was established after the 2021 Approved budget.

### How the Lessons Learned on Site C Will Inform Future Projects

For future BC Hydro major capital projects, BC Hydro will continue to use Monte Carlo simulations to model the quantitative risk analysis and generate an estimated project cost distribution. The estimated Project contingency required at the P50 level will be used. The project reserve will be composed of two distinct components:

- The difference between the P90 estimated cost and the P50 estimated costs. This amount provides additional coverage for the blended impact of known project-specific and non-specific risks already reflected in P50 contingency, but at a higher confidence level that the total estimated project cost will not be exceeded; and

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<sup>3</sup> A three-point cost estimate includes optimistic, most likely, and pessimistic estimates.

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- **Special Reserve, which includes known specific risks that have not been assigned a probability of occurrence but may be realized as a project is implemented. A special reserve is not routinely included in most estimates, but in certain circumstances it may be appropriate to include for risks specifically identified for a project. Please refer to BCUC Staff IR 1.12.4 that describes when a special reserve may be determined for low probability, high consequence risks.**

**BC Hydro adapted and enhanced processes throughout the Site C Project, as outlined throughout this response. In order to carry forward these enhancements, the lessons learned will inform the determination of Project contingency and reserve amounts on future major capital projects in the following ways:**

- **BC Hydro should continue to estimate the cost for the project, and the required project contingency and any project reserve, based on BC Hydro's Project and Portfolio Management Cost Estimating practice, which is consistent with the AACEI standards. For very large and complex projects, like Site C, BC Hydro will consider utilizing the enhanced Cost Risk Analysis process that was used based on the input from Mr. Peter Milburn and Ernst & Young (Lesson RM2). This enhanced analysis is appropriate when project uncertainties, novelty, or cost require a more detailed understanding of potential outcomes to support decision making;**
- **A single consolidated risk register was implemented for the Site C Project in 2018. For future capital projects, BC Hydro should prepare a consolidated and enhanced risk register that includes all key risks that can impact or benefit the delivery of the Project. The comprehensive single risk register will improve the cost risk estimates and provide more consistent contingency analysis (Lesson RM1);**
- **Site C conducted extensive geotechnical investigations and site studies prior to the start of construction. For future capital projects with significant geotechnical risks, BC Hydro should complete early and comprehensive geotechnical studies and site investigations to develop a detailed geological model to be used to inform the Project team on the key geotechnical risks faced by the Project and to be included in the Risk Register (Lessons GR2 and GR3); and**
- **BC Hydro should ensure governing bodies are aware of the low-probability, high-consequence risks for the project, and that they fully understand the budget and schedule impacts if these risks materialize (Lessons RM4 and RM5).**

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- 2.0 B. **PERFORMANCE ON SCOPE, SCHEDULE AND COST**  
Reference: **BC HYDRO SITE C LESSONS LEARNED REPORT**  
**Lessons Learned Report, pp. 6, 8, 10–11; Table 3, p. 11;**  
**Section 4.4.5, p. 74; Section 6.1.3, p. 132**  
**Performance on Scope, Schedule and Cost**
- 1.2.3 Please describe the management process for all contingencies and reserves.

**RESPONSE:**

Please refer to BC Hydro’s response to BCUC Staff IR 1.2.2 for an explanation regarding how reserves and contingencies were established on the Site C Project and on other major capital projects.

**Site C Project Reserve**

The Final Investment Decision Budget, the 2018 Approved Budget, and the 2021 Approved Budget were approved by BC Hydro Management, the Site C Project Board / the Project Assurance Board (from 2018), the BC Hydro Board of Directors, and the Government of B.C.

The Final Investment Decision Budget and the 2018 Approved Budget included a project reserve held by the Treasury Board. Access to project reserve funding required Treasury Board approval. Due to the ongoing implementation of recommendations from the 2021 Milburn Report and the Risk Management Enhancement Plan, the 2021 Approved Budget did not include a project reserve. However, regular Project cost reporting was provided to the Treasury Board and because the Project has continued to forecast the Project would be delivered within the \$16 billion approved budget, no Project reserve was established after the 2021 Approved Budget.

**Site C Contingency**

The management processes for the project contingency went through numerous iterations and evolved over the construction phase of the Project, as Project governance and oversight was enhanced. Access to the project contingency funding required approval from the Site C Project Board / Project Assurance Board (from 2018) and the BC Hydro Board of Directors. This represented a higher level of governance and oversight of project contingency compared to other BC Hydro capital projects where access to project contingency is typically delegated to the Project Team.

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For the contingency included in the First Full Funding budget, the Project Team requested approval for contingency releases from the BC Hydro Board of Directors on an annual basis, or more frequently if required, to manage the risks for that period and included requests for contract contingency for the major contracts being awarded at the time. The contingency releases, if approved, were allocated to the sub-project (e.g., Main Civil Works, Generation Station and Spillways). Contingency usage, allocation, and a summary report was provided to the BC Hydro Board of Directors on a quarterly basis for information.

After the approval of the 2018 Approved Budget and the establishment of the Project Assurance Board, further enhancements were made to the contingency management process. In addition to the annual (or more frequent), approval of contingency releases from the BC Hydro Board of Directors, contingency reporting to the Project Assurance Board included forecasted cost pressures (i.e., forecasted costs more than current budgets that are likely to occur) and a forecasted cost “watch list” (i.e., potential incremental costs that are less certain to occur and the cost forecasts are less certain). This enhanced reporting provided timely information to the Project Assurance Board on potential future contingency release approvals and the potential impacts to the Project’s total cost.

Following the approval of the 2021 Approved Budget, the contingency management process was as follows:

- On a frequency determined by the Project Assurance Board, the Cost Risk Analysis<sup>1</sup> described in BC Hydro’s response to BCUC Staff IR 1.2.2, was completed for the Project. The Cost Risk Analysis estimated the required contingency at the P50 value to the end of the Project based on the remaining Project risks in the risk register.
- As part of the monthly progression cycle, the estimated costs for all work packages on the Project were reviewed and updated by the Project team and the following actions were taken:
  - ▶ If the updated forecasted cost to the end of the Project for any work package was lower than the control budget for that work package and it was very likely those lower costs would be realized, the control budget for

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<sup>1</sup> The Cost Risk Analysis is a structured process used to evaluate financial risks by analyzing all open risks in the Risk Register that have a financial loss consequence if they were to occur. The Cost Risk Analysis is conducted by the Risk Management Team, with input from Risk Owners and the Estimating Team through the completion of risk documents which include the risk event description, scope, risk assumptions, three-point cost estimate, risk probability, and a justification statement.

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the work package was reduced and those savings were identified and transferred to Project contingency; and

- ▶ If the updated estimated cost for any work package exceeded the control budget for that work package, a potential cost pressure was identified. If the cost pressure could be funded within the control budget for the work package, possibly due to other savings in the work package, the cost pressure was documented and there was no change to the control budget. If a cost pressure could not be funded within the control budget for the work package, these cost pressures were documented, tracked, and if required, approval for a Project contingency draw was initiated. If the Project contingency draw was approved by the Project Assurance Board and the BC Hydro Board of Directors, the required additional funds were used to increase the control budget for that work package.
- On a monthly basis, the following information was reported to the Project Assurance Board and the BC Hydro Board of Directors:
  - ▶ The approved Project contingency amount;
  - ▶ The remaining Project contingency amount, and the life-to-date net draw (sum of cost pressures and savings) on the Project contingency;
  - ▶ A list of all potential cost pressures that had been identified for all work packages on the Project. The list included the total amount and individual amounts for each potential cost pressure in the list;
  - ▶ The remaining amount from the most recent approved Cost Risk Analysis. The remaining amount was determined based on the original amount from the most recent approved Cost Risk Analysis, less any previous Project Assurance Board-approved Project contingency draws that were the result of risks in the Cost Risk Analysis materializing; and
  - ▶ The Available Contingency amount. The Available Contingency amount is the remaining Project contingency amount, less the sum for all potential cost pressures identified to date, less the remaining amount for the most recent approved Cost Risk Analysis. If the Available Contingency amount was greater than zero, the Project continued to forecast to be completed within the approved budget.

### Project Reserve on Other Major Capital Projects

For general project reserves that are established for other capital projects, BC Hydro monitors project costs and remaining forecasts as part of its standard monthly progression cycle. If the forecast cost of the project exceeds the

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**Expected Cost<sup>2</sup> but is lower than the Authorized Cost<sup>3</sup> and the change in forecast is deemed to be permanent, then a reserve draw may be requested.**

**For project reserves that are established for specific identified project risks, a reserve draw may be requested if those risk materialize. Access to the project reserves requires additional approval from the financial approver of the project or as otherwise delegated.**

### **Contingency on Other Major Capital Projects**

**Contingency forecast updates are typically performed monthly and are similar to the management processes described above for Site C. The project team will determine the remaining impact of any future risks to determine the new contingency forecast each month.**

**Similar to Site C, if the updated estimated cost for any work package is lower than the control budget for that work package and the forecast change is deemed to be permanent, then the control budget for the work package may be reduced and those savings are transferred to Project contingency. If the updated estimated cost for any work package exceeds the control budget, and the change in forecast is deemed to be permanent, then a contingency draw can be made. This involves increasing the control budget for the work package, reducing the contingency forecast by the same amount, and documenting this change in the change log.**

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<sup>2</sup> The Expected Cost is defined as the estimated cost at the P50 confidence level, as defined in AACEI Recommended Practice 10S 90, which indicates an “expected 50% probability that the final result will be less than (more favourable) or equal to the P50 value.”

<sup>3</sup> The Authorized Cost is defined as the estimated cost at the P90 level, plus the Special Reserve.

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**Section 4.4.5, p. 74; Section 6.1.3, p. 132**  
**Performance on Scope, Schedule and Cost**

1.2.4 Please describe all lessons learned pertaining to cost estimating on the Site C Project.

**RESPONSE:**

BC Hydro acknowledges that the Project was more complex and challenging than BC Hydro and its contractors anticipated, and this was a key learning from the Project. For example, the costs related to the major seasonal variations in weather, delays in ramping up internal resources more proactively and sooner at the start of construction, the need to attract a skilled workforce to a non-urban area, and higher environmental regulations were all more expensive than initially estimated despite following cost estimating best practices. In addition, the Project also experienced several challenges that led to significant budget increases in 2018 and 2021. These experiences and the lessons learned on the Project will help inform, improve, and enhance the delivery of future major capital projects and the associated cost estimates.

The following specific lessons learned pertain to cost estimating on the Site C Project:

***RM1: Consolidate and enhance risk registers to improve cost risk estimates and provide more consistent analysis.***

The risk register is a key input when determining the amount of project contingency required to address the project risks. The use of a single consolidated risk register, with appropriate fields, allows for a consistent approach to risk identification, assessment, and quantification. A consolidated risk register also establishes one source of truth, reducing the chance of inadvertently omitting risks documented elsewhere. A single consolidated risk register was implemented for the Site C Project in 2018.

A single consolidated risk register improves the cost risk estimates and provides more consistent and transparent contingency analysis.

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***RM2: For very large and complex projects, implement Cost Risk Analysis and Schedule Risk Analysis processes that are complete and transparent and include effective methods to quantify risks.***

Implementing the Cost Risk Analysis process on the Site C Project allowed for improved cost estimation of project risks. As described in BC Hydro’s response to BCUC Staff IR 1.2.3, regular quantification of the forecasted Cost Risk Analysis amount, along with the remaining contingency amount and the total amount for all potential cost pressures that had been identified for all work packages was used to calculate the remaining contingency available. This lesson learned highlights the important role that the Cost Risk Analysis process played in being able to communicate the remaining contingency amount to the Project’s governing bodies.

***RM5: Ensure governing bodies are aware of the low-probability, high consequence risks for the project and that they fully understand budget and schedule impacts if these risks materialize.***

Depending on the nature of a future major capital project, low-probability, high consequence risks could be included in a project’s total cost estimate by allocating funds to a special reserve or to contingency. A thorough and detailed discussion between the project’s risk management team, project leadership and the governing bodies should review the low-probability, high consequence risks to determine the likelihood and impacts of the risk materializing and if additional contingency or a special reserve should be established. For example, it is unlikely that the impacts of another global pandemic would be included in contingency or a special reserve for future major capital projects. However, if a future capital project is to build a new generating station, dam, and spillway, additional contingency or a special project reserve might be appropriate for unknown or unexpected geotechnical risks as a result of the Site C Lessons Learned. In some cases, these risks may be identified but not accounted for in the cost estimate. In these cases, governing bodies must recognize that additional funds will need to be allocated to the project if these risks materialize. For further discussion on this point, please refer to BC Hydro’s response to BCUC Staff IR 1.12.4.

This lesson learned highlights the importance of communicating effectively to governing bodies what project risks are excluded from the project’s total cost estimate, so that the cost and schedule impacts of the excluded risks, if they materialize, are clearly understood.

***RM7: Implement effective early project planning to mitigate or reduce project costs and schedule impacts.***

Early project planning can help improve cost estimating in the following ways:

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- Having an early understanding of scopes of work, such as those associated with the North American Electric Reliability Corporation (NERC) requirements, can improve the accuracy of cost estimates, and mitigate the risk of changes to scopes of work once the work has commenced; and
- Early project planning should include the development of the project’s risk register and a review of lessons learned to inform cost estimates in the early phases of the project lifecycle. As outlined in Lesson RM3, it is important to ensure that sufficient and qualified risk management resources have been assigned, especially early in the project lifecycle.

***GR1: Identify and engage geotechnical experts early, particularly on complex issues, and maintain involvement throughout design and major change processes.***

For projects with complex geotechnical issues, geotechnical experts can provide guidance and advice on designs and independent verification of recommended solutions, which improves the quality of the design that informs cost estimates.

***GR2: Conduct thorough investigations to inform design considerations early and to frame baseline information.***

Early geotechnical investigations can help to inform design considerations, provide baseline information, data and identify potential risks, which can help improve the accuracy of cost estimates.

***GR3: Develop robust geotechnical models to evaluate performance and proactively support required enhancements.***

For projects with complex geotechnical issues, the development of robust geological models can reduce geotechnical risks and provide valuable inputs for the cost estimate. On the Site C Project, the instrumentation installed and then monitored, allowed BC Hydro to detect and evaluate small deviations from the model, supporting a proactive approach to addressing geotechnical risks as they arose. The model also provided valuable information and data which was used to develop scopes of work and detailed cost estimates (e.g., identifying reservoir impact lines and the expected likelihood and nature of hazards around the reservoir). The geological models and instrumentation information were also shared and discussed with third-party independent experts (e.g., Technical Advisory Board), so their technical knowledge and expertise could review, advise, and endorse the Project team’s recommended technical solutions. This independent technical expertise and endorsement of the recommended solutions supported and informed the cost estimates prepared for the work scopes.

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**Performance on Scope, Schedule and Cost**

1.2.5 Please explain BC Hydro’s selection of a monthly progression cycle for the Project. In the response, please explain whether BC Hydro considered weekly progressions or another interval other than monthly. Please explain how a project’s total cost and duration are considered when selecting a progression cycle interval.

**RESPONSE:**

This response also answers BCUC Staff IR 1.2.6.

The Site C Project used a monthly progression cycle, in conjunction with daily and weekly meetings and updates from on-site construction teams and contractors which also included participation from senior management across the project, monthly progression payment estimates from contractors, and monthly actual costs.

A monthly progression cycle, combined with daily and weekly on-site construction updates or production tracking, is the Project and Portfolio Management standard used for all BC Hydro major capital projects, regardless of a project’s total cost and duration. It is considered best practice and typical for large, complex, engineering and construction projects, like Site C. The daily and weekly on-site construction updates were used to:

- Monitor, track, update, and report on the detailed construction progress within the period between the monthly progressions. This enabled the Project team and senior management across the Project to compare the construction progress daily to the latest monthly progression schedule and planning, and ensured productivity targets were being met. For example, during the peak construction period, the quantities of concrete placements for the powerhouse and spillways and dam core placements were tracked and discussed at the daily and weekly on-site meetings and compared to the monthly progression schedules. The daily and weekly monitoring updates were verified by BC Hydro and compared when approving the monthly progress payments to the contractors; and
- Enable the early identification of construction issues, schedule delays, or other issues, and provide the ability to quickly course correct and respond to issues before significant project spend occurred.

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**The process for the monthly progression cycle takes approximately 10 days to complete. A monthly progression cycle balances the appropriate level of detail with data manageability and provides a sufficient period to measure meaningful progress within complex work scopes. It also supported effective cashflow to the contractors performing the work through compiling and certifying the progress made and the work executed. Therefore, weekly progressions or another interval shorter than monthly, was not considered or deemed to provide more meaningful information.**

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**Performance on Scope, Schedule and Cost**

1.2.6 Please explain whether daily and weekly updates from the onsite teams and contractors were provided and how the updates were used to inform Project progress, schedule updates and decision-making. If not, please explain otherwise.

**RESPONSE:**

**Please refer to BC Hydro’s response to BCUC Staff IR 1.2.5 where we explain how daily and weekly updates from the onsite teams and contractors were provided and how they were used to inform Project progress, schedule updates, and decision-making.**

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Performance on Scope, Schedule and Cost**

1.2.7 Please provide the Project's average monthly spend during construction, and explain BC Hydro's lessons learned related to progression meeting frequency and opportunities to course correct before significant project spend occurs.

**RESPONSE:**

Construction on the Site C Project began on July 27, 2015. The Project's average monthly spend during the construction period from August 1, 2015 to November 30, 2025 was \$115.4 million.

As described in BC Hydro's response to BCUC Staff IR 1.2.5, using a monthly progression cycle, combined with daily and weekly on-site construction updates, was an appropriate frequency for the Site C Project and follows BC Hydro's Project and Portfolio Management standard for capital projects. BC Hydro does not expect that increasing the progression meeting frequency would have allowed for earlier opportunities to course correct, if required. The monthly progression cycle enabled BC Hydro to identify construction issues early before significant project spend occurred.

In addition to the monthly progression cycle, the following practices enabled BC Hydro to identify construction issues early before significant project spend occurred:

- The daily and weekly on-site construction updates or production tracking with the Project team, including participation from senior management across the Project and contractors, enabled the construction progress to be compared with the monthly progression schedule to ensure productivity targets were being met. This resulted in timely identification and effective intervention if issues arose, or work progress was delayed. Having senior management participate in the daily and weekly on-site construction updates provided the Project team and contractors timely decisions on the resolution of issues before they impacted production and ensuring priorities across the teams were aligned;
- BC Hydro's dedicated on-site construction management and resident engineering personnel were able to respond to issues on a real-time basis and directly with contractors who were performing the work;

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- **On-site BC Hydro management had the appropriate level of decision making authority to address emerging issues; and**
- **Having on-site representatives allowed for prompt escalation of issues to senior management and the governing bodies, as required.**

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**Performance on Scope, Schedule and Cost**

1.2.8 Please further discuss how BC Hydro intends to pay careful attention to the additive affects of small issues that can impact the schedule when combined together on future projects. In the response, please discuss how BC Hydro considers methods other than the Critical Path Method in its approach to project scheduling.

**RESPONSE:**

To address the additive effects of small issues that can impact project schedules, BC Hydro will continue to use monthly progression cycles for future major capital projects and will apply the considerations set out in CM 5.4<sup>1</sup>, as appropriate. The monthly progression cycle, with a focus on the specific considerations set out in CM 5.4, helps to address these additive effects by:

- Reflecting actual progress and forecast changes, based on monthly updates. This includes reviewing the integrity of contractor schedule updates and the impact it has on key interface points in the overall schedule;
- Reviewing quality assurance checks prior to publishing the monthly progression schedule in support of maintaining schedule integrity;
- Identifying new critical or near-critical paths, based on integrated Critical Path Method logic that recalculates schedule float; and
- Identifying variances early and highlighting cumulative impacts before they become critical.

BC Hydro also employs other approaches in addition to the Critical Path Method to support project scheduling, including:

- **Milestone Variance Analysis:** monthly review of milestones against their Approved Dates to detect trends and emerging risks. This analysis is carried out for all milestones, not just those on the critical path;

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<sup>1</sup> Refer to Table 10 of the Lessons Learned Report.

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- **Risk Management: tracking and monitoring of risks through the risk register that have a potential schedule consequence; and**
- **Change Control Process: this process involves the tracking and release of schedule float to milestones as required.**

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**Performance on Scope, Schedule and Cost**

1.2.9 Please describe how BC Hydro measures its progress on project schedule. In the response, please explain whether schedule performance is managed against the 2014 schedule, or another schedule.

**RESPONSE:**

Consistent with BC Hydro’s Project and Portfolio Management practices, the Site C Project maintained the following schedule baselines:

- **First Full Funding:** this baseline is established one time only, at the point of first full funding for the Implementation phase of the project (i.e., the Final Investment Decision for the Site C Project in December 2014);
- **Performance Measurement Baseline:** this baseline is established to support a revision of the full project funding (i.e., for the 2018 Approved Budget and schedule, and the 2021 Approved Budget and schedule);
- **Prior Month Forecast Baseline:** this baseline is established monthly. It contains the forecasted costs, milestones, and resources at a point in time, and is used to compare against the Performance Measurement Baseline; and
- **Fiscal Year Baseline / Seasonal Baselines:** the purpose of these baselines are to allow schedule tracking by fiscal year and construction season. For the Site C Project, seasonal baselines were taken in April and October to provide benchmark schedules for the upcoming summer and winter construction periods.

Schedule performance for the Site C Project was managed against the most recent Performance Measurement Baseline schedule. As part of the Project Completion and Evaluation Report, schedule performance will also be compared against the First Full Funding schedule.

The Site C Project used information from several sources to measure progress on the Project schedule, including:

- Information in the Project schedule;

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- **Contract pay item information from contractor progress payment reports and change orders;**
- **Daily and weekly field reports;**
- **Three-week look ahead schedules from contractors; and**
- **Information collected from BC Hydro field resources including resident engineers, construction officers, and quantity surveyors.**

**Construction progress on-site was tracked and reported by BC Hydro’s contractors, consistent with their contractual obligations, and confirmed by BC Hydro construction management and resident engineering personnel. This information was then used by BC Hydro for the daily and weekly on-site construction progress tracking, updates, and reporting, and for the monthly schedule progression cycle to ensure the productivity targets would be met.**

**Construction progress tracking related to the Project schedule was based on the physical completion of the quantities of work in the field and compared against the plan, as well as an understanding of the remaining outstanding work (i.e., is the remaining work more, or less, complex or time consuming compared to the completed work). This information was then used to determine the percentage complete of the work for each construction work package.**

**The information from the daily and weekly on-site construction updates with the Project team, senior management from across the Project and contractors was also used to compare schedule progress in the monthly progress payments to contractors. Progress payments to contractors were made based on quantities verified by BC Hydro, e.g., concrete placements for the powerhouse and spillways or dam material placements or by achieving milestones. This also ensured effective cashflows to the contractors performing the work.**

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**Section 4.4.5, p. 74; Section 6.1.3, p. 132**  
**Performance on Scope, Schedule and Cost**

1.2.10 Please list and explain any lessons learned regarding project schedule management.

**RESPONSE:**

As BC Hydro describes in BCUC Staff IR 1.2.5, a monthly progression cycle, combined with daily and weekly on-site construction updates or production tracking, is the Project and Portfolio Management standard used for all BC Hydro major capital projects, and typical for large, complex, engineering and construction projects, like Site C. The daily and weekly construction updates significantly focused on schedule performance with attendance from the Project team, senior management across the project, and the contractors to monitor, track, update and report on the detailed construction progress between the monthly progressions. This resulted in construction issues or delays being identified in a timely manner and proactive and timely decision making if course correction was required.

The following specific lessons learned pertain to project schedule management on the Site C Project:

- **RM2: for very large complex projects, implement cost risk analysis and schedule risk analysis processes that are complete and transparent and include effective methods to quantify risks.**

Implementing the Schedule Risk Analysis process on the Site C Project helped to determine the probability of achieving the Project schedule objectives using risk analysis software and a simulation model. This work strengthened the timeliness, completeness, and transparency of reporting on the quantification of the Project’s risks and provided important insights into the Project’s ability to achieve the schedule objectives to the governing bodies. This lesson learned highlights the important role of the Schedule Risk Analysis process and being able to communicate the ability to achieve the schedule objectives to governing bodies.

- **RM4: ensure risk reporting is clear and timely and provides early visibility to the potential for low-probability, high consequence events.**

This lesson learned highlights the importance of risk reporting consistently capturing all major or potentially major risks that could impact the Project’s

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schedule objectives, so that it can be communicated to governing bodies and discussed and reviewed accordingly.

- **RM5: ensure governing bodies are aware of the low-probability, high consequence risks for the project and that they fully understand budget and schedule impacts if these risks materialize.**

This lesson learned highlights the importance of effectively communicating to governing bodies what risks are excluded from the project schedule, so that the schedule impacts of the excluded risks can be understood if they materialize and the opportunities to course correct, if required.

- **RM7: implement effective early project planning to mitigate or reduce project cost and schedule impacts.**

Early project planning can help improve project schedule management in the following ways:

- ▶ **Having an early understanding of scopes of work, such as those associated the North American Electric Reliability Corporation (NERC) requirements, should reduce schedule risk, and mitigate the risk of delays once the work has commenced;**
- ▶ **Early project planning should identify seasonal impacts due to weather conditions (e.g., winter freeze) and environmental constraints (e.g., bird nesting) that can impact scopes of work and scheduling;**
- ▶ **Early project planning should include the development of the risk register and review of lessons learned to inform the project schedule in the early phases of the project lifecycle. As outlined in RM3, it is important to ensure that sufficient and qualified risk management resources have been assigned, especially early in the project; and**
- ▶ **Early and continuous engagement with contractors (including planned, proactive, and responsive engagement) to manage relationships and avoid delays.**
- **GR1: identify and engage geotechnical experts early, particularly on complex issues, and maintain involvement throughout design and major change processes.**

For projects with complex geotechnical issues, geotechnical experts can provide guidance and advice on designs early in the development process, as well as independent verification of recommended solutions, which can reduce schedule risk.

- **GR2: conduct thorough investigations to inform design considerations early and to frame baseline information.**

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Early geotechnical investigations can help to inform design considerations, provide baseline information and identify potential risks, which can reduce schedule risk.

- **GR3: develop robust geotechnical models to evaluate performance and proactively support required enhancements.**

For projects with complex geotechnical issues, the development of robust geological models can reduce geotechnical risks and the associated potential schedule delays.

- **IC1: enable early consultation and streamline ongoing engagements, including use of permitting and environmental forums.**

The Site C Project engaged Indigenous Nations from a very early period and throughout construction of all elements of the Project. Structured, regular engagements played a key role in building strong relationships. BC Hydro actively communicated schedules early, clearly, and repeatedly to avoid misunderstanding and support more constructive discussion.

- **CE1: plan and implement responsive stakeholder engagement early and maintain throughout the project lifecycle.**

The extensive stakeholder engagement plan that was implemented early in the project lifecycle helped to mitigate potential schedule delays due to concerns from communities, members of the public, property owners, environmental groups, and other stakeholders. The Project team responded to requests in a timely manner and pro-actively provided Project information, on a regular basis, to several stakeholders, that was targeted and tailored by region. This approach helped to de-escalate potential concerns and build trust with stakeholders and the public.

For large and complex projects like Site C, there are many inputs into the Project's schedule management, and these schedule management inputs are supported by a substantial number of data sources including onsite field reports, contractor progress reports, quantitative data (e.g., volume of materials) and schedule standards and practices. The Project's schedule is the summation of all of these inputs and sources of data, and these are used to develop accurate schedule forecasts, including key Project milestones.

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**Performance on Scope, Schedule and Cost**

1.2.11 Please explain who at BC Hydro defines project success and how success is measured. In the response, please explain how BC Hydro's performance against the original scope, schedule, and budget at Final Investment Design are considered in that definition, and any metrics used.

**RESPONSE:**

**A project's success is formally defined and measured at project completion in alignment with BC Hydro's Management and Accounting Policies and Procedures. A Project Completion and Evaluation Report is required to be completed and accepted by the Project Initiator and Project Sponsor for all projects that have a total forecasted Authorized Amount of greater than \$1 million at project completion. The Project Completion and Evaluation Report evaluates the project's success by measuring the actual cost, schedule and scope results against the baseline targets captured in the First Full Funding or Final Investment Decision baseline and also evaluates the actual impacts and realized benefits of the project against those stated in the First Full Funding or Final Investment Decision Business Case.**

**In addition to the formal measurement of a project's success at project completion through the Project Completion and Evaluation Report, projects often measure success at the completion of major milestones or the completion of major work scopes during the implementation phase of the project, and for Site C, metrics were included regarding performance against Site C's schedule and budget in the BC Hydro Annual Service Plan and Annual Service Plan Report. As explained in BC Hydro's response to BCUC Staff IR 1.2.9, BC Hydro captures multiple project baselines to measure and determine a project's success in relation to scope, schedule, and cost and the latest approved project budget and schedule is often used to measure success.**

**Under the formal process, the purpose of the Project Completion and Evaluation Report is to:**

- **Show completion, summarizing how the project was conducted from a project management perspective in terms of scope, cost, and schedule; and**
- **Evaluate the impacts and realized benefits.**

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The Project Completion and Evaluation Report details the extent to which project objectives, impacts and benefits were achieved and identifies lessons learned to improve future projects. The Project Completion and Evaluation Report uses the following metrics to measure scope, schedule, budget and impacts and benefits success:

- **Scope:** delivery of all major scope elements against the approved First Full Funding or Final Investment Decision, plus approved scope changes, and that the final asset or outcome meets the intended performance objectives stated in the Business Case;
- **Schedule:** measured by the variance between the planned In-Service Date (from First Full Funding or Final Investment Decision) and the actual In-Service Date where the In-Service Date achieved was on time or early, plus explanations for delays greater than one month;
- **Cost:** measured by the variance between the Authorized Cost at First Full Funding or Final Investment Decision and the final Estimate at Completion, plus explanations of any cost variances greater than \$1 million and greater than 20%; and
- **Impacts and Benefits:** evaluation is performed by knowledgeable individuals or subject matter experts who are in the best position to know, understand, and comment on what the project was meant to deliver by way of business benefits and impacts stated in the First Full Funding or Final Investment Decision business case and what was delivered.

For the Site C Project, the Project Completion and Evaluation Report is expected to be completed by the end of 2028, after the Project is complete. The Project Completion and Evaluation Report will include the evaluation of the Project's impacts and benefits that were detailed in the First Full Funding or Final Investment Decision business case such as economic development, environmental, community and Indigenous benefits, and alignment to the Provincial Government objectives in relation to the *Clean Energy Act*. The Project Completion and Evaluation Report will be submitted to the Commission.

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**3.0 C. PROJECT AND PORTFOLIO MANAGEMENT FRAMEWORK AND LESSONS LEARNED PRACTICE**

**Reference: Lessons Learned Report, Section 3.1, p. 38  
Project and Portfolio Management Framework**

1.3.1 Please elaborate on how BC Hydro’s Project and Portfolio Management framework is typically adapted to meet the scale and complexity of a specific project. Please explain how BC Hydro determines that its Project and Portfolio Management framework has been adapted appropriately to meet the scale and complexity of a specific project, including who makes these determinations.

**RESPONSE:**

**Projects that are classified as low risk and low complexity are typically assigned to BC Hydro’s Program and Contract Management Key Business Unit. This group is responsible for managing projects where the potential for issues is minimal and the execution is relatively straightforward. For all other projects, particularly those with higher risk or greater complexity, BC Hydro’s Project Delivery Key Business Unit is selected to oversee project execution.**

**The Project Delivery Key Business Unit executes its capital projects according to the Project and Portfolio Management standard project lifecycle. This framework is designed to be scalable to the unique characteristics of each project. The framework incorporates a structured approach for scaling up or down based on key factors, including project cost, complexity, and associated risks so that governance, documentation, and resource requirements are proportionate to the project’s size and risks while maintaining consistency across BC Hydro.**

**Scaling is determined through assessment against a defined set of criteria during the project’s Initiation and Identification-Needs phases. This assessment includes a determination of whether the project can be advanced as a single viable alternative project with a clear leading alternative. Scaling opportunities can also be assessed in the Identification-Conceptual, Identification-Feasibility, and Definition phases.**

**This scaling assessment evaluates the project against a defined set of criteria, including:**

- Technical and design complexity: scope definition, technology requirements, and integration challenges;**
- System integration: interdependencies with existing infrastructure;**

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- **Indigenous relations: considerations informed by the Project Impact Assessment (which BC Hydro uses to identify the project’s consultation or engagement requirements);**
- **Environmental: environmental screening based on project scope complexity and impacts to land, water, wildlife habitats, and archeology;**
- **Safety: potential safety impacts on workers and the public;**
- **Regulatory and permitting obligations: compliance requirements and timelines;**
- **Land tenure and acquisition risks: property-related requirements;**
- **Stakeholder engagement risks: community impacts and consultation needs; and**
- **Additional factors: team experience, procurement complexity, site accessibility, and scope certainty.**

**The scaling assessment is completed by the project team and reviewed and approved by the appropriate members of BC Hydro’s governing bodies.**

**3.0 C. PROJECT AND PORTFOLIO MANAGEMENT FRAMEWORK AND LESSONS LEARNED PRACTICE**

**Reference: Lessons Learned Report, Section 3.1, p. 38 Project and Portfolio Management Framework**

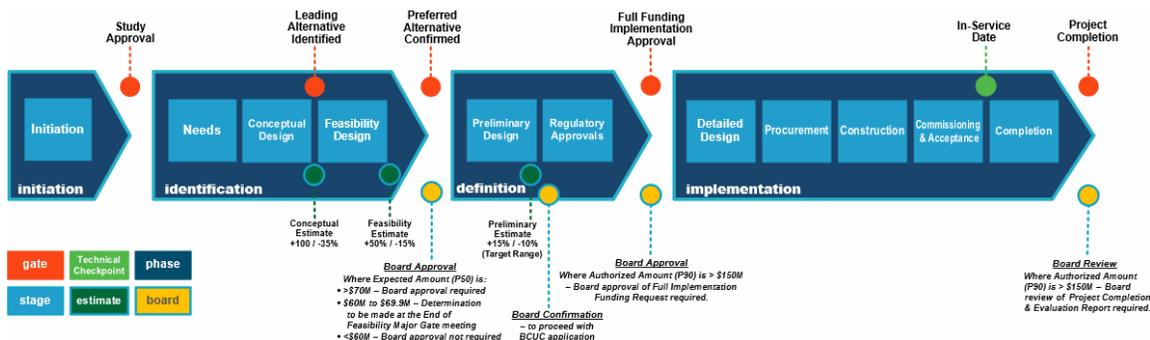
1.3.1 Please elaborate on how BC Hydro’s Project and Portfolio Management framework is typically adapted to meet the scale and complexity of a specific project. Please explain how BC Hydro determines that its Project and Portfolio Management framework has been adapted appropriately to meet the scale and complexity of a specific project, including who makes these determinations.

1.3.1.1 Please discuss how often BC Hydro typically reviews its Project and Portfolio Management approach over the course of a project to determine whether adjustments are needed.

**RESPONSE:**

BC Hydro reviews its Project and Portfolio Management approach on projects during the Initiation, Identification, Definition, and early Implementation phases.

BC Hydro executes its capital projects according to the Project and Portfolio Management standard project lifecycle (shown in the figure below), which can be scaled based on the scaling criteria documented in BC Hydro’s response to BCUC Staff IR 1.3.1.



Generally, large and complex capital projects follow the full standard project lifecycle. This phased lifecycle consists of the Initiation, Identification, Definition, and Implementation phases, with various stages within each phase as shown above.

Approvals of the approach generally occur at Identification-Needs or Identification-Conceptual stages in the project lifecycle, specifically at project

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gates, where key information such as project budget, schedule, scope, and risks are presented to the Project Initiator and Project Sponsor, and governing bodies.

Additional reviews and approvals can be requested, in addition to the standard gate reviews if significant changes are required to the project scope, schedule, and budget. If, the project team or others believe a revised approach is required at any point, change requests are presented to the Project Initiator and Project Sponsor, and as applicable, Executive Team members and BC Hydro's Board of Directors.

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**3.0 C. PROJECT AND PORTFOLIO MANAGEMENT FRAMEWORK AND LESSONS LEARNED PRACTICE**

**Reference: Lessons Learned Report, Section 3.1, p. 38  
Project and Portfolio Management Framework**

1.3.1 Please elaborate on how BC Hydro's Project and Portfolio Management framework is typically adapted to meet the scale and complexity of a specific project. Please explain how BC Hydro determines that its Project and Portfolio Management framework has been adapted appropriately to meet the scale and complexity of a specific project, including who makes these determinations.

1.3.1.2 Please discuss how often BC Hydro reviews its Project and Portfolio Management approach generally. In the response, please explain whether the Project and Portfolio Management approach is reviewed and adjusted after the completion of each large major capital project as part of the lessons learned process. If not, please explain why not.

**RESPONSE:**

**BC Hydro conducts an annual compliance audit on its Project and Portfolio Management practice areas. This process includes developing an annual compliance plan for Project and Portfolio Management, where each practice area identifies key compliance areas and deliverables to focus on and sets a target compliance threshold. Outcomes of the annual audit may result in the creation of action plans and enhancements to the practices. Enhancements are identified through other inputs, such as external third-party audits and the lessons learned from completed projects.**

**Simple updates to Project and Portfolio Management framework from large major projects are incorporated immediately while more complex changes are planned as part of the annual Project and Portfolio Management enhancement process, which is outlined in BC Hydro's response to BCUC Staff IRs 1.4.1 and 1.4.6.**

**Please also refer to BC Hydro's response to BCUC Staff IR 1.1.2 which explains how the Project and Portfolio Management Framework has been and will be adjusted as a result of the lessons learned in the Lessons Learned Report.**

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**3.0 C. PROJECT AND PORTFOLIO MANAGEMENT FRAMEWORK AND LESSONS LEARNED PRACTICE**

**Reference: Lessons Learned Report, Section 3.1, p. 38  
Project and Portfolio Management Framework**

1.3.2 Please elaborate on how BC Hydro's Project and Portfolio Management framework was specifically adapted to meet the scale and complexity of the Site C Project and explain whether additional adaptation of the framework may have been helpful in avoiding or foreseeing the challenges faced throughout Project development and construction.

**RESPONSE:**

As described in BC Hydro's response to BCUC Staff IR 1.3.1, BC Hydro's Project and Portfolio Management framework incorporates a structured approach for scaling the framework. The scaling assessment evaluates the project using a defined set of criteria and includes technical and design complexity requirements, Indigenous relations impacts, environmental impacts, regulatory requirements and other factors (e.g., team experience, and procurement complexity). For example on the Site C Project, the Contract Management practice was scaled up to form a dedicated, centralized Commercial Management team, the Risk Management practice was scaled up by enhancing the identification, tracking, quantification, and reporting of Project risks, the Governance structured was scaled up to include independent oversight and advisors to the governing bodies, and the Indigenous Relations practice was scaled up to enable additional consultation through specific forums and committees.

The response below provides further examples of how BC Hydro's Project and Portfolio Management framework was adapted and scaled up to meet the size and complexity of the Site C Project.

**Contract Management Practice**

- As discussed in BC Hydro's response to BCUC Staff IR 1.5.1, KPMG, as financial advisor to the Project, established a Due Diligence Advisory Team, and was available throughout the development of the procurement approach to provide strategic advice on procurement, commercial, and financial considerations. The findings from this work were consolidated in the Project Procurement Options Report;
- As discussed in BC Hydro's response to BCUC Staff IR 1.5.4, deficiency tracking is also a standard element of BC Hydro's Project and Portfolio Management practices. However, the comprehensive, stand-alone Deficiency

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**Management Plan that was developed for the Site C Project was developed to address the scale, complexity, and multi-contractor environment of the Project and is not a specific requirement of deficiency tracking;**

- **As discussed in BC Hydro’s response to BCUC Staff IR 1.5.5, the Project formed a dedicated, centralized Project Commercial Management team and developed a Project-specific Commercial Management Plan;**
- **As discussed in BC Hydro’s response to BCUC Staff IR 1.5.7, in-depth claims oversight workshops were held regularly with Ernst & Young, as the Project’s Independent Oversight Advisor. These workshops focused on reviewing claims and assessing impacts of claims on project cost, schedule, and risk;**
- **As discussed in section 4.4.2 of the Lessons Learned Report, an internal Interface Management Plan supported by structured processes, tools, and governance was developed to manage the information being exchanged between sub-project internal teams and contractors, particularly during interface handovers. The Project team also developed an online Prime Contractor Web Map to coordinate contractor responsibilities;**
- **As discussed in section 4.4.5 of the Lessons Learned Report, the Project established an Integrated Site Construction Schedule across all contracts to evaluate schedule variances and changes across the Project; and**
- **As discussed in section 4.4.6 of the Lessons Learned Report, the Project created a Labour Committee which served as an open forum where the Project team and contractors could engage in meaningful dialogue, share perspectives, and raise concerns.**

#### **Project Risk Management Practice**

- **As discussed in sections 5.1 and 5.2 of the Lessons Learned Report, although the Project followed the same general risk management framework and practices of BC Hydro’s Enterprise Risk Management Department and BC Hydro’s Project and Portfolio Management Sub-Practice for Risk Management, it was scaled up to the needs of the Project. This included the Risk Management Program, which sets out the risk management criteria developed for the Project, and the Risk Management Process, which describes how the Risk Management Program should be implemented;**
- **As shown in Figure 5 of the Lessons Learned Report, the Site C Project developed its own specific Risk Matrix based on the BC Hydro Project Delivery Risk Matrix, with adjustments for additional Consequence Severity categories to provide a more granular range of Risk Levels and an additional Project Risk Zone (for the Executive Team and Project Assurance Board);**

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- **As discussed in section 5.2.1 of the Lessons Learned Report, the Project has a centralized Risk Management Team that is generally responsible for reviewing all risk entries for accuracy and completeness. A Project Risk Review Committee was also established to provide governance for the Risk Management Program;**
- **As discussed in section 5.2.5 of the Lessons Learned Report, a monthly Site C Project Assurance Board Risk Report was provided to the Project Assurance Board, including the Government of B.C. representatives, and to the BC Hydro Board of Directors. The report sought to capture all the significant or potentially significant risks that could impact the Project's objectives; and**
- **As outlined in section 5.2.6 of the Lessons Learned Report, improvements were made to risk management throughout the Project lifecycle, including in 2019 in response to a report by Ernst & Young, and in 2020 and 2021 in response to the Site C Project Review by Mr. Peter Milburn. These improvements included: combining various risk registers into a single central risk register and increasing the visibility and reporting of identified risks; improved mapping of identified risks to the Cost and Schedule Risk Analyses; increasing the frequency of Cost and Schedule Risk Analyses; better applications and systems; adding more experienced resources to the central risk management team; and a greater role for the Project Assurance Board and the Independent Oversight Advisor.**

#### **Project Governance Practice**

- **The Site C Project adapted the typical Project and Portfolio Management governance structure, as shown in Figure 7 of the Lessons Learned Report. The Site C Project implemented the following additional governing bodies:**
  - ▶ **Site C Project Assurance Board;**
  - ▶ **The Commercial Sub-Committee;**
  - ▶ **The Technical Advisory Board;**
  - ▶ **The Independent Advisor Mr. Peter Milburn in July 2020, and two independent dam experts in late 2020;**
  - ▶ **The Independent Oversight Advisor (Ernst & Young);**
  - ▶ **The Treasury Board and / or Chair of Treasury Board and the Ministry of Energy and Climate Solutions; and**
  - ▶ **The procurement, as required, of independent third-party experts for advice, knowledge, and opinions in complex technical issues and**

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solutions (e.g., two international dam experts were retained by the Project Assurance Board to review the Right Bank Enhancement solutions).

### Indigenous Relations Practice

- The Site C Project adapted the typical Project and Portfolio Management Indigenous Relations Practice with additional consultation such as:
  - ▶ Forums and committees with First Nations, which created an opportunity to bring together multiple Nations to engage on important issues together;
  - ▶ The use of neutral facilitators selected by Indigenous Nations to assist in navigating sensitive topics and supporting the development of governance structures and Terms of Reference;
  - ▶ Regular Environment and Permitting specific forums with multiple First Nations, to serve as a platform to discuss construction activities, permitting requirements, and environmental and Indigenous concerns. Attended by BC Hydro subject matter experts and representatives from federal and provincial regulatory bodies, the forums enabled direct and ongoing dialogue and feedback; and
  - ▶ A Cultural and Heritage Resources Committee that helped with the identification of potential impacts and mitigation measures, identification and naming of key cultural sites, documenting historical use of the area, and commemoration of sites lost to inundation.

### Stakeholder Engagement Practice

- The Site C Project adapted the typical Project and Portfolio Management Stakeholder Engagement Practice and added additional consultation means such as:
  - ▶ Monthly employment figures were posted on the Project website and issued to the media;
  - ▶ BC Hydro established the Regional Community Liaison Committee during Project construction, to foster dialogue between BC Hydro, Peace region municipal and regional government officials, Peace region provincial government officials and Indigenous groups;
  - ▶ The Fort St. John Site C Community Consultation Office was established in 2008, followed by a second office in Hudson's Hope to provide direct, accessible points of contact for the public;

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- ▶ **BC Hydro entered into Community Measures Agreements with several municipalities and the Peace River Regional District as part of the Project. BC Hydro’s objective in negotiating Community Measures Agreements was to develop mitigation approaches to address unique impacts arising from the Project in cases where there were no existing mitigation measures or Environmental Assessment Certificate or Federal Decision Statement conditions already in place; and**
- ▶ **The Project also entered into the Regional Legacy Benefits Agreement between BC Hydro and the Peace River Regional District.**

**These adaptations during the Project’s lifecycle were appropriate for the scale and complexity of the Project. The table below identifies areas where earlier adaptation of the Project and Portfolio Management framework may have been beneficial.**

<b>Project and Portfolio Management Practice Area</b>	<b>Earlier Adaptation</b>
<b>Construction and Contract Management</b>	<b>Ramp up dedicated contract and commercial management resources, with representation on the project leadership team, earlier in the project lifecycle to effectively manage the commercial impact of contractor claims.</b>
<b>Risk Management</b>	<p><b>To be able to better communicate the breadth of low-probability, high-consequence risks that have the potential to result in significant budget and schedule impacts, implement the following enhancements earlier in the project lifecycle:</b></p> <ul style="list-style-type: none"> <li>• <b>Establish the Risk Management Program;</b></li> <li>• <b>Combine various risk registers into a single central risk register and increase the visibility and reporting of identified risks;</b></li> <li>• <b>Improve mapping of identified risks to the Cost and Schedule Risk Analyses;</b></li> <li>• <b>Increase the frequency of Cost and Schedule Risk Analyses;</b></li> <li>• <b>Adopt enhanced applications and systems;</b></li> <li>• <b>Add more experienced resources to the central risk management team; and</b></li> <li>• <b>Provide a greater role for the Project Assurance Board and the Independent Oversight Advisor.</b></li> </ul>

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Project and Portfolio Management Practice Area	Earlier Adaptation
Project Governance	<p>Implement adaptations to the mandate, expertise, and independence of the Project's governing bodies from the beginning, where appropriate. These adaptations may include:</p> <ul style="list-style-type: none"> <li>• <b>Creating a dedicated Project Board to provide sufficient time for the governing bodies to provide specific project focus and advice, and complete the required due diligence, discussions, and review;</b></li> <li>• <b>Establish sub-committees where additional advice and oversight is required; and</b></li> <li>• <b>Ensure independent membership of the dedicated Project Board, if created, from other governance bodies (such as the BC Hydro Board of Directors and Executive Team) and making independent external advice available to them.</b></li> </ul>

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**3.0 C. PROJECT AND PORTFOLIO MANAGEMENT FRAMEWORK AND LESSONS LEARNED PRACTICE**

**Reference: Lessons Learned Report, Section 3.1, p. 38  
Project and Portfolio Management Framework**

1.3.3 Please explain how the lessons learned from the Project and Portfolio Management approach on the Site C Project will inform the adaptation of the Project and Portfolio Management framework for the upcoming North Coast Transmission Line Phase 1 and Phase 2 Projects (North Coast Transmission Line Projects).

**RESPONSE:**

**The lessons learned on the Project and Portfolio Management approach used by the Site C Project will be reviewed and assessed for applicability to the North Coast Projects.**

**Examples of lessons learned that have already been implemented, or are planned to be implemented on the North Coast Transmission Line Projects and will result in adaptations to the Project and Portfolio Management framework, include:**

**Construction Management Practice**

- **Lessons learned discussed in sections 4.4.2 and 5.5.7 of the Lessons Learned Report identified Prime Contractor assignment and interface management as areas requiring stronger governance. In response to these lessons learned, a standalone Prime Contractor Assignment Plan will be prepared for the North Coast Transmission Line Projects;**
- **As discussed in BC Hydro’s response to BCUC Staff IR 1.5.6, the North Coast Transmission Line Projects will assign a dedicated commercial and claims team to monitor contractor progress and manage claims from the outset of the implementation phase;**
- **The North Coast Transmission Line Projects will implement the lessons described in section 4.4.4 of the Lessons Learned Report by developing a project tracking plan that integrates and uses spatial mapping, schedule tracking, quantities tracking, and visual representation and other digital tools, as applicable;**
- **The North Coast Transmission Line Projects will implement the lessons described in section 4.4.5 of the Lessons Learned Report with contracting strategies and deliverables that are clear on schedule requirements with contractors and have the detail required to support an integrated site construction schedule and reporting; and**

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- **The North Coast Transmission Line Projects will implement the lessons described in section 4.4.6 of the Lessons Learned Report by engaging in an early contractor involvement process for the line contractor construction procurement, and for other suitable contract areas, as applicable.**

#### **Risk Management Practice**

- **The North Coast Transmission Line Projects will apply the lessons described in section 5.5.1 of the Lessons Learned Report by using a centralized and enhanced risk register for managing the complexity and volume of risks and developing a risk management plan based on the recommendations from the 2021 Milburn Report, with adjustments as needed. As discussed in BC Hydro's response to BCUC Staff IR 1.17.7, the BC Hydro Board of Directors will consider the appointment of an Independent Oversight Advisor for the North Coast Transmission Line Projects as they proceed into the construction phase;**
- **As discussed in BC Hydro's response to BCUC Staff IR 1.12.3, the North Coast Transmission Line Projects will provide clear and timely risk reporting including visibility to low-probability, high-consequence risk events;**
- **As discussed in BC Hydro's response to BCUC Staff IR 1.12.3, the North Coast Transmission Line Projects will inform governing bodies of the implications of low-probability, high-consequence risks to inform decision-making and contingency planning; and**
- **The North Coast Transmission Line Projects have considered and will continue to consider the lessons described in section 5.5.6 of the Lessons Learned Report, including utilizing internal resources from the Site C Project and external advisors with experience in relevant projects. The practice of reviewing lessons learned will continue to support knowledge transfer from other ongoing projects.**

#### **Geotechnical Risk Management**

- **The North Coast Transmission Line Projects will apply the lessons learned in section 6.4.1 of the Lessons Learned Report by initiating early engagement with geotechnical experts to identify areas of concern where additional investigative work is needed. Efforts to mitigate issues will continue throughout the project;**
- **The North Coast Transmission Line Projects have applied the lessons learned in section 6.4.2 of the Lessons Learned Report by completing investigations and incorporating early geotechnical analysis into the decision-making process for route selection; and**

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- **The North Coast Transmission Line Projects are also implementing the lessons described in section 6.4.3 of the Lessons Learned Report by using monitoring tools at specific locations identified as higher geotechnical risk areas, and using instrumentation and ongoing monitoring for managing geotechnical risks.**

#### **Project Governance Practice**

- **The North Coast Transmission Line Projects have implemented the lessons described in sections 7.3.1 and 7.3.2 of the Lessons Learned Report by implementing a monthly Executive Steering Committee and the North Coast Transmission Line Projects Sub-Committee of the Capital Projects and Programs Committee of the BC Hydro Board of Directors.**

#### **Indigenous Relations Practice**

- **The North Coast Transmission Line Projects will implement the lessons learned described in sections 8.3.1 to 8.3.4 of the Lessons Learned Report by:**
  - ▶ **Maintaining early and ongoing communication throughout the projects on environmental, cultural, and heritage matters and in accordance with agreements with First Nations;**
  - ▶ **Developing cultural monitoring and guardian programs, as needed, as the projects progress and in accordance with agreements with First Nations;**
  - ▶ **Developing an Indigenous Participation Strategy in accordance with agreements with First Nations; and**
  - ▶ **Employing Indigenous workers and supporting Indigenous awareness training among project personnel and in accordance with agreements with First Nations.**

#### **Stakeholder Engagement Practice**

- **The North Coast Transmission Line Projects will implement the lessons described in sections 9.3.1 to 9.3.4 of the Lessons Learned Report by:**
  - ▶ **Implementing early stakeholder engagement approaches such as open houses, public communication information sites, and offering an active community presence through in person office hours across the region; and**

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- ▶ **Tailoring organizational structures including a dedicated communications lead, which will be scaled to the size and demands of the projects as needed.**

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**4.0 C. PROJECT AND PORTFOLIO MANAGEMENT FRAMEWORK AND LESSONS LEARNED PRACTICE**

**Reference: Lessons Learned Report, Section 3.2, pp. 39–41  
Lessons Learned Database**

1.4.1 Please discuss the evolution of BC Hydro’s Lessons Learned Database over time. In the response, please include when it was established, how lessons added are reviewed and considered, and how BC Hydro considers past lessons learned when planning and executing its projects.

**RESPONSE:**

This response also answers part of BCUC Staff IR 1.4.6 by providing details on the process and frequency of reviews of the Lessons Learned Database.

BC Hydro’s Project Delivery Lessons Learned Database was established in March 2014. As part of its implementation, lessons documented in project records prior to 2014 were incorporated into the database.

Any project team member can contribute a lesson to the Lessons Learned Database. When a lesson is entered, it begins in “draft” status and is initially visible only to team members working on that particular project. The lesson then undergoes several reviews and status changes, as described below.

For each lesson entered in the database, the Project Manager reviews the lesson and may edit it for clarity and accuracy. The Lessons Learned Practice also requires a Project Manager to review and confirm that:

- The lesson is relevant to the project;
- The lesson does not contain commercial or other sensitivities; and
- The lesson includes sufficient information to be clear and actionable.

The Project Manager then updates the status of the lesson to “report” to allow the lesson to be available to anyone who is consulting the database. The Project Completion and Evaluation Report for the project includes a list of key lessons learned that were entered in the lessons learned database with any necessary corrections or consolidations, and is reviewed and approved by BC Hydro’s Executive Team members and by BC Hydro’s Board of Directors, where applicable.

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**Project and Portfolio Management Practice Leads<sup>1</sup> conduct periodic reviews of the Lessons Learned Database. The database is queried on a monthly basis to determine the volume of new lessons that have been added into the database. Review frequency is then adjusted based on the volume of new lessons, and may vary across practice areas. Historically, this review was done every six months. Based on feedback from Practice Leads, beginning in 2026, BC Hydro will be increasing reviews to a monthly frequency for all practice areas. This approach will provide more timely awareness of a lesson being raised by a project team and enable the lesson to be actioned sooner by a Practice Lead to the benefit of other projects.**

**As part of their review, Practice Leads are responsible for:**

- **Confirming the relevance of the lesson to the practice and its potential applicability to future projects;**
- **Ensuring alignment of the lesson with Project and Portfolio Management Lessons Learned best practices;**
- **Determining if the lesson should trigger a Project and Portfolio Management Practice update; and**
- **Identifying opportunities for training.**

**Following this review, lessons are retained in the database with a “reviewed” status if the Practice Lead does not think that the lesson is broad enough to require an update to the practice area. Practice Leads may also choose to consolidate lessons for clarity and efficiency or change the status to “closed” if the Project and Portfolio Management Practice has been updated to address the lesson, or if the lesson is not relevant to future projects.**

**The Site C Project has a dedicated database with a similar process in place for entering lessons learned. As described in BC Hydro’s response to BCUC Staff IR 1.4.8, the lessons learned from the Site C Project, are being integrated into the Project Delivery Lessons Learned Database. Moving forward, revisions, updates, and additions to the lessons learned for the Site C Project will be reflected in the Project Delivery Lessons Learned Database and reviewed regularly, as described above.**

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<sup>1</sup> **Project and Portfolio Management has 17 practice areas, including: project management (which includes the project governance and project risk management sub-practices, amongst other sub-practices); design (which addresses geotechnical design considerations); construction and contract management; procurement; stakeholder engagement; and Indigenous relations. Each practice and sub-practice is assigned a leader.**

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Lessons are considered during project planning and execution in two ways:

- **Practice Level:** When a Lesson Learned has broad applicability, it is integrated into the Project and Portfolio Management Practice and applied to projects on a go-forward basis; and
- **Project Level:** When a Project Manager or project team member searches the database during a project, relevant Lessons Learned will be applied at the project level.

At the project level, the Lessons Learned Practice recommends reviewing past lessons throughout the project lifecycle, as described in section 3.2 of the Site C Lessons Learned Report. The Lessons Learned Practice is not limited to reviews of the Lessons Learned Database. For example, project teams will consult:

- **Lessons Learned Database:** A centralized source of documented lessons from past projects. The repository includes a search tool that allows detailed searches using keywords and filters, enabling the team to quickly locate relevant insights;
- **Project Completion and Evaluation Reports:** reviews of comprehensive completion reports, which include lessons learned from the database;
- **Direct Engagement with Experienced Teams:** Contacting project team members from recent comparable projects within the Project Delivery and Program and Contract Management Key Business Units to gather practical insights; and
- **Informal Training and Updates:** Lessons learned are shared with project teams and across the organization through various means such as project team meetings, newsletters, training sessions, project manager presentations, and lunch and learn sessions.

In addition, relevant Lessons Learned are discussed for strategic planning and documented in the Risk Register, the Project Plan, the Supply Chain Strategy, Contract Plans, and other project documentation.

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**4.0 C. PROJECT AND PORTFOLIO MANAGEMENT FRAMEWORK AND LESSONS LEARNED PRACTICE**

**Reference: Lessons Learned Report, Section 3.2, pp. 39–41  
Lessons Learned Database**

1.4.2 Please confirm, or explain otherwise, that project teams are required to incorporate lessons learned from prior projects in the planning stage of new projects.

**RESPONSE:**

**Confirmed.**

**Project Teams are required to use the Lessons Learned Search Tool to identify lessons that may be relevant during planning stages of the project lifecycle (from Identification to Definition phases). The Lessons Learned Practice also highlights key times during the project lifecycle where Project Managers should consider prior lessons, including:**

- **When an opportunity or problem is identified, and a Project Manager is assigned;**
- **Before a major procurement event;**
- **In preparation for constructability reviews;**
- **As part of a risk workshop; and**
- **During design reviews.**

**If an identified lesson is relevant to the project, the Project Manager is required to incorporate it into the planning process and update the “Lessons Learned Considered” section of the project plan.**

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**4.0 C. PROJECT AND PORTFOLIO MANAGEMENT FRAMEWORK AND LESSONS LEARNED PRACTICE**

**Reference: Lessons Learned Report, Section 3.2, pp. 39–41  
Lessons Learned Database**

1.4.3 Please identify each lesson learned from the Lessons Learned Database that was applied to the Site C Project. In the response, please include: (i) a description of the lesson learned and the project on which it was learned; (ii) at which point(s) in the Site C Project lifecycle the Lessons Learned Database was consulted and applied; (iii) how the lesson learned was applied to the Site C Project; and (iv) who was responsible for ensuring the lesson learned was applied effectively.

**RESPONSE:**

With regard to the Lessons Learned Database specifically, the BC Hydro Lessons Learned Database and Practice were initiated in 2014, and both were continuing to evolve during the early stages of Project construction and have continued to evolve since. By the time the Lessons Learned Database had matured, and the current audits, reviews and quality checks were implemented, the Project had already undertaken the majority of its early planning. This meant that the database itself had a limited role in identifying lessons learned applicable to the Site C Project.

Please refer to BC Hydro’s response to BCUC Staff IR 1.4.4 which outlines the extensive work that was done to solicit lessons learned for the Site C Project, beyond the Lessons Learned Database. The Project drew upon decades of internal knowledge by embedding the experience and expertise of BC Hydro employees into the Site C Project team. As part of the ramp-up of resources for Site C, key personnel (such as project managers, engineers, construction managers, and other functional disciplines) from within BC Hydro were used to help establish the teams and were brought onto the Project team because of their expertise on past projects. These personnel brought with them their learnings from other BC Hydro projects and were the same people who were responsible for applying the lessons learned since they had already been through that experience on other projects.

In addition, the Project team learned lessons throughout the progress of the work that could be applied to other areas within the Project while the Project was ongoing. These lessons were added to the Project database. For example, after the MCW contract was awarded, enhancements were made to the terms of contract for the GSS scope before it was awarded in 2018, and again further enhancements were made to the terms of contracts when the BOP contracts were awarded in 2021. These changes in areas such as interfaces, and dispute resolution enabled improved management of the contracts.

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**4.0 C. PROJECT AND PORTFOLIO MANAGEMENT FRAMEWORK AND LESSONS LEARNED PRACTICE**

**Reference: Lessons Learned Report, Section 3.2, pp. 39–41  
Lessons Learned Database**

1.4.4 As Site C is BC Hydro's largest project to date, and considering BC Hydro's past projects are significantly smaller, please discuss how BC Hydro's Lessons Learned Database is the appropriate vehicle for incorporating lessons learned from past projects to develop the approach in the Site C Project.

**RESPONSE:**

**As discussed in BC Hydro's response to BCUC Staff IR 1.4.3, the majority of early planning and design work for the Site C Project was undertaken prior to 2014 while the BC Hydro Lessons Learned Database and Practice were initiated in 2014 and were both continuing to evolve during the early stages of Project construction. By the time the Lessons Learned Database had matured and the current audits, reviews and quality checks were implemented, the Project had already undertaken the majority of its early planning. This meant that the database itself had a limited role in identifying lessons learned applicable to the Site C Project.**

**The Site C Project sought and applied lessons learned from the following sources:**

- **External parties and stakeholders such as contractors, local communities and oversight bodies, as discussed in BC Hydro's response to BCUC Staff IR 1.4.9;**
- **Research, interviews and surveys of utility peers, as discussed in BC Hydro's response to BCUC Staff IR 1.4.4.1;**
- **Market sounding processes to inform the development of the procurement approach, as discussed in BC Hydro's response to BCUC Staff IR 1.5.3;**
- **Independent Project Analysis, which is a world leading authority on benchmarking and research devoted to empirical research of capital projects and project systems. In 2014 and 2015, Independent Project Analysis assessed the readiness and performance of the Project versus industry best practice and concluded that the Project was meeting industry best practice;**
- **Experienced BC Hydro project teams from recent analogous projects. In many cases, those key individuals from BC Hydro teams were transferred to the Project to bring their learnings directly to the Project on topics such as design, construction, operations, and project management; and**
- **Technical experts and external consulting companies, including Partnerships BC, with expertise on large scale capital construction and dam building.**

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**4.0 C. PROJECT AND PORTFOLIO MANAGEMENT FRAMEWORK AND LESSONS LEARNED PRACTICE**

**Reference: Lessons Learned Report, Section 3.2, pp. 39–41  
Lessons Learned Database**

1.4.4 As Site C is BC Hydro's largest project to date, and considering BC Hydro's past projects are significantly smaller, please discuss how BC Hydro's Lessons Learned Database is the appropriate vehicle for incorporating lessons learned from past projects to develop the approach in the Site C Project.

1.4.4.1 Please discuss what other supplementary information sources BC Hydro consulted, including canvassing utility peers or other organizations, when soliciting lessons learned relevant to the development and execution of the Site C Project. If no other sources were used, please discuss why not.

**RESPONSE:**

Please refer to BC Hydro's response to BCUC Staff IR 1.4.4 where we explain how the Site C Project sought and applied lessons learned from a variety of sources. This response focuses specifically on efforts to obtain and apply lessons learned from utility peers.

BC Hydro conducted interviews with Canadian utilities and Crown Corporations (e.g., Manitoba Hydro, Hydro Quebec, Nalcor, Ontario Power Generation, and Columbia Power Corporation) that had built or were considering building large hydro facilities at the time. Continued discussions with these utilities occurred over the course of the Project.

BC Hydro also conducted a survey of international hydroelectric construction to provide a perspective on experience with building large hydro facilities in other jurisdictions including Chile, Brazil, India, Mexico, Turkey, and South Africa.

Through these efforts, BC Hydro obtained and applied information on procurement models, including why particular models were chosen, project packaging, financial/financing considerations, risk tolerance of private sector participants and market response to Requests for Qualifications and/or Requests for Proposals. Key lessons learned obtained and applied included:

- **Procurement Models**
  - ▶ Discussions with the proponents of projects being undertaken in Canada revealed that Design-Bid-Build and Design-Build procurement models were most commonly utilized to deliver these types of projects. Globally, the only other commonly used model identified was Design Build Finance;

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- ▶ **Through utilization of these models, most project owners were unable to transfer any significant material risk of construction cost overruns and schedule delays to their respective counterparties; and**
- ▶ **Procurement-related decisions were largely driven by construction considerations. These considerations included management of interface risks, construction sequencing and accommodating the procurement of long delivery items such as turbines and generators.**
- **Financing Models**
  - ▶ **The primary models for financing the construction costs of Canadian precedent projects were either 100% public funding or project financing;**
  - ▶ **Where necessary, due to the utilized financing model, some project owners provided guarantees to their lenders to cover cost overruns. The potential for federal guarantees had also been used by at least one Canadian hydroelectric project (Nalcor);**
  - ▶ **Public funding of 100% of the capital costs was employed by Hydro Quebec and Manitoba Hydro; and**
  - ▶ **Project Financing was employed by Nalcor and Ontario Power Generation for their projects. The primary objective of using project finance was to keep the project liabilities off the balance sheets of the ultimate owners (i.e., the provinces of Ontario and Newfoundland – Labrador, respectively).**
- **Local Participation**
  - ▶ **Several project owners structured a portion of their procurement strategy with a goal of enabling participation from local companies. While local companies generally participated in smaller packages, this provided an important benefit to remote communities with economies dependent on one or few industries.**

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**4.0 C. PROJECT AND PORTFOLIO MANAGEMENT FRAMEWORK AND LESSONS LEARNED PRACTICE**

**Reference: Lessons Learned Report, Section 3.2, pp. 39–41  
Lessons Learned Database**

1.4.5 For the North Coast Transmission Line Projects, please discuss which lessons from the Lessons Learned Database have been considered and incorporated into the current approach for those projects. In the response, please specifically comment on how BC Hydro’s lessons learned from past transmission line projects, such as the Interior to Lower Mainland Transmission Line Project were considered.

**RESPONSE:**

**BC Hydro has considered and incorporated lessons learned from past major transmission line projects, including the Interior to Lower Mainland project, the Northwest Transmission Line project, and relevant components of the Site C Project into the planning for the North Coast Transmission Line projects. Lessons have been sourced from the Lessons Learned Database and from other sources of lessons such as Project Completion and Evaluation Reports, and direct engagement with experienced teams. Please refer to BC Hydro’s response to BCUC Staff IR 1.4.1 where we explain that under the Lessons Learned Practice, there are multiple sources of lessons learned available beyond the Lessons Learned Database.**

**These lessons have directly shaped contracting strategies, procurement processes, project controls, engineering practices, environmental management, Indigenous participation frameworks, and safety programs for the current North Coast Transmission Line development. North Coast Transmission Line Phase 1 and 2 (Prince George to Terrace) are more advanced in planning than Phase 3 (North of Terrace), and we will continue to seek and apply lessons learned to Phase 3 as planning advances, including those experienced on Phase 1 and 2 as they move into the Implementation phase.**

**Lessons Learned on Procurement and Delivery Model**

**Lessons learned on the procurement and delivery model from Interior to Lower Mainland and Northwest Transmission Line identified delay challenges with the Design–Build model on long, linear transmission projects due to interface challenges between the Design-Build contractor responsibilities and BC Hydro responsibilities. Lessons highlighted that critical interface challenges related to the timing of design and layout for the transmission line and for clearing and access, which gave rise to schedule delay due to property access, First Nations consultation, and archaeology. Quality and timing issues were also encountered**

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with contractor supplied materials. The Site C Project selected a Design-Bid-Build approach for transmission line construction, and there were fewer interface challenges in these areas.

For North Coast Transmission Line Phase 1 and 2, BC Hydro has adopted a Design-Bid-Build approach for both transmission line and stations construction. The approach retains key design and layout with BC Hydro for the transmission line, clearing and access layout, property access, and archaeology. We are also undertaking an early contractor involvement stage to engage transmission line contractors earlier in the process of design, layout, and scheduling. We have consolidated foundations, structure erection, and stringing into integrated construction packages. BC Hydro has retained responsibility for tower design, testing and supply along with foundation and station equipment and materials supply.

Lessons learned from the Interior to Lower Mainland Transmission Line and Site C projects with respect to line contractor procurement and evaluation practices highlight the importance of appropriately weighting technical and organizational capability. Strong technical and organizational capability will support the selection of contractors with strong teams, improving overall outcomes, including schedule realism and low subcontractor turnover.

For the North Coast Transmission Line Phase 1 and 2 projects, the use of an Early Contractor Involvement stage (which was also used for some Site C procurements) will enable multiple qualified proponents to provide feedback to BC Hydro on key delivery aspects including design, schedule, and constructability. This approach is expected to support more prescriptive scheduling and documentation requirements and contribute to performance oversight of contractors.

### **Lessons Learned on Vegetation Clearing and Access**

BC Hydro has benefited from a variety of lessons learned with respect to vegetation clearing and access. In consideration of experience on the Northwest Transmission Line project, we are better estimating the time needed for direct award contract negotiations, identifying the information needed for cost estimation, and considering seasonal constraints. Seasonal work planning is being built into the baseline schedule for the North Coast Transmission Line projects.

The Interior to Lower Mainland Transmission Line project also faced property access and archaeological challenges that disrupted continuous clearing work fronts. For North Coast Transmission Line projects, we have segmented work fronts for clearing and construction to sequence and prioritise layout, property

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access, and archaeological work, and undertaking earlier identification of access requirements, including potential aggregate sources.

### **Lessons Learned on Project Controls**

The Interior to Lower Mainland Transmission Line, Northwest Transmission Line, and Site C project lessons learned also reinforce the need for strong project controls, particularly around record keeping, schedule analytics, risk management, and construction documentation.

BC Hydro’s approach for the North Coast Transmission Line projects incorporates strengthened governance from the outset of project development, including structured gate reviews and digital project controls. We have also adopted enhanced risk management, including Schedule Risk Analysis and Cost Risk Analysis practices aligned with enhancements implemented for the Site C Project following the 2021 Milburn Review.

### **Lessons Learned on Geotechnical Risks**

Both the Interior to Lower Mainland and Northwest Transmission Line projects encountered delays and cost increases due to late engineering, underestimation of challenging ground conditions, and the need for mid-construction tower and foundation redesigns. In response, the North Coast Transmission Line projects are employing a staged geotechnical investigations program, early engineering engagement for alternative foundation types including helical pile assessments that were used for the Site C Project, as well as the development of multiple pre-designed foundation solutions to reduce schedule delays when ground conditions differ from predictions.

### **Lessons Learned on Environmental and Archaeological Risks**

Environmental and archaeological management approaches for the North Coast Transmission Line Phase 1 and 2 projects incorporate lessons from the Interior to Lower Mainland and Northwest Transmission Line projects, both of which experienced environmental incidents, sediment control challenges, and delays resulting from incomplete archaeological work (for Interior to Lower Mainland Transmission Line, due to delay from the Design Build contractor with respect to tower locations).

The North Coast Transmission Line projects are developing Environmental Management Plans with early First Nations input, site-specific prescriptions, mandatory qualifications for environmental professionals, and using a Design-Bid-Build approach to improve the interface with archaeological work. We are also

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**adopting from Site C the use of a permitting coordination forum with regulators and First Nations, and building in proactive engagement with First Nations on cultural resource planning, environmental monitoring, and guardian programs.**

### **Lessons Learned on Indigenous Procurement**

**Lessons from the Interior to Lower Mainland and Northwest Transmission Line projects with respect to Indigenous procurement participation highlighted the importance of meaningful engagement and an appropriate focus on market competitive pricing, qualifications, oversight to ensure contractor performance, and highlighted the schedule and interface risks associated with unclear scopes, capacity constraints, and prolonged contracting timelines.**

**For the North Coast Transmission Line projects, BC Hydro has advanced a co-ownership model with project area First Nations, which involved engaging Nations very early in project development. Working within BC Hydro's Indigenous Procurement policy, we are using Master Service Agreements for repetitive work to reduce contracting timelines and improve contract certainty, ensuring qualified contractors, and market competitive pricing and which include clear negotiation timelines, and competitive approaches where appropriate. These approaches were also effective on the Site C Project regarding early planning for Indigenous procurement, transparent communication of opportunities, and the incorporation of cultural and environmental monitoring programs.**

### **Lessons Learned on Safety**

**Finally, safety lessons from the Interior to Lower Mainland and Northwest Transmission Line projects have directly shaped safety governance on BC Hydro's high-voltage transmission line projects. For the North Coast Transmission Line projects, BC Hydro plans to ensure Prime Contractor accountability with explicit contractual obligations, enhanced screening of contractor safety competence, mandatory orientations, and clear compliance mechanisms. These measures reflect BC Hydro's approach on the Site C Project and are reinforced by other past project experience.**

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**4.0 C. PROJECT AND PORTFOLIO MANAGEMENT FRAMEWORK AND LESSONS LEARNED PRACTICE**

**Reference: Lessons Learned Report, Section 3.2, pp. 39–41  
Lessons Learned Database**

1.4.6 Please elaborate on the process followed and the frequency of the periodic audits of: (i) the Lessons Learned Database; and (ii) the Project and Portfolio Management practice areas.

**RESPONSE:**

Please refer to BC Hydro’s response to BCUC Staff IR 1.4.1, where we provide details on the process and frequency of the periodic reviews of the Lessons Learned Database.

BC Hydro conducts an annual compliance audit on its Project and Portfolio Management practice areas. This process includes developing an annual compliance plan for Project and Portfolio Management, where each practice area identifies key compliance areas and deliverables to focus on and sets a target compliance threshold.

The audit selections are determined based on enhancements from the Project and Portfolio improvement initiatives in the Project and Portfolio Management Enhancement Plan, which is described in BC Hydro’s response to BCUC Staff IR 1.3.1.2. Outcomes from the compliance audit are reviewed by the Project and Portfolio Management Governance Committee and may result in action plans to be addressed by the Practice Leads.

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**4.0 C. PROJECT AND PORTFOLIO MANAGEMENT FRAMEWORK AND LESSONS LEARNED PRACTICE**

**Reference: Lessons Learned Report, Section 3.2, pp. 39–41  
Lessons Learned Database**

1.4.6 Please elaborate on the process followed and the frequency of the periodic audits of: (i) the Lessons Learned Database; and (ii) the Project and Portfolio Management practice areas.

1.4.6.1 Please discuss the results of the most recent audits and describe any actions resulting from the audits, including how the results of the audits will be used to inform future projects.

**RESPONSE:**

**Lessons Learned Database**

The most recent reviews of the Lessons Learned Database were completed in June and December 2025. The results are provided in the table below.

		June 2025	December 2025
1	Projects Reviewed	84	66
2	New lessons for review (i.e., lessons added since the last review cycle)	314	220
3	Lessons requiring a practice update	29	1
4	Lessons that do not trigger a practice update but remain relevant for future projects (these lessons will be available for public view)	214	180
5	Lessons only relevant to the project from which they were generated	71	39
6	Lessons triggering training opportunities <sup>1</sup>	47	4

The following examples demonstrate how the results of lessons learned reviews are used to inform future capital projects:

- An opportunity for a practice update was identified in the Construction and Contract Management practice to improve the Non-Conformance Records process. This work resulted in the issuance of a revised Non-Conformance Reporting Procedure, which is governed and maintained by the Quality Practice Department;

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<sup>1</sup> These lessons may also appear in rows 3–5 (they are not mutually exclusive).

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- An opportunity for a practice update was identified in the **Construction and Contract Management Practice** to strengthen the contract kick-off meeting process with contractors. The planned improvement involves separating the kick-off into two distinct meetings: a commercial kick-off and a construction kick-off; and
- An opportunity for a practice update was identified in the **Project Management practice** to encourage multi-disciplinary teams to visit work sites together to assess the viability of project alternatives and discuss the advantages and disadvantages of each alternative.

Continuous improvements of the Lessons Learned Practice are undertaken as needed. The practice has been reviewed twice in the last three years to adjust the frequency of the periodic reviews of the Lessons Learned Database, to improve the database tool for increased accessibility to the lessons, and to establish a more formal process for applying lessons learned.

#### **Project and Portfolio Management Practice Areas**

As discussed in BC Hydro's response to BCUC Staff IR 1.4.6, BC Hydro conducts annual audits of the Project and Portfolio Management practice areas through the Project and Portfolio Management Compliance Audit. The audit for fiscal 2026 resulted in an overall compliance score of 91%, surpassing our target of 85%. The audit results are provided in the table below.

<b>Practice Area</b>	<b>September 2025 Result</b>
<b>Project Management</b>	<b>90%</b>
<b>Quality</b>	<b>100%</b>
<b>Design</b>	<b>95%</b>
<b>Environment</b>	<b>100%</b>
<b>Procurement</b>	<b>100%</b>
<b>Indigenous Relations</b>	<b>100%</b>
<b>Construction and Contract Management</b>	<b>96%</b>

If the practice compliance review results are above the target threshold, like the most recent review, no action plan is required. If the practice compliance review results fall below the target threshold, a secondary audit is performed, and an action plan is developed.

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**4.0 C. PROJECT AND PORTFOLIO MANAGEMENT FRAMEWORK AND LESSONS LEARNED PRACTICE**

**Reference: Lessons Learned Report, Section 3.2, pp. 39–41  
Lessons Learned Database**

1.4.7 Please further explain the frequency, scope, content and participation in the workshops mentioned in the preamble.

**RESPONSE:**

The Site C Project held more than 30 lessons learned workshops throughout 2024 and 2025. The workshops were chaired by the Site C Project Commercial Management team and included representation from Site C Project employees and consultants. These workshops were a venue for the functional teams within the Site C Project to bring up ideas and share information.

In general, the attendees for each workshop were chosen by the Project Manager or functional manager for that specific area of focus and included the key subject matter experts for that area. The workshops were each generally one to three hours in duration depending on the topic and included five to 10 participants on average. Depending on the complexity of the topic, follow-on workshops were conducted when necessary.

The workshops focused on the collection and discussion of lessons learned considerations on topics such as contract management, risk management, geotechnical risk, project governance, Indigenous consultation, and community engagement. The workshops were structured in an interactive style with the participants spending the majority of the time in discussions, which was intended to draw out meaningful lessons through collaborative dialogue.

Lessons learned workshops will continue, although less frequently, until Project completion to ensure that lessons during the completion and handover to operations stage are documented within the Project Completion and Evaluation Report.

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**4.0 C. PROJECT AND PORTFOLIO MANAGEMENT FRAMEWORK AND LESSONS LEARNED PRACTICE**

**Reference: Lessons Learned Report, Section 3.2, pp. 39–41  
Lessons Learned Database**

1.4.8 Please explain how BC Hydro intends to utilize the dedicated Site C lessons learned database for future projects. Please identify whether it will remain a dedicated database, be a requirement to review for all future projects, including the North Coast Transmission Line Projects, and whether it has been used to inform any ongoing or future projects to date.

**RESPONSE:**

**The dedicated Site C lessons learned database will be retired once the lessons learned are integrated into BC Hydro’s Project Delivery lessons learned database. This integration will provide teams with access to all Site C lessons learned, consistent with how lessons learned are documented from other BC Hydro projects. As described in BC Hydro’s response to BCUC Staff IR 1.4.2, these lessons will be used to inform future projects.**

**As discussed in BC Hydro’s response to BCUC Staff IR 1.3.3, the North Coast Transmission Line Projects have benefited from access to the lessons learned from both the Site C lessons learned database and the Site C Lessons Learned Report.**

**In addition, as outlined in BC Hydro’s response to BCUC Staff IR 1.1.2, many Site C lessons learned have already been incorporated in the Project and Portfolio Management framework that is used to inform ongoing and future projects.**

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**4.0 C. PROJECT AND PORTFOLIO MANAGEMENT FRAMEWORK AND LESSONS LEARNED PRACTICE**

**Reference: Lessons Learned Report, Section 3.2, pp. 39–41  
Lessons Learned Database**

1.4.9 Please explain how BC Hydro solicits feedback to inform a project's lessons learned from external parties and stakeholders such as contractors, local communities, oversight bodies, etc. Please describe the process for obtaining and implementing this feedback and identify any lessons learned resulting from external feedback on the Site C Project. If external parties and stakeholders are not canvassed for feedback, please explain why not.

**RESPONSE:**

**For the Site C Project, feedback on lessons learned was solicited through a variety of sources, such as:**

- **Ongoing feedback from contractors, solicited through constructability reviews and planning sessions. This feedback informed how change orders were drafted and in some cases amendments to contract language and Project plans. Please refer to BC Hydro's response to BCUC Staff IR 1.9.1 where we describe our approach to incorporating contractors in early planning on Site C;**
- **A workshop with the Project Assurance Board which was used to discuss lessons learned about project governance and informed the governance section of the BCUC lessons learned report;**
- **Ernst & Young met with Commercial Management Senior Managers regularly to identify opportunities to improve commercial management processes and practices on the Project, which informed lessons learned for future projects. Please refer to BC Hydro's response to BCUC Staff IR 1.5.8 for discussion on lessons learned from Ernst and Young through claims oversight workshops;**
- **Feedback from Ernst & Young, the Project Assurance Board, and the Commercial Sub-Committee led to several enhancements to the commercial and claims dashboards and reports over time, improving visibility into commercial risks and traceability of claims-related activities, which informed lessons learned for future projects;**
- **Feedback from Ernst & Young and the 2021 Milburn Report resulted in enhancements to the Cost Risk Analysis and Schedule Risk Analysis**

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processes and risk management practices and templates, which informed lessons learned for future projects;

- **The Site C Project Risk Committee involved attendance by the Independent Oversight Advisor, Ernst & Young, who provided expert input and feedback on risk discussions and issues, which informed lessons learned for future projects;**
- **The Project Assurance Board and the Technical Advisory Board contributed feedback on critical Project decisions such as the selected solution for the right bank foundation enhancements, as well as guidance and input on high-priority risks and mitigation strategies monitored in the Project risk register which informed lessons learned for future projects;**
- **Environment and Permitting Forums with First Nations enabled direct and ongoing dialogue and feedback. Input from these forums was actively integrated into permit applications and environmental mitigation and management programs which facilitated the timely issuance of permits. The use of consultation forums on the Project, which was something new for BC Hydro, enabled early and streamlined consultation and informed lessons learned for future projects. Please refer to BC Hydro's response to BCUC Staff IR 1.18.3 for more discussion on the Permitting and Environmental forums;**
- **A workshop with Ministry of Transportation and Transit employees and consultants was used to discuss lessons learned on various topics such as contract management, geotechnical risk, and community engagement as it related to highway and road construction; and**
- **BC Hydro led an extensive public consultation process that included hosting or participating in more than 500 engagement events such as presentations, local government meetings, open houses, and other community events. These sessions provided opportunities for residents, local organizations, and interest groups to provide feedback on key aspects such as environmental impacts, land use, and community benefits. The use of this multi-pronged approach to local engagement throughout the whole lifecycle of the Project likely served to reduce the number of public complaints and concerns and informed lessons learned for future projects.**

**The West End Substation project provides another example of how BC Hydro is seeking feedback on lessons learned from external parties to inform projects. This project involves the construction of an underground substation in a complex and dense neighbourhood in downtown Vancouver.**

**In support of the West End Substation project, BC Hydro conducted site visits to other utilities in North America and consulted with utilities around the world. These reviews and site visits allowed the project team to learn from organizations**

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that have similar projects in progress or have successfully designed and operated indoor and/or underground substations in complex urban environments in the past decade and how they managed specific risks throughout the project lifecycle. A key objective of the site visits was to identify how areas of public concern regarding substation safety were addressed by various projects and utilities, given the project's proximity to a future school and an existing park. The site visits focused on key design and operational aspects, including regulatory compliance, project delivery and risk management practices, fire risk mitigation, noise reduction, Electromagnetic Field (EMF) management, stakeholder engagement, waterproofing, urban integration, and long-term maintenance strategies.

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**5.0 D. CONTRACT MANAGEMENT**  
**Reference: Lessons Learned Report, Section 4.1.1, p. 45; Section 4.2.2, p. 54; Section 4.3.1, pp. 57–58**  
**Contract Management Process**

1.5.1 Please elaborate on the role and membership of the Due Diligence Advisory Team. In the response, please discuss the Due Diligence Advisory Team’s effectiveness on the Project in advising on procurement, commercial and financial considerations.

**RESPONSE:**

In 2011, KPMG was engaged as financial advisor for the Project. One of the components of their service delivery included a Due Diligence Advisory Team that was comprised of senior KPMG members with experience in energy projects and infrastructure development from around the globe. The team was led by one of Vancouver KPMG’s senior Project Directors and also included senior KPMG advisors from their Toronto, London, and Budapest offices.

The expertise of the Due Diligence Advisory Team was made available to the Site C team as required throughout the development of the procurement approach and they provided strategic advice on procurement, commercial, and financial considerations.

The role of the Due Diligence Advisory Team was primarily limited to the 12-month period up until the Project’s Procurement Options Report was approved by the BC Hydro Board of Directors in 2012. These advisors were periodically consulted during the development of the Procurement Options Report, which guided the procurement approach for the Project. The Due Diligence Advisory Team also acted as “on-call” subject matter experts when either KPMG or the Project team required specific strategic advice.

The Due Diligence Advisory Team provided value to the Site C Project by performing a separate review of the procurement options report before the report was released to the Project team and before it proceeded to BC Hydro Board of Directors for approval. Their assessment helped validate the report’s conclusions.

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**5.0 D. CONTRACT MANAGEMENT**  
**Reference: Lessons Learned Report, Section 4.1.1, p. 45; Section 4.2.2, p. 54; Section 4.3.1, pp. 57–58**  
**Contract Management Process**

1.5.2 Please explain under what conditions, timing, and project type(s) BC Hydro considers establishing a Due Diligence Advisory Team and discuss BC Hydro’s anticipated approach for implementing such a team on future projects.

**RESPONSE:**

**As discussed in BC Hydro’s response to BCUC Staff IR 1.5.1, the Due Diligence Advisory Team’s role on the Site C Project was limited to the Procurement Options Report.**

**BC Hydro generally does not establish a Due Diligence Advisory Team for projects. For large, complex, higher risk, or novel projects, BC Hydro assesses the benefit of engaging independent expertise to assist with a project’s Supply Chain strategy on a project-by-project basis. This assessment is typically performed during the Feasibility Design stage, and its refinement and implementation in future stages are based on scope clarification, design progression, and market feedback.**

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**5.0 D. CONTRACT MANAGEMENT**  
**Reference: Lessons Learned Report, Section 4.1.1, p. 45; Section 4.2.2, p. 54; Section 4.3.1, pp. 57–58**  
**Contract Management Process**

1.5.3 Please elaborate on the market sounding activities undertaken by BC Hydro as part of the Project and discuss the conclusions and effectiveness of each activity. In the response, please explain how the effectiveness of the market sounding activities will inform BC Hydro’s approach to market sounding on future projects.

**RESPONSE:**

Overall, the market sounding activities undertaken by the Site C Project have been effective in that each of the major procurement packages had sufficient interest from the market to ensure that the bidding process was competitive. As a result of the market sounding, the bidder quality was high and allowed the bidding process to have competitive tension during the Request for Qualification (RFQ) and Request for Proposal (RFP) stages.

The objectives of the market sounding process for the Site C Project were:

- To collect information and gain feedback and insight from the market to help inform the development of the procurement approach for Site C; and
- To share information with the market regarding the procurement process to raise market awareness and develop relationships with market participants.

BC Hydro conducted one-on-one interviews with seven categories of market participants:

- Large Civil Contractors;
- Large Infrastructure Project Concessionaires;
- Turbine-Generator Suppliers;
- Worker Accommodation Camp Contractors;
- Electrical and Transmission Contractors;
- Pulp Mills and Sawmills Operators; and
- Logging Contractors.

In addition to the interviews, BC Hydro reached out to the market as part of a broader market sounding strategy, which included:

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- **Hosting regular business information sessions, which were open to the entire business community;**
- **Establishing a business directory, in which businesses could register in order to receive updates on potential business opportunities; and**
- **Presenting project and procurement updates at relevant industry associations.**

**Key conclusions from the market sounding processes that informed the development of the procurement approach were:**

- **Large Civil Contractors**
  - ▶ **Respondents generally indicated that joint ventures would likely have to be developed to deal with large construction packages and with specific areas of expertise;**
  - ▶ **Participants generally indicated that transferring all of the geotechnical risk to contractors would be expensive for BC Hydro and any attempt to do so could also limit the number of firms interested in bidding;**
  - ▶ **Several companies suggested that BC Hydro set a geotechnical baseline for the critical areas and share/keep risks beyond that baseline;**
  - ▶ **Participants suggested that BC Hydro may recognize some value from early engagement with contractors on geotechnical risks and through determining what, if any, additional information would help contractors prepare their proposal and reduce geotechnical risk;**
  - ▶ **Participants suggested that BC Hydro should ensure that First Nations do not enter into exclusive agreements with any contractor during the bidding process and instead be available to work with any contractor awarded a particular piece of work; and**
  - ▶ **Larger participants preferred larger packages to minimize interface risk while smaller firms were more comfortable with smaller packages despite interface issues.**
- **Large Infrastructure Project Concessionaires**
  - ▶ **Respondents generally indicated that joint ventures would likely have to be developed to deal with large construction packages; and**
  - ▶ **None of the participants had undertaken a hydroelectric project on a concession basis and they were only aware of a couple of such projects around the world.**
- **Turbine-Generator Suppliers**

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- ▶ Even with several other Canadian projects being procured at the same time as Site C, suppliers indicated that the turbine and generator market was expected to have adequate capacity; and
- ▶ Suppliers indicated that efficiency warranty terms were typically one to three years, but extended warranties were available.
- **Worker Accommodation Camp Contractors**
  - ▶ All respondents were providing similar services to similar projects on an ongoing basis;
  - ▶ Participants indicated that the industry had experience working with First Nations;
  - ▶ Firms consistently indicated that the market was at peak capacity and that their products and services would be in high demand. However, they indicated that this would not be problematic as capacity can be expanded fairly quickly; and
  - ▶ Firms consistently indicated that many of their projects were contracted on a Design Build Finance Operate Maintain (DBFOM) basis, though they are familiar and comfortable using other models.
- **Electrical and Transmission Contractors**
  - ▶ All of the participants indicated that they had been building transmission lines in the province and several other jurisdictions for a number of years;
  - ▶ One participant had constructed transmission lines as components of a larger power generating project for private sector owners;
  - ▶ Two of the participants commented that Design Build appeared to be the most frequently used procurement model for current transmission line projects in other jurisdictions. One participant believed Design Bid Build was still the most common model in the industry, though Design Build was becoming more common;
  - ▶ Two of the firms noted that savings could be achieved through innovation in tower design, tower placement, non-conventional foundation designs, and conductor selection, if procurement was based on a Design Build model;
  - ▶ One of the participants did not see a significant benefit in packaging the transmission lines and substation from a design or construction perspective. The company commented that the contractor would need to subcontract elements of the substation (e.g., substation expertise, electrical contractors) which would increase the overall cost to BC Hydro; and

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- ▶ **Two of the participants preferred packaging the transmission line and substation together and indicated that packaging would be more attractive to larger contractors and create some efficiencies associated with the civil works in the substation. However, they noted that these efficiencies would only result in relatively minor overall cost savings.**
- **Reservoir Clearing**
  - ▶ **Logging contractors believed that there was sufficient capacity to accommodate the activity from Site C;**
  - ▶ **Logging contractors indicated that they scale their capacity to be consistent with the requirements of the mills in the region. The companies indicated that BC Timber Sales purchases accounted for a relatively low percentage of their total annual volume;**
  - ▶ **Market sounding with pulp mills and sawmills confirmed that the region had adequate capacity for the merchantable timber;**
  - ▶ **Participants indicated that, in general, it was unlikely that a single contractor would have the capability to undertake all of the clearing; and**
  - ▶ **All of the participants indicated that they had partnerships and agreements with First Nations groups.**

**As demonstrated by the insights reviewed above, market sounding activities provided a better understanding of the capacity and capability of potential vendors for the Site C Project. In particular, the process provided valuable information that shaped BC Hydro's procurement approach and helped to raise awareness of key projects and enable vendors to be prepared for future procurement activities, which supported improved bidder quality.**

**BC Hydro's approach to market sounding will be to continue to collect information and gain feedback and insight from the market to help inform the development of the procurement approach and to share information with the market regarding the procurement process to raise market awareness and develop relationships with market participants.**

**The extent of market sounding will be tailored based on the needs of the project. For some projects, market sounding may be limited, as a recent project may have engaged the market on those same components and already provided the information required and created market understanding and engagement. For projects with components that have not been procured recently, more extensive market sounding may occur to understand the market capacity and delivery models.**

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**5.0 D. CONTRACT MANAGEMENT**  
**Reference: Lessons Learned Report, Section 4.1.1, p. 45; Section 4.2.2, p. 54; Section 4.3.1, pp. 57–58**  
**Contract Management Process**

1.5.4 Please discuss the effectiveness, over the course of the Project, of each of the following project plans and explain how it will inform BC Hydro’s approach to similar plans on future projects. For each, please include a description of any input the contractor provided to the development and execution.

- Contract Management Plan;
- Project Quality Plan; and
- Project Deficiency Management Plan.

**RESPONSE:**

**The following sections discuss the approach to the Contract Management Plan, Project Quality Plan, and the Deficiency Management Plan on the Site C Project. These plans are prepared and tailored to the specific requirements of each project.**

**Contract Management Plan**

**The Contract Management Plan is an internal document that is used by BC Hydro project teams to plan and manage major contracts on a project. For the Site C Project, there was an over-arching Contract Management Plan that was applicable to the entire project, and which was updated over the course of the Project. In addition, each major contract also had a detailed and contract-specific Contract Management Plan, which outlined the contractor’s specific contractual obligations. The preparation of these contract-specific Contract Management Plans began during the procurement phase and continued to be updated as the contract was finalized.**

**The Contract Management Plan was an effective tool for the Site C Project. It provided, in one document, information needed to manage the major contracts, ensured all Project and contractor contractual obligations were clearly documented in contract-specific plans, and facilitated the completion of important contract management activities and deliverables. The Contract Management Plan was used as a reference document to guide Project staff throughout the duration of the Project and was especially valuable for continuity for new Project team members and when people changed roles on the Project.**

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**As the Project progressed, the Contract Management Plan was used in conjunction with the Commercial Management Plan (which was created in 2021) to specifically address contractor commercial issues and claims. The Commercial Management Plan was supported by structured processes, tools, and governance. Additional training, tools, and processes, including claims reporting, were provided to support consistent commercial management across the scope and duration of the Project.**

**Contractor input to the Contract Management Plan was limited to their contributions related to the development of their final contract with the Project, any subsequent changes to their contract, and the roles and responsibilities of the contractor.**

### **Project Quality Plan**

**The Project Quality Plan is an internal document that is used by BC Hydro project teams to plan, manage, track and document quality on projects. The purpose of the Project Quality Plan is to ensure the quality objectives of a project are achieved. The Project Quality Plan is a living document that is updated over the course of a project as it evolves from design to construction to completion, and in response to changes in processes and governance.**

**The Project Quality Plan was an effective tool for the Site C Project. It resulted in the performance of the Project either meeting or exceeding the design expectations and validated the quality of the design and construction.**

**Some examples of highly complex work on the Project with outcomes that demonstrate the effectiveness of the Project Quality Plan are:**

- The generating facility and supporting structures are performing in line with design specifications;**
- Instruments monitoring the performance of the foundations and dam show readings within expectations; and**
- The performance of the major equipment (i.e., turbines and generators) continues to meet expectations for reliability.**

**Contractor input to the Project Quality Plan was limited to the contractual commitments they agreed to related to quality management in their contracts with the Project, and to collaborating with the Project team to use the processes and systems that were documented in the Project Quality Plan.**

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## Deficiency Management Plan

The Deficiency Management Plan is an internal document that describes the processes, procedures, tools, systems, and roles and responsibilities that are required to manage deficiencies on the Site C Project. The Deficiency Management Plan details how to document, manage, and report on deficiencies to support the successful close-out of a contract or scope of work before an asset is handed over to BC Hydro's Operations team. It mitigates project close-out risks and supports the delivery of high-quality assets, constructed to the correct specifications in alignment with the project schedule.

The Deficiency Management Plan was an effective tool for the Site C Project. It provided, in one document, the information needed to identify, document, and close-out deficiencies, and to ensure that important deficiency management activities and deliverables were completed. It was also used as a reference document to guide the Project staff throughout the construction, commissioning, and turnover to BC Hydro Operations phase of the Project.

The effectiveness of the plan was demonstrated in 2025 with the successful close-out of the Main Civil Works contract, and the successful completion of the interim fit-for-service handovers of the Units 1 to 6 turbines and generators to the BC Hydro Operations team. The Deficiency Management Plan will continue to be an important plan for the Project in 2026 and 2027 as BC Hydro closes out other major contracts and continues to handover other systems and equipment to BC Hydro Operations (e.g., the spillway equipment).

Contractor input to the Deficiency Management Plan is limited to the contractual commitments they agree to related to deficiency management as part of their contract, and using the processes and systems that are documented in the Deficiency Management Plan to identify, track, manage, and resolve all Project deficiencies.

## Future Projects

Contract Management Plans and Quality Plans are an established part of BC Hydro's Project and Portfolio Management practices. As these plans have been helpful tools on the Site C Project and other major capital projects, BC Hydro intends to continue developing these plans for future projects, where appropriate. These plans support a structured approach to managing contracts and quality requirements.

Deficiency tracking is also a standard element of BC Hydro's Project and Portfolio Management practices. However, the comprehensive, stand-alone Deficiency Management Plan that was developed for the Site C Project was developed to address the scale, complexity, and multi-contractor environment of that project

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**and is not a specific requirement of deficiency tracking. For future large construction projects, BC Hydro will consider implementing a specific Deficiency Management Plan where project size, risk profile, and complexity warrant a more detailed and dedicated approach. This will support the management of deficiency identification, tracking, resolution, and close-out in a disciplined and transparent manner, and in alignment with project needs.**

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**5.0 D. CONTRACT MANAGEMENT**  
**Reference: Lessons Learned Report, Section 4.1.1, p. 45; Section 4.2.2, p. 54; Section 4.3.1, pp. 57–58**  
**Contract Management Process**

1.5.5 Please explain what BC Hydro considers to be a “timely resolution” of commercial issues and discuss BC Hydro’s performance in meeting this over the course of the Project. In the response, please explain BC Hydro’s performance in timely resolution both before and after the appointment of the Project Commercial Management Team and Project-specific Commercial Management Plan, and how BC Hydro intends to adapt its approach on future projects.

**RESPONSE:**

**BC Hydro defines timely resolution of commercial issues as:**

- **Identifying, addressing, and closing issues as quickly as possible to minimize risks to the Project cost, schedule, and relationships; and**
- **Being proactive to ensure that issues do not prolong or escalate.**

**For the Site C Project, this entailed best efforts to identify issues as soon as possible; being clear in communication with the contractor, other stakeholders, and Project leadership and oversight; and undertaking analysis, negotiating, and then resolving issues through a formal change document or settlement agreement where release language was used to minimize future exposure.**

**In the initial stages of the Project, commercial issues were resolved by the Project Management, Contracts, and Construction teams as part of their duties as the parties responsible for contracts. Initially, there were a limited number of major contractors on site so claims and commercial issues were primarily related to the Main Civil Works contract. The Main Civil Works team (with support from other internal functional teams such as contracts and legal) were able to address those claims in a timely manner. To minimize schedule impacts, the team was able to employ contractual mechanisms such as Change Orders/Directives and Interim Directions that allowed work to continue while commercial issues were resolved.**

**As the Project progressed and more major contracts were awarded, claims became more numerous, more complicated, and frequently involved overlapping claims that impacted multiple contracts. By 2020/2021, and with the onset of the COVID-19 pandemic and its significant impacts on the Project, there was a backlog of commercial issues that was continuing to grow.**

**In response, the Project put in place a dedicated Project Commercial Management team to focus on claims and commercial resolution. While this approach was effective, it took some time before the backlog could be fully addressed. The Commercial Management team was focussed on limiting the impact to a given**

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**contract, any interface or critical path schedule and cost impacts to other contracts, and to the Project in general. Sometimes this meant that, although the claim was still open, mechanisms were put in place so that disputed work could be progressed.**

**The Project Commercial Management team adopted an approach when resolving contractual claims whereby the Project obtained a release of past claims to the date of the settlement or agreement. This approach was valuable in that it put the past behind and allowed the Project and the contractor to focus on facts and claims that arose after the date of the release.**

**Contract management systems to track claims and claims resolution were built and enhanced based on feedback from Ernst & Young and the Project Advisory Board. However, as these systems were not fully operational until 2021, it is difficult to measure the claims resolution timeframes pre-2021 and before the formation of the dedicated commercial management team.**

**For future projects, BC Hydro plans to adopt a similar and scaled approach to the timely resolution of commercial issues. Early identification and tracking of issues will continue to be central to BC Hydro’s approach. Through our existing Project and Portfolio Management practices, BC Hydro promotes proactive issue identification, timely communication, and use of claims-tracking systems so that issues are monitored and addressed expediently, while minimizing cost based on contractual entitlement.**

**BC Hydro will continue to focus on resolving commercial issues in a timely manner while maintaining progress on critical-path work. Where appropriate, the use of tools such as term sheets and Memoranda of Understanding are current practice, and will continue for future projects, allowing work to proceed while settlement terms and release language are finalized.**

**Please also refer to BC Hydro’s response to BCUC Staff IR 1.5.6 for further details on how BC Hydro will approach future capital projects, including the North Coast Transmission Line Projects.**

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**5.0 D. CONTRACT MANAGEMENT**  
**Reference: Lessons Learned Report, Section 4.1.1, p. 45; Section 4.2.2, p. 54; Section 4.3.1, pp. 57–58**  
**Contract Management Process**

1.5.6 Please confirm, or explain otherwise, that BC Hydro intends to form a dedicated, centralized Project Commercial Management team and Project-specific Commercial Management Plan for future capital projects over a certain size. In the response, please detail how BC Hydro selects the threshold for project size and if the North Coast Transmission Line Projects meet this threshold.

**RESPONSE:**

**For other larger or more complex projects that involve elevated commercial risk, multiple interfaces, or significant contractor-coordination requirements, BC Hydro will establish dedicated, centralized commercial management resources. This approach has recently been implemented for the Campbell River system projects, where a dedicated claims and commercial management resource supports the projects. Based on this approach, the North Coast Transmission Line Projects will also have a dedicated commercial management structure and a project-specific Commercial Management Plan. This approach reflects the scale, complexity, multi-contract delivery model, and commercial risk considerations of these projects.**

**BC Hydro will align its commercial management structures (including the requirement for Commercial Management Plans) with the size, complexity, and risk profile of each capital project. BC Hydro does not plan to apply a single dollar-value or project-size threshold to its commercial management approach. Rather, we will consider the commercial risks inherent in each project and match planning and oversight efforts accordingly.**

**For projects of more modest size or complexity, commercial issues and claims will continue to be managed by the project and construction management teams in their roles as Contract Owners and BC Hydro Representatives, with the ability to draw on specialized expertise from BC Hydro’s centralized Claims Management team. This centralized approach also ensures alignment with BC Hydro’s overall claims and commercial management practices, providing consistency across projects and enabling large, complex programs to benefit from dedicated expertise capable of responding to fast-paced commercial issues.**

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**5.0 D. CONTRACT MANAGEMENT**  
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**Contract Management Process**

1.5.7 Please discuss the pros and cons of holding claims oversight workshops with a Project Independent Oversight Advisor and explain whether BC Hydro intends to do the same on future projects, including the North Coast Transmission Line Projects. If not, please explain why not.

**RESPONSE:**

**BC Hydro’s experience with claims oversight workshops with a Project Independent Oversight Advisor is limited only to the Site C Project. For that Project, the terms of reference for the Independent Oversight Advisor (Ernst & Young) included reviewing the commercial team and related processes, as well as reviewing ongoing claims and related commercial strategies. This was carried out through workshops, in addition to regular meetings, during the course of the Project.**

**The pros of holding oversight workshops are that they provided independent validation before major decisions on commercial claims were undertaken, and provided an opportunity to stress test assumptions, methodologies and ensure decisions were defensible. Tools, processes, templates, governance, and documentation improved based on feedback from Ernst & Young, and there were no outstanding recommendations from Ernst & Young that were not addressed. Please refer to BC Hydro’s response to BCUC Staff IR 1.5.8 for more discussion of how BC Hydro addressed Ernst & Young’s recommendations. Ernst & Young’s involvement meant that that presenting claims information to the Project Assurance Board and Commercial Sub-Committee of the Project Assurance Board was more efficient and effective because the issue had been previously discussed, allowing any concerns or issues to be proactively addressed.**

**A con of holding oversight workshops is that, given the rapidly evolving nature of many of Site C’s commercial claims issues, a significant amount of effort and time went into ensuring that information could be quickly and efficiently prepared and communicated for presentation in the workshops. In addition, significant time was required to follow-up on actions. This additional time and effort resulted in trade-offs for Project staff who also needed to prioritize direct engagement on the issues. In some cases, this created strain on relationships between the parties, especially when recommendations were made that were theoretically possible but, in practice, not practical to implement.**

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**Given the experience on the Site C Project, for future projects BC Hydro will consider using claims oversight workshops with governing bodies on a project-by-project basis, considering each project’s size, complexity, and commercial risk profile. While the level of independent oversight used for the Site C Project may not be required for all projects, certain forms of internal oversight separate from the project may add value. Such oversight could be tailored to focus on specific areas such as technical assessments, complex claims analysis, commercial strategy validation, or governance practices. As described in BC Hydro’s response to BCUC Staff IR 1.17.7, the BC Hydro Board of Directors will consider the appointment of an Independent Oversight Advisor for the North Coast Transmission Line Projects as they proceed into the construction phase.**

**For projects with complex technical issues or elevated commercial risk, BC Hydro may seek technical external oversight (separate from the project teams) on discrete claims or issues. BC Hydro would need to incorporate a threshold specific to the project for these issues.**

**For the North Coast Transmission Line Projects, oversight may include internal (separate from the project) review functions, focused on technical, commercial, or governance matters. The project executive steering committee and the sub-committee both include external advisors. BC Hydro also remains engaged with First Nations in co-ownership discussions, which provide independent oversight of the co-ownership terms and agreements.**

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**5.0 D. CONTRACT MANAGEMENT**  
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**Contract Management Process**

1.5.8 Please identify all lessons learned from Ernst & Young through the claims oversight workshops. Please also explain how those lessons will inform changes to BC Hydro’s internal management of claims.

**RESPONSE:**

Ernst & Young provided feedback on a number of areas with respect to commercial and claims management for the Site C Project. This was gathered through a combination of claims oversight workshops and also regular meetings with the Project team. The main areas of feedback included: process and procedures, claims reporting, claims integration, claims assessment, commercial analysis, and data review. The following are examples of what was done to address their feedback.

Claims process flows were enhanced and detailed the lifecycle of a claim, and included roles and responsibilities to bring the claim to resolution. This resulted in consistency and clarity between subprojects across the Project.

Enhancements to Project Assurance Board reports and dashboards were made and additional data fields were added to contract management tools such as Unifier. This allowed for more transparency of information, and summarized complex data in graphs and tables.

Reports were created to summarize funding source for claims and highlighted areas that required risk (contingency) which aligned with risk reporting. This information was added to Project Assurance Board and BC Hydro Board requests for Contract Increases.

Commercial mandate documents for complex claims were augmented to include estimating and risk analysis as part of the evaluation.

Regular reviews were undertaken by Ernst & Young, and at the conclusion of their engagement in 2025, they reported that their feedback had been addressed and all recommendations were closed.

Learnings from this engagement on Site C will be leveraged on future projects, as it identified areas for improvement and will inform changes to our internal management of claims. BC Hydro has identified updates to claims process flows, reporting, training, and resourcing, as areas of prioritization for complex projects.

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**BC Hydro will use the Site C claims related process flows to inform the development and documentation of additional claims practices within the Project and Portfolio Management Practices for larger and more complex projects with higher risk profiles. We will also build on, tailor, and utilize the claims education and training modules developed during the Site C Project.**

**BC Hydro will continue to use its internal claims tracker dashboard to support smaller and less complex projects with claims related data reporting across project teams. For larger, more complex projects with a greater risk profile, project teams will assess the applicability of other tools such as standardized one-page summaries for claims and enhanced reporting and tracking dashboards to support more detailed oversight.**

**As BC Hydro assembles teams for future projects, lessons learned from the Site C Project will continue to be transferred, where applicable, into both our dedicated commercial management, and centralized contracts and claims groups. These lessons will be scaled appropriately based on the project size, risk profile, and contract interfaces. In addition, as per the lessons learned practice, lessons will also be searchable in the centralized database.**

**In addition to this knowledge transfer, BC Hydro also intends to build additional capacity by adding resources with suitable backgrounds and experience to meet the demands of our growing capital plan. Together, these improvements will help support more robust commercial and claims management across projects of varying scale and complexity.**

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**6.0 D. CONTRACT MANAGEMENT**  
**Reference: Lessons Learned Report, Section 4.4.1, p. 62**  
**Contract Management, Lesson CM1: Evaluation of Consortium Bidders**

1.6.1 Please explain how BC Hydro typically evaluates a multinational contractor's ability to meet the unique challenges of working in British Columbia. Please explain whether BC Hydro has experience with multinational contractors failing to meet these expectations on previous projects or how these challenges were avoided on past projects. In the response, please explain how lessons learned from working with multinational contractors on Site C may be incorporated into future project contract awards.

**RESPONSE:**

**When working with multinational proponents, BC Hydro evaluates their ability to work effectively through a combination of financial, technical, organizational, and experience-based questions within the solicitation documents for each major project. Key evaluation criteria typically include, but are not limited to:**

- **Relevant experience, particularly experience delivering projects in climates, geographies and construction environments comparable to those found in British Columbia;**
- **Demonstrated understanding of local regulatory requirements, including provincial and federal permitting processes, environmental approvals, WorkSafeBC regulations and other jurisdictional obligations;**
- **Organizational capacity and key personnel, with emphasis on the proposed project leadership team, plans for retaining key personnel, and clarity on how responsibilities will be shared among subcontractors or partners; and**
- **Past performance on similar large and complex projects, supported by verifiable references and examples of successful delivery under similar conditions.**

**BC Hydro's general experience with multinational equipment supply contractors on past projects, where the scope of their contracts has been less complex than Site C infrastructure contractors, is that the contractors have experience operating in Canada, are able to demonstrate their ability to meet the evaluation criteria and are meeting expectations.**

**The very high contract values associated with the Site C opportunities attracted foreign multinational contractors that had limited or no experience working in**

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**British Columbia. The multinational contract consortium on Site C was able to demonstrate their ability to meet the evaluation criteria, in part by incorporating a local partner with local knowledge. However, there were two key challenges which led to the consortium taking longer than expected to understand the unique challenges of working in British Columbia:**

- **The local partner under the Main Civil Works contract consortium had to withdraw after the contract award because of insolvency. The challenge created by this loss of local knowledge was most acute with respect to a lack of understanding of detailed requirements for plans submission at the start of the project to address Environmental Assessment Certificate obligations and a lack of understanding of working with WorkSafeBC and other regulatory agencies; and**
- **It became evident that the consortium had trouble and did not have experience integrating with each other, which created additional challenges to overcome and reduced its ability to respond to the unique challenges of working in British Columbia.**

**Recognizing the unique challenges foreign multinational contractors may face when working in British Columbia, future evaluations for large complex projects will build on the lessons learned on the Site C Project, as discussed in BC Hydro's response to BCUC Staff IR 1.1.2. In particular:**

- **BC Hydro will ensure that pre-award activities for large complex projects include enhanced evaluation criteria so that multinational contractors are required to demonstrate thorough strategies for managing the unique requirements of construction in British Columbia, and that they have the required knowledge of local conditions and regulatory requirements;**
- **Additional measures, such as early integration workshops may be introduced before contract award to proactively address challenges associated with delivering work in British Columbia. At these workshops, the entities of a consortium will be required to show how they will collaborate with each other, and present the key strengths that they contribute toward the consortium and how they resolve internal disagreement between themselves; and**
- **Evaluation criteria for consortiums for large complex projects will include being able to demonstrate that each of the consortium partners are financially viable and have worked together before, with examples of this past experience.**

**BC Hydro believes that these steps will help to avoid the challenges faced with the multinational consortium on Site C.**

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**6.0 D. CONTRACT MANAGEMENT**  
**Reference: Lessons Learned Report, Section 4.4.1, p. 62**  
**Contract Management, Lesson CM1: Evaluation of Consortium Bidders**

1.6.2 Please explain how BC Hydro has sought, or will seek, feedback from multinational contractors on how BC Hydro communicated its expectations prior to awarding the contract. In the response, please describe the feedback received and identify any actions that BC Hydro will take as a result.

**RESPONSE:**

Post-award feedback from some contractors on the Site C Project was that the submission of plans was much more challenging than anticipated and took multiple rounds of revision between BC Hydro and the contractor before they were approved.

Site C was a complex and more challenging project than anticipated. Actions can be taken on future projects to avoid the setbacks experienced on Site C when dealing with multinational contractors. These pre-award steps are discussed in BC Hydro's response to BCUC Staff IR 1.6.1.

BC Hydro's bid documents, both on Site C and generally, outline the obligations of contractors. In addition, expectations are clarified by engaging bidders and potential bidders through a range of pre-award activities intended to ensure that BC Hydro's expectations regarding scope, regulatory compliance, site conditions, and delivery risks are communicated. BC Hydro's standard pre-award activities for setting expectations include:

- Requests for Information (RFIs) to test market understanding, identify areas of uncertainty, and clarify expectations before issuing or finalizing Request for Qualification/Proposal (RFx) documents;
- Information sessions and bidder meetings, which provide opportunities for contractors to ask questions and receive clarification on technical, commercial, regulatory, environmental, and safety requirements;
- Site visits, enabling bidders to directly observe site conditions, geographic constraints, climate considerations, logistical challenges, and interface risks that may not be fully conveyed through written documentation;
- Formal RFx clarification processes and written questions which allow bidders to raise concerns or seek clarification in a fair, transparent, and consistent manner; and
- Preferred Proponent presentations during negotiations, where appropriate, to confirm the proponent's understanding of the project's technical, commercial, and execution requirements prior to contract award.

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**7.0 D. CONTRACT MANAGEMENT**  
**Reference: Lessons Learned Report, Section 4.4.3, p. 68**  
**Contract Management, Lesson CM3: Leadership**  
**Involvement in Contract Claims**

1.7.1 Please explain: (i) why the Project had limited resources for claims and commercial management when construction started; (ii) when in the Project lifecycle BC Hydro determined its claims and commercial management resources were not sufficient; and (iii) any impacts from insufficient claims and commercial management resourcing.

**RESPONSE:**

**During the early stages of the Site C Project, the commercial issues were primarily related to the Main Civil Works contract. As described in BC Hydro’s response to BCUC Staff IR 1.5.5, in the initial stages of the Site C Project, commercial issues were resolved by the Project Management, Contracts, and Construction teams with support from other functional groups such as legal and estimating. This is consistent with standard practice within BC Hydro’s Project and Portfolio Management process that the Project Management and Contracts and Construction teams manage commercial issues, as part of their roles as the contract owner and BC Hydro representative for specific contracts.**

**As the Project progressed through the Implementation Phase of the project lifecycle in 2020 and 2021, and with the onset of the COVID-19 pandemic, the backlog of commercial issues grew to the point that a dedicated Project Commercial Management team, with a focus on claims and commercial resolution, was needed. At the same time, the 2021 Milburn Report and feedback from Ernst & Young also put forth recommendations to strengthen the commercial resources on the team.**

**The impact of not having this dedicated commercial team was that it put pressure on the delivery teams who had to split their time between progressing and managing the construction work and addressing commercial issues. A dedicated commercial team could have limited the growth in the backlog of claims, reduced the burden on the delivery teams, and addressed and progressed claims and commercial issues to resolution.**

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**7.0 D. CONTRACT MANAGEMENT**  
**Reference: Lessons Learned Report, Section 4.4.3, p. 68**  
**Contract Management, Lesson CM3: Leadership**  
**Involvement in Contract Claims**

1.7.2 Please describe BC Hydro's process for determining the required level of claims and commercial management resources necessary for a project, both at the outset and throughout construction.

**RESPONSE:**

This response also answers BCUC Staff IR 1.7.3.

**BC Hydro determines the level of claims and commercial management resourcing on its major capital projects through the following process:**

- **An initial resourcing assessment completed prior to contract award and mobilization (i.e., prior to the start of construction), which is based on the following project attributes and information:**
  - ▶ **The delivery model;**
  - ▶ **Contract complexity indicators (e.g., interface count, project type, geographic dispersion, subcontractor involvement);**
  - ▶ **Contractor capability and historical claims behaviour;**
  - ▶ **Design completeness at award;**
  - ▶ **Permitting or third-party dependencies;**
  - ▶ **Logistics and seasonality;**
  - ▶ **Owner readiness (drawings, submittals); and**
  - ▶ **Historical resourcing data;**
- **As described in BC Hydro's response to BCUC Staff IR 1.5.6, project attributes will determine whether a project requires a dedicated Commercial and Claims Management team, as well as the team's size and composition;**
- **Continuous right-sizing of claims and commercial management resources during project construction is based on the following project metrics:**
  - ▶ **Performance and resolution metrics:**

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- **Resolution cycle time: average time to resolve claims, segmented by claim type; and**
- **Frequency and volume trends: claim incidence per contract type.**
- ▶ **Escalation rate: percentage of claims requiring senior leadership or legal involvement;**
- ▶ **Increasing volume, aging, or complexity prompts resourcing reviews to ensure timely impact analysis and resolution;**
- ▶ **Financial and commercial metrics:**
  - **Claim value distribution and status: average and cumulative financial exposure per claim categories;**
  - **Payment friction and contractual remedies: disputed pay-application amounts, withholds and set-offs, and any acceleration directives are monitored as signals of commercial contention requiring augmented contract administration and claims expertise; and**
  - **Predictive and staffing metrics.**
- ▶ **Early warning indicators: spike in change orders, repeated scope clarifications, or prolonged Requests For Information (RFIs) response time.**

**Monthly governance reviews (or ad-hoc when indicators spike) determine whether to maintain, scale up, or redeploy commercial and claims resources. Decisions consider the trend and persistence of the above metrics and the team’s ability to keep change and claim files current. When indicators show sustained deterioration or a major claim event, BC Hydro assigns a claims specialist, augments administrative capacity, and increases reporting cadence and contractor submission requirements.**

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**7.0 D. CONTRACT MANAGEMENT**  
**Reference: Lessons Learned Report, Section 4.4.3, p. 68**  
**Contract Management, Lesson CM3: Leadership**  
**Involvement in Contract Claims**

1.7.3 Please identify any metrics or attributes that BC Hydro will monitor on future projects to anticipate that an increase of claims and commercial management resources is necessary.

**RESPONSE:**

**Please refer to BC Hydro’s response to BCUC Staff IR 1.7.2 where we identify the metrics and attributes that BC Hydro monitors on capital projects to anticipate if an increase of claims and commercial management resources is necessary.**

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**7.0 D. CONTRACT MANAGEMENT**  
**Reference: Lessons Learned Report, Section 4.4.3, p. 68**  
**Contract Management, Lesson CM3: Leadership**  
**Involvement in Contract Claims**

1.7.4 Please explain whether there was representation from the project leadership team in the dedicated contract and commercial management resources assigned to the Project. If not, please explain why not. In the response, please describe how future projects will incorporate the project leadership team in contract and commercial management.

**RESPONSE:**

The dedicated contract and commercial management team initially reported to the Vice President, Dam Site who was a senior member of the Project leadership team and provided commercial strategic direction on behalf of the Project leadership team.

This reporting relationship was through a Senior Commercial Manager (located at site) and a Senior Commercial Governance and Compliance Manager (located in Vancouver). These senior managers were also responsible for reporting out to the Project team, to the Project Assurance Board, the Commercial Sub-Committee, and Ernst & Young.

This structure of reporting allowed commercial issues to be elevated quickly up through the project and oversight bodies for timely input on strategy and resolution. After the Vice President, Dam Site role was concluded (in January 2025), the commercial management senior leadership was added directly into the Project Leadership Team.

For future large and more complex projects, such as the North Coast Transmission Line Projects, BC Hydro expects the approach to be similar (i.e., contract and commercial leadership will either report directly to a member of the project leadership team or will be a member of the project leadership team). Smaller projects will continue to have access to BC Hydro's centralized claims management team for specialized support.

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**7.0 D. CONTRACT MANAGEMENT**  
**Reference: Lessons Learned Report, Section 4.4.3, p. 68**  
**Contract Management, Lesson CM3: Leadership**  
**Involvement in Contract Claims**

1.7.5 Please explain BC Hydro’s past experiences with resourcing for claims and commercial management on its largest capital projects (i.e. over \$750 million). In the response, please identify lessons learned on those past projects, whether the lessons were applied on the Site C Project, and the impact of the changes to approach.

**RESPONSE:**

Prior to the Site C Project, BC Hydro had not implemented internal dedicated commercial or claims management teams on any of its projects. Projects were delivered using a centralized approach where project managers and construction management sourced contract and commercial support from a centralized pool of BC Hydro specialists or dealt with the commercial issues themselves as part of their roles as the contract owner or BC Hydro representative, as defined in the Project and Portfolio Management framework.

Prior to the Site C Project, the centralized approach to providing projects with claims and commercial support had been effective. Therefore, BC Hydro did not have documented lessons learned from its largest capital projects (i.e., over \$750 million) on resourcing for commercial and claims management teams that would have informed the need for a dedicated contract and commercial management team.

The Site C Project presented a uniquely complex and challenging set of circumstances relative to other BC Hydro projects in regard to claims and commercial issues, as discussed in BC Hydro’s responses to BCUC Staff IRs 1.7.1 and 1.7.4. Therefore, a dedicated commercial team was required for the Project which resulted in the lessons learned described in section 4.4 of the Lessons Learned Report.

More recently, on the Campbell River System projects, BC Hydro has introduced a centralized commercial and claims management team, informed by the experience gained on the Site C Project.

Please also refer to BC Hydro’s response to BCUC Staff IR 1.7.1 for further discussion regarding why the Site C Project had limited commercial resources in the initial stages of the Project.

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**8.0 D. CONTRACT MANAGEMENT**  
**Reference: Lessons Learned Report, Section 4.4.5, p. 74**  
**Contract Management, Lesson CM5**

1.8.1 Please describe how BC Hydro managed challenges in securing compliant schedules from the major contractors. In the response, please explain any contractual repercussions on contractors as a result of the delayed or missing compliant schedules.

**RESPONSE:**

This response also answers BCUC Staff IR 1.8.2, which asks for a description of the impacts to the Project team in obtaining contractually compliant schedules.

On a complex project like Site C, the schedule is key, and maintaining schedule progression drives behaviour, shapes commercial positions, and influences how both the Project team and contractors respond to change. When work sits on the critical path, any dispute over costs or schedule impacts can create significant cascading consequences. The Project team had to use every available tool to keep work on the Site C Project moving forward while issues were being resolved.

On the Site C Project, as with other BC Hydro projects, a compliant schedule was one of the requirements before work could begin. The contract terms and conditions for the schedule set out detailed expectations for formatting, level of detail, submission frequency, and quality checks. These requirements were designed to prevent ambiguity and ensure the contractor understood what was expected. Although the Project received compliant schedules at the start of each contract, challenges increased as work progressed, and changes occurred. Each change required the contractor to update the schedule, and it was common for several rounds of review and revision to be required before the updated schedule met the contractual standards. In most cases, this process worked as intended, and the Project team ultimately secured compliant schedules that accurately reflected the revised scope and its impacts.

However, some contractors on the Project were reluctant to provide greater visibility into their schedule float or resource loading when changes occurred. During commercial discussions regarding the schedule and cost impacts of these changes, some contractors delayed providing a compliant schedule until broader issues or claims were resolved. This made resolution of claims more complicated and slowed the progress of commercial matters, because the absence of a current compliant schedule created challenges in assessing impacts on interfaces with other contractors, as described in BC Hydro's response to BCUC Staff IR 1.8.2.

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Several major contracts on the Project included provisions that allowed the Project team to withhold the entire monthly payment if the contractor did not submit a compliant schedule. Exercising this right had to be considered carefully as there was significant risk if it was exercised. A contractor could choose to suspend work, and any delay to critical path activities could result in substantial financial impacts to the Project. To manage these risks, BC Hydro determined that it was more prudent to keep critical work progressing and temporarily waive the monthly schedule requirement while changes were being resolved. Schedule non-compliance was formally documented, and through settlement agreements, BC Hydro required contractors to submit compliant schedule updates before the agreements were executed and before any settlement payments were released.

During these periods, the Project team used other schedule tools to maintain adequate visibility. These included three weeks look ahead schedules, which supported short term planning, and Without Prejudice Schedules, which were working documents used during settlement negotiations. These tools provided the necessary interim insight until fully compliant schedules were received.

While the contractual repercussions can be severe when contractors fail to submit a compliant schedule, the risk to a project is also significant if work on the critical path is impacted. On Site C, the Project team used every available tool to keep work moving forward while issues were being resolved.

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**8.0 D. CONTRACT MANAGEMENT**  
**Reference: Lessons Learned Report, Section 4.4.5, p. 74**  
**Contract Management, Lesson CM5**

1.8.2 Please discuss any impact(s) to the Project as a result of the challenges in securing compliant schedules from the major contractors, and further explain the steps BC Hydro intends to take on future projects to actively manage the submission of compliant schedules.

**RESPONSE:**

Please refer to BC Hydro's response to BCUC Staff IR 1.8.1 for a description of the impacts faced by the Project team in obtaining contractually compliant schedules.

To actively manage the submission of compliant schedules on future projects, BC Hydro will implement the following measures:

- Continuing to include detailed schedule compliance requirements within contract documents. These will address items such as schedule format and structure, narrative or basis, logic integrity, update frequency, and requirements for resource and cost loading, consistent with industry best practices;
- A compliant baseline schedule will remain a prerequisite for contractor mobilization. This approach supports transparency and clarity regarding scope, execution methodology, resource plans, design status, procurement timelines, owner-supplied long-lead items, sequencing, and critical path activities;
- Bid schedules prior to contract award and baseline schedule submissions will continue to undergo detailed quality reviews to ensure compliance with contractual requirements and industry standards;
- Where applicable, projects that incorporate Early Contractor Involvement may provide opportunities to facilitate collaborative schedule development workshops;
- BC Hydro will continue to require contractors to submit schedules suitable for integration into the project's master schedule. This supports alignment of interfaces, critical path visibility, and consistent reporting across all project work fronts; and
- Where appropriate, progress payments will continue to be linked to verifiable physical progress, with schedule compliance reflected in payment terms. Rules of credit will be defined early on and agreed upon to support objective

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**and transparent progress measurement. These measures will be scaled appropriately to each project based on its risks, constraints, contract type, and commercial structure.**

**BC Hydro recognizes that while many of these measures were in place for the Site C Project, there were still problems with non-compliance as described in BC Hydro's response to BCUC Staff IR 1.8.1. In the event of contractual non-compliance, future projects will need to make difficult business decisions with regard to enforcing contractual rights. As discussed in BC Hydro's response to BCUC Staff IR 1.9.1, the Site C Project developed alternatives to continue to progress work on the Project and avoid impacts to the critical path. Other lessons learned related to the bidding process, as discussed in BC Hydro's response to BCUC Staff IR 1.6.1, are intended to help secure the right contractors, with the right information, to reduce the potential for non-compliance.**

**On Site C, the Project team learned that schedule risk cannot simply be transferred to the contractor. BC Hydro must manage, plan, and understand the schedule as well as, or better than, the contractor. BC Hydro also needs to actively and proactively manage the schedule in partnership with the contractors so that issues and obstacles are removed before they affect active work fronts. A shared and accurate understanding of the schedule helps align expectations on productivity, supports contractor success, and improves the likelihood of achieving key milestones.**

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**9.0 D. CONTRACT MANAGEMENT**  
**Reference: Lessons Learned Report, Section 4.3.2, p. 60; Section 4.4.6, pp. 76–78**  
**Relationships with Contractors**

1.9.1 Please describe BC Hydro’s approach to incorporating contractors in planning for the Project.

**RESPONSE:**

The Site C Project took a proactive approach to incorporating contractors in planning for the project, particularly in the upfront design and procurement phases. The involvement of contractors in planning was a continuous, evolving process for each stage of the work, each work front, and each construction season. The schedule risk was managed jointly between the Project and the contractors, and planning was done to remove barriers before they affected the work front progress.

Examples of specific planning activities with contractors during the design and procurement phases of the Project included:

- Involving potential major contractors early during initial market sounding and the Request for Quotation procurement stage (well before the major Project contracts were awarded) to optimize the final designs, drawings, specifications, schedules, quality, timelines, work packaging, requirements, risk transfer, payment options, submissions, contractual terms and conditions, as well as alternatives, to enable BC Hydro to obtain the best and most competitive procurement responses;
  - ▶ Examples include engaging Voith (Turbines and Generators), Acciona (Large Infrastructure Contractor), and ATCO (Worker Accommodation) in market sounding. Additional information on the market sounding activities that were completed on the Project is provided in BC Hydro’s response to BCUC Staff IR 1.5.3.
- Involving First Nations in directed procurement opportunities early to obtain feedback on packaging, pricing and capacity of their designated businesses; and
- Involving other agencies throughout the Environmental Impact Statement and Environmental Assessment stages of the Project. Examples include the Ministry of Transportation who oversaw the construction of the highway relocation work.

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**Planning with contractors continued during the post-award and into the construction phase of the Project. Specific examples included:**

- **Involving contractors in planning through the delivery of their submittals and plans. Prior to the start of construction, the contractor was contractually required to submit their plans, and the plans needed to be accepted by the Project before the work proceeded;**
- **Regular planning and execution meetings between the project team and each contractor. This included meetings between construction management and resident engineering staff and their contractor counterparts as well as senior level Contractor Relationship meetings between the senior leadership of the Site C Project and the senior leadership of four of the major contractors to support alignment on project goals related to safety, quality and performance, and to foster trust and collaboration;**
- **Contract terms allowed for contractor planning through Value Engineering Proposals that could be submitted by the contractor to modify works with the resulting benefits being split equally between the Project and the contractor;**
- **Specific Project planning constructability workshops were held prior to new or complicated construction activities such as the installation of the orifices in the diversion tunnel required for reservoir filling, the right bank foundation enhancements, and the approach channel design change. In addition, extensive planning was undertaken prior to tunnel conversion to ensure that the risks around this significant event were addressed and mitigated. This resulted in successful conversion within the allotted schedule timeframe;**
- **Framework agreements were developed to provide structure to the scoping and planning work from the contractor; and**
- **The Preliminary Change Instructions process was used to solicit contractor input and feedback on upcoming new work before the work plan and direction was finalized and issued to the contractor. In addition, change order reviews were held with contractors before finalization to optimize terms before work commenced.**

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**9.0 D. CONTRACT MANAGEMENT**  
**Reference: Lessons Learned Report, Section 4.3.2, p. 60; Section 4.4.6, pp. 76–78**  
**Relationships with Contractors**

1.9.2 Please discuss whether BC Hydro considers that holding similar meetings during the planning stages of a project would be beneficial. If yes, does BC Hydro intend to implement this practice on future projects? If not, please explain why not.

**RESPONSE:**

**Yes. In BC Hydro’s experience, early and ongoing engagement with contractors is important to support alignment on project expectations and objectives and we expect to continue this practice on future projects. The scope and frequency of such meetings will be scaled based on the project risk profile, size, complexity, and interface requirements.**

**As described in BC Hydro’s response to BCUC Staff IR 1.9.1, the Site C Project took a proactive approach to incorporating contractors in early planning stages, which achieved considerable benefits.**

**BC Hydro’s current Project and Portfolio Management practices incorporate contract kickoff and pre-job meetings with contractors, which serve as structured forums to establish clear expectations, define roles and responsibilities, and set communication protocols prior to the commencement of on-site work. These meetings help to establish a shared understanding of contractual requirements and project objectives from the outset of the project. They also provide an opportunity to foster collaboration and start to build strong working relationships in preparation for the start of on-site work.**

**For contracts that include an Early Contractor Involvement phase, there is an enhanced ability to implement these early planning discussions due to the extended timeframe available during the planning stage. This approach facilitates more comprehensive collaboration, which can improve project outcomes and mitigate risks.**

**These planning-stage meetings can also help to establish the foundation for a regular cadence of meetings throughout peak construction periods. This structured engagement enables proactive identification of issues, collaborative management of commercial considerations, and early mitigation of risks before they escalate.**

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**10.0 E. RISK MANAGEMENT**  
**Reference: Lessons Learned Report, Section 5.2.2, pp. 87–88; Section 5.2.3, p. 88; Section 5.2.4, p. 90; Section 5.2.6, pp. 94, 96, 97 Risk Analysis and Evaluation**

1.10.1 Please confirm, or explain otherwise, that risks identified on other past projects are used as a source for identifying possible risks on a project and building the risk logs.

**RESPONSE:**

**Confirmed. Each project has its own risk register and project teams look up past project risk registers and lessons learned as a source for identifying risks.**

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**10.0 E. RISK MANAGEMENT**  
Reference: **Lessons Learned Report, Section 5.2.2, pp. 87–88; Section 5.2.3, p. 88; Section 5.2.4, p. 90; Section 5.2.6, pp. 94, 96, 97 Risk Analysis and Evaluation**

1.10.2 Please explain how lessons learned on past projects were used in building the risk log, identifying specific past lessons learned that were considered and incorporated.

**RESPONSE:**

Using lessons learned on past projects as a source to identify project risks is a standard practice within the Project and Portfolio Management framework.

Please refer to BC Hydro’s response to BCUC Staff IRs 1.4.3 and 1.4.4 where we explain how lessons learned have been solicited for the Site C Project.

During the development of the project’s risk register, the Site C team drew upon the knowledge of internal resources (both current and retired employees at the time) and subject matter experts with knowledge from past generation projects (e.g., the Ruskin Dam and Powerhouse Upgrade, the John Hart Generating Station Replacement, the Revelstoke Generating Station Unit 5, and the Mica Units 5 and 6 Projects). Engagement was conducted through facilitated meetings.

Once the risk themes from other major projects were identified, the project team applied them to the Site C Project to create project-specific risks, which were logged in the risk register. As the risk management process matured on Site C, risks on previous projects were again consulted to help inform the probability of consequence, especially in relation to commissioning equipment.

The following are some examples of lessons from past projects used to build the Site C risk register:

- Lessons learned related to contract risk and contingency management integration and complex construction risk identification and analysis. On Site C, this was reflected in a number of risks related to claims included in the risk register, as well as the completion of a Cost Risk Analysis on a regular basis throughout the Implementation phase; and
- Lessons learned related to interface management from past projects were reflected in the Site C risk register. The project also had a dedicated interface management team, as well as an interface system with related processes/procedures.

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**10.0 E. RISK MANAGEMENT**

**Reference: Lessons Learned Report, Section 5.2.2, pp. 87–88; Section 5.2.3, p. 88; Section 5.2.4, p. 90; Section 5.2.6, pp. 94, 96, 97 Risk Analysis and Evaluation**

1.10.3 Please explain how the term “significant impact” is defined when evaluating risks on a qualitative basis and explain how BC Hydro determines this threshold for individual projects.

**RESPONSE:**

**“Significant impact” refers to risks with the highest combination of consequence severity and probability under the Project Delivery Risk Matrix. Attachment 1 to this response provides the Project Delivery Risk Matrix. Attachment 2 to this response provides the Site C Project Risk Matrix.**

**The project’s assessment of the probability and consequence severity of each risk is mapped into the Risk Matrix to determine the risk zone and risk score. The risk zone that is mapped for the individual risk provides the risk communication guidelines to determine the actions. For example, for Site C, risks mapped to the Executive Level risk zone require detailed analysis and discussion with the Executive Vice President for the Site C Project, BC Hydro’s President and CEO and the Project Assurance Board.**

**Risks with high consequence severity, including those assessed to be low probability, are included in the highest Risk Zone, Executive Level 3. This threshold is pre-defined in the Site C Project Risk Matrix and the Project Delivery Risk Matrix.**

PROBABILITY OF CONSEQUENCE (Duration of Project through Implementation)			BC Hydro PROJECT DELIVERY Risk Matrix						
60%	<b>Likely</b> More than even chance to occur	L7	8	9	10	11	12	13	
30%	<b>Fairly Likely</b> Often occurs	L6.5	7.5	8.5	9.5	10.5	11.5	12.5	
10%	<b>Possible</b> Could well occur	L6	7.0	8.0	9.0	10.0	11.0	12.0	
1%	<b>Remote</b> May occur	L5	6	7	8	9	10	11	
0.1%	<b>Very Unlikely</b> Not expected to occur	L4	5	6	7	8	9	10	
CONSEQUENCE TYPE			CONSEQUENCE SEVERITY						
			S1	S2	S3	S4	S5	S6	
<b>Safety</b>	<b>Worker</b>		First Aid	Treatment by Medical Professional	Temporary Disability	Permanent Disability	Fatality	Multiple Fatalities	
	<b>Public</b>		Near Miss	First Aid	Treatment by Medical Professional	Temporary Disability	Permanent Disability	Fatality	
<b>Environmental</b>			Minor	Low	Moderate	High	Extreme	Catastrophic	
<b>Financial Loss</b>			\$10K to \$100K	\$100K to \$1M	\$1M to \$10M	\$10M to \$100M	\$100M to \$1B	\$1B to \$10B	
<b>Reputational</b>			Limited complaints to company or shareholder	Negative local profile	Small but vocal minority of customers critical	Many customers critical	Loss of trust- strategic change imposed by regulator and/or shareholder	Loss of consent to operate	
<b>Reliability</b>	<b>Supply</b>		N/A	N/A	Require voluntary load reduction	Localized load shedding	Significant load shedding required	BC load shedding spreads to WECC	
	<b>Customer</b> (hours lost per event)		< 5K	5K to 50K	50K to 500K	500K to 5M	5M to 50M	50M to 500M	

Project Risk Zone	Risk Communication Guidelines
3) Executive	Detailed analysis and discussion at project VP level, with engagement of business group EVP or SVP. Input from Executive Team generally should be sought.
2) Initiator	Analysis and discussion between Portfolio Manager, Project Manager, and Initiator about the risks and appropriate courses of action.
1) Project Manager	Risk generally analysed and discussed with PM at project team level. Safety risks should be reviewed with the Project Initiator.

**Purpose of the Project Delivery Risk Matrix**

1. To provide a standard representation of the results of risk analyses for use in the evaluation and communication of project delivery risks.
2. As a risk governance tool. The Project Risk Zone relates to the level of management oversight to aid in decision-making.
3. Not used to describe risk tolerance.
4. A comparison of differing risks may also be conducted based on the Risk Levels.

**To use the Risk Matrix**

1. Select the Consequence Type.
2. Select the highest appropriate Consequence Severity.
3. Select the Probability level of the Consequence Type and Severity.
4. Plot the Consequence severity and Probability level pair to determine the Risk Level and associated Project Risk Zone.
5. Based on the Project Risk Zone, review Risk Communication Guidelines to determine action.

**NOTE: The rigour of analysis in analyzing consequence and frequency should be commensurate with the Project Risk Zone. This may be an iterative process.**

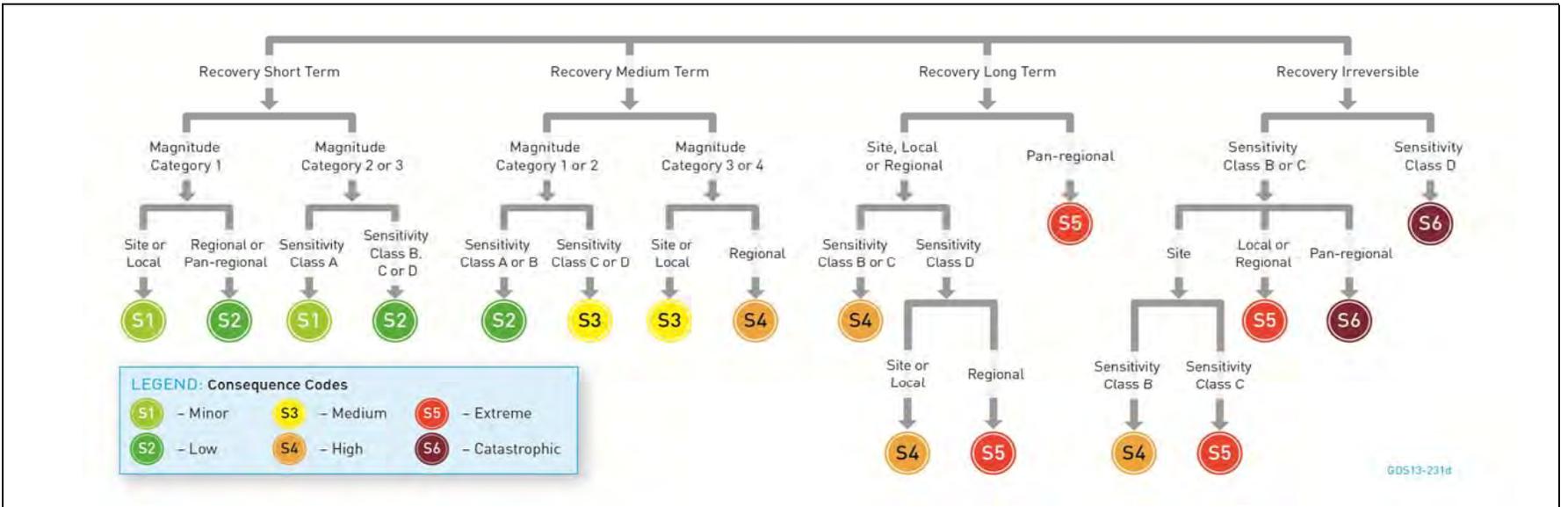
**This Project Delivery Risk Matrix is aligned to the Corporate Risk Matrix.**

\*NOTE: "Schedule" is not included as a consequence type as a missed schedule must effect the Consequence Types listed to be meaningful.

Detailed descriptors (Dimensions) for Reputational Consequence are included below to assist in determining consequence severity. To identify the severity, first review and select the Reputational consequence for each dimension, and then select the highest severity dimension.

CONSEQUENCE TYPE	DIMENSION	CONSEQUENCE SEVERITY					
		S1	S2	S3	S4	S5	S6
Reputational	Public response	Complaints to company shareholders, regulator	Small minority of public critical	Small but vocal minority of customers critical	Many customers critical	Majority of customers critical	Customers nearly unanimous in public criticism
	Media/Opinion Leaders' Response	No coverage	Brief negative or mixed local media coverage	Possible isolated "one-off" major media coverage	Some negative media coverage at provincial level.	Widespread and sustained negative media coverage.	Opinion leaders nearly unanimous in public criticism. Sustained very negative media coverage. National media coverage.
	Response of Public Officials	None	Issue brought to attention of public officials	Questions raised by MLAs and/or municipal officials	Conduct questioned in legislature	BC Hydro subject of sustained criticism of government in legislature	Public inquiry/criminal investigation
	Impact	None	Short-term delays to projects or minor modifications to work plan(s)	Medium-term delays in project or major modifications to plan. Significant dedication of resources to move forward	Cancellation of a major project or program, regulatory authority or shareholder imposed operating changes	Strategic change imposed by regulator or shareholder	Loss of shareholder support leading to massive organizational change.

Environmental consequence severities are determined by a combination of rankings for event sensitivity (the importance of the effected habitat/species), magnitude (the degree of impact on the habitat/species), spatial extent and recovery duration. To identify the severity, select the ranking for each of these criteria and follow the appropriate pathway in the Consequence Severity Decision Tree (below). Directions on selecting criteria rankings are provided at [Environmental Consequence Severity Scale – Application Guide](#).



NOTE: The Reputational descriptors have been consistent since the June 2009 Corporate Risk Matrix. The Environmental scale was updated in May 2014.

PROBABILITY OF CONSEQUENCE (Duration of Project through Implementation)										BC Hydro SITE C PROJECT Risk Matrix										Risk Zone	Risk Communication Guidelines
60%	Likely More than even chance to occur	L7	8	9	10	11	12	12.5	13	13.5	3-A) Executive and PAB		Detailed analysis and discussion at Project EVP, President and Site C Project Assurance Board (PAB) level with input from Site C Leadership and/or BC Hydro Executive Team members.								
30%	Fairly Likely Often occurs	L6.5	7.5	8.5	9.5	10.5	11.5	12	12.5	13	3-B) Executive		Detailed analysis and discussion at the Project EVP level, with engagement of business group EVP or SVP, and /or Site C Leadership Team. Input from Executive Team generally should be sought.								
10%	Possible Could well occur	L6	7	8	9	10	11	11.5	12	12.5	2) Initiator		Analysis & discussion between Site C Leadership Team Director, Project Manager and Functional Manager about the risk and appropriate course of action.								
1%	Remote May occur	L5	6	7	8	9	10	10.5	11	11.5	1) Project Manager		Risk generally analysed and discussed with PM at project team level. Safety Risks should be reviewed with Project Safety Lead and Site C Leadership Team Director.								
0.1%	Very Unlikely Not expected to occur	L4	5	6	7	8	9	9.5	10	10.5											
CONSEQUENCE TYPE		CONSEQUENCE SEVERITY																			
		S1	S2	S3	S4	S5	S5.5	S6	S6.5												
Safety	Worker	First Aid	Treatment by Medical Professional	Temporary Disability	Permanent Disability	Fatality		Multiple Fatalities													
	Public	Near Miss	First Aid	Treatment by Medical Professional	Temporary Disability	Permanent Disability		Fatality													
Environmental *		Minor	Low	Moderate	High	Extreme		Catastrophic													
Financial Loss		\$10K to \$100K	\$100K to \$1M	\$1M to \$10M	\$10M to \$100M	\$100M to \$300M	\$300M to \$1B	\$1B to \$3B	\$3B to \$10B												
Reputational *		Limited complaints to company or shareholder	Negative local profile	Small but vocal minority of customers critical	Many customers critical	Loss of trust- strategic change imposed by regulator and/or shareholder		Loss of consent to operate													
Reliability	Supply	N/A	N/A	Require voluntary load reduction	Localized load shedding	Significant load shedding required		BC load shedding spreads to WECC													
	Customer (hours lost per event)	< 5K	5K to 50K	50K to 500K	500K to 5M	5M to 50M		50M to 500M													

**Purpose of the Risk Matrix**

1. To provide a standard representation of the results of risk analyses for use in the evaluation and communication of risks.
2. As a risk governance tool. The Risk Zone relates to the level of management discussion to aid in decision-making.
3. Not used to describe risk tolerance.
4. A comparison of differing risks may also be conducted based on the Risk Levels.

**To use the Risk Matrix**

1. Select the Consequence Type.
2. Select the highest appropriate Consequence Severity.
3. Select the Frequency level of the Consequence Type and Severity.
4. Plot the Consequence severity and Frequency level pair to determine the Risk Level and associated Risk Zone.
5. Based on the Risk Zone, review Risk Communication Guidelines to determine action.

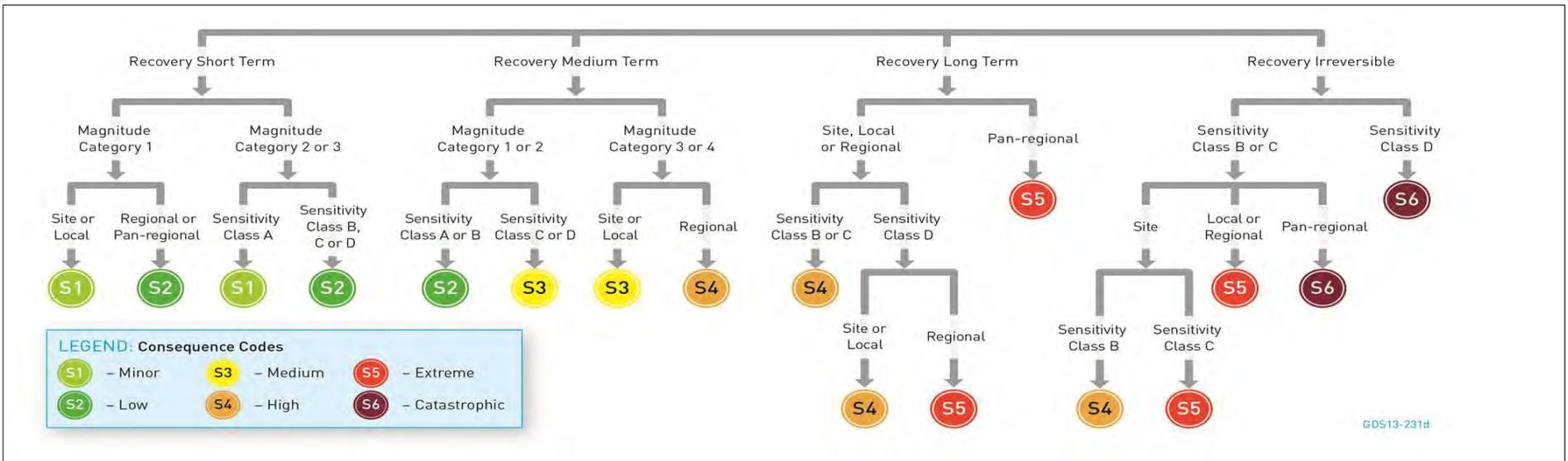
**NOTE: The rigour of analysis in analyzing consequence and frequency should be commensurate with the Risk Zone. This may be an iterative process.**

Date: Nov 2, 2020  
Site C Risk Matrix Revision 3

Detailed descriptors (Dimensions) for Reputational Consequence are included below to assist in determining consequence severity. To identify the severity, first review and select the Reputational consequence for each dimension, and then select the highest severity dimension.

CONSEQUENCE TYPE	DIMENSION	CONSEQUENCE SEVERITY					
		S1	S2	S3	S4	S5	S6
Reputational	Public response	Complaints to company shareholders, regulator	Small minority of public critical	Small but vocal minority of customers critical	Many customers critical	Majority of customers critical	Customers nearly unanimous in public criticism
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	Response of Public Officials	None	Issue brought to attention of public officials	Questions raised by MLAs and/or municipal officials	Conduct questioned in legislature	BC Hydro subject of sustained criticism of government in legislature	Public inquiry/criminal investigation
	Impact	None	Short-term delays to projects or minor modifications to work plan(s)	Medium-term delays in project or major modifications to plan. Significant dedication of resources to move forward	Cancellation of a major project or program, regulatory authority or shareholder imposed operating changes	Strategic change imposed by regulator or shareholder	Loss of shareholder support leading to massive organizational change.

Environmental consequence severities are determined by a combination of rankings for event sensitivity (the importance of the effected habitat/species), magnitude (the degree of impact on the habitat/species), spatial extent and recovery duration. To identify the severity, select the ranking for each of these criteria and follow the appropriate pathway in the Consequence Severity Decision Tree (below). Directions on selecting criteria rankings are provided at [Environmental Consequence Severity Scale – Application Guide](#).



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**10.0 E. RISK MANAGEMENT**  
Reference: **Lessons Learned Report, Section 5.2.2, pp. 87–88; Section 5.2.3, p. 88; Section 5.2.4, p. 90; Section 5.2.6, pp. 94, 96, 97 Risk Analysis and Evaluation**

1.10.4 Please explain whether all risks, where significant impact is identified, are typically included in the project-wide quantitative analysis. If all significant impact risks are not included, please explain how BC Hydro determines which risks are omitted and discuss the pros and cons of this approach.

**RESPONSE:**

**Not all project risks with a significant impact are included in the quantitative risk analysis. As discussed in BC Hydro’s response to BCUC Staff IR 1.10.3, “significant impact” refers to risks with the highest combination of consequence severity and probability under the Project Delivery Risk Matrix.**

**Risks are typically selected for the quantitative analysis as follows:**

- **Risk consequence type: quantitative risk analysis is undertaken on project risks that may have an impact on budget or schedule and have a financial loss consequence type. Project risks that have other consequence types that do not impact budget or schedule (such as reputational consequence) are typically not included in a quantitative risk analysis; and**
- **Risk scores: project cost or schedule impact risks with the highest combination of probability and consequence severity undergo quantitative risk analysis. Project risks with the most significant impact are determined when BC Hydro’s project team undertakes risk identification, evaluation, and qualitative analysis of all the risks in the risk register, scoring each risk based on probability and consequence severity.**

**Risks with lower scores may be omitted from quantitative risk analysis. The key advantage to including only a select subset of risks in the quantitative analysis is that it allows the team to focus their efforts and provide more in-depth analysis on the most critical risks.**

**By only including the most critical risks in quantitative risk analysis to inform contingency for the project, that means that some low-probability, high-consequence risks may not be included in the quantitative risk analysis. The standard project contingency should be an amount that is expected to be spent to successfully complete the project. Risk events that are highly unlikely and have very high consequences are typically not consistent with the use for standard**

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**project contingency. Therefore, it is appropriate to separately examine low-probability, high-consequence risks that are not included in quantitative risk analysis. These risks are included in the project risk register and will undergo evaluation and qualitative analysis by the project team, which can be used to determine if additional contingency or a project reserve is required. These low-probability, high-consequence risks are reviewed through detailed and early discussions between the project team and the governing bodies to determine the likelihood of the risk materializing and if additional contingency or project reserve should be established. In cases where no additional contingency or project reserve is established, the governing bodies will be made aware of the impacts to the project's cost and schedule if the risks were to materialize.**

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**10.0 E. RISK MANAGEMENT**  
**Reference: Lessons Learned Report, Section 5.2.2, pp. 87–88; Section 5.2.3, p. 88; Section 5.2.4, p. 90; Section 5.2.6, pp. 94, 96, 97 Risk Analysis and Evaluation**

1.10.5 Please explain who is ultimately responsible for the selection of the probability and consequence of a risk event occurring and identify any steps BC Hydro takes to ensure that risk probability and consequence are reasonable.

**RESPONSE:**

**The Risk Owner, typically a subject matter expert on the project team, is responsible for the selection of the probability and consequence of a risk. This selection must be endorsed by the Project Manager.**

**Facilitated discussions and meetings amongst project team members are used to solicit the perspectives of other team members so that the full breadth of the risk is considered by the Risk Owner and that their selection of the probability and consequence of the risk is reasonable.**

**Project risks are reviewed at various points in the project lifecycle, specifically at gates by BC Hydro’s Executive Team members, and as applicable, by BC Hydro’s Board of Directors.**

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**10.0 E. RISK MANAGEMENT**

**Reference: Lessons Learned Report, Section 5.2.2, pp. 87–88; Section 5.2.3, p. 88; Section 5.2.4, p. 90; Section 5.2.6, pp. 94, 96, 97 Risk Analysis and Evaluation**

1.10.6 Please explain when and how the Risk Owner performs a Cost Benefit Analysis for a risk. In the response, please explain whether a Cost Benefit Analysis is always performed for significant risks. If not, please explain how a decision is made on whether a Cost Benefit Analysis is necessary as part of developing risk mitigation plans.

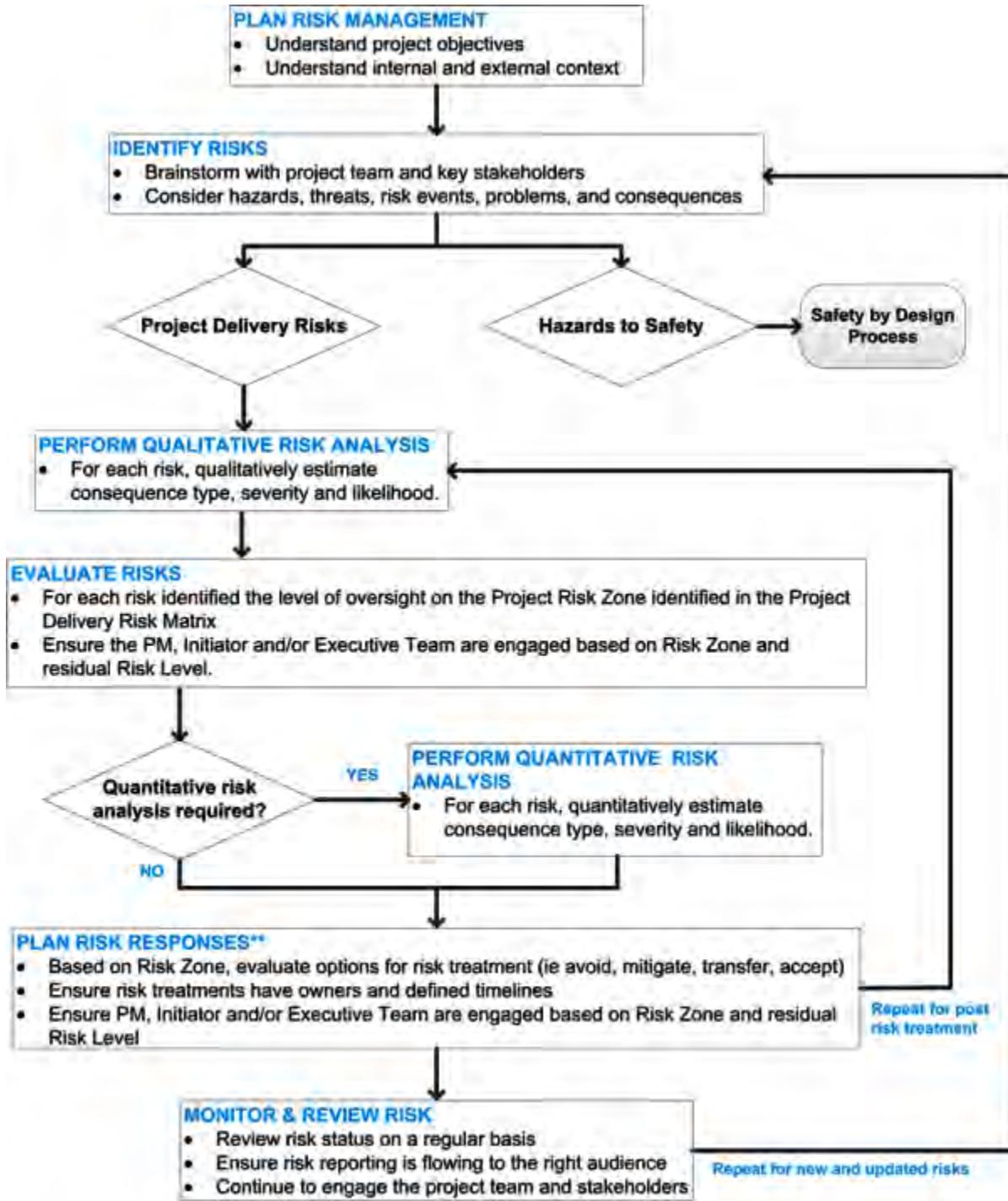
**RESPONSE:**

**A Risk Owner assesses costs and benefits when developing risk treatment options as part of the Plan Risk Responses stage of the Risk Management Process, which is provided in Attachment 1 to this response. This assessment considers the cost and effectiveness of a risk mitigation against the likelihood and cost of the unmitigated risk.**

**A Cost Benefit Analysis is not always performed for significant risks. Rather, it is performed when a significant risk and associated treatment plan exhibit uncertainty regarding the risk consequence, risk likelihood, treatment plan cost, and/or treatment plan effectiveness.**

**A Cost Benefit Analysis may be initiated by the Risk Owner, members of the project team, or by governing bodies.**

Project Delivery Risk Management Process Map



**NOTES**

\*\*This focuses on non-financial consequence types, as the requirements for Financial risk quantification (ie. Problematic cost estimate) is outlined in the Estimating procedure.

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**10.0 E. RISK MANAGEMENT**

**Reference: Lessons Learned Report, Section 5.2.2, pp. 87–88; Section 5.2.3, p. 88; Section 5.2.4, p. 90; Section 5.2.6, pp. 94, 96, 97 Risk Analysis and Evaluation**

1.10.7 Please elaborate on the roles and value that both Ernst & Young and Mr. Peter Milburn had in the development of the Risk Management Enhancement Plan.

**RESPONSE:**

As described in section 5.2.6 of the Lessons Learned Report, BC Hydro worked in close collaboration with Ernst & Young and Mr. Peter Milburn to enhance risk management processes, applications, documentation, training, governance, systems and risk analytics.

To identify the opportunities for enhancement, and develop and implement the Risk Management Enhancement Plan, Ernst & Young and Mr. Peter Milburn provided:

- Independent oversight, guidance, and advice to BC Hydro Management on identifying opportunities for Risk Management improvements from the 2021 Milburn Report;
- Global and extensive expertise on Risk Management for large and complex projects, like Site C;
- Experience and technical knowledge on Risk Management practices and processes;
- Input, including detailed discussions and independent opinions, at regular Project team meetings and to the Risk Management team on the Risk Management Enhancement Plan and the implementation of the recommendations for improvement; and
- Independent advice, opinions and reporting to the Project Assurance Board and Government of B.C. on the actions that the Project team were taking to develop the Risk Management Enhancement Plan and the implementation of the recommendations from the 2021 Milburn Report.

The value that Ernst & Young and Mr. Peter Milburn brought to the development of the Risk Management Enhancement Plan included:

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- **Assisting, reviewing, and providing the Risk Management team several opportunities and recommendations to improve the Project's Risk Management practice and processes;**
- **Independent oversight, guidance and opinions on the opportunities and implementation of the Risk Management Enhancement Plan;**
- **Global and extensive knowledge and experience of Risk Management on large and complex projects;**
- **Advice and independent feedback on the implementation of the Risk Management Enhancement Plan;**
- **Active participation in Project Team meetings on the development and implementation of the Risk Management Enhancement Plan, including reviewing, verifying, and endorsing the Project's proposed solutions and actions by Management; and**
- **Independent advice, opinions and reporting to the Project Assurance Board and Government of B.C. on BC Hydro Management's actions on the Risk Management Plan.**

**BC Hydro found the collaboration and input from Ernst & Young and Mr. Peter Milburn on the identified opportunities for improvement and advice and guidance on the recommendations to implement valuable and provided the Project Assurance Board and Government of B.C. independent verification and endorsement of the Risk Management enhancements being implemented by BC Hydro Management.**

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**10.0 E. RISK MANAGEMENT**

**Reference: Lessons Learned Report, Section 5.2.2, pp. 87–88; Section 5.2.3, p. 88; Section 5.2.4, p. 90; Section 5.2.6, pp. 94, 96, 97 Risk Analysis and Evaluation**

1.10.7 Please elaborate on the roles and value that both Ernst & Young and Mr. Peter Milburn had in the development of the Risk Management Enhancement Plan.

1.10.7.1 Please explain how BC Hydro will determine the need for independent oversight of its risk management processes on future projects. If a capital cost threshold or other threshold is used to determine which projects, please identify the threshold.

**RESPONSE:**

**BC Hydro recognizes the benefit of independent oversight of risk management processes, particularly for large, complex, and novel projects with risk profiles comparable to Site C.**

**BC Hydro expects to determine the need for independent oversight of risk management processes on a project-by-project basis, rather than relying on a set threshold such as the capital cost, so that oversight requirements are tailored to the risk characteristics and governance needs of each project. This determination will be made through consultation with the Project Board (if one is in place), the BC Hydro Board of Directors, and, where appropriate, the Government of B.C.**

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**10.0 E. RISK MANAGEMENT**

**Reference: Lessons Learned Report, Section 5.2.2, pp. 87–88; Section 5.2.3, p. 88; Section 5.2.4, p. 90; Section 5.2.6, pp. 94, 96, 97 Risk Analysis and Evaluation**

1.10.8 Please elaborate on the role and value of Ernst & Young in the regular meetings regarding the Project Risk Register.

**RESPONSE:**

**BC Hydro held regular Project Risk Review meetings with Ernst & Young and worked collaboratively to review, discuss, and challenge the risks and the associated risk information in the Project Risk Register. Ernst & Young provided independent expertise and knowledge by asking questions, challenging the Risk Management team on any risk concerns or issues, providing opinions, and sharing their knowledge and experience from other large and complex projects to the Risk Management team. The input from Ernst & Young at these meetings strengthened the quality and completeness of the risk information.**

**Ernst & Young also provided valuable perspectives and guidance on Cost and Schedule Risk Analyses, supported the preparation and implementation of the Risk Management Enhancement Plan, and participated in monthly Risk Review Committee meetings, Project Assurance Board meetings, Project Accountability meetings, and periodic targeted risk workshops. BC Hydro considers Ernst & Young participation beneficial because they constructively challenged the Project’s risk management practices and improved the detail, quality, and transparency of the Project’s risk reporting. Ernst & Young also provided their independent opinion on the Project’s risks and Cost and Schedule Risk Analyses, when required, to the Project Assurance Board and Government of B.C.**

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**10.0 E. RISK MANAGEMENT**  
Reference: **Lessons Learned Report, Section 5.2.2, pp. 87–88; Section 5.2.3, p. 88; Section 5.2.4, p. 90; Section 5.2.6, pp. 94, 96, 97 Risk Analysis and Evaluation**

1.10.9 Please confirm, or explain otherwise, that BC Hydro will continue to use the enhanced risk management framework for future projects, including the North Coast Transmission Line Projects, and discuss whether it plans to adapt the approach.

**RESPONSE:**

**Confirmed. BC Hydro will continue to use the enhanced risk management framework for future projects that are sufficiently large and complex, including the North Coast Transmission Line Projects, as described in BC Hydro’s response to BCUC Staff IR 1.3.3.**

**The enhanced framework includes the following:**

- **Use enhanced risk register fields to support the enhanced framework;**
- **Elevate the effort and frequency in monitoring and review of the risk register;**
- **Increase quantitative risk analysis reviews for cost and schedule and enhanced documentation of outcomes and basis;**
- **Enhance process for improved consistency and criteria to determine what risks get reported and frequency of reporting to governing bodies; and**
- **Equip dedicated project risk management resources (which have been established for the North Coast Transmission Line Projects) to implement and maintain the enhanced framework.**

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**10.0 E. RISK MANAGEMENT**  
Reference: **Lessons Learned Report, Section 5.2.2, pp. 87–88; Section 5.2.3, p. 88; Section 5.2.4, p. 90; Section 5.2.6, pp. 94, 96, 97 Risk Analysis and Evaluation**

1.10.10 Please describe any planned reviews or audits of the effectiveness of BC Hydro’s risk management framework.

**RESPONSE:**

**Based on the lessons learned on the Site C Project, BC Hydro is currently carrying out a review of its Project and Portfolio Management Risk Management practice.**

**Please also refer to Attachment 1 to BC Hydro’s response to BCUC Staff IR 1.1.2 which demonstrates that many of the Site C lessons learned actions, with regard to risk management, have already been implemented.**

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**11.0 E. RISK MANAGEMENT**  
**Reference: Lessons Learned Report, Section 5.5.3, p. 118**  
**Risk Management, Lesson RM3**

1.11.1 Please explain how BC Hydro determines the appropriate level of qualified resources for the dedicated risk team to meet the complexity of specific projects.

**RESPONSE:**

**The level of risk management resources is determined based on the complexity and needs of a project. For example, a dedicated risk management team was established for the Site C Project considering its significant scope and complexity. For most projects, the risk management activities are undertaken by project team members.**

**For specific projects that are complex and critical (e.g., the North Coast Transmission Line Projects), dedicated risk resources are determined based on governance structures, technical and design complexity, delivery and contracting models, regulatory and permitting obligations, and other relevant factors, as part of the project planning process (including risk management planning).**

**Please refer to BC Hydro's response to BCUC Staff IR 1.11.2 where we discuss how the North Coast Transmission Line Projects have determined the appropriate level of qualified risk management resources.**

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**11.0 E. RISK MANAGEMENT**  
**Reference: Lessons Learned Report, Section 5.5.3, p. 118**  
**Risk Management, Lesson RM3**

1.11.2 Please confirm, or explain otherwise, how Lesson RM3 has been applied on the North Coast Transmission Line Projects. Please explain how BC Hydro determined the level of resourcing for the dedicated risk team on the North Coast Transmission Line Projects is adequate and that the team has the required skills.

**RESPONSE:**

**Confirmed. BC Hydro will be applying Lesson RM3 to the North Coast Transmission Line Projects.**

**Please refer to BC Hydro’s response to BCUC Staff IR 1.11.1 where we describe how BC Hydro determines the appropriate level of risk management resourcing on a project.**

**BC Hydro has assessed the North Coast Transmission Line Projects risk management resourcing needs and determined that a fully dedicated project resource will be needed. Hiring for this resource is underway. The job description for this role includes requirements for the appropriate knowledge, experience, and expertise required to implement the project’s risk management practices. This dedicated resource will be directly accountable to the Project.**

**In addition, consulting resources will be used when necessary to augment the risk management function (e.g., to support specific risk management activities such as the quantitative risk analysis). The risk management team will also work with the estimating team on schedule and cost analysis so that the project’s risk management practices align with the Project and Portfolio Management practice.**

**The resourcing level will be monitored as the projects mature and adjustments will be made as necessary. BC Hydro will add additional resources as required to support ongoing risk management and updates to the quantitative risk analysis.**

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**12.0 E. RISK MANAGEMENT**  
**Reference: Lessons Learned Report, Section 5.5.5, pp. 119–120; Table 29, p. 120**  
**Risk Management, Lesson RM5: Governing Bodies Awareness of Risk**

1.12.1 Please further explain how BC Hydro intends to better communicate the breadth and potential impacts of low-probability, high-consequence risks for future projects and explain how this differs from the approach taken on the Project.

**RESPONSE:**

**To better communicate low-probability, high-consequence risks on future projects, BC Hydro plans to consistently and regularly highlight and report on these risks to governing bodies and provide governing bodies with sufficient time to review, discuss and challenge the risk assessment.**

**The communication materials will address the breadth of the potential impacts to the project’s cost and schedule should they materialize, including whether a provision for the cost and schedule impacts, if the risk were to materialize, is included in project contingency or project reserves, or excluded. If a provision for the risk is excluded, this will be clearly communicated to governing bodies with opportunities for further discussion and review.**

**Although the Site C Project included low-probability, high-consequence risks in the Project’s Risk Register, future projects should plan for more detailed and early discussion with the governing bodies on the potential cost and schedule impacts of these kinds of risks should they occur.**

**During the construction phase of the Project, improvements were made to the Risk Management framework through the Risk Management Enhancement Plan and implementing the recommendations from the 2021 Milburn Report. The reporting and transparency of the low-probability and high-consequence risks to governing bodies improved with these enhancements, which included providing sufficient time to governing bodies to review, discuss, and challenge the results of the Cost Risk Analysis and Schedule Risk Analysis.**

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**12.0 E. RISK MANAGEMENT**  
**Reference: Lessons Learned Report, Section 5.5.5, pp. 119–120; Table 29, p. 120**  
**Risk Management, Lesson RM5: Governing Bodies Awareness of Risk**

1.12.2 Please identify who, within BC Hydro's organization, is responsible for ensuring that governing bodies have a thorough understanding of the low-probability, high-consequence risks for a project.

**RESPONSE:**

**The Project Manager is accountable for identifying and assigning a Risk Owner (typically a project team member) and reporting on project risks. As outlined in the Risk Communication Guidelines (as shown in the Project Delivery Risk Matrix provided in Attachment 1 to BC Hydro's response to BCUC Staff IR 1.10.3), risks that have a risk score in the Executive Risk Zone require detailed analysis and discussion at the project Vice President level, with engagement of members of the Executive Team.**

**The Project Manager is responsible for escalating risks, including low-probability, high-consequence risks, to project Director and project Vice President level. Project Directors are responsible for ensuring that governing bodies have a thorough understanding of these risks and their potential impacts if they materialize.**

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**12.0 E. RISK MANAGEMENT**  
Reference: **Lessons Learned Report, Section 5.5.5, pp. 119–120; Table 29, p. 120**  
**Risk Management, Lesson RM5: Governing Bodies Awareness of Risk**

1.12.3 Specific to the North Coast Transmission Line Projects, please explain whether the low-probability, high consequence risks, if fully defined, have been communicated to governing bodies in an approach different from that taken on the Site C Project. If so, please describe the process that was followed.

**RESPONSE:**

**BC Hydro has applied the lessons learned on low-probability, high-consequence risks on the Site C Project, as discussed in section 5.5.4 of the Lessons Learned Report, to the North Coast Transmission Line Projects. The low-probability, high-consequence risks are being reviewed through detailed and early discussions between the project team and the governing bodies to determine the likelihood of the risk materializing and if additional contingency or project reserve should be established. In cases where no additional contingency or project reserve is established, the governing bodies will be made aware of the impacts to the project’s cost and schedule if the risks were to materialize.**

**In preparation to advance the Phase 1 and 2 North Coast Transmission Line Projects into the Implementation phase, we are also developing an enhanced risk management plan and undertaking a risk review process, as discussed in BC Hydro’s response to BCUC Staff IR 1.10.9. The process that will be followed for communication is set out in BC Hydro’s Project Delivery Risk Communication Guidelines (as provided in Attachment 1 to BC Hydro’s response to BCUC Staff IR 1.10.3), and in the North Coast Transmission Line Projects risk management plan, which is under development.**

**Risks that have a risk score in the Executive Risk Zone require discussion with the Senior Vice-President of Capital Infrastructure Project Delivery, with engagement of other members of the Executive Team. For the North Coast Transmission Line Projects, engagement with Executive Team members will take place through the monthly North Coast Executive Steering Committee, which engages the Senior Vice-President and other executives, as well as with the North Coast Transmission sub-committee to the Capital Projects and Programs Committee of the BC Hydro Board of Directors.**

**Going forward, if a new low-probability, high-consequence risk is identified for the project, it will be added to the project risk register and communicated to governing bodies in accordance with the Risk Communication Guidelines.**

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**12.0 E. RISK MANAGEMENT**  
Reference: **Lessons Learned Report, Section 5.5.5, pp. 119–120; Table 29, p. 120**  
**Risk Management, Lesson RM5: Governing Bodies Awareness of Risk**

1.12.4 Please explain how BC Hydro determines whether the impact of a low-probability, high-consequence risk materializing should be included in a project’s contingency estimate. In the response, please identify who is responsible for that decision.

**RESPONSE:**

This response also answers BCUC Staff IR 1.15.1.

When determining cost and schedule contingencies for a project estimate, the Project’s Risk Management team, Project leadership and other designated subject matter experts review the risk register. This review validates the identified risks, their mitigation strategies, and potential consequences if the risks materialize.

For risks with low-probability, high-consequence, the project team may recommend a course of action to the Project Initiator and Project Sponsor, which could include allocating funds in a project reserve, allocating additional cost and/or time to the project’s contingency or project reserve, or allocating additional funds to the project if the project’s contingency and reserve were insufficient to cover the full costs if the risk were to materialize.

The individuals responsible for the decision on how to treat a low-probability high-consequence risk are the Project Initiator and Project Sponsor. However, depending on the dollar value of the project, these decisions may also include a thorough and detailed discussion and approval by the project’s governing bodies. If no contingency or project reserve is established for the low probability, high consequence risks, the governing bodies must be made aware of the impacts to the project’s cost and schedule, if they were to materialize.

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**13.0 E. RISK MANAGEMENT**  
**Reference: Lessons Learned Report, Section 5.2, Table 15 p. 102; Section 5.5.7, p. 121**  
**Major Risk 2: Cost and Schedule Increases on the Project up to 2018**

1.13.1 Please provide further explanation of BC Hydro’s Lesson RM7 on early project planning, with specific steps BC Hydro will take on future projects to reduce project cost and schedule impacts. In the response, please provide details on how BC Hydro will implement this lesson learned, with reference to each item listed in Table 15 related to cost and schedule impacts before 2018.

**RESPONSE:**

**Lesson RM7 highlights the importance of early project planning to reduce exposure to cost and schedule risks. While the description of RM7 in section 5.5.7 of the Lessons Learned Report focusses on considerations related to safety, contract interfaces, and Mandatory Reliability Standards requirements, this lesson is broadly applicable to other project considerations as well. The benefit of early project planning is reflected in other lessons in the Lessons Learned Report (e.g., CM6, GR2, GR3, and PG1) and BC Hydro’s approach to involving contractors early in project planning, as described in BC Hydro’s response to BCUC Staff IR 1.9.1.**

**BC Hydro’s Project and Portfolio Management practices include processes for project planning to minimize the cost and schedule impacts of procurement activities, design progression, and risks encountered during construction. These practices include progressive elaboration of design, constructability reviews, schedule analyses, risk workshops, and market sounding to validate planning assumptions.**

**The items listed in Table 15 of the Lessons Learned Report are project-specific circumstances, many of which are situational in nature. As such, these items may not directly correlate to risks that future projects will face. The intent of RM7 is to capture the broader learning that emerged from reviewing the circumstances described in Table 15. Please refer to BC Hydro’s response to BCUC Staff IR 1.1.2 for information regarding how BC Hydro will implement the lessons from the Site C Lessons Learned Report.**

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**13.0 E. RISK MANAGEMENT**  
Reference: **Lessons Learned Report, Section 5.2, Table 15 p. 102; Section 5.5.7, p. 121**  
**Major Risk 2: Cost and Schedule Increases on the Project up to 2018**

1.13.2 Please explain, with examples if possible, when BC Hydro would take the role of Prime Contractor on a project in alignment with RM7.2. Please discuss the considerations for and against taking the role.

**RESPONSE:**

**In alignment with RM7.2, BC Hydro may consider retaining the Prime Contractor role where the risk profile, interfaces, or other factors outweigh the benefits of assigning the Prime Contractor role to a qualified contractor. This may include situations where:**

- **BC Hydro cannot fully disclose and/or handover all relevant knowledge of and authority for the workplace, that would be required for the contractor to be responsible as Prime Contractor for the workplace; and/or**
- **BC Hydro is best positioned and most knowledgeable of the workplace as the Owner responsible for planning and coordinating all safety activities at the workplace.**

**Considerations that would support BC Hydro retaining the role of Prime Contractor include:**

- **Risk Profile: Specialized work such as live-line work or emergency repairs that require stringent safety oversight and may require BC Hydro specific safe work procedures;**
- **Interface Management: Projects with a large number of interfaces involving multiple contractors working in close proximity to each other. Complex projects with overlapping scopes of work benefit from centralized coordination and BC Hydro may be better positioned to manage interfaces with other BC Hydro entities such as Operations teams;**
- **Projects with Significant Operational Impact: Work inside operating facilities, where coordination with ongoing operations is critical, and often requires BC Hydro to retain the Prime Contractor role; and**

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- **Contractor Qualifications:** Where the contractor is not qualified or has limited or no experience as Prime Contractor, BC Hydro will retain the Prime Contractor role.

In general, BC Hydro will typically retain the role of Prime Contractor in the following cases:

- **Projects within existing generating stations and substations; and**
- **Smaller projects where there is no qualified contractor.**

Considerations that would support BC Hydro not taking on the role of Prime Contractor include:

- **Resourcing:** Acting as Prime Contractor requires dedicated additional site resources, presence, safety coordination, and administrative oversight, which require additional internal resources. Assigning the Prime Contractor role to a contractor allows BC Hydro to focus on governance and oversight; and
- **Increased Cost:** Contractors experienced in Prime Contractor roles may prefer to manage the Prime Contractor role, especially on large, well-defined linear or greenfield projects that have limited interfaces. Having a qualified contractor perform this role can generate cost efficiencies.

BC Hydro will typically assign the role of Prime Contractor to a qualified contractor in the following cases:

- **Forestry operations (e.g., logging);**
- **New (greenfield) substations and transmission line construction;**
- **Projects outside of generating facilities or substations with limited or no overlapping work areas with operations teams; or**
- **Interconnection work delivered outside of BC Hydro station boundaries and delivered by another owner.**

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**14.0 E. RISK MANAGEMENT**  
**Reference: Lessons Learned Report, Section 2.2.1, p. 29; Section 2.2.4, p. 32; Section 5, p. 79; Section 5.3, Table 16, pp. 103–104 COVID-19 Impacts**

1.14.1 Please provide a further breakdown of the \$1.606 billion cost impact of the COVID-19 pandemic on the Project. In the response, please explain why each of these cost impacts would not have been incurred in the absence of the COVID-19 pandemic.

**RESPONSE:**

The estimated cost of \$1.606 billion due to COVID-19 that was used to prepare the February 2021 approved budget of \$16 billion was based on both actual costs incurred and the estimated COVID-19 impacts to the Project, including the estimated one-year delay to the final unit in-service date from November 2024 to November 2025.

The total estimated impacts due to COVID-19 included:

- **Schedule delays: Schedule impacts due to contractor workforce reductions impacting construction activities and productivity both at the dam site and off dam site locations, particularly the construction of the dam and the preparatory work for the placement of the roller-compacted concrete in the dam buttress. Prior to the pandemic, BC Hydro expected 2020 to be one of the Project’s peak workforce years. The initial reduction in the workforce at the site, and the continued lower-than-planned workforce at site during 2020, resulted in missing approximately 60% of the 2020 important summer construction season for the earthfill dam and core buttress and the generating station and spillways. The schedule delays due to the lower than planned workforce and construction activities and productivity was a direct result of the COVID-19 pandemic;**
- **Contractor claims: Additional contractor costs related to incremental workforce premiums, the suspension of work, productivity impacts due to a lower workforce, incremental operating costs, complying to changes in law or Provincial Health orders, incremental demobilization costs, and additional costs to safely carry out scopes of work. These additional contractor claims were a direct result of the COVID-19 pandemic;**
- **Incremental investments and costs: Additional contractor costs to recover construction delays and accelerate critical construction work. The Project focused and reprioritized the critical construction activities to achieve river diversion in 2020 and reached agreements with contractors to accelerate**

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work and meet schedule milestones. In late 2020, the Project successfully and safely completed the diversion of the Peace River. These incremental investments required to meet river diversion during the pandemic were a direct result of the COVID-19 pandemic;

- **Incremental Interest During Construction costs:** Additional construction costs and an additional year of construction due to the delay in the final unit in-service date from November 2024 to November 2025 as a direct result of the COVID-19 pandemic;
- **Incremental other costs:** Additional BC Hydro Project resource costs to support the Project for an additional year (i.e., BC Hydro construction management, engineering design, engineering support to construction, environmental and regulatory, Indigenous relations, legal and litigation, owner’s engineering and quality, project controls, risks and services, project management and leadership, properties, public affairs, resident engineering, safety, and financial support resources), royalties, permits and licenses, insurance, and independent oversight. These incremental other costs were a direct result of the one-year delay in final unit in-service due to the COVID-19 pandemic;
- **Incremental worker accommodations costs:** Additional bednights for contractors and BC Hydro employees and additional operating costs for enhanced cleaning and other COVID-19 mitigation actions at the camp including implementing strict sanitation and physical distancing protocols, worker screening, quarantine facilities and implementing protocols in the event of positive COVID-19 cases. These incremental worker accommodations costs were a direct result of the COVID-19 pandemic;
- **Incremental medical clinic and on-site security costs:** Additional costs mainly due the one-year delay to the final unit in-service date. These incremental medical clinic and security costs were a direct result of the COVID-19 pandemic;
- **Incremental monitoring costs:** Additional costs for fish and fish habitat field monitoring for the 17 separate field monitoring programs required by regulators, community benefits payments required under the approved Community Benefit Agreements, for water quality, air quality, and other terrestrial environmental monitoring programs mainly due to the one-year delay in the final unit in-service date. These additional monitoring costs were a direct result of the COVID-19 pandemic; and
- **Additional procurement costs:** Additional costs to accelerate equipment and material procurements and for the additional storage for required materials (e.g., fly ash for the roller-compacted concrete) due to supply chain uncertainty during the pandemic. These additional procurement and storage costs were a direct result of the COVID-19 pandemic.

The table below shows a summary breakdown of the estimated cost impacts totalling \$1.606 billion due to COVID-19, that were used for preparing the February 2021 approved budget of \$16 billion. The estimated cost impacts are the combined impacts from COVID-19 and the one-year delay to the final unit in-service date due to COVID-19. At the time these cost estimates were determined, there remained a great deal of uncertainty related to the ongoing and future impacts related to the COVID-19 pandemic.

Project Area	Estimated Cost Impact (\$ millions)
<b>Main Civil Works:</b> The \$552 million included estimated schedule delays, contractor claims, worker accommodations, and investment costs to the Main Civil Works contractor as described above.	\$552
<b>Interest During Construction:</b> The \$430 million included the estimated costs for additional construction costs and an additional year of Interest During Construction on the Project.	\$430
<b>Generating Station and Spillways Civil Works:</b> The \$342 million included estimated schedule delays, contractor claims, worker accommodations, and investment costs to the Generating Station and Spillways Civil Works contractor as described above.	\$342
<b>Other Indirect Costs:</b> The \$164 million included other costs, for BC Hydro resources, as described above, for royalties, licenses and insurance, and for the independent oversight advisor for the Project.	\$164
<b>Worker Accommodations:</b> The \$46 million for the worker accommodations as described above.	\$46
<b>Turbines and Generators:</b> The \$23 million included estimated schedule delays, contractor claims, worker accommodations, and investment costs to the Turbines and Generators contractor as described above.	\$23
<b>Infrastructure:</b> The \$22 million included additional costs to operate and maintain the debris booms, the on-site medical clinic, and for site security.	\$22
<b>Mitigation and Compensation:</b> The \$15 million included additional monitoring costs as described above.	\$15

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<b>Project Area</b>	<b>Estimated Cost Impact (\$ millions)</b>
<b>Balance of Plant:</b> The \$10 million included estimated schedule delays, contractor claims, worker accommodations, and investment costs to the Balance of Plant contractors as described above.	<b>\$10</b>
<b>Transmission:</b> The \$1 million included estimated schedule delays and contractor claims to the transmission contractor as described above.	<b>\$1</b>
<b>Total COVID-19 Estimated Cost Impact:</b>	<b>\$1,606</b>

Note: All values are displayed to the nearest million, therefore totals may not add due to rounding.

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**14.0 E. RISK MANAGEMENT**  
Reference: **Lessons Learned Report, Section 2.2.1, p. 29; Section 2.2.4, p. 32; Section 5, p. 79; Section 5.3, Table 16, pp. 103–104 COVID-19 Impacts**

1.14.2 Please explain how BC Hydro plans to address the potential impacts of unexpected events, such as pandemics, in its approach to future projects.

**RESPONSE:**

**Future capital projects will continue to align to BC Hydro’s Project and Portfolio Management cost estimating practices (e.g., consistent with the Association for the Advancement of Cost Engineering International standards) and consider the lessons learned from other projects, like Site C, when evaluating the potential impacts of unexpected events. The development and establishment of a project’s reserve and / or contingency will continue to assess the project’s risks, as described in BC Hydro’s response to BCUC Staff IR 1.2.2.**

**Depending on the nature, size, and complexity of a future capital project, low-probability, high-consequence risks could be included in a project’s total cost estimate by allocating funds to a project reserve or to contingency. However, it is unlikely that the impacts of another global pandemic would be included in contingency or a project reserve due to the extremely low likelihood that this risk would materialize. Although this risk could be identified in the project’s risk register, the full cost of the potential impacts would not be included in the projects total cost estimate.**

**As described in BC Hydro’s response to BCUC Staff IR 1.2.4, a thorough and detailed discussion between the project’s risk management team, project leadership and the governing bodies would review the low-probability, high-consequence risks (e.g., the potential impact of a future pandemic) to determine the likelihood of the risk materializing and if additional contingency or project reserve should be established. If no additional contingency or project reserve is established, the governing bodies should be made aware of the impacts to the project’s cost and schedule if they were to materialize, as described in BC Hydro’s response to BCUC Staff IR 1.12.1.**

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**14.0 E. RISK MANAGEMENT**  
**Reference: Lessons Learned Report, Section 2.2.1, p. 29; Section 2.2.4, p. 32; Section 5, p. 79; Section 5.3, Table 16, pp. 103–104 COVID-19 Impacts**

1.14.3 Please explain why reservoir filling in Fall 2023 was not achieved, considering contractual schedules were developed and agreed to with contactors in advance. In the response, please identify and explain the measures BC Hydro took to adhere to the Fall 2023 reservoir filling deadline and any challenges that arose.

**RESPONSE:**

Due to the impacts resulting from the COVID-19 pandemic, BC Hydro worked to develop settlement agreements with each impacted Project contractor. These settlement agreements included revised contractual schedules that could have resulted in an opportunity for earlier reservoir filling in the fall of 2023 and achieving first power earlier than the approved Project schedule. The revised contractual schedules also lowered the risk of not achieving reservoir fill in 2024, per the approved schedule.

For the Project to achieve reservoir filling in fall 2023, all Project contractors needed to achieve the negotiated revised contractual schedules included in their settlement agreements, without future contractual changes due to unforeseen events at the time of the settlement agreements. BC Hydro continued to work diligently and collaboratively with each contractor to track construction progress on a daily, weekly, and monthly basis, hold contractors to their contractual schedules, and quickly identify and resolve any issues or potential delays as they arose.

As of November 2023, most of the Project’s contractors had achieved their revised contractual schedules and their scopes of work were sufficiently complete to enable BC Hydro to proceed with reservoir filling at that time. However, the Generating Station and Spillways contractor was not able to complete all the hydromechanical work (spillway gates and powerhouse intake gates) required to safely proceed with reservoir filling. There were two main reasons this work was not completed in time for reservoir filling in 2023:

- Further contractual changes were required subsequent to the Generating Station and Spillways contractor’s settlement agreement; and
- The Generating Station and Spillways contractor was not able to obtain sufficient highly skilled workers to complete this work and achieve the schedule in the original settlement agreement.

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**In addition to the remaining hydromechanical work, there were also other significant challenges to consider with a late fall 2023 reservoir fill. Commencing reservoir fill in late 2023 would have resulted in increased environmental risks (e.g., potential Total Dissolved Gas implications and the impacts to fish in the freshet due to the required spilling), wildlife impacts (e.g., mitigation actions required for bear denning in the reservoir inundation area during reservoir fill), and a prolonged period of water passing through the spillways and the associated risks to fish. As a result of these challenges, BC Hydro decided not to commence reservoir fill in late fall 2023.**

**With most of the major work that was required for reservoir filling being complete or near complete by the end of 2023, this significantly reduced the risk of not commencing reservoir filling in the fall of 2024. Reservoir filling commenced ahead of the approved Project schedule once the bird nesting season was over, and the first generating unit was placed into service approximately six weeks ahead of the approved Project schedule.**

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**14.0 E. RISK MANAGEMENT**  
Reference: **Lessons Learned Report, Section 2.2.1, p. 29; Section 2.2.4, p. 32; Section 5, p. 79; Section 5.3, Table 16, pp. 103–104 COVID-19 Impacts**

1.14.4 Please explain the cost and schedule impacts to the Project if reservoir filling had been advanced to Fall 2023. In the response, please explain whether advancing reservoir filling to Fall 2023 could have mitigated some of the cost and schedule impacts due to the COVID-19 pandemic.

**RESPONSE:**

If the Project had been able to achieve reservoir filling in late fall of 2023, there was the potential opportunity to realize estimated Project savings of \$240 million to \$445 million depending on when reservoir fill, and first power were achieved. Therefore, if these savings could have been realized, some of the forecasted COVID-19 pandemic costs of \$1.6 billion could have been mitigated.

The earlier filling of the reservoir could have resulted in an earlier first power of four to seven months from when actual first power was achieved in October 2024. This could have resulted in Interest During Construction Project savings of approximately \$35 million per month, or \$140 million to \$245 million, depending on when first power was achieved. The other potential saving was for BC Hydro internal resources of \$100 million to \$200 million if the earlier first power could have resulted in resources rolling off the Project earlier than planned.

Advancing reservoir filling to fall 2023 would likely have advanced the date of first power, but not the in-service dates for the remaining five generating units. These work scopes and contractual schedules would not have materially changed with an earlier first power, and therefore, there would not have been other material savings related to these Project costs or advancements to the actual final unit in-service date of August 2025.

There were no increased costs and schedule impacts when BC Hydro made the decision to proceed with reservoir filling in 2024 because this aligned to the Approved Project budget and schedule. As described in BC Hydro’s response to BCUC Staff IR 1.14.3, settlement agreements with contractors impacted by the COVID-19 pandemic established revised schedules that allowed for the possibility of late 2023 reservoir filling and the potential for earlier first power. Managing to these revised schedules mainly mitigated the risk of missing reservoir fill in 2024.

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**15.0 F. GEOTECHNICAL RISK**  
**Reference: Lessons Learned Report, Section 2.2, p. 28; Section 6.1.3, pp. 132–133; Section 6.1.5, p. 134**  
**Geotechnical Risk**

1.15.1 Please elaborate on BC Hydro’s typical process for determining whether to include provisions in a project contingency amount to account for the realization of high-consequence, low-probability risks. In the response, please explain if this process will change for future projects given the challenges experienced on the Project.

**RESPONSE:**

Please refer to BC Hydro’s response to BCUC Staff IR 1.12.4 for details on the process of determining whether to include allocations in a project contingency or reserve for low-probability high-consequence risks.

BC Hydro plans to improve its communications to project governing bodies on low-probability, high-consequence risks for future large and complex projects. This includes reviewing these risks through detailed and early discussion between project teams and governing bodies to determine the likelihood of the risk materializing and if additional contingency or project reserve should be established. In cases where no additional contingency or project reserve is established, the governing bodies will be made aware of the impacts to the project’s cost and schedule if the risks were to materialize. For further discussion on this point, please refer to BC Hydro’s response BCUC Staff IR 1.12.1.

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**15.0 F. GEOTECHNICAL RISK**  
**Reference: Lessons Learned Report, Section 2.2, p. 28; Section 6.1.3, pp. 132–133; Section 6.1.5, p. 134**  
**Geotechnical Risk**

1.15.1 Please elaborate on BC Hydro’s typical process for determining whether to include provisions in a project contingency amount to account for the realization of high-consequence, low-probability risks. In the response, please explain if this process will change for future projects given the challenges experienced on the Project.

1.15.1.1 Please explain how this process has been implemented in the cost estimation for the North Coast Transmission Line Projects.

**RESPONSE:**

**Please refer to BC Hydro’s response to BCUC Staff IR 1.12.4 which describes how BC Hydro determines whether the impact of a low-probability, high-consequence risk materializing should be included in a project’s contingency estimate. The North Coast Transmission Line Projects will follow this approach.**

**Specifically, on the North Coast Transmission Line Projects, cost and schedule contingencies will be set through a structured review of the project risk register by the project team and designated subject matter experts. This review validates each identified risk, its mitigation strategy, and the potential consequences if it materializes. Where risks are assessed as low-probability but high-consequence, the team will develop a recommended treatment for the Project Initiator and Project Sponsor to consider. This may include allocating funds to a project reserve, augmenting the project’s cost and/or schedule contingency, or allocating additional funds if the risk materializes.**

**In accordance with project governance practices, the final decision on the treatment of these risks will be made by the Project Sponsor and Project Initiator. Depending on the Project Risk Zone, these decisions may also require oversight and approvals by the BC Hydro Board of Directors. For further discussion on this point, please refer to BC Hydro’s response to BCUC Staff IR 1.12.3.**

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**15.0 F. GEOTECHNICAL RISK**  
Reference: **Lessons Learned Report, Section 2.2, p. 28; Section 6.1.3, pp. 132–133; Section 6.1.5, p. 134 Geotechnical Risk**

1.15.2 Please elaborate on how BC Hydro determined the assumptions listed in the preamble to be appropriate in the estimation of Project contingency, and explain who was responsible for this determination.

**RESPONSE:**

The methodology used to estimate the costs for the Site C Project for the approved budgets and the required Project contingency was based on BC Hydro’s Project and Portfolio Management estimating practice, which is consistent with the Association for the Advancement of Cost Engineering International (AACEI) standards. For further discussion on this point, please refer to BC Hydro’s response to BCUC Staff IR 1.2.3.

At the time the cost estimates were prepared by the BC Hydro Costs Estimating team, BC Hydro had completed extensive geotechnical studies and investigations. BC Hydro had also obtained additional geotechnical information from the instrumentation and geological mapping that was completed as part of the construction activities completed to date. Further, detailed analyses had been completed to assess the supply of available granular material and the quantities required for the Project. This work was consistent with standard estimating standards and practices, and BC Hydro believed the assumptions summarized in the preamble were reasonable and appropriate when estimating the 2014 Final Investment Decision budget.

The recommended Project contingency and reserve amounts in the Project’s budget, including risks in the Risk Register with a low probability and high consequence, were approved by the Project’s governing bodies. These risks were identified in the Risk Register and followed standard Risk Management quantification practices.

The full cost of these low probability and high consequence risks, if they were to materialize, were not included in the Project’s contingency or reserve budgets. Including the full cost of these low probability, high consequence risks in the Project’s contingency or reserve budgets would have been against accepted industry best practices for cost estimating and would have significantly overstated the expected cost of the Project at the time.

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**15.0 F. GEOTECHNICAL RISK**  
**Reference: Lessons Learned Report, Section 2.2, p. 28; Section 6.1.3, pp. 132–133; Section 6.1.5, p. 134**  
**Geotechnical Risk**

1.15.3 Please explain how funds were allocated in the budget to adapt design and construction according to as-found geotechnical conditions which arose during project construction, in accordance with the observational approach.

**RESPONSE:**

The scope of work for the Site C Project is broken down into work packages, including work packages for the design and construction of Project infrastructure such as the earthfill dam, roller compacted concrete buttresses, diversion tunnels, generating station, spillways, and each of the generating units. For the Right Bank Foundation Enhancements that were required as part of the 2021 budget increase, a new work package was created to allocate budget and track actual direct costs.

The approved budgets for the Project were based on the sum of the estimated costs for all direct and indirect work packages, along with the Project contingency, and interest during construction. The estimated cost for each work package was based on the best available information at the time the budget was approved, including the comprehensive studies and site investigations that had been completed to develop the detailed geological model for the Project.

Once the budget was approved, a control budget was established for each work package. During the construction of the Project, the observational approach was used to adapt the construction activities to the as-found geotechnical conditions in the field. If the as-found geotechnical conditions were the same as those assumed at the time the control budget for the work package was established, no change in the control budget was required. If the geotechnical conditions were better than assumed, and this resulted in a lower total forecasted cost for the work package, the control budget for the work package was reduced and those savings were identified and transferred to Project contingency. If the geotechnical conditions were worse than assumed, and this resulted in a higher forecasted cost for the work package, a cost pressure was identified for the work package. If the cost pressure could be funded within the control budget for the work package, possibly due to other savings in the work package, the cost pressure was documented and there was no change to the control budget. If the cost pressure could not be funded within the control budget for the work package, these cost pressures were documented, tracked, reported, and if required, approval for a Project contingency draw was initiated. If the Project contingency draw was endorsed by the Project Assurance Board and approved by the BC Hydro Board of Directors, the required additional funds were used to increase the control budget for that work package.

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**15.0 F. GEOTECHNICAL RISK**  
**Reference: Lessons Learned Report, Section 2.2, p. 28; Section 6.1.3, pp. 132–133; Section 6.1.5, p. 134**  
**Geotechnical Risk**

1.15.4 Please identify any alternatives to the observational approach and explain why BC Hydro selected the observational approach for the Project, and whether another approach may be considered for managing geotechnical risk on future projects.

**RESPONSE:**

The observational approach that was used on the Site C Project is consistent with established best practices for large engineering construction projects with material geotechnical risks. The design and construction of the Project complied with Canadian dam safety requirements.

The use of the observational approach is critical when large civil structures are being constructed at remote locations, for large water retaining structures like the Site C earthfill dam, powerhouse, and spillways, where the requirements to minimize settlement and movement are extremely high, and when the consequence of failure is catastrophic.

Under these conditions, the observational approach is necessary to ensure the final design reflects the most accurate understanding of the as-found foundation conditions. Key information is obtained through geotechnical instrumentation installed during excavation and through detailed geological mapping once excavations are complete.

There are two main alternatives to the observational approach as well as other hybrid type models based on the standard engineering construction methodologies:

- **Design, Bid, Build (DBB) Approach:** If a project utilizes the Design, Bid, Build approach, and does not utilize the observational approach, the design is completed, the construction work is bid based on the design, and the successful contractor constructs the project based on the final design without any design changes due to as-found geological foundation conditions. This process can work if the geological foundation conditions are fully understood at the time the design is completed with effectively no risk of as-found conditions varying from the design, and where the conditions described above do not apply;
  - ▶ An alternative is to include very significant safety factors to address uncertainty in the design (i.e., overly conservative design) to account of

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**all possible as found geological foundation conditions. The downside of this approach is that the final cost of the project is likely to be much higher than required if the as-found geological foundation conditions are better than those assumed as the worst case in the design; and**

- Design Build (DB) Approach: If a project utilizes the Design Build approach, and does not utilize the observational approach, the owner determines the performance requirements for the structures, the design and construction for the project is bid under one package, and the successful Design Build contractor then completes the design and constructs it based on their design. Using this process, the Design Build contractor is then responsible for meeting the performance requirements, regardless of the as-found geotechnical foundation conditions encountered. For the large civil structures, it is extremely unlikely that BC Hydro could have transferred the geotechnical risks on the Site C Project, including the as-found geological foundation conditions, to any contractor, and if it was possible, the risk premiums the contractor would demand would likely have been prohibitive. In addition, the extensive dam safety and regulatory requirements that apply to the Site C Project make the Design Build approach difficult to use. The Project was able to transfer some geotechnical risks to contractors but retained the remaining geotechnical risks that were impractical to transfer.**

**To manage geotechnical risks on future projects, BC Hydro will follow the Project and Portfolio Management Design Practice to best identify and assess the geotechnical risks of future projects and apply appropriate treatment methods and approach (i.e., observational method or other), depending on types and extents of geotechnical risks and their potential impacts.**

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**15.0 F. GEOTECHNICAL RISK**  
**Reference: Lessons Learned Report, Section 2.2, p. 28; Section 6.1.3, pp. 132–133; Section 6.1.5, p. 134**  
**Geotechnical Risk**

1.15.5 Please discuss any post-project assessment of the geotechnical risk evaluation and the assignment of low probability to the high-consequence geotechnical risks. In the response, please explain how the evaluation of the materialized geotechnical risks as low-probability and high-consequence will inform similar risk evaluations for future projects.

**RESPONSE:**

**With the Site C Project nearing completion, all six generating units in-service, and all large civil structures complete and performing in line with design specifications, BC Hydro believes the approach to geotechnical risk evaluation on the Project was comprehensive. Although the Project experienced significant cost increases as a result of low-probability, high-consequence geotechnical risks materializing, we believe that our initial assessment of these risks was the best possible assessment of the scope, probability and consequence of these risks at that time.**

**The approach taken to geotechnical risk evaluation on the Project included:**

- **Completing comprehensive studies and site investigations to develop a detailed geological model early in the project lifecycle. This improved the quality of the geotechnical risks included in the project risk register and mitigated the probability and/or consequence of geotechnical risks on the Project;**
- **Using the detailed geological model to develop the layout and design for the major project assets. This reduced the requirements for design changes due to as-found geotechnical conditions during Project construction;**
- **Developing the estimated costs for the Project based on a layout and design that considered the detailed geological model, and methodology that was aligned with BC Hydro’s Project and Portfolio Management estimating practices to estimate the Project’s cost. This improved the quality of the Project cost estimate; and**
- **Installing geotechnical monitoring instrumentation and completing geological mapping during excavation and construction and taking an observational approach to adapt the construction activities to the as-found geotechnical conditions in the field. This ensured that the final design was**

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**based on the best available geotechnical information and minimized the probability and consequence of future geotechnical risks.**

**Over the course of the Site C Project, several low-probability, high-consequence geotechnical risks were identified, most of which did not materialize. For example, none of the low-probability, high-consequence geotechnical risks that were identified for the earthfill dam and the diversion tunnels materialized. The earthfill dam was the structure with the largest geological footprint on the Project.**

**One of the main low-probability, high-consequence geotechnical risks that did materialize was associated with the tension cracks on the left bank. BC Hydro believes that our initial assessment of these risks was the best possible assessment of the scope, probability, and consequence of these risks at that time. This assessment was informed by completing comprehensive studies and site investigations to develop a detailed geological model early in the Project lifecycle with input and advice from a broad team of qualified geotechnical experts which informed design, enhancements, costing and risk management.**

**BC Hydro's Project and Portfolio Management framework provides guidance on standard practices, including risk identification and evaluation, and project oversight. When determining cost and schedule contingencies for a project estimate, the Project team and designated subject matter experts review the risks in the risk register. This review validates the identified risks, their mitigation strategies, and potential consequences if the risks materialize.**

**The Site C Project's experience with these low-probability, high-consequence geotechnical risks materializing demonstrates that, despite such extensive efforts, these risks can materialize. Going forward, Project teams should consider whether to allocate additional funds in a project contingency or project reserve to account for these risks if they were to materialize. This determination should be made in accordance with established best practices for cost estimating.**

**Please also refer to BC Hydro's responses to BCUC Staff IRs 1.12.1 and 1.12.4 where we describe how project teams will support effective communication and consideration of low-probability, high-consequence risks to BC Hydro Management and governing bodies.**

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**16.0 F. GEOTECHNICAL RISK**  
**Reference: Lessons Learned Report, Section 6.4.1, p. 149**  
**Geotechnical Risk, Lessons GR1 and GR4 – Technical**  
**Advisory Board**

1.16.1 Please discuss BC Hydro’s process for considering recommendations from the Technical Advisory Board on the Project and discuss whether it was effective in managing the geotechnical risks realized.

**RESPONSE:**

The Site C Project’s Engineering and Design Team and the Technical Advisory Board conducted meetings and workshops since the Technical Advisory Board was convened in 2010 and throughout the Project’s design, construction, and reservoir filling. As an output of these meetings, the Technical Advisory Board provided written reports with guidance and recommendations to the Engineering and Design Team and the Project Leadership Team. The Technical Advisory Board’s reporting structure also allowed this independent advice to be provided directly to the Project Assurance Board.

The Project’s Leadership Team would report monthly to the Project Assurance Board, which included an update on actions being taken in response to the Technical Advisory Board advice and recommendations.

BC Hydro believes that this process was transparent and effective at identifying and managing the geotechnical risks on the Project. The Technical Advisory Board was closely consulted on the major geotechnical issues (including the left bank tension crack and right bank foundation enhancements) and on all other important geotechnical aspects of the Project (diversion tunnel construction, earthfill dam foundation preparation, earthfill dam construction, etc.), and their advice and recommendations were documented and reported to the Project Leadership Team and the Project Assurance Board.

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**16.0 F. GEOTECHNICAL RISK**  
**Reference: Lessons Learned Report, Section 6.4.1, p. 149**  
**Geotechnical Risk, Lessons GR1 and GR4 – Technical Advisory Board**

1.16.2 Please list all future and current projects where BC Hydro will appoint or is considering appointing a Technical Advisory Board. In the response, please explain when in a project lifecycle BC Hydro typically evaluates the need for a Technical Advisory Board and how members would typically be selected.

**RESPONSE:**

**Technical Advisory Boards provide external expert review of projects with a dam safety component and are governed by BC Hydro’s Dam Safety Program Management System. Technical Advisory Boards are established at the direction of the Director, Dam Safety.**

**The only current project with an active Technical Advisory Board is the La Joie Dam Improvements Project. A Technical Advisory Board for this project was implemented in 2025. Three projects on the Campbell River System – John Hart Dam Seismic Upgrade Project, Ladore Spillway Gates Upgrade Project, and Strathcona Discharge Upgrade Project – shared a Technical Advisory Board during earlier phases of the projects.**

**Consideration of the appointment of a Technical Advisory Board typically occurs during the Identification or Definition phase of a project. BC Hydro does not determine in advance of project release whether a Technical Advisory Board will be appointed for future projects.**

**Technical Advisory Boards are composed of one or more recognized experts, commonly drawn from around the world, to provide BC Hydro with access to and the benefit of their considerable international experience over a wide range of relevant projects and circumstances.**

**Each Technical Advisory Board’s complement (i.e., the number of members and their requisite experience and expertise) is informed by the nature and range of issues to be addressed by the project. These issues may comprise existing dam safety issues or risks that are to be addressed by the project, dam safety risks that will be incurred while implementing the project, risks that the project may not meet its intended performance objectives, and issues or risks that may impact the constructability or timely execution of the project.**

**Technical Advisory Board members are selected for their project-relevant experience and expertise in dam engineering, dam construction management and methodologies, and/or dam and reservoir operations. Selection of Technical Advisory Board members is approved by the Director, Dam Safety.**

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**16.0 F. GEOTECHNICAL RISK**  
**Reference: Lessons Learned Report, Section 6.4.1, p. 149**  
**Geotechnical Risk, Lessons GR1 and GR4 – Technical Advisory Board**

1.16.3 Specific to the North Coast Transmission Line Projects, please explain whether any Technical Advisory Boards have been established and how, if at all, BC Hydro's approach to communication and consideration of feedback will be different than on the Site C Project.

**RESPONSE:**

Please refer to BC Hydro's response to BCUC Staff IR 1.16.2 where we explain that Technical Advisory Boards are appointed by BC Hydro to provide external expert review of projects with a dam safety component.

Oversight of the North Coast Transmission Line Projects is being carried out by a BC Hydro Executive Steering Committee and North Coast Transmission Sub-Committee, a sub-committee to the Capital Project and Programs Committee of the BC Hydro Board of Directors, both of which include independent external advisors with relevant knowledge and experience to support the technical, financial and construction considerations of the North Coast Transmission Line Projects.

This includes an internal Senior Technical Review Group made up of experienced Senior Managers and Directors from various BC Hydro teams. The Senior Technical Review Group will inform and guide complex decisions and bring in broader technical and operational perspectives from across BC Hydro. The group will provide structured oversight and will review and formally endorse key design decisions, trade-off analyses, and project impacts. In addition, the project team has engaged, and will continue to engage, the Safety Practices Committee for design and operational input and will include their input into the Senior Technical Review Group's work.

The differences in approach between the North Coast Transmission Line Projects and the Site C Project reflects their different characteristics. As outlined in the Lessons Learned Report, it is recommended that future major capital projects with geotechnical risks should consider establishing a Technical Advisory Board. The geotechnical risk for the North Coast Transmission Line Projects is primarily related to the foundation of transmission towers, and BC Hydro has strong internal expertise related to transmission tower foundations. As such, the approach of having a Senior Technical Review Group comprised of internal experts was determined to be the most appropriate mechanism for providing technical input and guidance.

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**17.0 G. PROJECT GOVERNANCE**  
**Reference: Lessons Learned Report, Section 7.1, p. 157; Section 7.1.1, p. 158; Section 7.1.5, p. 168**  
**Site C Governing Bodies and Independent Third-Party Advisors**

1.17.1 For each of the roles identified in the figure in the preamble, please explain how the responsibilities and reporting hierarchy evolved over the course of the Project.

**RESPONSE:**

This response provides a brief description of how the responsibilities and reporting hierarchy evolved over the course of the Site C Project for each role identified in the figure in the preamble.

**BC Hydro Board of Directors**

The key responsibilities of the BC Hydro Board of Directors remained consistent over the course of the Project. Since the early feasibility stage, through to the present, the BC Hydro Board of Directors provide governance, strategic direction, and oversight of BC Hydro, and provide overall Project governance, oversight, and approvals.

The most material change in responsibilities and reporting hierarchy occurred when the Project Assurance Board was formed in January 2018, replacing the Site C Project Board, which had been a sub-committee of the BC Hydro Board of Directors since 2013.

**Site C Project Assurance Board**

In January 2018, the Project Assurance Board was formed and replaced the Site C Project Board. The Project Assurance Board brought additional time, resources, and expertise to provide independent oversight of the Site C Project and reviewed all Project related approval resolutions in advance of them being submitted to the BC Hydro Board of Directors for approval.

The responsibilities of the Project Assurance Board increased over the course of the Project. The Project Assurance Board met at least monthly, reviewed briefing notes prepared by the Project team on key issues, risks, required approvals and decisions, and provided independent due diligence and oversight.

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The Terms of Reference for the Project Assurance Board were established in January 2018, and were updated in May 2020, and again in April 2021.

The updated responsibilities of the Project Assurance Board, described in the May 2020 Terms of Reference, included enhancements to cover safety and compliance with applicable environmental standards. As part of its enhanced oversight work, the Project Assurance Board would also oversee Schedule and Cost Risk Analyses over the life of the Project.

Based on the 2021 Milburn Report, the Project Assurance Board's governance and oversight responsibilities were further strengthened by:

- Developing a skills matrix for the Project Assurance Board;
- Changing the membership of the Project Assurance Board to have more external, independent, and skill-specific membership and to include a chair, three independent members, and two members of the BC Hydro Board of Directors;
- Providing more autonomy to facilitate opportunities for independent due diligence and deliberations;
- Implementing additional time for the Project Assurance Board to conduct due diligence and oversight; and
- Enhancing the structure of the Project Assurance Board meetings to enable them to review the topics that affected the commercial strategy, quality, schedule and costs in a detailed manner.

These changes were reflected in an updated terms of reference for the Project Assurance Board in April 2021.

### **Commercial Sub-Committee**

The Commercial Sub-Committee was formed in May 2021, and their responsibilities and reporting hierarchy did not significantly change over the course of the Project. The Commercial Sub-Committee had the resources and expertise to provide oversight and review of the construction, schedule, cost reporting, claims management and other commercial matters related to the Project. In addition, the Commercial Sub-Committee reviewed Project related approval resolutions related to these functions before they were submitted to the Project Assurance Board for endorsement and to the BC Hydro Board for approval.

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### **External Advisors - Technical Advisory Board:**

The responsibilities of the Technical Advisory Board did not significantly change over the course of the Project. The Technical Advisory Board was a global panel of engineering and construction experts that provided expert technical advice to BC Hydro related to the design, construction, risks, and project delivery for the Project. The most significant change in reporting hierarchy occurred when the Project Assurance Board was formed in January 2018, and the Technical Advisory Board began reporting to the Project Assurance Board, instead of the Site C Project Board.

### **Other External Advisors**

The Project Assurance Board engaged other external advisors, as needed, to provide expert advice and technical knowledge. These included two independent, world-leading international dam experts that were commissioned to provide a due diligence review of the right bank foundation enhancements. Their responsibilities were increased when the two experts continued to be involved in the review of the design and construction for the Project after they had completed their initial due diligence review. The reporting hierarchy of the external advisors did not materially change over the course of their engagement on the Project.

### **Treasury Board and/or Chair of Treasury Board and Ministry of Energy, and Climate Solutions.**

The responsibilities and the reporting hierarchy of the Treasury Board and/or Chair of Treasury Board and the Ministry of Energy and Climate Solutions did not change materially over the course of the Project.

### **Independent Oversight Advisor**

The responsibilities of the Independent Oversight Advisor increased over the course of the Project.

In October 2017, BC Hydro, in consultation with the Government of B.C., engaged Ernst & Young to provide independent oversight to the Project Assurance Board, assist the Project team with identifying and implementing effective mitigation strategies for key Project risks, and provide independent, external reporting to the Project Assurance Board, BC Hydro Board of Directors and the Government of B.C.

Ernst & Young provided independent oversight related to risk management, claims and commercial management, schedule management and change control,

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**engineering and technical topics, cost management and change control, and overall project oversight, planning, reporting, and monitoring.**

**The most significant change in Ernst & Young’s responsibilities over the course of the Project was to expand their oversight role in 2021 to include claims and commercial management; schedule management; engineering and technical considerations; cost management and change control; risk management; the review of the right bank foundation enhancements; the Project delivery and controls framework; and the overall Project planning, delivery, and reporting. In addition, the updated Statement of Work provided additional clarity related to roles and responsibilities and resulted in greater collaboration and a more effective working relationship between Ernst & Young and the Project team.**

**The reporting hierarchy for Ernst & Young did not materially change over the course of the Project. Ernst & Young reported to the Project Assurance Board beginning in January 2018 and provided independent reporting to the Project Assurance Board, BC Hydro Board of Directors, and the Government of B.C. over the course of the Project.**

#### **BC Hydro Management (Project Team)**

**The responsibilities of BC Hydro Management did not change materially over the course of the Project.**

**The most significant change in the reporting hierarchy for BC Hydro Management occurred when the Project Assurance Board was formed in January 2018. Once the Project Assurance Board was formed, it became the primary governance body that the Project team communicated with.**

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**17.0 G. PROJECT GOVERNANCE**  
**Reference: Lessons Learned Report, Section 7.1, p. 157; Section 7.1.1, p. 158; Section 7.1.5, p. 168**  
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1.17.2 Please explain how dashboards and project information reporting feeds into project monitoring information flowing to the different project governance and oversight groups. In the response, please explain any lessons learned regarding streamlining or automating these information flows.

**RESPONSE:**

**Dashboards and project information reporting fed into project monitoring information flowing to the different Site C Project governance and oversight groups in the following ways:**

- **As explained in BC Hydro’s response to BCUC Staff IR 1.2.9, construction progress information was used to measure progress on the Project schedule. This project monitoring information is also used as a source of data for various Project dashboards and construction progress reports that are used by the Project team to manage daily construction activities and reporting to the governing bodies;**
  - ▶ **For example, contractor daily field reports included quantities of materials that, once verified by BC Hydro, provided insights and inputs into the progression of work against the contractual schedules. Project dashboards were developed for major contracts detailing the approved contract value, approved change orders, life to date contract spend, safety performance and claims information. These dashboards gave the Project team up to date Project information and performance that were used to manage the Project and to develop the key information to be reported to the Project Assurance Board, BC Hydro Board of Directors, and the Treasury Board.**
- **On a monthly, or more frequent basis as needed, the Project team provided substantial reporting to the Project Assurance Board, Independent Oversight Advisor, the Commercial Sub-Committee, and the BC Hydro Board of Directors on construction and Project progress. This information was included in the Site C Monthly Report, Site C Bi-Weekly Construction Progress Reports, and Project related resolution documents and specific information updates that were issued to the Project Assurance Board;**

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- **The Technical Advisory Board met regularly with the Site C Engineering Design Team, and prepared technical reports that included their assessments on construction progress. These reports were provided to the Project team, the Project Assurance Board, the Independent Oversight Advisor, and the BC Hydro Board of Directors; and**
- **The Project team also provided reports, as requested, to the Treasury Board and/or the Ministry of Energy and Climate Solutions, that included a description on construction and Project progress and reports from external third parties (e.g., Technical Advisory Board).**

**The key lessons learned regarding streamlining or automating these information flows to the governing bodies for similar large and complex projects include:**

- **PG4: Establish processes, tools and reporting to ensure governing bodies obtain effective and timely information.**
  - ▶ **Work with the various governing bodies and agree in advance on the type, level of detail, frequency, and format of the Project information that is provided to them so that it best supports their ability to fulfil their governing responsibilities and objectives;**
  - ▶ **Provide relevant construction progress information on a timely basis so that governing bodies have up to date information on the status of the construction activities;**
  - ▶ **Provide the governing bodies with access to Project dashboards and Project team reporting as requested and provide access to additional information if needed, including storing of information in one central location to avoid duplication and reduce administrative activities; and**
  - ▶ **Automate processes where practical and appropriate to improve effective and efficient reporting to the governing bodies.**
- **RM1: Consolidate and enhance risk registers to improve cost risk estimates and provide more consistent analysis.**
  - ▶ **Adopt a single risk register for future large and complex projects, available to all project team members, to improve cost risk estimates and provide consistent reporting to the governing bodies.**
- **RM2: For very large complex projects, implement Cost Risk Analysis and Schedule Risk Analysis processes that are complete and transparent and include effective methods to quantify risks.**
  - ▶ **Ensure the risk register contains appropriate fields to support complete, transparent, and effective risk categorization, quantification, and reporting to the governing bodies;**

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- ▶ **Perform regular Cost Risk Analysis and Schedule Risk Analysis and report the quantification and important insights of these analyses to the governing bodies; and**
- ▶ **If the project governing bodies contain an independent oversight advisor, consider that these analyses are part of their independent review to provide more effective governance.**
- **RM4: Ensure risk reporting is clear and timely and provides early visibility to the potential for low-probability, high-consequence events.**
- **RM5: Ensure governing bodies are aware of the low-probability, high-consequence risks for the project, and that they fully understand budget and schedule impacts if these risks materialize.**
- **CM2: Assess and manage the impact of numerous work front interfaces among contractors to optimize performance and minimize potential claims.**
  - ▶ **To monitor and manage interface management items, consider developing an interface management dashboard and reporting to track the status, highlight upcoming handovers, and provide estimated transition dates; and**
  - ▶ **For future large and complex projects, consider providing digital tools such as GIS mapping for boundary management (to support Prime Contractor's tracking), standardized handover memos, and production tracking dashboards.**
- **CM4: Develop and provide project teams with the training, tools, and processes, including production tracking, to support consistent contract management across the scope and duration of the project.**
  - ▶ **Consider developing a claims management dashboard to track all commercial risks including Claims for Change, Notices of Delays, and Dispute Notices. Provide appropriate training to internal BC Hydro employees to ensure they have the required knowledge, expertise, and technical abilities to develop and sustain the dashboards rather than relying on external contractors.**
- **IC3: Plan for and build support for Indigenous procurement opportunities.**
  - ▶ **Consider developing a procurement dashboard to support timely reporting to Indigenous Nations on the status of procurement spending, to track progress and identify potential future opportunities.**

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1.17.3 Please explain the overall effectiveness of the project governance structure on the Project.

**RESPONSE:**

In BC Hydro's view, the overall governance structure for the Site C Project was effective and appropriate for a project of its size, complexity, and extended construction timeline. As discussed in section 7 of the Lessons Learned Report, the mandate, expertise, and independence of the Project's governing bodies were improved over time and future major capital projects should take steps to implement these improvements from the beginning, where appropriate.

The 2017 Site C Inquiry resulted in the establishment of the Project Assurance Board, replacing the Site C Project Board, and retaining Ernst & Young as the Independent Oversight Advisor. The project governance and oversight were further strengthened following the implementation of recommendations from the Site C Project Review by Mr. Peter Milburn.

BC Hydro believes the project governance and oversight of the Project was effective because:

- It supported continued oversight and governance, including the required approvals, from the BC Hydro Board of Directors;
- Clear Terms of Reference documents were developed for the Project Assurance Board and Independent Oversight Advisor and these documents updated as needed;
- The Project Assurance Board, as of April 2021, and consistent with their latest Terms of Reference, was largely independent from the BC Hydro Board of Directors and contained members with expertise in the engineering and construction of large projects. The Chair of the Project Assurance Board continued to be independent from the BC Hydro Board of Directors and BC Hydro Executives;
- The Project Assurance Board contained senior staff from the Government of B.C. (Ministry of Energy and Climate Solutions, and the Ministry of Finance); and

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- **The Project Assurance Board met on a monthly or more frequent basis to:**
  - ▶ **Review the status of the Project: This included updates and discussions on safety, construction progress as compared to the approved schedule, Project costs as compared to the approved budget, status of the project contingency, commercial activities, quality management activities, Project risks, environmental commitments, consultation and engagement activities with Indigenous groups and local stakeholders, property rights acquisition, labour issues or concerns, regulatory approvals, communications, security, and transition to BC Hydro Operations (included later in the project);**
  - ▶ **Provide advice and direction to Management during the execution of the Project;**
  - ▶ **Review requests for approval by the BC Hydro Board of Directors to access Project contingency and other financial approvals; and**
  - ▶ **To provide appropriate notification to the Government of B.C. on the status of the Project.**

**In addition, future Project Assurance Board meeting agendas were developed, discussed, and reviewed by the Project Assurance Board to ensure key items were tabled.**

- **The Management team prepared timely and comprehensive Project Assurance Board briefing notes on key issues, risks, construction progress, project costs, and required approvals and key decisions. Bi-weekly Construction Progress Reports were also provided to the Project Assurance Board;**
- **The Project Assurance Board engaged external advisors, as needed, to provide expert advice and opinions as the Project progresses through construction and where technical expertise was required for complex issues;**
- **Ernst & Young attended all Project Assurance Board meetings and key Management meetings and provided a monthly independent Project report to the Project Assurance Board and opinions on key approvals sought by Management (e.g., Cost Risk Analyses, Schedule Risk Analyses, budget reviews, contract increases); and**
- **The Commercial Sub-Committee, a subset of the Project Assurance Board, was formed to provide a more detailed and focused oversight of the commercial, claims, cost reporting, construction, and schedule aspects of the Project.**

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1.17.4 Please explain how any lessons learned with respect to project governance and oversight has, or will, inform the structure of the project governance and oversight for future projects, including the North Coast Transmission Line Projects, and any changes BC Hydro intends to make to streamline its project governance structure.

**RESPONSE:**

**BC Hydro is integrating governance lessons from the Site C Project into its Project and Portfolio Management Project Governance Practice and will be applying them to future projects as appropriate. Please refer to BC Hydro’s response to BCUC Staff IR 1.1.2 where we explain the near-term and long-term actions and changes to internal processes for each lesson learned.**

**Decisions related to streamlined governance structures—such as reporting relationships, communication protocols, and the use of external or independent advisors—will be determined based on project-specific needs, in consultation with project governing bodies.**

**As described in BC Hydro’s response to BCUC Staff IR 1.17.7, oversight of the North Coast Transmission Line Projects is being carried out by a BC Hydro Executive Steering Committee and North Coast Transmission Sub-Committee, both of which include independent external advisors. Oversight will also be provided in accordance with reporting commitments and agreements (in progress) with our First Nation co-owners, and by the independent BC Energy Regulator with respect to project permitting and compliance. Technical oversight of the Project will be undertaken by a Senior Technical Review Group, as described in BC Hydro’s response to BCUC Staff IR 1.16.3.**

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**Site C Governing Bodies and Independent Third-Party Advisors**

1.17.5 Please explain how BC Hydro's approach to an independent oversight advisor on future projects will be informed by BC Hydro's experiences on the Project with Ernst & Young.

**RESPONSE:**

The main benefit from having a recognized independent oversight advisor, like Ernst & Young, is that they validate, test, and challenge management's actions and recommendations, and provide their advice, opinions, and guidance to the governing bodies on management's overall effectiveness in delivering the project.

As discussed in BC Hydro's responses to BCUC Staff IRs 1.10.7 and 1.10.8, Ernst & Young's oversight provided value to the Site C Project, particularly with regard to the Risk Management Enhancement Plan and the Project risk register.

For future large, complex projects similar to Site C, the project team will work with the project governing bodies to evaluate the project complexity and risk early and consider if engaging an Independent Oversight Advisor would be beneficial and appropriate for the project. This evaluation will consider factors such as the total cost of the project, technical complexity of the project, level of public interest, identified risks including high-consequence, low-probability risks, and the type of project.

If the project governing bodies determine that an Independent Oversight Advisor would be beneficial and appropriate for the project, the experiences and lessons learned on the Site C Project recommend that:

- The Independent Oversight Advisor would report to the most appropriate governing body on the Project (e.g., the Project Board, if applicable, or the BC Hydro Board of Directors);
- Detailed Terms of Reference and/or Statement of Work would be prepared, reviewed, and approved with the project governing bodies prior to engaging the Independent Oversight Advisor to confirm their roles and responsibilities and the required expertise they would bring to the project;
- As the project progresses, the Terms of Reference and/or Statement of Work for the Independent Oversight Advisor would be periodically reviewed and updated to ensure they continue to describe the current purpose, objectives,

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**scope, roles and responsibilities, accountabilities, and communication channels;**

- **Clear communication protocols would be established for the Independent Oversight Advisor to the project governing bodies and the project team. The communication protocols may include the recommended communication processes, agendas, and meeting materials; and**
- **The project team would seek to establish a collaborative working relationship with the Independent Oversight Advisor and have them regularly participate in relevant project team meetings, and hold regular meetings with them to seek advice, feedback and perspectives on key project decisions, approvals, and analysis.**

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1.17.6 Please discuss the effectiveness of the communications protocol with Ernst & Young and identify any challenges realized over the course of the Project.

**RESPONSE:**

The communications protocols between Ernst & Young and the Project governing bodies, and the Project team, were effective.

The primary communication between Ernst & Young and the governing bodies took place during Project Assurance Board meetings, as well as Commercial Sub-Committee meetings. Ernst & Young was an active participant in these meetings, providing independent, external monthly reporting to the Project Assurance Board and Commercial Sub-Committee, reviewing processes, making recommendations, following up on previous recommendations, and responding to requests from the Project Assurance Board and Commercial Sub-Committee.

Ernst & Young provided independent oversight, including their opinions, to the Project Assurance Board on risk management, claims and commercial management, schedule management and change control, engineering and technical, and cost management and change control.

The primary communication between Ernst & Young and the Project team was participation in regular Project meetings related to risk management, claims and commercial management, schedule management, engineering and Technical Advisory Board meetings, and cost management. The Project team worked collaboratively with Ernst & Young in the development and review of all Cost Risk Analyses and Schedule Risk Analyses, identifying and implementing effective mitigation strategies for key Project risks, as well as the development and implementation of the recommendations from the 2021 Milburn Review and the implementation of the Risk Management Enhancement Plan. For additional information regarding meetings between the BC Hydro Project team and Ernst & Young related to the risk register, please refer to BC Hydro's response to BCUC Staff IR 1.10.8.

The material communications protocol challenges that occurred over the course of the project were identified and resolved as part of the 2021 Milburn Review. The challenges identified and described in the 2021 Milburn Report highlighted a lack of cooperation between the Project team and Ernst & Young, the Project team not

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**involving Ernst & Young in Project analyses at an early stage, and the Project team not always acting on, or considering, Ernst & Young’s suggestions for improvement or utilizing Ernst & Young’s recommendations to their full potential. In addition, due to changes that BC Hydro made to Ernst & Young’s contract, BC Hydro was determining the amount and type of oversight received from Ernst & Young. The 2021 Milburn Report concluded that this appeared “inconsistent with the concept of independent oversight and with BC Hydro’s commitments to government”.**

**In response to the 2021 Milburn Review, the Terms of Reference and Statement of Work for Ernst & Young were updated based on input from the governing bodies and the Project team. This update improved the communications and cooperation between Ernst & Young and the Project team. From this point, the Project team also involved Ernst & Young in key Project analyses early, such as the preparation of the Cost Risk Analyses and Schedule Risk Analyses.**

**To further improve the relationship between Ernst & Young and the Project team, a Risk Management Enhancement Plan was also prepared collaboratively with Ernst & Young that documented all identified opportunities for improvement from Mr. Peter Milburn and Ernst & Young. The Risk Management Enhancement Plan, which was completed by September 30, 2021, included specific action items, responsible individuals, and timing for completion of the plan. During the implementation of the Risk Management Enhancement Plan, BC Hydro and Ernst & Young met weekly to discuss progress and address any questions or concerns.**

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1.17.7 Please explain whether BC Hydro has included, or will include, an independent oversight advisor on the North Coast Transmission Line Projects. If yes, please explain how its role will compare to that of Ernst & Young on the Site C Project. If not, please explain why not and discuss any risks and benefits of this approach.

**RESPONSE:**

**At this time, oversight of the North Coast Transmission Line Projects is being carried out by a BC Hydro Executive Steering Committee and North Coast Transmission Sub-Committee, a sub-committee to the Capital Project and Programs Committee of the BC Hydro Board of Directors, both of which include independent external advisors. Oversight will also be provided in accordance with reporting commitments and agreements (in development) with our First Nation co-owners, and by the independent BC Energy Regulator with respect to project permitting and compliance. BC Hydro is also engaging with external lenders, and the Canada Infrastructure Bank, and these entities will undertake due diligence functions with respect to the projects.**

**As discussed in section 7.1.5 of the Lessons Learned Report, Ernst & Young Canada was engaged to provide Independent Oversight to the Site C Project Assurance Board in October 2017. The North Coast Transmission Line Projects Phase 1 and 2 construction activities are forecast to start in 2026 with a focus on early works, and major construction activities are sequenced from North Coast Transmission Line Projects Phase 1 to Phase 2, and then to Phase 3 (North of Terrace). Major construction activities are expected to start in 2027 and 2028.**

**As the North Coast Transmission Line Projects proceed into the construction phase, the BC Hydro Board of Directors will consider the appointment of an Independent Oversight Advisor.**

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1.17.8 Please explain whether the Project team had the ability to call for Board of Directors meetings on-demand if and when timely decision-making was required on the Project for an item requiring Board of Directors approval.

**RESPONSE:**

This response also answers BCUC Staff IR 1.17.10.

Yes, the Project team had the ability to call for Project Assurance Board and BC Hydro Board of Directors meetings on-demand if timely decision-making was required on the Project for an item requiring BC Hydro Board of Directors approval. BC Hydro Board of Directors meetings typically occur on a quarterly basis. However, during the peak construction period of the Project and at other times, special monthly BC Hydro Board of Director meetings were scheduled in order to approve and receive key updates on the Project.

Project Assurance Board meetings were scheduled in advance and typically occurred on a monthly basis. The regularly scheduled Project Assurance Board meetings were normally timed to occur a few days prior to the BC Hydro Board of Directors meetings. All Project related requests for approval were first reviewed by the Project Assurance Board, and if endorsed, taken to the upcoming BC Hydro Board of Directors meeting for approval.

However, if the Project team needed an approval prior to the next regularly scheduled monthly Project Assurance Board and BC Hydro Board of Directors meetings, they had the ability to request additional meetings to obtain timely approvals if required. Such additional meetings were requested and occurred several times over the course of the Project.

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- 17.0 G. PROJECT GOVERNANCE**
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**Site C Governing Bodies and Independent Third-Party Advisors**
- 1.17.9 Please explain the benefits and challenges of requiring Board of Directors approvals for:
- a) All financial commitments greater than \$75 million;
  - b) All draws on contingency.

**RESPONSE:**

**For the Site C Project, the approval of financial commitments greater than \$75 million or accessing the project contingency was not delegated down to the Project Team, or other delegate, which is typical for other BC Hydro Board of Directors approved capital projects.**

**The main benefits of requiring the BC Hydro Board of Directors to approve all financial commitments greater than \$75 million on the Site C Project include:**

- **Ensuring a higher level of review, due diligence, and approval is completed for these large financial commitments, including individuals with appropriate commercial or construction knowledge and experience of large, complex projects;**
- **Ensuring the Project team implements the required quality and level of detail for reporting and planning related to contract and control budgets, commitments, forecasts, and actuals on the project for the governing bodies to effectively perform their review, due diligence, and approval; and**
- **Ensuring the Project team plans and seeks the required financial approvals for these large financial commitments in advance and without delaying the project. BC Hydro Board of Directors approvals require greater review and due diligence from the Project team and BC Hydro Executives. These pre-planning requirements reduce the potential for urgent approvals being necessary to avoid delaying the project.**

**The benefits of requiring the BC Hydro Board of Directors to approve all draws on Project contingency on the Site C Project are similar to the benefits outlined above for financial commitments greater than \$75 million and include:**

- **A higher level of review, due diligence, and approval is completed related to all Project contingency draws. This provides the governing bodies with greater insight into potential cost and schedule risks that might impact the project's key milestones;**

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- **Ensuring the Project team looks for, identifies, and tracks all potential savings within all Project work packages to potentially offset required Project contingency draws. The requirement to obtain approval from the BC Hydro Board of Directors encourages the project team to seek savings rather than requesting draws on contingency;**
- **Ensuring the implementation of the required quality and level of detail for reporting and planning related to the usage of, remaining, and potential future Project contingency draws for the governing bodies to effectively perform their review, due diligence and approval; and**
- **Ensures the Project team seek the required approvals for Project contingency draws in advance and without delaying the project. The requirement to obtain approval from the BC Hydro Board of Directors encourages the project team to seek savings rather than requesting draws on contingency.**

**The potential challenges of requiring BC Hydro Board of Directors approvals for all financial commitments greater than \$75 million and for all draws on Project contingency include:**

- **Delays in obtaining approvals, either as a delay to governing bodies' review, or insufficient time for the review to take place, resulting in impacts to the Project's cost and schedule. However, to mitigate this, the Site C Project team was able to convene additional approval meetings with the governing bodies as required. Please refer to BC Hydro's response to BCUC Staff IR 1.17.8 that confirms that the Project team had the ability to call for BC Hydro Board of Directors meetings on-demand if and when timely decision-making was required on the Project for an item requiring BC Hydro Board of Directors approval; and**
- **Ensuring the appropriate balance between the time Management spends preparing approval materials for the governing bodies as compared to the time they spend managing all the other aspects of the project. This is especially important at critical times during the project when Management needs to focus on the timely resolution of project related issues which is often the time when the project also needs more approvals from governing bodies. However, to mitigate this, the Project team was able to work with the governing bodies to confirm the format, content, processes, level of detail, and frequency of the information they needed to fulfil their responsibilities related to the approvals of commitments greater than \$75 million and draws on Project contingency.**

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1.17.10 Please explain the timing of the Project Assurance Board meetings in relation to the Board of Directors meetings. Please explain the project team's ability to make decisions in a timely manner considering the potential delays while waiting for meetings to occur.

**RESPONSE:**

**Please refer to BC Hydro's response to BCUC Staff IR 1.17.8 where we explain that the Project team had the ability to call for additional Project Assurance Board and BC Hydro Board of Directors meetings if required and that such meetings were requested and occurred several times over the course of the Project.**

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1.17.11 Please explain any lessons learned related to the level of oversight for approvals of contingency, budget, contracts and timeliness of approvals.

**RESPONSE:**

The following response provides a description of the key lessons learned on the Project related to the level of oversight for approvals of contingency, budget, contracts, and timeliness of approvals. Please refer to BC Hydro's response to BCUC Staff IR 1.1.1 where we explain the circumstances that informed these lessons learned.

The level of governance and oversight on the Project was substantial and was enhanced over the construction phase of the Project. Future capital projects should consider implementing these improvements from the beginning of the project. Overall, BC Hydro believes the level of oversight on Site C was appropriate for a project of its size, complexity, impact, and level of public interest.

BC Hydro's Project and Portfolio Management Practices include a Project Governance Practice that is followed for all BC Hydro capital projects and is scalable depending on the cost, risks, and complexity of the project. The Lessons Learned Report has identified several lessons learned related to the level of oversight for approvals of Project contingency, budget, contracts, and timeliness of approvals. Specifically:

- **PG1: For large complex projects, evaluate project complexity and risk early, and consider the role of an independent project board, including members with applicable skills and knowledge.**
  - ▶ **For large complex projects like Site C, the Project team should work with the BC Hydro Board of Directors early to determine if an independent project board is required and the appropriate level of oversight and governance for the project (e.g., the need for an independent oversight advisor). Factors that should be considered when determining the appropriate level of governance and oversight include:**
    - **The total capital cost of the project;**
    - **Technical complexity;**
    - **Level of design completed;**

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- The number of project contractors and the complexity of the interfaces between them;
  - The delivery model utilized on the project (e.g., design-bid-build, design-build, early contractor involvement);
  - Geographic dispersion;
  - Schedule criticality; and
  - Project risk profile (e.g., cost, schedule, safety, dam safety, environmental, regulatory).
- ▶ Establishing the Project Assurance Board in 2018 and implementing the recommendations from the 2021 Milburn Report regarding governance, resulted in a project specific board that was independent from the BC Hydro Board of Directors that had the required skills, knowledge, and experience to provide governance and oversight to a large and complex project. The establishment of the Project Assurance Board allowed for specific project focus and sufficient dedicated time to fully understand the scope of the project and the issues and potential solutions that arise. The Project Assurance Board reviewed all major Project decisions and endorsed any approvals required from the BC Hydro Board of Directors including budgets, Project contingency draws, and financial commitments over \$75 million.
- PG2: Establish governance sub-committees and engage special advisors or experts, as needed, to supplement governing bodies' knowledge and experience.
  - ▶ Consider creating governance sub-committees during critical phases of the project, with members with the required skills and knowledge, to increase the effectiveness and efficiency of the project's governance and oversight. Establishing the Commercial Sub-Committee on the Project in 2021 resulted in greater oversight, advice, support, and governance to the Project team on large contracts and commercial activities and issues; and
  - ▶ The Project Assurance Board also engaged independent third-party advisors to provide expert advice and opinions as the Project progressed through construction or where specific expertise was required for a complex or technical issue. The advice, guidance, and recommendations from third party experts (e.g., the two international dam experts commissioned to provide a due diligence of the right bank foundation enhancements), supported the Project Assurance Board in meeting their governance and oversight objectives on the Project.
- PG3: Ensure clear and detailed terms of reference and communication protocols are established for all governance bodies, and if applicable, with external advisors and the independent oversight advisor.

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- ▶ **With respect to oversight and timeliness of approvals, future capital projects should ensure that standard governance processes and procedures are established, clearly documented, and communicated for project approvals and that the timing and frequency for approval meetings with governing bodies are established well in advance to enable the project team to plan ahead to ensure approvals are completed without delaying the project with the flexibility to request additional approval meetings if required; and**
- ▶ **On the Site C Project, detailed Terms of Reference were developed and updated, as required, that defined the Project Assurance Board's roles and responsibilities including providing independent due diligence and oversight of the Project including Project contingency, budget, and contracts. Detailed Statements of Work were also established, and updated when required, for the Independent Oversight Advisor that defined the roles and responsibilities of Ernst & Young. Ernst & Young provided independent reporting to the Project Assurance Board and Government of B.C. on the construction progress of the Project including their opinions of the major Project risks, Project contingency, budgets, and contracts and commercial activities.**
- **PG4: Establish processes, tools and reporting to ensure governing bodies obtain effective and timely information.**
  - ▶ **For large complex projects like Site C, BC Hydro should:**
    - **Review the time required for the governing bodies to complete the appropriate due diligence and deliberations and to review the volume of governance related materials they will receive; and**
    - **Ensure that the processes, tools, and reporting are strong and comprehensive to ensure the governing bodies receive the required information in a timely and effective manner.**
  - ▶ **The Site C Project developed key dashboards across multiple work scopes to track and monitor progress and established a monthly accountability meeting to report key Project activity progress and to raise any issues or concerns. These measures enhanced reporting and were effective at highlighting Project progress for major work fronts and any issues to be raised to the governing bodies. The Project also benefitted from strong site management and Project leadership which resulted in timely and efficient decision making at site and early communication for any forecasted draws on Project contingency.**

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**18.0 H. INDIGENOUS CONSULTATION**  
**Reference: Lessons Learned Report, Section 8, p. 177; Section 8.1.2, p. 181**  
**Court Proceedings and Consultation during Construction**

1.18.1 Please discuss the effectiveness of the early and extensive consultation on the Project in mitigating the likelihood of court proceedings from First Nations.

**RESPONSE:**

**As discussed in BC Hydro’s response to BCUC Staff IR 1.18.2, the courts affirmed BC Hydro’s approach to consultation on the Site C Project, which included early and broad outreach to a large number of Indigenous Nations.**

**Of the 29 Indigenous groups identified for consultation as part of the environmental assessment, a number of these groups expressed concern or opposition to the Project early in project review. However, after the Environmental Assessment approvals were issued, six Nations began court proceedings challenging the approvals, and ultimately, two Nations followed through with their court challenges. The court observed that with respect to those two Nations, the issue between the parties was not a failure of consultation but an honest and fundamental disagreement about whether the Project should proceed. BC Hydro, the Government of BC, and these two Nations ultimately entered into agreements.**

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**18.0 H. INDIGENOUS CONSULTATION**  
**Reference: Lessons Learned Report, Section 8, p. 177; Section 8.1.2, p. 181**  
**Court Proceedings and Consultation during Construction**

1.18.2 Please explain any lessons learned from these court proceedings and whether the court proceedings have informed, or will inform, BC Hydro's approach to Indigenous consultation on future major capital projects.

**RESPONSE:**

The various court proceedings that related to the issue of Indigenous consultation affirmed BC Hydro and the Crown's approach to consultation. There were five different court hearings in which the court considered the adequacy of consultation with two First Nations, and in each decision, the court found the consultation to be deep, meaningful and adequate in the circumstances.<sup>1</sup>

Given this affirmation by the courts, BC Hydro is continuing with its approach on other capital projects, while also adapting consultation to the specific circumstances and Nations being consulted.

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<sup>1</sup> Refer to: 2015 FC 1030, 2015 BCSC 1682, 2016 BCSC 2007, 2017 FCA 15, 2017 BCCA 58.

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**18.0 H. INDIGENOUS CONSULTATION**  
**Reference: Lessons Learned Report, Section 8, p. 177; Section 8.1.2, p. 181**  
**Court Proceedings and Consultation during Construction**

1.18.3 Please discuss the effectiveness of the Permitting and Environmental Forums and elaborate on the role that Indigenous Nations had in these forums. Please explain whether these forums are, or will be, a standard approach for future major capital projects.

**RESPONSE:**

The Permitting and Environmental Forums were highly effective in facilitating collaborative decision-making between BC Hydro and Indigenous Nations, as well as addressing environmental and cultural concerns regarding the Site C Project. Indigenous Nations played a critical role in these forums by contributing traditional knowledge, shaping mitigation strategies, and ensuring that Indigenous values were integrated into project decisions. This structured forum model is regarded as a best practice and is expected to inform engagement approaches for future major capital projects, where appropriate.

**Permitting and Environmental Forums Were Highly Effective**

The forums provided a structured, collaborative venue that enabled BC Hydro, Indigenous Nations, and federal and provincial regulators to engage in frequent, direct dialogue on permitting matters. There have been a total of 59 forums since 2016, bringing together representatives from 13 Indigenous Nations. This sustained engagement created continuity and accountability in the permitting process and supported complex issues being resolved efficiently.

The forums' structure supported adaptive management, allowing the Project to adjust plans and operations in response to issues raised. Sub-committees were established to address specialized topics requiring additional time and technical expertise. For example, a Methylmercury Sub-Committee co-developed a comprehensive Methylmercury Monitoring Plan (including an Indigenous community sampling program), and a Reclamation Sub-Committee was formed in 2020 to guide reclamation strategies for Site C. These focused working groups examined technical matters in detail and brought forward recommendations, which enhanced the overall effectiveness of the process.

Through this collaborative approach, Indigenous input was directly incorporated into project planning and mitigation measures. In particular, Indigenous participants helped identify and address concerns related to wildlife mitigation, fish passage design, and cultural resource protection. Continuous engagement

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meant that emerging issues could be proactively managed in a transparent manner, improving environmental outcomes, and strengthening confidence in the process.

### **Role of Indigenous Nations in the Forums**

Indigenous Nations were active partners throughout the forums. They brought forward traditional knowledge and community perspectives that shaped project decisions and informed culturally appropriate approaches to environmental and cultural management. Forum discussions frequently led to field-based collaborative activities and on-site cultural monitoring involving Indigenous participants, reinforcing transparency, and building mutual trust.

This collaborative model empowered Indigenous communities to take a lead role in representing their interests, and supported permitting decisions that were both technically sound and culturally informed. Engagement through the forums also strengthened relationships, built trust, and supported a decision-making process grounded in respect, shared understanding, and community values.

### **Use of Forum-Style Approaches for Future Major Projects**

The success of the Permitting and Environmental Forums at Site C provides a model for future major capital projects, recognizing that engagement must be tailored to each project. The structured forum approach — characterized by early, ongoing engagement and co-development of solutions with Indigenous Nations — is now recognized within BC Hydro as a best practice for complex projects involving multiple permits and significant Indigenous interest.

BC Hydro will assess early on in the development of future major capital projects, in consultation with Indigenous Nations, whether a forum or similar working-group structure is appropriate. Key considerations will likely include project scale and complexity, the number of Indigenous Nations affected, and each Nation’s interest and willingness to participate in a collective forum. Please refer to BC Hydro’s response to BCUC Staff IR 1.18.5 where we describe how we have established permitting forums and environmental protection working groups for Phase 1 and Phase 2 of the North Coast Transmission Line Projects.

Where Indigenous communities support such an approach, BC Hydro will implement forum-style engagement to replicate the open dialogue and joint problem-solving that proved effective for the Site C Project. In particular, the Site C experience showed that this approach can expedite issue resolution and support regulatory compliance while advancing reconciliation objectives. Where a different model is more suitable, BC Hydro will adapt its engagement accordingly.

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**18.0 H. INDIGENOUS CONSULTATION**  
**Reference: Lessons Learned Report, Section 8, p. 177; Section 8.1.2, p. 181**  
**Court Proceedings and Consultation during Construction**

1.18.4 Please discuss the effectiveness of the Cultural and Heritage Resources committee and elaborate on the role that Indigenous Nations had in the committee. Please explain whether this committee is, or will be, a standard approach for future major capital projects.

**RESPONSE:**

The Cultural and Heritage Resources Committee (CHRC), established in 2015 as a requirement of the Site C Project’s environmental assessment approval, was created to collaboratively identify, mitigate, and commemorate impacts to cultural and heritage resources in the Peace River Valley during construction of the Site C Project. The CHRC has been an effective forum for engagement between BC Hydro and Indigenous Nations and provides important lessons for future major capital projects.

**Effectiveness of the CHRC**

The CHRC has met regularly since 2015, holding 35 committee meetings and six site visits. These consistent interactions enabled steady progress on initiatives focused on preserving and honouring cultural heritage. In particular, the CHRC significantly mitigated cultural impacts and created lasting benefits through the following initiatives:

- Each participating Indigenous Nation received approximately \$30,000 to support activities commemorating sites affected by the Project;
- Several public educational initiatives were developed, including a travelling exhibit, a video highlighting Indigenous perspectives, and interpretive signage;<sup>1</sup>

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<sup>1</sup> The video, titled "Culture and Heritage Resources Committee | Site C," highlights many of the key themes discussed above and provides firsthand perspectives on the committee’s work: <https://www.sitecproject.com/indigenous-relations/culture-and-heritage>.

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- **Tours of Peace River sites were organized to foster place-based understanding and support the continuation of traditional harvesting practices;**
- **Cultural events and camps received dedicated support to strengthen community connections and preserve traditions; and**
- **A cultural centre is being developed to display artifacts uncovered during project construction, host cultural exhibits, and serve as a venue for gatherings and celebrations. Construction of the centre is scheduled to begin in 2026.**

**In assessing the CHRC’s effectiveness, it is important to acknowledge the challenges that the committee has overcome since its creation. In the early stages (2015 to 2016), the committee had difficulty gaining momentum for various reasons including differing views on the Site C Project and turnover in committee representation. These factors made it challenging to reach consensus and slowed progress initially. BC Hydro mitigated these concerns by supplementing the CHRC with additional one-on-one meetings with individual Nations. These discussions provided a space for communities to voice concerns more freely, which were then brought back into the wider committee’s work. Over time, as relationships strengthened and processes became more established, the CHRC gained traction.**

**Feedback from Indigenous participants underscores the CHRC’s effectiveness. During a CHRD appreciation event, several Indigenous representatives spoke about how the committee benefitted them. Common themes in their feedback included improved relationship building, more tangible outcomes, and improved trust due to transparency and regular dialogue.**

### **Role of Indigenous Nations in the CHRC**

**Indigenous Nations played a central and active role in the CHRC. Eleven Indigenous Nations participated in the CHRC, including Blueberry River First Nation, Doig River First Nation, Halfway River First Nation, Sauteau First Nations, and others, as well as Métis Nation British Columbia. Each Nation appointed representatives who brought forward their community’s priorities and traditional knowledge, ensuring that the committee’s work was culturally informed and community-driven.**

**Indigenous participants helped shape protocols for artifact handling, informed appropriate forms of commemoration for cultural sites, and reviewed educational materials such as signage and videos to ensure accuracy and respectful representation. Their involvement also extended to determining culturally appropriate approaches to mitigation and commemoration.**

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**Importantly, participation in the CHRC was voluntary. Each Nation contributed to the extent it chose, which reinforced the principle of Indigenous self-determination. This flexibility ensured that the committee respected the unique interests, cultural context, and capacity of each participating Nation.**

### **Application to Future Major Capital Projects**

**BC Hydro is committed to applying the principles demonstrated by the CHRC for future major capital projects. These principles include:**

- **Engaging Indigenous Nations early in project planning;**
- **Creating structured forums for ongoing dialogue;**
- **Ensuring transparency in information-sharing; and**
- **Working in partnership to address community-specific interests.**

**For future major capital projects, BC Hydro will evaluate, in consultation with affected Indigenous Nations, whether establishing a committee similar to the CHRC is desirable and feasible. Decisions will be guided by the project’s scale, the nature of potential cultural impacts, and the preferences of Indigenous communities.**

**Where Indigenous Nations support this approach, BC Hydro will implement a committee or forum structure that mirrors the collaborative, culturally grounded model of the CHRC. Where a different engagement approach is more appropriate, BC Hydro will adapt the model to better meet community needs.**

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**18.0 H. INDIGENOUS CONSULTATION**  
**Reference: Lessons Learned Report, Section 8, p. 177; Section 8.1.2, p. 181**  
**Court Proceedings and Consultation during Construction**

1.18.5 Please confirm, or explain otherwise, whether the North Coast Transmission Line Projects have, or will have, Permitting and Environmental Forums and a Cultural and Heritage Resources committee.

**RESPONSE:**

**Confirmed. Both Phase 1 and 2 of the North Coast Transmission Line Projects have established permitting forums and environmental protection working groups. These approaches have been developed in collaboration with First Nations and the BC Energy Regulator, and BC Hydro's input to the approach has been informed by our experience with the Site C Project.**

**Working groups with First Nations, the Government of B.C. and BC Hydro are in place to develop and review project environmental and socio-economic mitigations. Work with individual Phase 1 and 2 First Nations is also underway to identify cultural use areas and sites that may be affected by the project and to develop and agree on mitigations. The permitting forums are comprised of representatives from BC Hydro as the proponent, the Government of B.C., the BC Energy Regulator, and First Nations.**

**The specific ways that project First Nations will be engaged with respect to heritage and culture continue to be under discussion with project First Nations.**

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**19.0 H. INDIGENOUS CONSULTATION**  
**Reference: Lessons Learned Report, Section 8.3.1, p. 191**  
**Lesson IC1: Enable Early Consultation and Streamline Ongoing Engagements, Including Use of Permitting and Environmental Forums**

1.19.1 Please explain when in the Project lifecycle the neutral facilitator was appointed and provide the rationale for this timing. Please discuss potential benefits had the neutral facilitator been appointed earlier in the Indigenous engagement process and Project lifecycle.

**RESPONSE:**

The Cultural and Heritage Resources Committee was established as a condition of the Environmental Assessment Certificate (Condition #63), with its first meeting held in July 2015, during the Implementation phase of the Site C Project. The neutral facilitator was appointed in July 2017.

Before the neutral facilitator was appointed, the Project representatives facilitated CHRC meetings. Discussion at these meetings became increasingly complex and sensitive – with differing views and interests among Nations. In order to support continued constructive dialogue among participants and support the committee in fulfilling its mandate under the Environmental Assessment Certificate, the Project decided to engage a neutral third-party facilitator. This decision aimed to:

- Provide impartial leadership in meetings;
- Manage multi-party dialogue effectively; and
- Reduce tension and foster collaboration among Indigenous Nations and the Project.

The timing of the appointment coincided with the committee’s transition into detailed work on cultural and heritage mitigation measures and commemorative initiatives, which necessitated sensitive handling and structured facilitation.

While the facilitator’s appointment in 2017 was appropriate given the complexity of discussions at that stage, appointing a facilitator earlier in the engagement process may have offered the following additional benefits:

- Strengthening relationships and trust during initial engagement;
- Establishing shared expectations and priorities before implementation; and

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- **Reducing early tensions and supporting constructive dialogue among Nations.**

**Where a neutral facilitator is deemed beneficial on future projects, BC Hydro will consider these potential additional benefits when determining the appointment timing for a facilitator.**

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**19.0 H. INDIGENOUS CONSULTATION**  
**Reference: Lessons Learned Report, Section 8.3.1, p. 191**  
**Lesson IC1: Enable Early Consultation and Streamline Ongoing Engagements, Including Use of Permitting and Environmental Forums**

1.19.2 Please describe the type or magnitude of project where BC Hydro views a neutral facilitator to be appropriate. Please identify any future projects for which BC Hydro has appointed, or intends to appoint, a neutral facilitator and the rationale for the appointment.

**RESPONSE:**

**In BC Hydro’s view, it is appropriate to consider a neutral facilitator for very large and complex projects where multiple First Nations are participating across multiple interests, and where First Nations support the use of a neutral facilitator. Neutral facilitation was used for the Site C Project for these reasons.**

**While it may be considered when project scale, complexity, or Indigenous feedback indicates that it would add value, using a neutral facilitator is not a standard practice. For most BC Hydro projects, consultation and engagement is carried out directly through the Indigenous Relations team.**

**Although no upcoming projects are currently planned to use a neutral facilitator, lessons from the Site C Project show that neutral facilitation can be valuable for very large and complex projects involving multiple First Nations with diverse interests, when participating First Nations are aligned in supporting its use.**

**BC Hydro will continue to consider the use of neutral facilitators to support our commitment to reconciliation, transparency, and meaningful engagement.**

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**20.0 I. PUBLIC CONSULTATION**  
**Reference: Lessons Learned Report, Section 9.2.3, pp. 207–209;**  
**Section 9.3.3, p. 214**  
**Community Measures Agreement**

1.20.1 Please explain how BC Hydro identified: (i) the municipalities to enter into community measures agreements with; (ii) the appropriate timing for each agreement; and (iii) any impacted communities that were not party to community measures agreements.

**RESPONSE:**

**Consistent with the objective identified in the preamble, BC Hydro entered into Community Measures Agreements with municipalities with jurisdiction over the areas directly impacted by the Project. BC Hydro identified municipalities early in the project and commenced negotiations. Some negotiations took longer than others, with the result that the various agreements were concluded over a significant period of time. BC Hydro is not aware of any directly impacted municipalities that are not party to a Community Measures Agreement.**

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**20.0 I. PUBLIC CONSULTATION**  
**Reference: Lessons Learned Report, Section 9.2.3, pp. 207–209; Section 9.3.3, p. 214**  
**Community Measures Agreement**

1.20.1 Please explain how BC Hydro identified: (i) the municipalities to enter into community measures agreements with; (ii) the appropriate timing for each agreement; and (iii) any impacted communities that were not party to community measures agreements.

1.20.1.1 For each community identified that was not party to a community measures agreement, including Old Fort, please describe all Project impacts realized on that community and explain whether a community measures agreement could have mitigated the impacts.

**RESPONSE:**

**As described in BC Hydro’s response to BCUC Staff IR 1.20.1, BC Hydro entered into Community Measures Agreements with municipalities with jurisdiction over the areas directly impacted by the Project. The unincorporated community of Old Fort is located within Electoral Area C of the Peace River Regional District, and Peace River Regional District was a party to a community agreement that included provisions related to Old Fort.**

**Project related impacts experienced by residents of the Old Fort community included dust, noise, light, and traffic. Potential impacts on air quality, noise and traffic were raised and assessed in the environmental assessment and resulted in Environmental Assessment Certificate Conditions 35, 37, 57, 58, 59 and 69 being applied to the Project.**

**To address this combination of impacts on residents of Old Fort, additional mitigation measures were required. Prior to concluding a community agreement with the Peace River Regional District, BC Hydro provided temporary housing and food per diems to residents that requested alternate accommodations while work was occurring in close proximity to the community.**

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**20.0 I. PUBLIC CONSULTATION**  
**Reference: Lessons Learned Report, Section 9.2.3, pp. 207–209;**  
**Section 9.3.3, p. 214**  
**Community Measures Agreement**

1.20.2 Please describe how BC Hydro intends to utilize community measures agreements on future projects based on its experience on the Project.

**RESPONSE:**

**The Site C Project impacted several communities over approximately 10 years of construction. As such, BC Hydro determined that Community Measures Agreements were required to supplement the Environmental Assessment Certificate and Federal Decision Statement conditions.**

**BC Hydro may use Community Measures Agreements for future projects, but their use will be evaluated on a project-by-project basis based on the associated scope, complexity, and impact. Generally, BC Hydro would only consider using Community Measures Agreements when there are project impacts similar in scale to those of Site C that are not already avoided or mitigated by environmental or permitting conditions.**

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**20.0 I. PUBLIC CONSULTATION**

**Reference: Lessons Learned Report, Section 9.2.3, pp. 207–209; Section 9.3.3, p. 214  
Community Measures Agreement**

1.20.3 Please identify the circumstances under which BC Hydro would establish a regional office on future projects. In the response, please specifically comment on whether regional offices have been, or will be, established for the North Coast Transmission Line Projects, the Campbell River System projects, or any other projects of a similar size.

**RESPONSE:**

Throughout the Site C Project, the majority of the Community Relations team was based in Fort St. John, operating out of the Site C Community Consultation Office, which served as a central hub for public engagement and information sharing.

The circumstances under which BC Hydro would consider establishing a regional office on future projects include:

- When the project involves new infrastructure built on a single site (i.e., not a linear project across many kilometres);
- When the project has significant community impacts;
- When the project has a longer construction timeline; and
- When the project area does not have internet or cell phone coverage.

The North Coast Transmission Line Projects, Phase 1 and Phase 2, span a 450-kilometre distance between Prince George and Terrace. In addition to public open house events, public office days were initiated in fall 2025 from BC Hydro offices in Prince George and Vanderhoof to provide further opportunities for in-person engagement. We plan to continue offering public office hours in 2026 from BC Hydro offices along the corridor, and from a project office being established in Prince George in 2026. To accommodate the growing project team, a project office will be established in Prince George in 2026, in advance of construction start.

For the Campbell River System projects, BC Hydro partnered with the Museum at Campbell River to establish the Discovery Centre in October 2013, at the start of construction for the John Hart Generating Station Replacement Project. During construction, the centre provided information on construction activities, including timing, any associated trail or road closures, impact mitigation, and the overall project scope and schedule. This centre continues to provide visitors with information about the Campbell River watershed, the facilities and the dam safety projects underway via multi-media displays.