BC Hydro
Power smart

# Site C Clean Energy Project

## Quarterly Progress Report No. 22

## F2022 First Quarter

## April 1 to June 30, 2021

## PUBLIC

# Table of Contents

## List of Figures



## List of Tables

## Appendices

# 1 Executive Summary

## 1.1 Overview and General Project Status

BC Hydro continues to manage significant challenges that have materially impacted the Site C Project (Project) cost and schedule, as discussed in previous progress reports.

The most significant challenge continues to be the impacts of the global COVID-19 pandemic, which, during the quarter, had showed signs of improving with the number of COVID-19 cases associated with the Project declining and vaccinations increasing. Subsequent to the quarter end, after a period of five weeks with no COVID-19 cases at site, in the second week of August 2021, Site C was notified of more than 30 new contractor workers testing positive for COVID-19. The majority of those workers testing positive were not vaccinated. On August 18, 2021, Northern Health Authority (Northern Health) declared a COVID-19 outbreak on the Site C Project. The Project will continue as planned with the implementation of additional safety measures. These cases are a combination of both workplace transmission on the Project and community transmission from outside of the Project. BC Hydro is working closely with its contractors and Northern Health to manage these cases and to take further steps to reduce the potential for on site transmission. For the period August 1, 2021 to August 31, 2021, there were a total of 67 COVID-19 cases at site (66 related to the outbreak). As of August 31, 2021, there were nine active cases and 45 isolations remaining (23 in camp and 22at home), which was down from a peak of 44 active cases for a single day on August 19, 2021. The Project continues to operate under health orders related to industrial camps and large projects.

The second significant challenge relates to the increased costs and potential schedule impacts resulting from geotechnical issues on the right bank. By early 2020, BC Hydro had determined that significant foundation enhancements were required to increase the stability of the bedrock foundations under the

structures on the right bank, including the powerhouse, spillways and future dam core area. During the quarter, independent dam experts and the Technical Advisory Board continued to review and provide input to the design and construction of the right bank foundation enhancements, which include the installation of large piles to further extend the foundation deeper into the bedrock and enhancements to the approach channel above the powerhouse and spillways. The Project design continues to meet the highest safety standards and international best practices.

The final significant challenge relates to cost pressures facing the Project. Prior to the onset of the COVID-19 pandemic, the Project was already managing significant cost pressures; pandemic related costs and delays and the need for foundation enhancements added to these cost and schedule pressures. During the reporting period, Treasury Board approved the new budget for the Project of $16 billion and the new in-service date of 2025, which had been announced by the Government of British Columbia on February 26, 2021.

Despite challenges, the Project continued to advance in the lead up to the important summer construction season. The sections below discuss the major challenges and successes during the quarter in further detail.

## 1.2 COVID-19 Pandemic at Site

In April 2021, at the start of the quarter, COVID-19 cases on the Site C Project were increasing, mirroring what was occurring across the province during the pandemic's third wave. On April 28, 2021, Northern Health declared a COVID-19 outbreak at Site C as a result of the increase in cases at site. This step was taken to ensure the health and safety of employees, contractor workers and members of the public.

Northern Health determined there was no need to stop work on the Project and work continued as planned. The outbreak was officially declared over by Northern Health on June 23, 2021.

Subsequent to the quarter end, after a period of five weeks with no COVID-19 cases at site, in the second week of August 2021, Site C was notified of more than 30 new contractor workers testing positive for COVID-19. These cases are a combination of both workplace transmission on the Project and community transmission from outside of the Project. BC Hydro worked closely with its contractors and Northern Health to manage these cases and to take further steps to reduce the potential for on site transmission.

On August 18, 2021 Northern Health declared a second COVID-19 outbreak on the Site C Project. The Project construction continued as planned with the implementation of additional safety measures. BC Hydro is continuing to work closely with Northern Health to implement a number of enhanced infection control measures at Site C. For the period August 1, 2021 to August 31, 2021, there were a total of 67 COVID-19 cases at site (66 related to the outbreak). As of August 31, 2021, there were nine active cases and 45 isolations remaining (23 in camp and 22 at home), which was down from a peak of 44 active cases for a single day on August 19, 2021. The majority of the new cases of COVID-19 occurred in unvaccinated workers.

As of June 30, 2021, the onsite medical clinic had administered 1,731 first doses and 1,264 second doses of COVID-19 vaccines. BC Hydro estimates as of June 30, 2021, 70-75 per cent of active Site C workers had been vaccinated, either at the onsite clinic or through their local communities.

## 1.3 The BC Supreme Court released its decision in Yahey v British Columbia

On June 29, 2021, the BC Supreme Court released its decision in *Yahey v British Columbia*, 2021 BCSC 1287 (the “Blueberry River Decision”), determining that the cumulative impacts from a range of provincially authorized industrial activities (e.g. oil and gas, forestry and hydroelectric infrastructure) within Blueberry River First Nations traditional territory constituted an infringement of Blueberry River First

Nations Treaty 8 rights. BC Hydro was not a party to that court case. During the next six months, the Province will be negotiating with Blueberry River First Nations as directed by the Court to address potential changes to the regulatory regime to protect treaty rights. On the Site C Project, BC Hydro continues to consult with Blueberry River First Nations and all Treaty 8 Nations and remains open to negotiating an Impact Benefit Agreement with Blueberry River First Nations.

Although BC Hydro believes that the Blueberry Decision should not affect the issuance of permits because the Project is approved and under construction, there remains the possibility that the timing of the issuance of provincial permits required for the completion of the Project may be affected. As at the date of the completion of this report, that effect, if any, remains unknown.

## 1.4 Right Bank Foundation Enhancements Reviews Continue

The two independent, world-leading dam experts and the Technical Advisory Board continue to provide oversight to BC Hydro on the design and construction of the right bank foundation enhancements. During the quarter, the Technical Advisory Board and the independent dam experts reviewed and provided input on the engineering designs for the right bank foundation enhancements, including the design of the piles to increase the stability of the foundation of the spillways and powerhouse, and changes to increase the robustness and water tightness of the design of the lining within the approach channel. Both the Technical Advisory Board and independent dam experts continue to confirm that the foundation enhancements developed to address geotechnical issues in the bedrock foundation on the Project's right bank continue to meet the highest safety standards and international best practices. The foundation enhancements include the installation of large piles to further extend the foundation deeper into the bedrock and enhancements to the approach channel above the powerhouse and spillways.

During the reporting period, activities on the right bank foundation enhancements focused on detailed engineering design, development of a commercial agreement with the generating stations and spillways contractor to complete the scope of work, construction planning, site preparations to support construction and the procurement of materials.

## 1.5 Updated Budget Approved with New Expected In-Service Date

Following completion of the re-baselining process in June 2021, Treasury Board approved the revised cost estimate of $16 billion, announced by the Government of British Columbia on February 26, 2021. This is now the approved Project budget for the Project and includes a new expected in-service date of 2025. The impacts and delays due to COVID-19 are the single largest contributors to the cost increase, which includes the amount of interest costs financed by the Project for the one year delay, followed by the additional costs for foundation enhancement measures, and other cost pressures the Project was managing prior to the onset of the COVID-19 pandemic.

BC Hydro continues to monitor and assess significant risks with potential cost implications, including the continuation of the COVID-19 pandemic and the potential impacts to onsite construction activities; commercial negotiations with contractors; design finalization for the foundation enhancements and related procurements; procurements for the balance of plant contracts; the ability of the Project to attract and retain sufficient skilled workers and the possibility that the Blueberry River Decision affects the timing of the issuance of provincial permits required for the completion of the Project. Despite these risks, based upon information currently available to BC Hydro, BC Hydro expects that the Project will be completed within the approved budget of $16 billion, which includes a Project contingency of $737 million. As of June 30, 2021, the life to date actual costs of the Project are $7.4 billion which results in a remaining budget of $8.6 billion to complete the Project.

BC Hydro and Site C contractors are actively engaged in activities and negotiations to accelerate work on the Project delayed by the COVID-19 pandemic with a view to providing greater certainty to the planned 2025 in-service date. These activities, if successfully implemented, could result in an earlier in-service date: however, achieving an earlier in-service date remains subject to uncertainly and to the risks summarized in this report. During the reporting period, a memorandum of understanding was reached with the generating station and spillways civil contractor on the impacts due to the COVID-19 pandemic. Subsequent to the reporting period, on August 30, 2021, BC Hydro concluded a settlement agreement with the contractor that is consistent with the terms in the memorandum of understanding.

Subsequent to the end of the reporting period on June 30, 2021, BC Hydro and the main civil works contractor agreed on key terms for a summer 2021 dam acceleration program that provides incentives to the contractor to partially recover schedule from the COVID-19 pandemic and other impacts on the earthfill dam.

## 1.6 Upholding Commitments to the Environment, Indigenous Groups and Local Communities

During the reporting period, BC Hydro continued to uphold its commitments to the environment, Indigenous groups and local communities.

BC Hydro continued to secure the appropriate permits and authorizations to continue ongoing construction on the Project. BC Hydro estimates that approximately 600 permits will be required throughout the life of the Project and of these permits, 493 have been received to June 30, 2021, and are actively being managed. The remaining authorizations fall within the Project footprint and description of the Project that was approved in 2014. The permits are required for construction activities to achieve completion of Site C, as approved.

In June 2021, BC Hydro submitted its final Environmental Assessment Certificate amendment request to the Environmental Assessment Office regarding the use of

haul trucks on a contingency basis to transport till material from 85th Avenue Industrial Lands to the dam site area. Prior to submitting this final amendment request for this work, BC Hydro engaged with local governments, First Nations and local residents on the proposed activity and responded to concerns. During the quarter, BC Hydro held a virtual town hall with residents and local government officials to discuss the amendment application. A public comment period on the amendment application, led by the Environmental Assessment Office, occurred from April 29 to May 29, 2021. A decision on the amendment is expected in fall 2021.

Work advanced in the areas of environmental monitoring and assessment as well as in the Project's fish, wildlife, habitat, vegetation management and heritage programs. During the reporting period, environmental activities focused on responding to and assessing noise, light and air quality concerns within the Hudson's Hope area as well as refining the operations of the temporary fish passage and operating a contingency trap and haul programs to augment the fish passage.

Throughout the quarter, BC Hydro worked to engage, build relationships and find solutions together on topics that are most important to the First Nations communities impacted by Site C.

## 1.7 Despite the COVID-19 Pandemic, Construction Progress Continued

Despite the challenges of the COVID-19 pandemic, the Project continued to advance. In the generating station and spillways civil works area, construction progressed with the ongoing placement of concrete in the powerhouse, intakes and spillways; installation of the penstock segments; and construction of the steel super-structure for the powerhouse. By concrete volume, the generating station and spillways civil works sub-project is about 50 per cent complete.

In the main civil works area, roller-compacted concrete placements resumed at the dam and core buttress on the right bank; and placements of dam core and fill

material began on the left, centre section and right banks of the earthfill dam. Excavations in the approach channel also continued.

Off-dam site, during the reporting period, preparations were underway to start stringing the second 500-kV transmission line, which subsequently started in July 2021. Construction crews placed the first cast-in-place concrete on the Halfway River bridge deck and construction advanced on six segments of Highway 29. Construction continued on the Hudson's Hope berm.

## 1.8 Update on the Implementation of the Peter Milburn Recommendations

As of June 30, 2021, all recommendations from the independent review of the Project by special advisor Peter Milburn were either fully implemented or substantially complete. All governance related recommendations from Mr. Milburn were fully implemented. This includes changing the structure of the Project Assurance Board by having the majority of the Project Assurance Board members being independent members with expertise in the following areas: capital project construction and management; delivery of major civil projects; commercial negotiations; construction-related claims settlements and other areas.

The Project Assurance Board has also appointed a Commercial Sub-committee which has been actively providing oversight on ongoing key commercial matters.

As of August 31, 2021, outstanding actions from the Peter Milburn recommendations relate to finalizing one resource for the risk management team and one resource for the commercial management team. These are expected to be completed by September 30, 2021.

## 1.9 Project Status Dashboard for the Quarter

BC Hydro, with oversight from the Project Assurance Board, is committed to completing the Site C Project within the newly approved budget of $16 billion and

schedule with a 2025 in-service date, without compromising on safety, scope, and quality. To report on Project status, BC Hydro uses a dashboard system where key Site C Project areas are classified as red (at risk), amber (moderate issues) or green (on target).

The Project Status Dashboard is provided in Table 1 below. Notable changes from the previous quarter include:

- Following completion of the re-baselining process, the overall Project health is "amber", compared to the previous report where overall health was "red". In June 2021, Treasury Board approved the revised $16 billion budget and one-year delay to the Project in-service date to 2025, which was previously announced in February 2021. The newly approved budget and schedule address significant cost pressures and delays faced by the Project due to the COVID-19 pandemic, as well as the right bank foundation enhancements and other cost pressures being managed by the Project prior to COVID-19.
- The cost status is "amber", following completion of the rebaselining process, compared to the previous report where cost was "red". In June 2021, Treasury Board approved the revised $16 billion Project budget (previous budget of $10.7 billion), which was announced in February 2021. The approved budget will fund the cost pressures due to the COVID-19 pandemic, right bank foundation enhancements and other cost pressures prior to COVID-19. There are still ongoing risks which are being monitored and assessed for potential cost implications.
- Following completion of the rebaselining process, as of June 30, 2021, the schedule status is "amber", compared to the previous report where schedule was "red". While the Project is currently on schedule to achieve the new in-service date, the re-emergence of the COVID-19 outbreaks at the Project

and the possibility that the Blueberry River Decision affects the timing of the issuance of provincial permits required for the completion of the Project.

- The status of the regulatory, permits and tenures indicator has changed to "amber", compared to the previous report where the status was "green". This is due to the possibility that the Blueberry River Decision affects the timing of the issuance of provincial permits required for the completion of the Project.

**Table 1 Project Status Dashboard**

● On Target ● Moderate Issues ● At Risk

| Status as of: | | June 2021 |
|---|---|---|
| **Overall Project Health** | ● | Following completion of the re-baselining process, the overall Project health is "amber", compared to the previous report where overall health was "red". In June 2021, Treasury Board approved the revised $16 billion budget and one-year delay to the Project in-service date to 2025, which was previously announced in February 2021.The newly approved budget and schedule address significant cost pressures and delays faced by the Project due to the COVID-19 pandemic, as well as the right bank foundation enhancements and other cost pressures being managed by the Project prior to COVID-19.<br>The Technical Advisory Board and Independent experts continued to review and confirm BC Hydro's foundation enhancements solution is appropriate and sound, and will make the right bank structures safe and serviceable over the long operating life of Site C.<br>However, there are still significant risks to the Project that continue to be reviewed, assessed and monitored. |
| **Safety** | ● | Safety remained "amber" during the quarter. Management of COVID-19, including working through a declared outbreak, continued to be a priority in the reporting period. BC Hydro worked closely with Northern Health during the outbreak on asymptomatic testing, increased vaccinations, and other containment measures. The first outbreak was officially declared over on June 23, 2021.<br>The Site C medical clinic has continued to provide vaccinations onsite, which are accessible to all Site C workers working at onsite and offsite work locations. BC Hydro estimates as of June 30, 2021, 70-75 per cent of active Site C workers had been vaccinated, either at the onsite clinic or through their local communities.<br>During the reporting period, there were five serious safety incidents consisting of three near misses with the potential for a serious injury and two serious injuries that required medical attention, but the workers are expected to make a full recovery. To encourage active learning from significant safety incidents across all work fronts and contractors, the Project held 30 Safety Incident Reviews this quarter. |
| **Scope** | ● | Scope remained "amber" during the quarter as certain designs are still being finalized. The Technical Advisory Board and independent experts have confirmed that BC Hydro's right bank foundation enhancements solution is appropriate and sound and will make the right bank structures safe and serviceable over the long operating life of Site C and will continue to review the designs as they are finalized. |

| Status as of: | | June 2021 |
|---|---|---|
| **Schedule** | 🟡 | Following completion of the rebaselining process, as of June 30, 2021, the schedule status is "amber", compared to the previous report where schedule was "red". In June 2021, Treasury Board approved the new Project in-service date of 2025, which was previously announced in February 2021. While the Project is currently on schedule to achieve the new in-service date, the re-emergence of the COVID-19 outbreaks at the Project and the possibility that the Blueberry River Decision affects the timing of the issuance of provincial permits required for the completion of the Project indicate that schedule risks remain.<br>BC Hydro and Site C contractors continue to explore ways in which the work delayed by the COVID-19 pandemic could potentially be accelerated, which, if successful, could result in an earlier in-service date: however, achieving an earlier in-service date remains subject to uncertainly and to the risks summarized in this report. BC Hydro and the Site C contractors continue to negotiate contract changes associated with the right bank foundation enhancements. |
| **Cost** | 🟡 | Following completion of the rebaselining process, the cost status is "amber", compared to the previous report where cost was "red". In June 2021, Treasury Board approved the revised $16 billion Project budget (previous budget of $10.7 billion), which was announced in February 2021. The newly approved budget addresses cost pressures due to the COVID-19 pandemic, need for foundation enhancements on the right bank, and other cost pressures the Project was managing prior to the COVID-19 pandemic. Significant potential cost risks remain including the continuation of the COVID-19 pandemic, the continuation of commercial negotiations with contractors, procurements for the remaining work and equipment, the availability of skilled workers, and the possibility that the Blueberry River Decision affects the timing of the issuance of provincial permits required for the completion of the Project. The budget includes $737 million of project contingency to fund cost risks if required.<br>As of June 30, 2021, the life to date actual costs are $7.4 billion which results in a remaining budget of $8.6 billion. |
| **Quality** | 🟢 | The overall quality rating for the Project continued to be good during the reporting period, indicating that the work generally conforms to the requirements of the drawings and specifications. For the main civil works, BC Hydro remains focussed on ensuring that the materials testing for the main dam is completed in accordance with the specifications as the materials processing and placements progress. For the generating station and spillways civil works, BC Hydro continues to focus its quality assurance efforts on the wet curing, thermal control and strength of concrete for the generation station, spillways and intake structures, as well as the penstock welding. For offsite manufacturing, BC Hydro continues to meet weekly with the quality management teams of key suppliers in COVID-19 affected areas to discuss impacts, plan upcoming inspections and to coordinate with our local quality assurance representatives to ensure quality requirements are satisfied prior to components being shipped. |

| Status as of: | | June 2021 |
|---|---|---|
| **Regulatory, Permits and Tenures** | 🟡 | Due to the possibility that the Blueberry River Decision affects the timing of the issuance of provincial permits required for the completion of the Project. As a result, the status of the regulatory, permits and tenures indicator is "amber", compared to the previous report where the status was "green". The permits needed for completion of the Project relate to the manner and timing of construction already approved through the environmental assessment and should not fall within the scope of the Blueberry River Decision. Refer to section 9.3 for more information.<br><br>As at June 30, 2021, BC Hydro estimates that approximately 600 permits will be required throughout the life of the Project. Of these permits, 493 have been received and are actively being managed. The remaining authorizations fall within the Project footprint and description of the Project that was approved in 2014. The permits are required for construction activities to achieve completion of Site C, as approved.<br><br>On June 14, 2021, BC Hydro submitted a request to amend Condition 40 of the Environmental Assessment Certificate, proposing that BC Hydro amend one of three required boat launch locations required by the Certificate from Cache Creek to a location close to Halfway River. A decision is expected in the late fall/winter of 2021. BC Hydro is awaiting the decision on the amendment to provide for contingency haul trucking from the 85th Avenue quarry. |
| **Environment** | 🟢 | During the reporting period, the focus of the environmental work was responding to and assessing noise, light and air quality concerns within the Hudson's Hope area as well as refining the operation of the temporary fish passage and operating a contingency trap and haul program to augment the fish passage. Environment Canada initiated an investigation on October 10, 2018, with regards to a rainfall event in September 2018. BC Hydro has subsequently increased the system capacity along with other actions to reduce the potential of future similar events. This investigation is still ongoing. Focus remains on minimizing sediment and erosion across the dam site, care of water, hydrocarbon management, wildlife attractant management and invasive weed control. |
| **Procurement** | 🟢 | The balance of plant contract has been split into six packages and will be procured in 2021.<br><br>The first procurement package, the balance of plant mechanical request for proposals was posted on January 22, 2021 and closed on April 21, 2021. Subsequent to the reporting period, on July 29, 2021, the mechanical contract was awarded.<br><br>The second procurement package, the balance of plant electrical request for proposals was posted on March 19, 2021 and closed on June 23, 2021.<br><br>The third procurement package, the balance of plant architectural request for proposals was posted on June 18, 2021. |
| **Indigenous Relations** | 🟡 | BC Hydro has a mandate from the Province to reach project or impact benefit agreements with 10 indigenous groups which are most impacted by Site C. Seven of 10 agreements are fully executed and in implementation. There are three mandated First Nations with which BC Hydro has not negotiated agreements. West Moberly First Nations withdrew from confidential discussions to seek alternatives to litigation related to Site C in August 2019 and filed an amended Notice of Civil Claim in September 2019. |

| Status as of: | | June 2021 |
|---|---|---|
| **Litigation** | 🟡 | The treaty infringement claim filed by West Moberly First Nations in January 2018 remains active. An amended Notice of Civil Claim filed by West Moberly First Nations in September 2019, among other things, expanded their original treaty infringement action, shifting the focus to all three Peace River facilities, not just Site C, and their alleged cumulative impacts. BC Hydro is preparing for the trial, which is scheduled to commence in March 2022. |
| **Stakeholder Engagement** | 🟢 | BC Hydro continues to work with the communities, regional district and stakeholder groups on the implementation of various community agreements. Throughout the reporting period, BC Hydro continued sharing recurring COVID-19 updates (through calls and emails) with local community representatives and Northern Health, as well as engaged with stakeholders and residents about the Environmental Assessment Certificate amendment regarding the use of haul trucks on a contingency basis to transport till material from 85th Avenue Industrial Lands to the dam site area. Additionally, BC Hydro continues to receive, respond to and resolve Project-related complaints. |

## 1.10 Significant Project Updates for the Quarter

Significant Project updates that occurred between April 1 and June 30, 2021 include the following:

- Preparation of in-river infrastructure was completed in April 2021 to manage water-borne wood debris for the 2021 season. Refer to section 3.1.2 for more information.
- The balance of plant mechanical request for proposals, the first of six procurement packages for the balance of plant, closed on April 21, 2021. Subsequent to the reporting period, on July 29, 2021, the mechanical contract was awarded. Refer to section 3.1.4 for more information.
- On April 28, 2021, Northern Health declared a COVID-19 outbreak on the Site C Project. This step was taken to ensure the health and safety of the workforce and members of the public. A total of 56 workers were connected to this outbreak; all cases recovered. Northern Health declared the outbreak over on June 23, 2021. As of June 30, 2021, there were zero cases. Subsequent to the reporting period, Northern Health declared a second COVID-19 outbreak on the Site C Project on August 18, 2021. Refer to sections 1.2, 2.1 and 2.2 for more information.

- In April 2021, crews placed the first cast in place concrete on the Halfway River bridge deck, completing eight of thirteen cast-in-place concrete bridge deck placements by June 2021. Construction advanced on all six sections of Highway 29. Refer to section 3.1.7 for more information.
- In April 2021, when seasonal temperatures allowed, placement of roller-compacted concrete re-commenced and progressed to approximately 35 per cent completion overall by June 30, 2021. Refer to section 3.1.1 for more information.
- On May 1, 2021, the lower section of the Halfway River was reopened to boat traffic. This section of the river was closed to boaters from September 1, 2020, to April 30, 2021, while BC Hydro cleared vegetation to prepare for the Site C reservoir.
- In May 2021, annual blasting resumed at Portage Mountain Quarry. This material will be used for the Hudson's Hope shoreline protection works and the Highway 29 realignment. Refer to section 3.1.7 for more information.
- In May 2021, BC Hydro reached a memorandum of understanding with the generating station and spillways civil contractor on the impacts due to the COVID-19 pandemic. The agreement includes schedule recovery of most completion milestones that were impacted by the pandemic. Subsequent to the reporting period, on August 30, 2021, BC Hydro concluded a settlement agreement with the contractor that is consistent with the terms in the memorandum of understanding. Refer to section 3.1.3 for more information.
- In collaboration with local partners, BC Hydro launched a new environmental training program in mid-June 2021, which covered nine certifications that will enable local Indigenous participants to qualify for environmental monitoring work at Site C. Refer to section 11.4 for more information.

- In May 2021, with the excavation of the core trench and curtain grouting complete and when seasonal temperatures allowed, placement of earthfill dam material commenced on the left and right abutments, and centre sections of the dam. Refer to sections 1.7 and 3.1.1 for further information.
- On June 4, 2021, BC Hydro and Site C contractors observed 215 seconds of silence to honour Kamloops residential school survivors, their families and all Indigenous communities impacted by the legacy of residential schools in Canada. In addition, Site C recognized National Indigenous Peoples Day on June 21, 2021; the worker accommodations contractor commemorated a walking labyrinth, which was initiated as a memorial for the Kamloops residential school victims, and serves as a place for people seeking to find peace and meditation.
- On June 15, 2021, the B.C. Construction Association announced that BC Hydro and seven Site C contractors had become the first multi-contractor project to sign the Builders Code, setting a new industry standard with a project-wide commitment to eradicate hazing, bullying and harassment. Refer to section 11.4 for more information.
- On June 18, 2021, the Balance of Plant request for proposal for the architectural contract was posted to BC Bid. This is the third of six procurement packages for balance of plant. Refer to section 3.1.4 for more information.
- On June 23, 2021, the Balance of Plant request for proposal for the electrical contract closed. This is the second of six procurement packages for Balance of Plant. Refer to section 3.1.4 for more information.
- In June 2021, Treasury Board approved the $16 billion Project budget and new expected in-service date of 2025. Refer to sections 1.8 and 5.2 for more information.

- In June 2021, BC Hydro submitted a request to amend Condition 40 of the Environmental Assessment Certificate, proposing that BC Hydro amend one of three required boat launch locations required by the Certificate from Cache Creek to a location close to Halfway River. A decision is expected in late fall/winter 2021.
- In June 2021, BC Hydro submitted a final Environmental Assessment Certificate amendment request to the Environmental Assessment Office regarding the use of haul trucks on a contingency basis to transport till material from 85th Avenue Industrial Lands to the dam site area. Prior to submitting the request, BC Hydro engaged with local governments, First Nations and local residents on the proposed activity and responded to concerns in the final amendment submission. Refer to section 9.4 for further information.
- In June 2021, the heritage program field season was initiated with approximately ten archaeologists and Indigenous community representatives. Refer to section 10.3 for more information.
- In June 2021, BC Hydro contributed $10,000 to the Hudson's Hope Public Library through the Site C Project's Generate Opportunities (**GO**) Fund. Refer to section 12.1 for more information.
- In June 2021, there were 5,046 total workers on the Site C Project. Of the total workers, 3,573 (71 per cent) were from British Columbia, and there were 1,038 workers on site from the Peace River Regional District (24 per cent of the construction and non-construction contractors' workforce). The onsite contractor workforce number also includes 12 per cent women (532 workers), 375 indigenous workers and 176 workers who are working for various contractors as apprentice carpenters, electricians, millwrights, ironworkers, mechanics, boilermakers and heavy equipment operators. Refer to section 11.3 for further information.

- Powerhouse construction continued throughout the reporting period, including concrete placements at the powerhouse, intakes and spillways; installation of penstock segments; and construction of the steel super-structure for the powerhouse. Refer to section 3.1.3 for more information.

Refer to Appendix A for site construction photos for the reporting period and refer to Appendix B for a list of work completed since the project commenced in 2015.

# 2 Safety and Security

In addition to supporting field safety inspections and security operations on the construction Project, management of COVID-19 was a continued focus from April through June 2021.

## 2.1 COVID-19 Outbreak

During March and April 2021, the Project saw a steady increase in the number of COVID-19 cases at Site C, including some clusters in specific work areas. To ensure the health and safety of workers, Northern Health declared a COVID-19 outbreak on April 28, 2021, and authorized asymptomatic testing. The Project was not required to stop work at site due to the COVID-19 management protocols that were in place. BC Hydro worked with Northern Health to increase vaccinations onsite, reduce office capacities across all employers, and introduce more strict measures for COVID-19 compliance. In total, during the first outbreak there were 56 positive cases and 286 isolations associated with the outbreak. The outbreak declaration was rescinded on June 23, 2021.

Subsequent to the reporting period, on August 18, 2021 Northern Health declared a second COVID-19 outbreak on the Site C Project. The Project construction will continue as planned with the implementation of additional safety measures, including wearing masks across the dam site. BC Hydro is working closely with Northern Health to implement a number of enhanced infection control measures at

Site C. For the period August 1, 2021 to August 31, 2021, there were a total of 67 COVID-19 cases at site (66 related to the outbreak). As of August 31, 2021, there were nine active cases and 45 isolations remaining (23 in camp and 22 at home), which was down from a peak of 44 active cases for a single day on August 19, 2021. The majority of those workers testing positive were not vaccinated.

## 2.2 Site C COVID-19 Vaccinations

As part of the April 2021 COVID-19 outbreak declaration by Northern Health, Site C was authorized by the Provincial Health Services Authority to vaccinate anyone over 18, thus targeting more age groups ahead of the provincial vaccination program.

The Site C medical clinic continues to provide vaccinations which are accessible to all Site C workers at onsite and offsite locations. As of June 30, 2021, the clinic had administered a total of 2,995 vaccinations (1,731 first doses and 1,264 second doses). BC Hydro estimates, as of June 30, 2021, approximately 70 to 75 per cent of active Site C workers had been vaccinated, either at the onsite clinic or through their local communities.

## 2.3 Heat Dome

In late June 2021, Site C experienced extreme heat conditions along with the rest of the province. On June 29, 2021, temperatures were recorded at 54°C on aggregate stockpiles and 39°C on the roller-compacted concrete lifts. Overall, Site C contractors planned well for the heat, communicating effectively to their workers and managing through these extreme conditions. From June 25 to July 1, 2021, the onsite medical clinic handled a total of nine heat-related cases, with one serious case of heat exhaustion where the worker was transported to Fort St. John hospital for treatment.

## 2.4 Dropped Objects Safety Forum

BC Hydro's Site C safety team reviews all of the contractors Project safety incidents each week. The resulting data analytics enables the Site C safety team to identify incident trends, and opportunities for improvements. For example, Site C Safety facilitated a 'Dropped Objects Safety Forum' with three major contractors at site. The session covered: industry statistics for dropped object injuries, as well as Site C statistics; a drops calculator tool showing the impact of a water bottle being dropped from height that could result in a lethal injury; and reviewed several best practices. Each contractor had an opportunity to discuss their own company's dropped object training plans. The forum was well received by all.

## 2.5 Security

Security and safety improvements for the main security access to site (Gate A) kicked off on June 28, 2021. Project scope includes widening of the approach lanes to support staging of heavy trucks and equipment coming into site, installation of more effective search facilities, deployment of speed monitoring and motion detection technologies, and improved safety for the security guards. Once the Gate A upgrades are complete, all three of the Site C security access gates will have been upgraded to ensure effective security and efficient access and egress to site.

## 2.6 Summary of Safety and Regulatory Performance Metrics

From July 2015 through June 2021, all work fronts across the Project had completed almost 35 million work hours, with no fatalities and one permanent partial disabling injury in 2017. In this reporting period, there were five serious safety incidents consisting of three near misses with the potential to be a serious injury and two serious injuries that required medical attention. The workers are expected to make a full recovery. There were 294 non-serious incidents reported, including 84 near misses and 210 low-grade injuries that may have required first aid and/or medical attention treatment. A near miss is defined as an incident that could have resulted in

an injury but did not because of effective hazard barriers or the person was out of harm's way/missed. BC Hydro considers near miss reporting as indicative of a strong and improving safety culture and is strongly encouraging all Site C contractors and employees to report near misses.

To encourage active learning from significant safety incidents across all work fronts and contractors, the Project held 30 Safety Incident Reviews this quarter which include reviews with BC Hydro and contractor senior leaders (serious safety incident investigations and corrective actions) and BC Hydro and contractor construction management and safety teams (less-serious incidents).

Table 2 below reflects safety performance results for the Project, including all contractors and all sub-projects.

**Table 2 Summary of Site C Safety Metrics**

| | Reported April 1, 2021 to June 30, 2021[1] | Reported Since Inception (July 27, 2015 to June 30, 2021)[1] |
|---|---|---|
| Fatality[2] | 0 | 0 |
| Permanently Disabling Injury[3] | 0 | 1[4] |
| Serious Incidents[5] | 5 | 86 |
| Lost Time Injuries[6] | 2 | 36 |
| All-Injury Incidents[7] (Lost Time Injuries[6] and Medical Attention requiring Treatment[8]) | 16 | 238 |

1 Numbers are subject to change due to timing of when data is retrieved and when injury is categorized.

2 Excludes any non-occupational incidents.

3 A permanently disabling injury is one in which someone suffers a probable permanent disability.

4 In June 2018, an injured worker received a permanent partial disability award from WorkSafeBC due to a lost time injury incident in August 2017. The worker was attempting to unload a light plant (tower) from a flatbed truck. The worker stepped on the light plant (tower) outrigger to gain enough height to reach the lifting attachment when the worker lost balance and fell approximately 7.5 feet to the ground. BC Hydro reclassified this incident as a permanent disabling injury after receiving an update on the WorkSafeBC award in June 2018. The incident is identified as a serious injury in the BC Hydro Incident Management System.

5 Serious incidents are any injury or near miss with a potential for a fatality or serious injury.

6 Lost time injuries are those where a worker (employee or contractor) misses their next shift (or any subsequent shift) due to a work-related injury / illness. If a worker only misses work on the day of the injury, it is not considered a lost time injury.

7 All-Injury incidents are work-related medical attention requiring treatment, lost time injuries, and fatalities.

8 Medical attention requiring treatment is where a medical practitioner has rendered services beyond the level defined as "diagnostic or first aid" and the worker (employee or contractor) was not absent from work after the day of the injury. Services beyond diagnostic / first aid include (but are not limited to) receiving stitches, a prescription, or any treatment plan such as physiotherapy or chiropractic.

There were 16 all-injury incidents between April and June 2021, consisting of two lost time injuries and 14 medical attention incidents.

## 2.7 Safety Verifications

In this reporting period, the Site C safety team completed a total of 202 formal planned safety verifications for the Project (on dam-site and off dam-site) – an average of 67 per month. The closure rate for these verifications (indicating the number of nonconformances resolved) was 92 per cent, illustrating a strong collaboration between the BC Hydro construction and safety teams. Of these 202 safety verifications, 27 per cent were clean sheet verifications, where no nonconformances were found during the verification. Further, 90 per cent of all the safety verifications conducted during the reporting period identified good safety practices even if there were some nonconformances.

## 2.8 Regulatory Inspections and Orders

WorkSafeBC, under the authority of the *Worker's Compensation Act*, is the primary regulator with jurisdiction of safety for the Project. WorkSafeBC oversees all worker safety (employee and contractor) for the Project, both on the dam site and off the dam site. The Ministry of Energy, Mines and Low Carbon Innovation is the regulatory authority for worker safety on any work fronts subject to the *Mines Act*, specifically West Pine Quarry, Portage Mountain Quarry, and Wuthrich Quarry.

From April to June 2021, WorkSafeBC issued 19 regulatory inspection reports and 10 regulatory orders. The Ministry of Energy, Mines and Low Carbon Innovation issued three regulatory inspections and nine regulatory orders during this period.

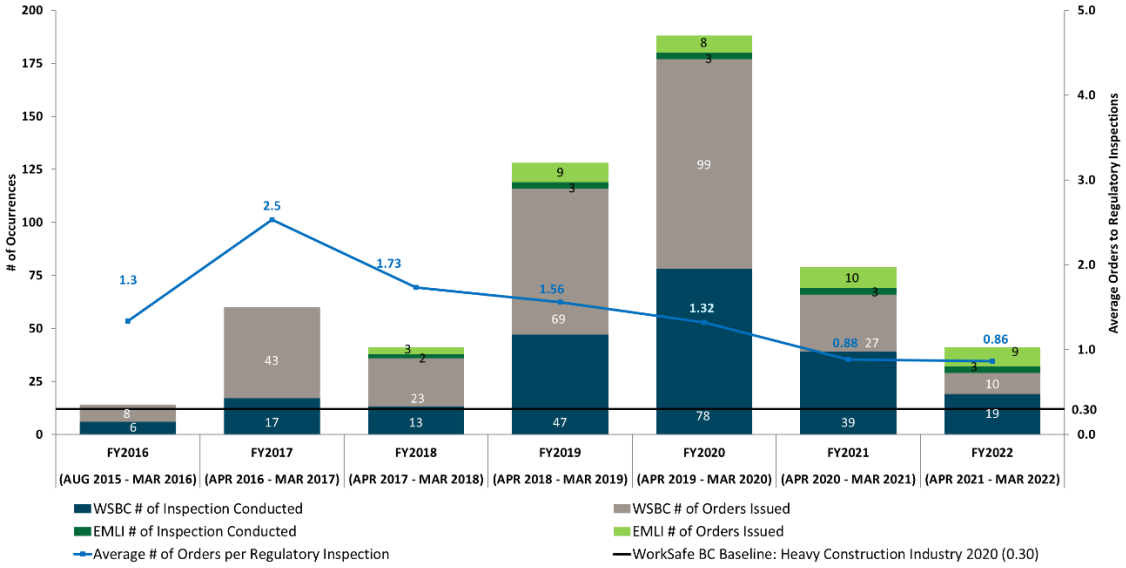
Of the 19 inspection reports, 13 were 'clean sheets' with no orders. This is a slight improvement from the quarter ended June 30, 2020. Two of the clean sheets were related to COVID-19. Refer to Appendix B, for a list of safety regulatory inspections and orders received from April 2021 to June 2021.

The Project monitors an additional metric – average number of orders per regulatory inspection. As shown in Figure 1, between April 2021 and June 2021, the average number of orders per inspection was 0.86, an improvement from previous years.

**Table 3 Safety Regulatory Inspection and Orders**

| | Reported April 1, 2021 to June 30, 2021[9] | Reported Since Inception (July 27, 2015 to June 30, 2021)[9] |
|---|---|---|
| Regulatory Inspections | 22 | 233 |
| Regulatory Orders | 19 | 318 |

**Figure 1 Number of Orders to Regulatory Inspections, August 2015 to June 2021**




## 2.9 Safety Performance Frequency Metrics

To assess safety performance over time, the Project uses safety frequency metrics (safety performance incidents/worker hours) to account as much as possible for the volume of work. Note there is not a strict linear relationship between incidents and work hours; other factors such as congestion of active work fronts, higher hazard work activities, environmental working conditions, etc., also influence the number of

[9] Numbers are subject to change due to timing of when data is retrieved and when injury is categorized.

safety incidents. If the number of safety incidents increases or decreases at a higher rate than work hours, frequency metrics will typically also increase or decrease at proportionally different rates.

Table 4 below summarizes these key safety frequencies by quarter, based on a rolling 12-month average.

**Table 4 Summary of Safety Performance Frequency Metrics**

| | Fiscal 2021 April 2020 – March 2021 (Rolling 12-Month Average) | | | | Fiscal 2022 April 2021 – March 2022 (Rolling 12-Month Average) | | | |
|---|---|---|---|---|---|---|---|---|
| | Q1 | Q2 | Q3 | Q4 | Q1 | Q2 | Q3 | Q4 |
| Serious Incident Frequency | 0.55 | 0.62 | 0.48 | 0.48 | 0.45 | n/a | n/a | n/a |
| Lost Time Injury Frequency | 0.23 | 0.21 | 0.21 | 0.12 | 0.09 | n/a | n/a | n/a |
| All Injury Frequency | 1.92 | 1.46 | 1.33 | 1.14 | 1.19 | n/a | n/a | n/a |

Fiscal 2021 Q2, Q3 and Q4 will be updated when information is available.

Comparing results from the quarter ended June 30, 2021 (current reporting period) to the quarter ended June 30, 2020, all Site C safety performance frequencies (serious incident, lost time injury and all-injury) have decreased (improved). The serious incident frequency for this quarter is 0.45, a slight but not significant decrease compared to 0.55 for the same period in 2020. Lost time injury frequency this quarter is 0.09, a significant 61 per cent decrease compared to 0.23 from the same quarter last year, due primarily to contractor's improved Return to Work programs. Finally, all-injury frequency is at 1.19 this quarter, a 38 per cent decrease compared to 1.92 for the same quarter last year.

Declines in the all-injury frequency were largely due to the reduction of higher risk activities and a smaller workforce over the last 12-months due to COVID-19 constraints - especially the workplace congestion, rebar work, and working at heights safety risks associated with the generating station and spillways sub-project.

Critical path work on the diversion of the Peace River continued until October 2020, and the successful completion of diversion reduced some of the hazardous work on the main civil works sub-project.

# 3 Construction and Engineering Major Accomplishments, Challenges and Work Completed

## 3.1 Construction

The COVID-19 pandemic continued to have an impact on construction activities in the second quarter of 2021.

BC Hydro continues to work closely with contractors to understand the costs and schedule impacts due to COVID-19.

### 3.1.1 Main Civil Works

The scope of the main civil works contract includes the construction of the following major components:

- Diversion works, including two concrete-lined, 10.8-metre-diameter tunnels. Tunnel No. 1 is 700 metres in length and Tunnel No. 2 is 790 metres in length;
- Diversion tunnel inlet and outlet portals, and approach channels;
- Excavation and bank stabilization;
- Relocation of surplus excavated materials (including management of discharges);
- Dams and cofferdams (including a zoned earth embankment dam 1,050 metres long and 60 metres above the present riverbed, and stage 1 and 2 cofferdams);
- Roller-compacted concrete (including a powerhouse, spillways and dam buttress approximately 800 metres long made up of approximately 1.7 million cubic metres of concrete); and

- Haul roads.

An update on construction activities currently underway or completed during the reporting period are described below under four main areas: (1) left bank, (2) right bank, (3) river diversion, and (4) earthfill dam. Refer to the Earthfill Dam section for updates on the right and left bank earthfill dam core trench excavation.

## Left Bank

During the reporting period, the finishing concrete work inside the 454-metre-long left bank drainage adit tunnel was substantially completed. Completion of the remaining tie in concrete is on hold until the portal design has been finalized. This delay will not impact any critical path works.

## Right Bank

The activities currently underway or completed for the quarter ending June 30, 2021 on the right bank include:

*Right Bank Drainage Tunnel*

Remediation and completion of the shotcrete work in the right bank drainage tunnel was completed in this quarter. In the fall of 2021, final work on completing the invert slab in the tunnel is scheduled to commence.

*Spillway Roller-Compacted Concrete (Dam/Core Buttress)*

During this quarter, the roller-compacted concrete re-commenced and progressed to 35 per cent completion by June 30, 2021. The contractor is on track to complete the overall roller-compacted concrete placements for the Project in fall 2021.

## Earthfill Dam

Earthfill dam placements commenced in this quarter, with 190,000 cubic metres of material placed as of June 30, 2021. The placements are forecast to increase significantly once grouting is completed and the first layer of till is placed in the dam

core trench across the full width of the dam, which was completed on August 28, 2021. The majority of the material placed during this quarter has been core (till) material on the left and right abutments of the core trench, and the shell material on the upstream and downstream sides.

*Core Trench Excavation*

During this quarter, core trench class 1 (soil), and class 2 (rock) excavations were completed. The completion of this work allowed for full access for the foundation consolidation and curtain grouting, which was also completed in the quarter. Placements of earthfill dam material in the core trench commenced on the left and right abutment sections of the dam, with approximately 97,000 cubic metres of core (till) material placed as of June 30, 2021. Placements of additional earthfill dam material (shell and filters) also commenced in smaller volumes.

*Conveyor Belt System*

As of June 30, 2021, the conveyor system is in full operation and has transported more than 100,000 cubic metres of till material this construction season for dam construction.

### 3.1.2 Infrastructure and Site Operations

Infrastructure and site operations include construction and operations updates for worker accommodation, debris management, and temporary fish passage operations for the reporting period.

**Worker Accommodation**

The total capacity of the worker accommodation, including camp operations staff, is 2,350.

Since January 2020, BC Hydro and the camp operator have implemented numerous measures to protect employees, contractors and facilities as a result of the

COVID-19 pandemic. The changes made at the worker accommodation lodge to increase cleaning and physical distancing continued through the quarter.

Prior to workers boarding flights, all workers continue to be required to complete the B.C. Ministry of Health self-assessment and confirm their results with their employer.

Every person accessing the site is screened and their temperature is scanned daily at the gate before entering the work site. BC Hydro and its contractors also set up thermal scanners at various exit and entry points in the worker accommodation lodge that are used before workers board crew buses or leave camp to go to other Project work sites. This supports the employers and employees with the required daily self-assessment before reporting to work each day.

BC Hydro continues to implement the protocols mandated by the Provincial Health Authority and the British Columbia Centre for Disease Control for the worker accommodation lodge. During the COVID-19 outbreaks that were declared on the Site C Project, the camp operator and the onsite health clinic worked collaboratively with Northern Health to manage isolations, positive cases and contact tracing requirements.

On April 13, 2021, the *Industrial Camps Order of the Provincial Health Officer* was posted which rescinded the camp occupancy thresholds established in the previous order and set a new requirement for workers to remain in the camp and refrain from accessing the local community for the duration of their shift. On May 21, 2021 the *Industrial Camps Order of the Provincial Health Officer* was posted which provided a number of clarifications related to expectations for workers, employers and coordinators.

### Debris Management

There are four debris retention structures on the Moberly and Peace Rivers that provide coverage for all head pond elevations to capture and prevent debris from entering the diversion tunnels. Debris management is seasonal with activities from

approximately April to November each year and no activities over the winter season (approximately December to March).

During the quarter, the debris management contractor performed maintenance on the BC Hydro Peace River boom prior to returning it to service for the season. Debris management has been conducted as required on the Peace River. In June 2021, a contract was awarded to manage debris at both the Peace River and Moberly River until the end of 2023, with an option to extend to 2024.

**Temporary Fish Passage**

The temporary fish passage facility is a trap-and-haul facility located on the left bank of the Peace River diversion tunnel outlet channel and provides safe and efficient fish passage from the outlet channel to upstream release locations during the construction of the Project. The operational season for the temporary fish passage is approximately April to October each year and the facility is winterized for the period of approximately October to the end of March. The facility was re-commissioned by April 1, 2021. From April 1 to June 30, 2021, 774 fish passed through the facility. After reservoir inundation, fish passage operations will be transferred to the permanent fish passage facility that will be constructed.

### 3.1.3 Generating Station and Spillways

The generating station and spillways scope of work includes the construction of the following major components:

- Generating station and spillways civil works, including:
  - Powerhouse: Concrete placements, installation of structural steel, and installing hydraulic gates;
  - Inlet headworks: Concrete placements, construction of the penstocks, and installing hydraulic gates; and
  - Spillways: Concrete placements and installing hydraulic gates.

- Cranes, which includes the supply and commissioning of the powerhouse cranes, tailrace gantry crane, and headworks gantry crane; and
- Hydromechanical equipment, including the supply of all gates.

Construction progress is taking place in the generating station and spillways civil works, cranes and hydromechanical equipment as described below.

### Generating Station and Spillways Civil Works

The generating station and spillways civil works contract includes the delivery of civil works associated with the powerhouse, intakes, penstocks, and spillways.

In May 2021, a memorandum of understanding was reached with the generating station and spillways civil contractor on the impacts due to the COVID-19 pandemic. Under the terms of the memorandum of understanding, the contractor will recover all major completion milestones, with the exception of the stilling basin completion date. The stilling basin completion date is later than the original plan due to the right bank foundation enhancements work. The contractor submitted a revised schedule, which now forms the new generating station and spillways civil works baseline schedule. The contractor has been working to this schedule since April 2021. Subsequent to the reporting period, on August 30, 2021, BC Hydro concluded a settlement agreement with the contractor that is consistent with the terms in the memorandum of understanding.

By concrete volume, the generating station and spillways civil works project is approximately 50 per cent complete.

*Powerhouse*

Powerhouse concrete is more than 75 per cent complete. The first stage concrete (the concrete foundation of the powerhouse) is complete. The second stage concrete (concrete that embeds the turbines and forms the floors) is advancing at a pace to match the turbines and generators contractor’s schedule. The contractor

started to remove its infrastructure from the downstream adjacent area (the tailrace) to enable the foundation enhancements work to proceed on schedule.

*Intakes Headworks*

Intakes concrete is more than 60 per cent complete. Intakes 1 and 3 are largely complete, while intakes 2 and 6 are nearing completion. Construction of intake 5 has started. Intake 4 provided penstock construction access for the other five penstocks – hence intake 4 will be the last to be constructed. Intakes are about 10 per cent behind plan. BC Hydro is working with the contractor to recover the schedule including assigning additional resources. There is schedule float for the intakes.

*Penstocks*

Penstock steel is more than 75 per cent complete. The contractor has placed 66 penstock sections out of a total of 90 sections. The number of sections installed closely matches the plan. The steel for penstocks 1, 2, and 6 is complete. Penstocks 3 and 5 are proceeding on schedule. Penstock 4 will commence in earnest once the other penstocks and associated backfill have been completed to the point where additional penstock 4 sections can be transported to the worksite via the lower access route.

*Spillways*

The contractor has completed about 35 per cent of the spillways concrete. Some concrete work in the spillways stilling basins has been postponed until the right bank foundation enhancements work is complete in late 2021. The contractor is placing some stilling basin concrete concurrent to the foundations work as a way to mitigate the impacts of the foundation enhancements work. The spillway headworks is on the critical path for the generating station and spillways civil works sub-project.

### Cranes

The powerhouse bridge cranes were initially commissioned in August 2020. The cranes continue to be commissioned over the length of the powerhouse as the work progresses.

### Hydromechanical Equipment

Draft tube gates, intake operating gates, and intake maintenance gates started shipping from Italy in 2020. All of the gates are expected to be at the site by end of 2021.

## 3.1.4 Balance of Plant

The balance of plant procurement has been split into six contract packages and the schedule for the balance of plant work is being aligned with the turbines and generators schedule. The six contract packages include: mechanical; electrical; architectural; heating, ventilation, and air conditioning; fire detection and protection; and permanent upstream fishway and other out structures. Subsequent to the reporting period the balance of plant mechanical contract was awarded, three proposals for the electrical contract were received and, the architectural contract was posted on BC Bid. The remaining three requests for proposals will be posted through 2021.

## 3.1.5 Turbines and Generators

The scope of work for turbines and generators includes the complete design, supply, installation, testing and commissioning of six turbines, generators, governors and exciters. Overall, the manufacturing and installation for the turbines and generators are on schedule, and recently BC Hydro directed a night shift be added to ensure the contractor completes spiral case welding for units 1, 2 and 3, ready for pressure testing, as close to schedule as is achievable for this component of the work.

The contractor's São Paulo, Brazil, factory will supply most of the turbine and generator components. There are some impacts due to the COVID-19 pandemic, but work is continuing. Meetings regarding manufacturing progress of the turbine and generator components in the São Paulo, Brazil factory are continuing and have been held concurrently with visits by BC Hydro's subcontracted inspection agencies to many of the contractor's subcontractors in the São Paulo area and Europe.

Two turbine runners have been transported from São Paulo, Brazil, and are currently being stored at site. The remaining four turbine runners will be shipped from Brazil later this year.

### 3.1.6 Transmission

The transmission sub-project connects the Site C Project to the BC Hydro transmission system. The scope of work includes the following major components:

- Two 75-kilometre-long, 500 kV transmission lines from the Site C substation to the Peace Canyon generating station;
- Three one-kilometre-long, 500 kV transmission lines from the Site C generating station to the Site C substation;
- A new 500 kV Site C substation; and
- Expansion of the existing Peace Canyon 500 kV Gas Insulated Switchgear to incorporate the two new 500 kV transmission line terminals.

Progress continued on the transmission lines during this reporting period.

The following reflects progress to June 30, 2021:

**Transmission Towers and Lines**

*Transmission Lines*

Construction of the second 500 kV transmission line continues as the transmission line contractor prepares to begin stringing the conductors starting in July 2021.

In total, 405 towers will support the two new 500 kV transmission lines that will connect the Site C substation to the Peace Canyon generating station, over a distance of 75 kilometres.

### 3.1.7 Highway 29 and Hudson's Hope Shoreline Protection Berm

The creation of the Site C reservoir requires realignment of six segments of Highway 29 totalling approximately 32 kilometres. The scope of the highway realignment includes relocation of existing 25 kV distribution lines adjacent to the highway and the decommissioning of some sections of the existing highway. BC Hydro is working with the Ministry of Transportation and Infrastructure on Highway 29 construction. The Highway 29 sub-project also includes the construction of a shoreline protection berm within the District of Hudson's Hope to protect against bank erosion due to reservoir wind waves and water table rise, and the development and operation of the Portage Mountain Quarry, which will supply riprap and filter materials for highway and berm construction. The permanent highway realignment is planned to be completed by spring 2023 to ensure the highway remains accessible once the reservoir is inundated and the dam is operational.

The Highway 29 sub-project is divided into the following components:

- Cache Creek highway realignment and bridge;
- Halfway River highway realignment and bridge;
- Farrell Creek East highway realignment;
- Farrell Creek highway realignment and bridge;
- Dry Creek highway realignment and bridge;
- Lynx Creek highway realignment and bridge;
- Portage Mountain Quarry development and operation; and
- Hudson's Hope shoreline protection berm.

The following reflects progress to June 30, 2021:

### Cache Creek

Construction continued on the Cache Creek East segment during the reporting period. Activities included construction of bridge and bridge abutment concrete foundations, construction of the highway embankment and stability berm, and the continued installation of piles for the bridge foundations. Construction was 46 per cent complete at the end of the reporting period.

### Halfway River

The Halfway River segment includes the realignment of 3.7 kilometres of highway and the construction of a new one-kilometre long bridge crossing the Halfway River, approximately 500 metres north of the current structure.

At the end of the reporting period, the contractor had completed the highway grading to 89 per cent, the bridge substructure to 99 per cent and the bridge superstructure to 79 per cent. This included the completion of eight of 13 cast-in-place concrete bridge deck placements.

### Farrell Creek East

The Farrell Creek East segment includes the realignment of 8.4 kilometres of highway. Geotechnical studies in 2019 concluded that 5.7 kilometres of this segment could be removed from the scope of work and monitored following the creation of the Site C reservoir, reducing the length of Farrell Creek East realignment work to 2.7 kilometres.

During the reporting period, the contractor has completed approximately 26 per cent of the construction of the highway re-alignment, including grading, drainage and fencing work.

### Farrell Creek

The Farrell Creek segment includes the realignment of 1.9 kilometres of highway, including the construction of a new 411-metre-long bridge.

At the end of the reporting period, the contractor had completed the foundation piles, began the construction of the concrete bridge and bridge abutment foundations, and began construction of the east and west bridge approaches. Construction at the end of the reporting period was 45 per cent complete.

### Dry Creek

The Dry Creek segment includes the realignment of 1.4 kilometres of highway, including the construction of a new 192-metre-long bridge.

During the reporting period the contractor remobilized to the site and began construction of the bridge and bridge abutment concrete foundations. At the end of the reporting period, construction was 45 per cent complete.

### Lynx Creek

The Lynx Creek segment includes the realignment of 9.1 kilometres of highway and the construction of a 169-metre-long bridge.

During the reporting period the Lynx Creek contractor continued gravel extraction, hauling and placement along the highway alignment and began construction of the bridge foundations. Bridge foundation piling was completed, and the construction of the concrete bridge and bridge abutment foundations started. At the end of the reporting period, the Lynx Creek work was 30 per cent complete.

### Portage Mountain Quarry

Portage Mountain Quarry supplies riprap and berm filter materials for various segments of the Highway 29 realignment and construction of the shoreline protection berm in the District of Hudson's Hope.

Quarry rock blasting resumed on May 16, 2021, and the contractor began producing various grades of riprap for the Hudson's Hope berm and the Highway 29 construction. Riprap deliveries were made to the Hudson's Hope berm, Lynx Creek, Cache Creek and Halfway River.

**Hudson's Hope Shoreline Protection Berm**

The Hudson's Hope berm is a 2.6-kilometre shoreline protection berm that will protect the slopes adjacent to the reservoir from erosion.

As of the end of the reporting period, the contractor had completed 63 per cent of the berm stripping and vegetation clearing, 62 per cent of the construction of the toe berm, which forms the base of the berm, and 32 per cent of the berm filter placement.

### 3.1.8 Reservoir

**Reservoir Clearing**

The reservoir clearing scope of work is divided into two main regions:

- Lower reservoir, Moberly River drainage and eastern reservoir including Cache Creek drainage; and
- Middle reservoir including Halfway River drainage and western reservoir.

Clearing in the lower reservoir, Moberly River drainage, eastern reservoir including Cache Creek drainage and middle reservoir up to Halfway River was required to support river diversion. All other clearing is scheduled for completion prior to reservoir inundation.

The following reflects progress to June 30, 2021:

*Lower Reservoir, Moberly River Drainage and Eastern Reservoir including Cache Creek Drainage*

All clearing and burning activities are now substantially complete for these areas except for some minor waste wood disposal and road deactivation activities. Any remaining works are scheduled to be completed in late summer and early fall after bird nesting is complete.

*Middle Reservoir, Halfway River Drainage and Western Reservoir*

As planned, clearing activities ceased in early April 2021 in the middle and western reservoir with no further work planned until late summer when road conditions are acceptable.

Advancing the designs and initiating the procurements of two outstanding clearing contract packages for the western reservoir occurred during the reporting period. Works are direct awards and are being offered to First Nations designated businesses.

**Other Reservoir Work**

The scope of other reservoir work includes infrastructure relocations and reinforcements as well as environmental mitigation and enhancements works, which are required as part of reservoir filling.

BC Hydro’s existing 1L364 transmission line crossing of the Halfway River drainage needs to be relocated prior to inundation. Detailed design work continued over the spring and the supply of the steel poles contract was awarded. Procurement for the supply and install of the pole foundations works was also initiated. Construction of this work is scheduled to start in late fall 2021 and finish over the winter.

Preliminary designs and estimates for fish habitat enhancements in the eastern and western reservoir were developed during this reporting period. The works will be constructed between fall 2021 and summer 2022.

There are some existing oil and gas wells that are above the elevation of the future Site C reservoir, but they could be impacted by the reservoir due to erosion or stability concerns. The assessment of these individual well sites continued over the spring and this work is anticipated to continue into the next year. Consultation with regulatory bodies is occurring. Field work, including archaeological and engineering studies, is ongoing to develop site-specific plans for mitigating the project impacts on sensitive archeological sites.

## 3.2 Engineering

The Engineering team provides technical support to all aspects of the Project. Through the reporting period, substantial effort was given to support the achievement of the contractor's schedule for both the main civil works and the generating station and spillways civil works contracts, as well as advancing the selection and design of required foundation enhancements to the structures on the right bank.

### 3.2.1 Main Civil Works

Support for the main civil works contract continued during the reporting period supporting excavations, grouting and instrumentation of the main dam foundations. Dam fill placements started in this reporting period with placement of till and filters in the core trench on the left and right abutments. Engineering support included ensuring that this new scope of work was successfully started and that the specifications were followed.

Detailed geological mapping of the excavations and instrumentation monitoring continues during construction. This information is used to update the design parameters for the site geology and foundations.

### 3.2.2 Foundation Enhancements

During the reporting period, value engineering activities continued in support of advancing the design of the foundation enhancements measures required to increase the stability below the powerhouse and spillways.

Work included finalizing the design of the 48 piles located within the spillways foundation and advancing the design of the 48 piles and pile cap located downstream of the powerhouse.

Value engineering of the enhancements to improve the water-tightness of the approach channel continued. Work included finalizing the design of the channel's concrete plinth and grout curtain and advancing the design of the channel's lining, drainage and additional instrumentation.

BC Hydro continued to engage the independent dam experts, Technical Advisory Board and other subject matter experts to provide oversight of value engineering activities associated with the design of the foundation enhancements. Refer to section 3.2.7 for a summary of the Technical Advisory Board meetings and Appendix E for the reports issued by the independent dam experts and Technical Advisory Board during this reporting period.

### 3.2.3 Large Cranes, Hydromechanical and Turbines and Generators

Engineering support to construction and manufacturing, as well as vendor submittal review and integration, continued throughout the reporting period for the large cranes, hydromechanical equipment and turbines and generators contracts.

### 3.2.4 Generating Station and Spillways, Balance of Plant and Equipment Supply

During the reporting period, work focused on the production of record drawings for the powerhouse, along with supporting construction with review of submittals for the powerhouse, intakes, penstocks, and spillways.

For the balance of plant scope of work, engineering focused on preparation and issuance of the technical specifications and issued for proposal drawings for the balance of plant architectural and permanent upstream fishway request for proposals packages. The engineering team continues to support the procurement process for the electrical and architectural request for proposal packages through responding to requests for information, proposal evaluations, negotiations and other requests. Work also continued on the preparation of the technical specifications and issued for proposal drawings for the three remaining balance of plant request for proposals packages. The balance of plant team also continued to support the review of the technical submittals and design drawings, factory acceptance testing, and virtual factory visits for the nine equipment supply contracts including the generator terminal equipment, generator circuit breakers, generator step-up transformers, AC station service, DC station service, 500 kV motor operated disconnects, diesel generators, large valves and compressed air receivers contracts.

Engineering design and fabrication continued to be advanced on the protection and control systems and integrated testing is also progressing on fabricated equipment.

Overall, the detailed engineering on the generating station and spillways is complete. This excludes the foundation enhancements design, for which the detailed engineering is approximately 75 per cent complete.

### 3.2.5 Transmission

During the reporting period, engineering support was provided to complete substation and transmission line record drawings.

### 3.2.6 Highway 29

The 90 per cent detailed design was completed for the highway decommissioning work. Engineering support is being provided to the various highway segments and the Hudson’s Hope berm as required to progress construction activities.

The detailed design was completed for the highway intersection for the Halfway River East boat launch.

### 3.2.7 Technical Advisory Board

A series of video conferences occurred from April to June 2021. A report was issued from the Technical Advisory Board in June 2021 as TAB report #24.

Refer to Appendix E for the report issued by the Technical Advisory Board during the reporting period.

## 3.3 Quality Management

The Project has a quality management plan that outlines activities to ensure materials, equipment and the constructed works meet contract quality requirements. The plan identifies resources and procedures necessary for achieving the quality objectives, roles and responsibilities, and is the framework document for the quality management program.

During the reporting period, the Project team continued its activities to support the Project quality plan, including:

1. Ongoing meetings with the quality management teams of key manufacturers in countries affected by COVID-19;
2. Ongoing meetings with the quality management teams of the site contractors to address quality issues; and
3. Continuing with monthly quality performance indicator assessments for the engineering, manufacturing and construction activities across each sub-project.

The Project team continues to track and manage quality nonconformances. Table 5 summarizes quality nonconformity instances during the reporting period.

**Table 5 Quality Management Nonconformity Report (NCRs) Metrics Reporting Period – April 2021 to June 2021**

| Contract | NCRs Reported April 1, 2021 to June 30, 2021 | NCRs Closed April 1, 2021 to June 30, 2021 | NCRs Reported to Date | NCRs Closed to Date | NCRs Open as of June 30, 2021 |
|---|---|---|---|---|---|
| Main Civil Works | 21 | 23 | 1847 | 1833 | 14 |
| Turbines and Generators (total = manufacturing + installation) | 89 | 115 | 531 | 439) | 92 |
| Generating Station and Spillways Civil Works | 125 | 133 | 765 | 708 | 57 |
| Large Cranes | 0 | 0 | 26 | 26 | 0 |
| Hydromechanical Equipment | 3 | 2 | 33 | 31 | 2 |
| Transmission | 0 | 1 | 115 | 115 | 0 |

BC Hydro's ability to travel to participate in equipment inspections and final acceptance tests continues to be restricted due to the COVID-19 pandemic. In order to mitigate the quality risks associated with these restrictions, BC Hydro continues to meet virtually with contractors in affected areas, including the turbines and generators contractor (Brazil) and the hydromechanical equipment contractor (Italy) on a weekly basis to plan upcoming inspections and to coordinate with local quality assurance representatives. For critical components, BC Hydro's local inspectors maintain a full-time equivalent presence in order to monitor the progress and quality of the manufacturing.

During the reporting period, the main civil works contractor started the material processing and material placements for the main dam. During the initial stages of the processing and placements, the contractor experienced challenges keeping up with the number of tests required by the technical specifications due to insufficient

availability of quality inspectors and laboratory technicians. These challenges were exacerbated by heavy rainfall events which necessitated reconditioning and retesting of the materials. BC Hydro continues to monitor the contractor's quality control staffing levels closely and has communicated its concerns to the contractor. BC Hydro has set-up a mobile materials testing facility on the site to perform independent tests alongside the main civil works contractor. There has been good correlation between the test results so far. BC Hydro continues to closely monitor the roller-compacted concrete batching and placements. A quality stop was issued by BC Hydro to the main civil works contractor on June 25, 2021 due to rising temperatures at the site (Western Canada heat dome) and BC Hydro's concerns about the contractor's ability to maintain the specified temperature and wetness of the concrete aggregate to prevent the concrete from drying out. BC Hydro and the contractor continue to meet weekly to discuss and resolve open nonconformity reports as well as discuss broader topics related to the contractor's quality performance.

The quality of the constructed works in the generating station and spillways and intake structures continues to be good. During the reporting period, the contractor focussed its efforts on monitoring its concrete mix design and the consistency of the fly ash and cement to ensure that the 56-day requirements for compressive strength continued to be met. The contractor also continued to maintain the heating and hoarding structures over the concrete placements to ensure that the thermal control and wet-curing requirements are achieved during the spring shoulder season where significant ambient temperature swings are experienced day-to-day, as well as in between daytime and nighttime. The quality of the penstock welding continues to be good and Powertech Labs remains onsite to assist with BC Hydro's quality assurance program. BC Hydro and the contractor continue to meet weekly to discuss and resolve open nonconformity reports as well as discuss broader topics related to the contractor's quality performance.

For the turbines and generators contract, the quality of the components manufactured to date continues to be good. BC Hydro continues to meet with the contractor on a weekly basis to discuss upcoming inspections, quality issues and the overall quality assurance program.

# 4 Project Schedule

## 4.1 Project In-Service Dates

Work to re-baseline the Project began in July 2020. In June 2021, Treasury Board approved the new Project in-service date of 2025, which was announced in February 2021. The Project's new schedule considers the delays and impacts of the COVID-19 pandemic and is currently on track. BC Hydro and Site C contractors are actively engaged in activities and negotiations to accelerate work on the Project delayed by the COVID-19 pandemic with a view to providing greater certainty to the planned 2025 in-service date. These activities, if successfully implemented, could result in an earlier in-service date: however, achieving an earlier in-service date remains subject to uncertainly and to the risks summarized in this report.

Table 6 shows the status of key Project milestones in relation to the approved expected in-service date of 2025.

**Table 6 In-Service Dates**

| Description | In-Service Dates based on the Announcement from the Government of B.C.[10] | Status |
|---|---|---|
| 5L5 500 kV transmission line | October 2020 | Complete |
| Site C substation | October 2020 | Complete |
| 5L6 500 kV transmission line | July 2023 | On track |
| Unit 1 (first power) | December 2024 | On track |
| Unit 2 | February 2025 | On track |
| Unit 3 | May 2025 | On track |
| Unit 4 | July 2025 | On track |
| Unit 5 | September 2025 | On track |
| Unit 6 | November 2025 | On track |

# 5 Project Governance, Costs and Financing, and Risk

## 5.1 Project Governance

On February 26, 2021, the Government of B.C. announced that construction on Site C will continue. At the same time, the Government of B.C. released the independent review of the Project by special advisor Mr. Peter Milburn, which included 17 recommendations aimed at improving oversight and governance and strengthening Site C risk reporting and management. Seven recommendations were specifically related to Project governance. Activities during the reporting period related to the measures to improve Project governance include:

- As of June 30, 2021, all recommendations from the independent review of the Project by special advisor Mr. Milburn were either fully implemented or substantially complete. Subsequent to the reporting period, as of August 31, 2021, outstanding actions from the recommendations relate to finalizing one resource for the risk management team and one resource for the

[10] In-service dates based on Government of British Columbia approval of budget in June 2021.

commercial management team. These are expected to be completed by September 30, 2021.

- All governance related recommendations from Mr. Milburn were fully implemented. This includes changing the structure of the Project Assurance Board by having the majority of the Project Assurance Board members being independent members with expertise in the following areas: capital project construction and management; delivery of major civil projects; commercial negotiations; construction-related claims settlement and other areas.
- The Project Assurance Board has also appointed a Commercial Sub-committee which has been actively providing oversight on ongoing key commercial matters.
- EY Canada continues to provide independent oversight for the Project, including budget oversight, schedule and commercial management evaluation and risk assessment analysis.
- During the reporting period, BC Hydro and EY Canada worked collaboratively to implement the risk management enhancement plan, which includes enhancements identified by both EY Canada and Mr. Milburn, in preparation for the cost risk analysis and schedule risk analysis to be prepared with a data date of July 1, 2021.

## 5.2 Project Budget Summary

In June 2021, Treasury Board approved the revised cost estimate of $16 billion, announced by the Government of British Columbia on February 26, 2021. This is now the approved project budget and includes a new expected in-service date of 2025. The impacts and delays due to COVID-19 (including the amount of interest costs financed by the Project for the one year delay) are the single largest contributors to the cost increase, followed by the additional costs for foundation enhancement measures, and other cost pressures the Project was managing prior to the onset of the COVID-19 pandemic.

BC Hydro continues to monitor and assess significant risks with potential cost implications, including the continuation of the COVID-19 pandemic and potential impacts to on site construction activities; commercial negotiations with contractors; design finalization for the foundation enhancements and related procurements; procurements for the balance of plant contracts; the ability of the Project to attract and retain sufficient skilled workers and the possibility that the Blueberry River Decision affects the timing of the issuance of provincial permits required for the completion of the Project. Despite these risks, based upon information currently available to BC Hydro, BC Hydro expects that the Project will be completed within the approved budget of $16 billion. As of June 30, 2021, the life to date actual costs of the Project are $7.4 billion which results in a remaining budget of $8.6 billion to complete the Project.

The Project Budget in Table 7 below reflects the project budget of $16 billion approved in June 2021 by key work area, life to date actual expenditures to June 30, 2021 and the remaining budget.

**Table 7 Project Budget by Key Work Area ($ million)**

| Description | Project Budget (Note 4) | Actuals, LTD (as of June 2021) | Remaining Budget (as of June 2021) |
|---|---|---|---|
| Dam, Power Facilities and Associated Structures and Transmission (Note 1) | 8,258 | 4,055 | 4,203 |
| Offsite Works, Direct Construction Supervision and Site Services (Note 2) | 2,895 | 1,507 | 1,388 |
| **Total Direct Construction Cost** | **11,153** | **5,562** | **5,591** |
| Indirect Costs (Note 3) | 2,082 | 1,131 | 951 |
| **Total Construction and Indirect Costs** | **13,235** | **6,693** | **6,542** |
| Interest During Construction | 2,028 | 719 | 1,309 |
| Contingency | 737 | 0 | 737 |
| **Total** | **16,000** | **7,412** | **8,588** |

Note 1: Key items included are river diversion infrastructure, earthfill dam and related works, spillways, powerhouse, generation equipment and transmission and substation work.

Note 2: Key items included are highway re-alignment and reservoir related work, direct construction supervision, and site services such as workers accommodation.

Note 3: Key items included are mitigation and compensation programs, development and regulatory costs, project management, engineering and other support services such as project controls, contracts management, environmental, and Indigenous relations.

Note 4: The Project Budget, approved in June 2021 by Treasury Board, is the same budget as the revised Project cost estimate reported on in Quarterly Progress Report No. 21.

## 5.3 Project Expenditure Summary

Table 8 provides a summary of the approved total project budget, the current forecasts, and related variances. The table also presents the cumulative plan and actual costs to June 30, 2021 and the related variances.

**Table 8 Total Project Budget Compared to Forecast and Life to Date Plan Compared to Actuals to June 2021 ($ million Nominal)**

| | Total Project | | | Life to Date (LTD), to June 2021 | | |
|---|---|---|---|---|---|---|
| **Description** | **Budget** | **Forecast** | **Variance** | **Plan** | **Actual** | **Variance** |
| Total Construction & Indirect Costs | 13,235 | 13,235 | 0 | 6,983 | 6,693 | 290 |
| Interest During Construction | 2,028 | 2,028 | 0 | 732 | 719 | 13 |
| Contingency | 737 | 737 | 0 | 33 | - | 33 |
| **Total** | **16,000** | **16,000** | **0** | **7,748** | **7,412** | **336** |

As of June 30, 2021, the life to date actual costs of the Project are $7.4 billion which results in a remaining budget of $8.6 billion to complete the Project. Details of the variances between actual and plan are in Appendix G.

Table 9 below provides a Fiscal 2022 year-to-date (YTD) summary as of June 2021 for the plan, actual cost and related variance based on the 2021/22 to 2023/24 Service Plan.

**Table 9 2021/22 to 2023/24 Service Plan Compared to Actuals to June 2021 ($ million Nominal)**

| Description | 2021/22 to 2023/24 Service Plan (June 2021) | Actuals, YTD (June 2021) | Variance |
|---|---|---|---|
| Total Project | 753 | 545 | 208 |

Details of the variances between actual and plan are in Appendix H.

## 5.4 Site C Project Financing

Most of BC Hydro's capital projects, including the Site C Project, are debt financed. The Site C Project costs are included as part of BC Hydro's overall borrowing and included in the Province's budget and fiscal plan. The debt and related interest costs are managed corporately by BC Hydro.

## 5.5 Material Project Risks

Material Project risks are identified and reviewed on an ongoing basis. As the Project progresses through implementation phase, the material Project risks will evolve to reflect the current risks facing the Project.

During the reporting period and in response to recommendations from the independent review of the Project by Mr. Milburn, the criteria for selecting those risks for inclusion in internal and external reporting were updated. The criteria include both objective and subjective measures, and these criteria have been utilized to select the risks included in the list below.

Refer to Table 10 below for a list of the material Project risks as of June 30, 2021.

**Table 10 Material Project Risks**

| Risk Description | Impact and Response Plan Summary |
|---|---|
| Risk that COVID-19 event impacts continuation of construction activities at site or in Vancouver. | **Impact**: BC Hydro and contractors do not have access to the required labour for daily construction and project management activities. BC Hydro and contractor costs increase to respond to COVID-19 and schedule delay impacts; camp capacity reduction and/or shutdown due to COVID-19 outbreaks.<br>**Response:** Minimize non-essential travel to site. Screen workers before they travel to site and at site before entry; implement camp mitigation measures (additional cleaning, closed cafeteria self serve stations, establish isolation wings); put in place BC Hydro and contractor worker protection exposure protocols and plans. |
| Risk that the Project cannot attract and retain sufficient skilled workers. | **Impact:** Contractors may not be able to adequately source, supply, attract, and retain sufficient project labour due to workforce demographics, increased competition for labour from other major projects, the requirement for specialized workers, and the effects of COVID-19. This may result in potential impacts to schedule, safety, productivity and cost.<br>**Response**: Contractors provide labour sourcing and supply plans, provide advance notice of foreign workers, and participate in local job fairs. BC Hydro encourages and facilitates capacity building initiatives and monitors employee turnover rates and labour conditions on other projects. |

| Risk Description | Impact and Response Plan Summary |
|---|---|
| Risk that increased interest rates, changes in expenditure timing or cost escalations increase borrowing costs. | **Impact**: Rising interest rates, changes in expenditure timing, and cost escalations result in an increase to the Project's interest costs above the amount budgeted.<br>**Response**: BC Hydro has implemented an interest hedging program for debt placements, Site C actively manages and monitors the cashflow. Costs escalations could be funded with project contingency. |
| Risk of contractor claims. | **Impact**: Increased construction management and contract management effort required to respond to and investigate claims; settlement of claims may result in increased costs.<br>**Response**: Ensure sufficient commercial management resources in place, proactively resolve claims as received, and ensure commercial management procedures are in place and are being followed. |
| Risk of a safety incident resulting in a fatality or disabling injury. | **Impact:** Serious worker injury or fatality; project delays and associated costs.<br>**Response**: Continue with BC Hydro and contractor safety steering committee to address shared safety issues and opportunities; BC Hydro and contractors have implemented safety cultural leadership training; increase BC Hydro executive involvement and engagement with site safety leadership; regularly hold on site safety conferences; continue to include safety in BC Hydro and contractor on boarding orientations; and continue to promote a strong safety culture. |
| Risk of a slope failure on transmission right-of-way above the Site C substation. | **Impact**: Slope failure on the transmission line right-of-way above the substation. Costs to repair transmission lines and substation.<br>**Response**: Conduct geotechnical investigations, install additional instrumentation, and implement recommended slope failure mitigation measures. |
| Risk of erosion of the diversion outlet riprap material. | **Impact**: Cost of remediation; schedule delay and potential generation flow restriction on G.M. Shrum and Peace Canyon generation stations.<br>**Response**: Complete both temporary and permanent solutions to prevent erosion. Monitor outlet area for any signs of erosion. |
| Risk of right bank foundation enhancement interface conflicts. | **Impact**: Existing contractors' scope of work and schedule impacted by potential new right bank foundation enhancements contractor interfaces.<br>**Response:** Rely on change schedule terms of existing contracts to proceed with change orders for the right bank foundation enhancements work scope. |
| Risk of delamination of the diversion inlet shotcrete due to operational range requirements | **Impact:** Schedule delay for repairs and repairs costs; restriction on upstream G.M. Shrum and Peace Canyon generation stations water flow during repair period.<br>**Response:** Generation Station Operations put in place interim upstream water flow management plans to manage the risk of further delamination and the project completes short-term and permanent repair work summer/fall 2021. |

| Risk Description | Impact and Response Plan Summary |
|---|---|
| Risk of insufficient on-dam site aggregate supply to meet demand | **Impact:** Decreased productivity, schedule delays and increased cost that could impact multiple contracts.<br>**Response:** Increase aggregate stockpiles; work with contractors to minimize waste and maximize aggregate production; release additional contingency aggregate excavation sites; seek out additional aggregate sources and procure off site and haul in additional aggregate. |
| Risk of delay of Blueberry River Decision on Required Permits | **Impact:** The Blueberry River Decision could delay the timing of decisions on remaining permits required from the Provincial government to complete the Project.<br>**Response:** Presently the impact is uncertain. The permits needed for completion of the Project relate to the manner and timing of construction already approved through the environmental assessment and should not fall within the scope of the Blueberry River Decision. These permits should not be adversely affected by the Blueberry River Decision. However, the response of the regulatory agencies remains uncertain and they may change their approval practices, resulting in delays to permit decisions. There is a possibility that the decisions for requested amendments to the Project's environmental assessment certificate are also delayed. BC Hydro will continue to work closely with regulators to understand any potential changes to approval practices. |

# 6 Key Procurement and Contract Developments

## 6.1 Key Procurement

The procurement approach was approved by the board of directors in June 2012 for the construction of the Project. The procurement approach defined the scope of the major contracts and their delivery models. The remaining procurements on the Project are summarized in Table 11 below.

**Table 11 Remaining Major Project Contracts and Delivery Models**

| Component | Contract | Procurement Model | Anticipated Timing |
|---|---|---|---|
| Reservoir/ Transmission Clearing | Multiple reservoir clearing contracts to be awarded over seven to eight years | Design-Bid-Build | Fifteen contracts completed (reservoir 13, transmission two). Two reservoir access and clearing contract packages are in procurement. One remaining access and clearing package is expected to be procured in 2022. |
| Generating Station and Spillways | Balance of Plant – Mechanical contract | Design-Bid-Build | Request for proposals closed in April 2021. Contract was awarded subsequent to the reporting period. |
| | Balance of Plant – Electrical contract | Design-Bid-Build | Request for proposals closed in June 2021. |
| | Balance of Plant – Architectural contract | Design-Bid-Build | Request for proposals was posted in June 2021. |
| | Balance of Plant – Permanent upstream fishway and other structures | Design-Bid-Build | Request for proposals scheduled to be posted in July 2021. |
| | Balance of Plant – Fire detection and protection contract | Design-Build | Request for proposals scheduled to be posted in August 2021. |
| | Balance of Plant – Heating, ventilation and air conditioning contract | Design-Build | Request for proposals scheduled to be posted in September 2021. |

## 6.2 Major Construction Contracts Exceeding $50 million

Since inception of the Project, 10 major construction contracts have been awarded that exceed $50 million in value, as shown in Table 12.

All of the construction contracts have been procured and awarded as per BC Hydro procurement policies.

**Table 12 Major Project Construction Contracts Awarded**

| Contract | Contract Value at June 30, 2021[11] ($ million) | Contract Execution Date |
|---|---|---|
| Site Preparation: North Bank | 60 | July 2015 |
| Worker Accommodation | 585 | September 2015 |
| Main Civil Works | 2,728 | December 2015 |
| Turbines and Generators | 464 | March 2016 |
| Transmission and Clearing | 80 | October 2016 |
| Quarry and Clearing | 101 | February 2017 |
| Generating Station and Spillways Civil Works[12] | 1,873 | March 2018 |
| Hydromechanical Equipment | 70 | April 2018 |
| Transmission Line Construction | 137 | May 2018 |
| Highway 29 | 376 | October 2019 |

## 6.3 Contracts Exceeding $10 million

For open contracts procured and awarded in excess of $10 million, refer to Appendix F.

## 6.4 Contract Management

### 6.4.1 Material Changes to the Major Contracts

The main civil works contract is a unit price contract and as such variations in quantities and design are expected over the term of the contract. Since contract award in December 2015, the main civil works contract value has increased by $981 million to reflect approved changes to June 30, 2021. This increase in contract value is primarily the result of a number of contract amendments since contract

[11] Contract value reflects the current value including executed change orders to the end of the reporting period.
[12] Includes some of the scope of work for the right bank foundation enhancements.

award in 2015 including two larger contract amendments, one in 2018 and the second in March 2020.

The generating station and spillways contract is also a unit price contract and, as such, variations in quantities and design are expected over the term of the contract. Since contract award in March 2018, the generating station and spillways contract value has increased by $269 million to reflect approved changes to June 30, 2021. The increase in contract value is the result of contract amendments to support the right bank foundation enhancements, COVID-19 related items, and variations in quantities and design. During the reporting period, a memorandum of understanding was reached with the generating station and spillways civil contractor on the impacts due to the COVID-19 pandemic. Subsequent to the reporting period, on August 30, 2021, BC Hydro concluded a settlement agreement with the contractor that is consistent with the terms in the memorandum of understanding.

# 7 First Nations Consultation

Pursuant to the Environmental Assessment Certificate and Federal Decision Statement, BC Hydro is required to consult with 13 Indigenous groups with respect to the construction stage of the Project. This consultation includes the provision of information on construction activities, support for the permit review process, and review and implementation of mitigation, monitoring and management plans, and permit conditions.

Accommodation offers were originally extended to 10 First Nations communities. Seven agreements have been fully executed and are in various stages of implementation. In February 2019, the Government of B.C., BC Hydro, West Moberly First Nations and Prophet River First Nation agreed to enter into confidential discussions to seek alternatives to litigation related to the Site C Project. West Moberly First Nations withdrew from the discussions in August 2019 and filed an amended Notice of Civil Claim in September 2019. The Government of B.C. and

BC Hydro have since negotiated an agreement with Prophet River First Nation to settle this litigation, which was publicly announced in August 2020. To date, Impact Benefits Agreements with McLeod Lake Indian Band, Doig River, Halfway River First Nation, Prophet River First Nation, and Saulteau First Nations, and Project Agreements with Dene Tha' First Nation and Duncan's First Nation have been publicly announced.

Engagement on Project construction activities has continued through regular Project update meetings with First Nations. The Environment Forum and Culture and Heritage Resource Committee have also continued to meet regularly. The Culture and Heritage Resource Committee has concluded their work on most cultural recognition projects to date, such as signage at the Site C viewpoint describing the culture and history of Treaty 8 communities. The Committee has recently agreed to focus their efforts on the proposed Cultural Centre Development Project and are currently finalizing the terms of reference for that project. The Environment Forum has discussed key topics including Project reclamation planning, and methylmercury monitoring in the future reservoir.

Consultation is ongoing with impacted First Nations regarding options and site-specific plans for identified burial and cultural sites impacted by reservoir inundation, in particular in the Halfway River and Cache Creek Bear Flats areas. A number of non-intrusive field investigations have been undertaken to plan management options for these sites. BC Hydro will take direction from impacted First Nations on the most appropriate management options and any community support needs.

The cultural monitoring program continues with First Nations monitors observing Project construction at Highway 29 locations as well as environmental enhancement and mitigation programs. Due to COVID-19 safety measures, the cultural monitors will not be on the dam site until further notice.

In October 2020, in collaboration with the Project's Cultural and Heritage Resources Committee, BC Hydro launched a new interactive travelling exhibit that tells the story of Indigenous peoples in the Peace Region and displays replicas of artifacts found during the construction of Site C. The travelling exhibit is now set up at Halfway River First Nation and at Tse'Kwa (a property owned by Treaty 8 First Nations) and will resume travel to communities once COVID-19 health orders are lifted.

The exhibit describes past use of the Peace Valley area, tells stories from various communities, and commemorates sites that will be lost to inundation from the future Site C reservoir. It includes important archaeological evidence uncovered from the Site C construction area, which spans from 12,500 years ago until the recent past.

# 8 Litigation

The details of open proceedings as of June 30, 2021 are summarized in Table 13 below.

**Table 13 Litigation Status Summary**

| Description | | Date |
|---|---|---|
| **B.C. Supreme Court: Treaty Infringement Claim** | | |
| West Moberly First Nations | Civil claim filed<br>Injunction application filed<br>Injunction hearing date<br><br>Injunction denied (no appeal filed)<br>Amended civil claim filed<br>Scheduled trial date | January 15, 2018<br>January 31, 2018<br>July 23 to August 3, 2018 and September 4 to 7, 2018<br>October 24, 2018<br>September 25, 2019<br>March 2022 |
| **B.C. Supreme Court: Civil Claims** | | |
| Building and Construction Trades Council | Civil claim filed<br>Response to claim filed<br><br>No steps have been taken in litigation that require a response from BC Hydro. | March 2, 2015<br>April 10, 2015 |
| Michael Acko, etal<br><br>(residents of Old Fort community) | Civil claim filed<br><br>Application for particulars hearing date | January 18, 2021<br><br>June 25, 2021 |
| Allianz Global Risks US Insurance Company, etal | Civil claim filed<br><br>Claim was filed by BC Hydro to preserve BC Hydro's rights to claim under the Site C property insurance policy for losses related to left bank tension crack events. | February 5, 2021 |

| Description | | Date |
|---|---|---|
| **B.C. Supreme Court: Civil Claims – Expropriation Act** | | |
| Joy Eileen Ross | Notices of claim filed to keep open plaintiffs' rights to claim further compensation under the *Expropriation Act*.<br><br>Further appraisal and other reports are required prior to commencing settlement negotiations in all but one claim, where an agreement has been reached.<br><br>No requirement for BC Hydro to file responses at this time. | July 22, 2019 |
| Chipmunk Holding Ltd., *et al* | | July 22, 2019 |
| Samuel James Mahood and Judy Edith Mahood | | July 22, 2019 |
| Gordon Roy Kelly and Heather Marie Kelly | | May 13, 2020 |
| Derrek Gerald Dean Beam | | September 22, 2020 |
| Kenneth Victor Boon and Arlene Lois Boon (aka Arleen Lois Boon) | | January 15, 2021 |
| Lois Caroline Bentley | | January 15, 2021 |
| Dale Alvin London and Clara Anne London | | January 15, 2021 |
| Carla Jane Salmond | | January 15, 2021 |
| Lloyd Stewart Bentley, *et al* | | January 15, 2021 |
| Hudson's Hope Historical Society | | March 18, 2021 |
| Hudson's Hope Holdings Ltd., Robert Edward Bach and Beverly Jean Bach | | March 26, 2021 |
| Lloyd Stewart Bentley and Katheryn Lynn Bentley | | April 23, 2021 |
| Butler Ridge Energy Services (2011) Ltd. | | April 23, 2021 |

# 9 Permits and Government Agency Approvals

## 9.1 Background

Before the Site C Project could start construction, an extensive environmental assessment process was undertaken which resulted in the issuance of the Provincial Environmental Assessment Certificate and the Federal Decision Statement in support of the Project. In addition, the Project is required to apply for multiple provincial permits, water licences, leaves to commence construction and federal authorizations. Timing of the application for these permits and authorizations is staged and aligned with the construction schedule, availability of detailed design information, and by Project component. Permitting approaches and requirements are also determined through regular meetings with regulatory agencies and are subject to change throughout the Project. As at June 30, 2021, BC Hydro estimates that approximately 600 permits will be required throughout the life of the Project. Of these permits, 493 have been received and are actively being managed.

Multiple conditions are attached to each permit or authorization, which cover subjects such as air quality, water quality, fish and aquatics, wildlife, heritage, health and safety, construction environmental management and First Nations consultation. As of June 30, 2021, all required conditions and submissions have been met in accordance with the schedule and requirements of the conditions.

## 9.2 Federal Authorizations

Federal authorizations are required under the *Fisheries Act* (Fisheries and Oceans Canada) and the *Navigation Protection Act* (Transport Canada). All major federal authorizations for construction and operation of the Site C dam and reservoir were received in July 2016. As of June 30, 2021, one additional *Fisheries Act* authorization is anticipated for the temporary placement of fill material immediately downstream of the downstream cofferdam. Additional *Canadian Navigable Waters Act* (formerly *Navigation Protection Act)* approvals for discrete works in the reservoir

(e.g., shoreline works, debris booms and Highway 29 bridges) are anticipated to be issued at the regional level. As of June 30, 2021, a total of 99 federal approvals have been received and are actively being managed. Twenty-four future approvals are planned.

## 9.3 Provincial Permits

Site C requires provincial permits primarily under the *Land Act, Water Sustainability Act, Forest Act, Wildlife Act, Heritage Conservation Act,* and *Mines Act*. These permits include investigative permits, licences to occupy land, water licence approvals, leaves to commence construction and leaves to construct, and licences to cut vegetation, among others.

Approximately 470 provincial permits and approvals will be required throughout the life of the Project. As of June 30, 2021, 394 permits have been obtained and are actively being managed. These include permits for the dam site, worker accommodation, Highway 29 realignment, transmission line and eastern, middle, and western reservoir clearing. Future provincial permits are being planned for the remainder of the generating station construction, reservoir filling and operations, as well as decommissioning of the existing Highway 29.

On June 29, 2021, the BC Supreme Court released its decision in *Yahey v British Columbia, 2021* BCSC 1287, determining that the cumulative impacts from a range of provincially authorized industrial activities (e.g. oil and gas, forestry and hydroelectric infrastructure) within Blueberry River First Nations traditional territory constituted an infringement of Blueberry River First Nations Treaty 8 rights. BC Hydro was not a party to that court case.

The effect of the Blueberry River Decision on the timely receipt of permit decisions required from the Provincial government for the Project is uncertain. The permits needed for completion of the Project relate to the manner and timing of construction already approved through the environmental assessment and should not fall within

the scope of the Blueberry River Decision. These permits should not be adversely affected by the Blueberry River Decision. However, the response of the regulatory agencies remains uncertain and they may change their approval practices, resulting in delays to permit decisions. There is a possibility that the decisions for requested amendments to the Project's environmental assessment certificate are also delayed.

## 9.4 Environmental Assessment Certificate

Compliance with the Project conditions in the Environmental Assessment Certificate is regularly monitored, and evidence is collected by various federal and provincial regulatory agencies, the Independent Environmental Monitor, BC Hydro and contractors.

On March 16, 2021, BC Hydro submitted a draft Environmental Assessment Certificate amendment request to the Environmental Assessment Office regarding the use of haul trucks on a contingency basis to transport till material from 85th Avenue Industrial Lands to the dam site area. Prior to submitting the final submission in June 2021, BC Hydro engaged with local governments, First Nations and local residents on the proposed activity and responded to concerns. A decision is expected in the fall of 2021. Hauling will comply with all requirements for the use of public roadways.

On June 14, 2021, BC Hydro submitted a request to amend Condition 40 of the Environmental Assessment Certificate, proposing that BC Hydro amend one of three required boat launch locations required by the Certificate from Cache Creek to a location close to Halfway River. A decision is expected in late fall/winter 2021.

All amendments and amendment requests are posted on the Environmental Assessment Office website.

As with any large construction project, refinements to the design are expected. There are no material impacts to the cost of the Project as a result of the proposed amendment requests.

## 9.5 Permitting Improvement

To efficiently and effectively manage the large volume of permits required for the Project, BC Hydro continues to engage with regulators, Indigenous groups, and contractors to share information, seek feedback, and identify process improvements. Process improvements implemented include the following:

- BC Hydro continues to facilitate meetings with the Ministry of Forests, Lands, Natural Resource Operations and Rural Development, the Comptroller of Water Rights, the Department of Fisheries and Oceans and contractors to ensure permit applications are coordinated, timely and sufficient;
- BC Hydro has implemented a coordinated Indigenous groups consultation process with the Ministry of Forest, Lands, Natural Resource Operations and Rural Development to assist with the government permit workload; and
- Regular permitting forums are being held with Indigenous groups to share information on upcoming permit applications and to seek feedback before applications are submitted to regulators. Given progress on provincial permit applications, smaller bundles of permits may also be reviewed with Indigenous groups at Environmental Forums. Permits were discussed at two environmental forums held during this quarter, April 14, 2021 and May 11, 2021.

# 10 Environment

## 10.1 Mitigation, Monitoring and Management Plans

The Environmental Assessment Certificate and Federal Decision Statement conditions require the development of environmental management, mitigation and monitoring plans, as well as the submission of annual reports on some of these plans.

Focus remains on minimizing sediment and erosion across the dam site, care of water, hydrocarbon management and invasive weed control. Given the size of the Project and the length of construction, wildlife is becoming less wary of the site. As such, wildlife attractant management continues to be a focus.

On the left bank, all care-of-water systems performed well during the spring melt, re-vegetation is established in many areas of the site, and operation of the temporary fish passage facility is being refined with periodic augmentation by a contingency “trap and haul” program.

On the right bank, the water treatment plant and holding ponds to treat potentially acid generating rock contact water were fully operational throughout the reporting period.

Throughout the spring, focus was on wildlife sweeps for nesting birds, fish salvage due to fluctuations in water levels, and wildlife awareness to avoid conflicts.

Field monitoring continues in the Hudson’s Hope area related to works within the berm and along the truck haul route, as needed. Point monitoring at the roadways and along the berm did not identify air quality or noise exceedances coming from the Site C works. Environmental staff continue to monitor the area and work with inspectors from the Environmental Assessment Office.

Care-of-water systems within the till conveyor performed well over the reporting period.

## 10.2 Environmental Compliance Inspections and Enforcement

During the reporting period, the Project was inspected by the Independent Environmental Monitor who performed more than 350 hours of inspections.

Throughout the course of the onsite inspections, environmental compliance was focused on the following areas:

- Invasive plants management and procedures. BC Hydro has updated signage/awareness regarding noxious weeds management and potential spread. Signage updates include, but are not limited to, restrictions, control measures, and increased visibility and sediment fencing management around the wetland complex at the 72/2 tower site on the transmission line. BC Hydro has installed fencing near the wetland area to effectively protect the area from runoff. This also includes periodic monitoring to ensure the fence is functioning as intended.
- Ensuring all construction areas are clean of anthropogenic food sources, with garbage stored in verified bear-proof containers. BC Hydro's contractors have continued to make improvements to the management of anthropogenic food waste across the Project. Such improvements include installation of appropriate animal-proof waste containers, increased frequency of toolbox talks to address wildlife attractant issues, and the creation of a waste management team.
- Equipment spill/leak monitoring. BC Hydro continues to promptly identify the presence of leaks and spills on equipment and report the findings in daily logs. Further actions to address issues include continuing to utilize spill pads and drip trays, and monitoring of equipment with appropriate storage and disposal.

BC Hydro completed 8,657 environmental compliance inspections in the reporting period, with a compliant or partial compliant result of 99 per cent across all contractors and works areas.

Site C Project staff continue to meet with provincial regulators to ensure ongoing focus and attention to the areas of most importance and concern for the regulators, and to proactively address any environmental or regulatory issues that may arise.

Additionally, the Project has engaged both an Independent Environmental Monitor and an Independent Engineer that report directly to provincial regulators. The Independent Environmental Monitor provides weekly reports that have also demonstrated substantial compliance across the Project while continuing to identify areas of focus for sediment and erosion control, water management and spill prevention. The Independent Engineer works directly with site staff to proactively identify design issues that may impact the environment and develop mitigation plans to avoid or minimize impacts.

## 10.3 Heritage

In accordance with Environmental Assessment Certificate and Federal Decision Statement conditions, the Site C Heritage Resources Management Plan addresses the measures that will be used to mitigate the adverse effects of the Project on heritage resources.

In the period April 1 to June 30, 2021, the heritage program focused on planning and conducting field work that met regulatory requirements for pre-construction archaeological impact assessments at selected locations, as well as providing Project construction support. The field season was initiated in June 2021 with approximately 10 archaeologists and Indigenous community representatives.

During the reporting period, no archaeological reports were scheduled to be submitted to the B.C. Archaeology Branch and Indigenous groups in accordance with *Heritage Conservation Act* permit terms and conditions. One *Heritage Conservation Act* permit amendment was requested during this reporting period.

Heritage reviews of contract documents, contractor environmental plans and construction readiness plans, as well as construction-related field inspections at archaeological sites were performed to ensure compliance. Two reported heritage chance finds were determined to have palaeontological significance and will be further analyzed and documented.

### 10.4 Agricultural Mitigation and Compensation Plan Framework

As part of the Site C Agricultural Mitigation and Compensation Plan, BC Hydro has established a $20 million BC Hydro Peace Agricultural Compensation Fund to support agricultural production and related economic activity in the Peace Region. The fund is governed by a regional decision-making board made up of representatives from five regional agricultural organizations, the Peace River Regional District, three agricultural producer members-at-large and one Peace River Valley agricultural producer. Northern Development Initiative Trust is the fund administrator and manages the investment of the funds.

As of June 30, 2021, $771,319 in funding has been approved for 33 projects. A grant intake is planned for early fall 2021.

## 11 Employment and Training Initiatives and Building Capacity Initiatives

### 11.1 Labour

To date, unions that have participated in the construction of Site C are listed in Table 14 below.

**Table 14 Participating Unions**

| Union |
|---|
| Construction Maintenance and Allied Workers (CMAW) |
| Christian Labour Association of Canada (CLAC), local 68 |
| Canada West Construction Union (CWU) |
| Construction and Specialized workers Union (CSWU), local 1611 |
| International Union of Operating Engineers (IUOE), local 115 |
| Millwrights Union local 2736 |
| Ironworkers, local 97 |
| International Brotherhood of Electrical Workers (IBEW) |
| MoveUP, local 378 |
| Pile Drivers 2402 |
| Boilermakers, lodge 359 |
| United Association of Journeymen & Apprentices of the Plumbing & Pipefitting Industry of the U.S. & Canada, local 170 |
| Teamsters, local 213 |

In addition, unions affiliated with the BC Building Trades will be working on the installation of the turbines and generators.

The labour approach for the Site C balance of plant contracts will be for the contractors to retain the Construction Labour Relations Association to enter into an agreement, with the Bargaining Council of B.C. Building Trades Unions or another consortium of Building Trades Unions that covers an agreed set of labour requirements.

## 11.2 Labour Update on Scaled Back Activities at Dam Site due to COVID-19 Pandemic

BC Hydro continues to provide updates to key project unions on site regarding information that is being shared with workers. The latest number of people in camp in isolation, and the status of COVID-19 testing results are available on the Site C website.

In early January 2021, the Provincial Health Officer updated the *Industrial Projects Restart Order* to include the requirement for camp workers to remain in camp during their shift rotation. During the reporting period, BC Hydro and Site C contractors continued working to implement this order. Exemptions are granted for work-related reasons, medical emergencies and critical appointments.

## 11.3 Employment

Contractors submit monthly workforce data electronically to BC Hydro. Table 15 presents the monthly number of construction contractors, non-construction contractors, engineers, and Project team workers for this period. As with any construction project, the number of workers – and the proportion from any particular location – will vary month-to-month and also reflects the seasonal nature of construction work.

**Table 15 Site C Jobs Snapshot Reporting Period – April 2021 to June 2021**

| Month | Number of B.C. Primary Residents[13] | Total Number of Workers[14] |
|---|---|---|
| April 2021 | 3,269 | 4,589 |
| May 2021 | 3,425 | 4,868 |
| June 2021 | 3,573 | 5,046 |

In June 2021, there were 5,046 total workers on the Site C project. Seventy-one per cent (3,573 workers) of the workforce was made up of residents of British Columbia, while 24 per cent (1,038 workers) of the workforce lived in the Peace River Regional District. The onsite contractor workforce number also includes

[13] Employment numbers provided by Site C contractors and consultants are subject to revision. Data not received by the Project deadline may not be included in the above numbers. Employment numbers are direct only and do not capture indirect or induced employment.

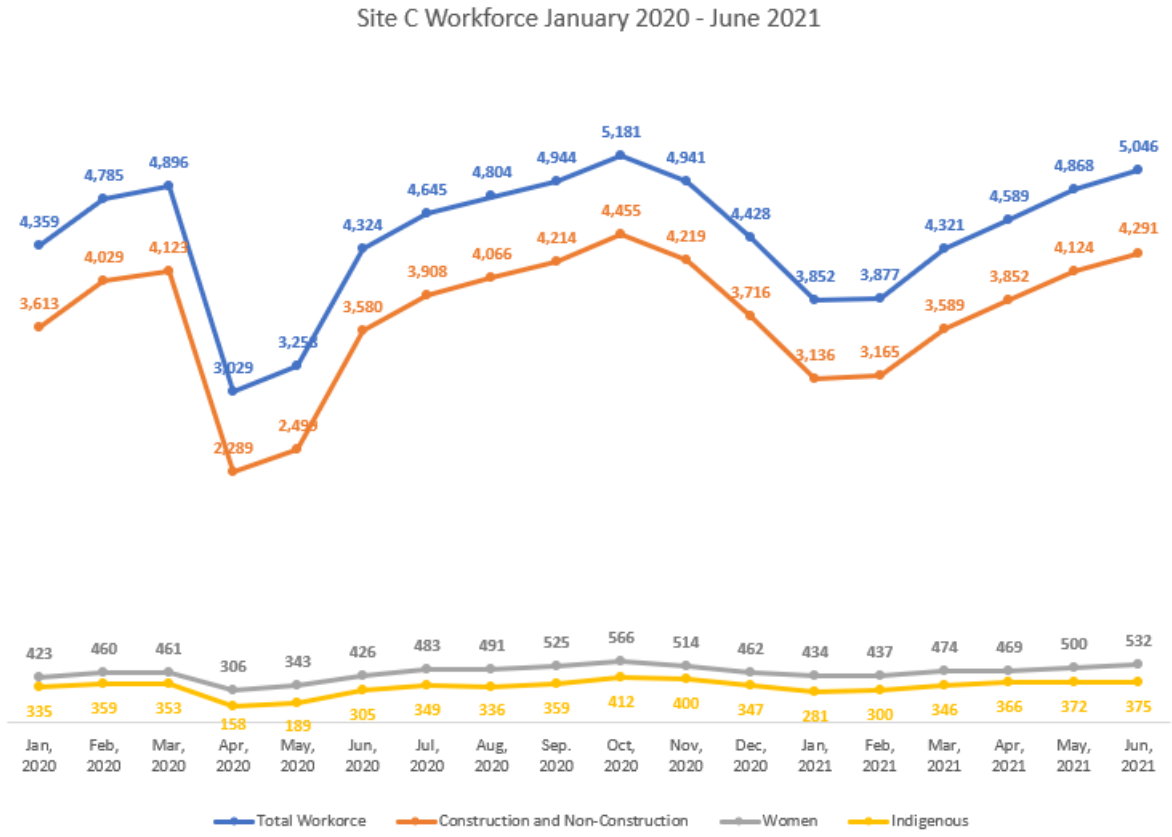
[14] Total workers include:

- Construction and non-construction contractors performing work on Site C dam site, transmission corridor, reservoir clearing area, public roadwork, worker accommodation and services.
- Engineers and Project team that is comprised of both onsite and offsite workers.
- The Project team, which includes, BC Hydro construction management and other offsite Site C Project staff. An estimate is provided where possible if primary residence is not given.

12 per cent women (532 workers) and 176 workers who are working for various contractors as apprentice carpenters, electricians, millwrights, ironworkers, mechanics, boilermakers and heavy equipment operators.

Figure 2 below shows the monthly Site C workforce over the period from June 2020 to June 2021. The *Industrial Projects Restart Order*, which limited workers returning to site in January and February 2021, continued to impact the construction and non-construction workforce during the reporting period.

**Figure** 2 **Site C Workforce June 2020 to June 2021**




Note: The Indigenous and women numbers are a subset of the construction and non-construction contractors workforce number.

## 11.4 Training and Capacity Building Initiatives

In September 2017, the Contractors Labour Committee agreed to establish an Indigenous labour sub-committee. The purpose of the sub-committee is to support Indigenous training, labour and employment on Site C through communication, consultation, coordination and cooperation among contractors on the Project.

The committee meets quarterly, or on an as-needed basis. All major Site C construction contractors currently attend this meeting.

BC Hydro has included apprentice targets in the generating station and spillways civil works contract, the transmission lines and the substation contracts, the balance of plant contracts and the Highway 29 work to be procured by BC Hydro, as appropriate.

In August 2013, Northern Lights College Foundation started distributing the BC Hydro Trades and Skilled Training Bursary Awards. As of June 2021, a total of 283 students had received bursaries, including 131 Indigenous students who have benefitted from the bursary in programs such as electrical, welding, millwright, cooking, social work, and many others. BC Hydro has worked with the Northern Lights College Foundation to extend the bursary timeline and reserve a portion of bursary amounts for trades programs directly needed for Project work. Part of this agreement was to set aside funds for the BC Hydro and Northern Lights College pre-carpentry skills pilot program for Site C as well as other joint pre-skills programs. In March 2021, BC Hydro provided funds to the Northern Lights College Foundation to continue the bursary for an additional year.

BC Hydro continues to work with local employment agencies to ensure that as job opportunities become available, they are posted on the WorkBC website as well as on the Fort St. John Employment Connections website.

On June 15, 2021, the B.C. Construction Association announced that BC Hydro and seven Site C contractors had become the first multi-contractor project to sign the

Builders Code, setting a new industry standard with a project-wide commitment to eradicate hazing, bullying and harassment. Signing this pledge jointly demonstrates the Project's commitment and belief that everyone has a right to be safe and protected at the worksite. This initiative between BC Hydro and Site C contractors demonstrates that inclusion, diversity and respectful workplace behavior is jointly valued on the Project. The Builders Code continues to be implemented on site.

Site C contractors have noted that certain trades will continue to be in high demand during peak Project construction periods. As such, in early 2020, major onsite contractors started exploring opportunities for apprentice and other training to take place onsite. Further in 2020, BC Hydro worked with Northern Lights College and Site C contractors to develop three onsite pilot programs. The programs included a new program with Northern Lights College designed for local Indigenous candidates interested in becoming heavy equipment operators on the Site C Project, a re-launch of the Pre-Carpentry Skills Program with Northern Lights College, and a Fish Monitoring Program.

Both the pre-heavy equipment operator skills program and pre-carpentry skills programs were postponed due to COVID-19. BC Hydro continues to monitor the situation for an appropriate time to proceed with these programs as well as looking at restructured options for smaller groups and online options.

The BC Hydro and Northern Lights College Fish Monitoring Program was restructured with additional COVID-19 safety plans and successfully delivered offsite in August 2020. Eight participants completed the program. This program included workforce training certifications in preparation for employment opportunities on the Project. As contractors performing environmental monitoring have not scaled back activities due to COVID-19,  this program was held again in June 2021. The program contained additional wildlife training and was renamed the environmental training program. This program included eight participants from Treaty 8 Nations who

participated in an online and in-person training program from June 14 to 26, 2021. All of the candidates successfully completed the entire program.

# 12 Community Engagement and Communication

## 12.1 Local Government Liaison

There are a number of Environmental Assessment Certificate conditions that are relevant to local communities in the vicinity of the Project. BC Hydro is implementing some of these conditions through community agreements offered to five local governments. Through these agreements and discussions, BC Hydro has, in some instances, agreed to additional measures to address concerns about local community impacts from construction and operation of the Project. BC Hydro provided update emails at a frequency agreed upon with the Regional Community Liaison Committee regarding actions taken to respond to the pandemic and, in 2020, launched a Site C COVID-19 website for public information. Bi-weekly calls continued through the reporting period with the Regional Community Liaison Committee to continue to engage with local governments and Indigenous groups in partnership with Northern Health and Emergency Management B.C.

BC Hydro has concluded four community agreements with respect to the Project: The District of Taylor (2013), the District of Chetwynd (2013), the City of Fort St. John (2016) and the District of Hudson’s Hope (2017). BC Hydro and the City of Fort St. John established a Community Agreement Monitoring Committee to jointly oversee implementation of the community agreement.

BC Hydro and the Peace River Regional District are continuing discussions on mitigation measures and regulatory requirements for the Charlie Lake wastewater outfall. BC Hydro provided a comprehensive response to the Peace River Regional District on April 9, 2021, addressing all the issues raised by the Peace River Regional District in 2020 and early 2021. There is a significant gap between the payments proposed by the Peace River Regional District and what BC Hydro has

offered based on an analysis of direct specific impacts due to Site C and the existing environmental assessment certificate conditions.

The Regional Community Liaison Committee, which is comprised of local elected officials and local First Nations communities, most recently met virtually on June 9, 2021. Eight local governments and four local First Nations communities (McLeod Lake Indian Band, Doig River, Saulteau First Nations and Blueberry River First Nations) as well as the two MLAs for Peace River North and Peace River South, are invited to participate as committee members. Representatives from the Project's major contractors may also attend the meetings as invited guests.

As part of the Site C Project, BC Hydro is working with communities to provide lasting benefits for residents of the Peace Region. In 2016, BC Hydro launched the Generate Opportunities (GO) Fund, an $800,000 fund to support Peace Region non-profit organizations. The GO Fund is being distributed over an eight-year period to organizations that provide services to vulnerable populations including children, families and seniors.

The GO Fund is administered by Northern Development Initiative Trust on behalf of BC Hydro. During this reporting period, BC Hydro distributed $36,075 to four non-profit organization in the Peace Region and as of June 30, 2021, nearly $540,066 had been distributed to 61 projects since the fund was launched in 2016.

## 12.2 Business Liaison and Outreach

BC Hydro continued to implement its Site C Business Participation Plan, which supports local and regional business participation in the Project. The Project team sent out three procurement notifications to the Site C business directory in the second quarter of the year.

### 12.2.1 Community Relations and Construction Communications

Throughout the reporting period, BC Hydro continued to implement its construction communications program. The program includes updating and maintaining the Project website (www.sitecproject.com) with current information, and photos and videos of construction activities, as well as providing information to local and regional stakeholders as required.

Due to COVID-19 restrictions, the Site C community relations team has not hosted any external site tours since before the beginning of the pandemic.

#### Construction Bulletins

Bi-weekly construction bulletins continued to be issued throughout the reporting period. These bulletins are posted on the Project website and sent by email to the web-subscriber list. There were seven construction bulletins and one quarterly construction notification letter issued in the second quarter of 2021.

#### Public Enquiries

In total, BC Hydro received 243 public enquiries between April 1 and June 30, 2021. The majority of these enquiries continued to be about business and job opportunities, with limited construction impact concerns from local residents. Table 16 shows the breakdown of some of the most common enquiry types.

In total, BC Hydro has received more than 12,950 enquiries since August 2015.

**Table 16 Public Enquiries Breakdown**

| Enquiry Type[15] | April 1 to June 30, 2021 |
|---|---|
| Job Opportunities | 77 |
| Business Opportunities | 30 |
| General Information | 60 |
| Construction Impacts[16] | 30 |
| Other[17] | 46 |
| **Total** | **243** |

### 12.2.2 Communications Activities

Based on a search using the media database Infomart, there were 198 stories about the Site C Project in B.C. news media between April 1 and June 30, 2021.

## 12.3 Labour and Training Plan

In accordance with an Environmental Assessment Certificate condition, a Labour and Training Plan was developed and submitted to the Environmental Assessment Office on June 5, 2015. This plan, as well as Environmental Assessment Certificate Condition 45, includes reporting requirements to support educational institutions in planning their training programs to support potential workers in obtaining Project jobs in the future. This report was issued to the appropriate training institutions in the northeast region of B.C. in July 2016, July 2017, July 2018, July 2019, September 2020 and July 2021. The next report will be issued in July 2022.

## 12.4 Human Health

### 12.4.1 Health Care Services Plan and Emergency Service Plan

The Project health clinic is contracted by BC Hydro with Halfway River International SOS Medical Ltd., a partnership between Halfway River First Nation and

[15] This table is a sample of enquiry types and does not include all enquiry types received.
[16] The nature of the construction impact inquiries is primarily air quality, noise and traffic conditions.
[17] "Other" accounts for enquiries related to a variety of other topics, such recreation access near construction sites, property owner correspondence, or requests for site tours.

International SOS. The clinic continues to operate in its permanent location within the Two Rivers Lodge and based on camp occupancy was staffed 24/7 during this period with a nurse practitioner and advanced care paramedics. BC Hydro and the clinic operator continue to liaise with the local health care community.

The clinic provides workers with access to primary and preventative health care and work-related injury evaluation and treatment services and is currently open seven days a week, 24 hours a day. Since opening the health clinic, there have been a total of 27,708 patient interactions. During the second quarter of 2021, there were 4,167 patient interactions, of which 269 were occupational and 3,898 non-occupational. Several preventive health themes were promoted to workers including social distancing, mask use and hygiene, workplace transmission, along with COVID-19 vaccines and heat related illness and injuries.

## 12.5 Property Acquisitions

In summer of 2021, with all land rights required for the highway acquired, BC Hydro is now focussing on land acquisitions to enable reservoir clearing and inundation.

## 12.6 Plans During Next Six Months

Based on the new schedule and in-service date of 2025, Table 17 below shows the key milestones for activities planned during the next six months, July 2021 to December 2021.

**Table 17 Key Milestones for Activities Planned During the Next Six Months (July 2021 to December 2021)**

| Milestone | Performance Measurement Baseline (June 2021) | Plan Date (Control Date[18]) | Forecast[19] | Status[20] (Measured by Month) |
|---|---|---|---|---|
| **Generating Station and Spillways** | | | | |
| Unit 5 – Unit bay superstructure complete and powerhouse bridge crane ready | June 2021 | June 2021 | July 2021 | Late |
| Unit 6 – Unit bay superstructure complete and powerhouse bridge crane ready | August 2021 | August 2021 | August 2021 | On Track |
| Gate Guides, Gates, and Wire Rope Hoists for SPOG,SPSL Supplied | October 2021 | October 2021 | October 2021 | On Track |
| INOG and INMG (incl Lifting Beam, HPU, and Hoist) Supplied | November 2021 | November 2021 | November 2021 | On Track |
| **Balance of Plant** | | | | |
| Contract Award – Balance of Plant Mechanical | July 2021 | July 2021 | July 2021 | On Track |
| Contract Award – Balance of Plant Electrical | September 2021 | September 2021 | September 2021 | On Track |
| Contract Award – Balance of Plant Architectural | December 2021 | December 2021 | December-2021 | On Track |
| **Main Civil Works** | | | | |
| Roller-compacted concrete buttress complete | September 2021 | September 2021 | October 2021 | At Risk |
| Left Bank Excavation Works Complete | December 2021 | December 2021 | December 2021 | On Track |

18 Control date reflects plan, adjusted for approved changes to milestone dates.
19 As at June 30, 2021.
20 As at June 30, 2021.

| Milestone | Performance Measurement Baseline (June 2021) | Plan Date (Control Date[18]) | Forecast[19] | Status[20] (Measured by Month) |
|---|---|---|---|---|
| **Turbines and Generators** | | | | |
| Unit 1 – Stay ring and spiral case assembled and handover of generator embedded parts | June 2021 | June 2021 | July 2021 | At Risk |
| Unit 2 – Stay ring and spiral case assembled and handover of generator embedded parts | September 2021 | September 2021 | October 2021 | At Risk |
| Unit 3 – Stay ring and spiral case assembled and handover of generator embedded parts | November 2021 | November 2021 | November 2021 | On Track |
| **Right Bank Foundation Enhancements** | | | | |
| Commence pile installation at the spillway | August 2021 | August 2021 | August 2021 | On Track |

# 13 Impacts on Other BC Hydro Operations

During the reporting period, the operation of system storage at Williston Reservoir (including GM Shrum and Peace Canyon powerplants) was planned to meet flow releases necessary for Site C construction, and this operation continues. Water releases from Peace Canyon Generating Station were maintained at or below the levels necessary for Project construction. BC Hydro maintained adequate vacant storage in Williston Reservoir to protect Site C construction works from flows that could otherwise exceed the capacity of the diversion works.

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# Site C Clean Energy Project

# Quarterly Progress Report No. 22

## Appendix A

## Site Photographs

**Figure A-1** **Crews use a crane to lift formwork for placement at the spillway headworks (April 2021)**

**Figure A-2** **The spillways, headworks and stilling basins (April 2021)**

**Figure A-3** **Transmission towers for two new transmission lines stand side-by-side above the completed Site C substation (April 2021)**

**Figure A-4** **Causeway construction on the Highway 29 realignment at Lynx Creek (April 2021)**

**Figure A-5** **Crews place roller-compacted concrete on the dam and core buttress (May 2021)**

**Figure A-6** **Halfway River bridge showing cast-in-place bridge deck construction. The new bridge is over one kilometre long (May 2021)**

**Figure A-7 Powerhouse component installation is underway for Units 1, 2, and 3 (May 2021)**

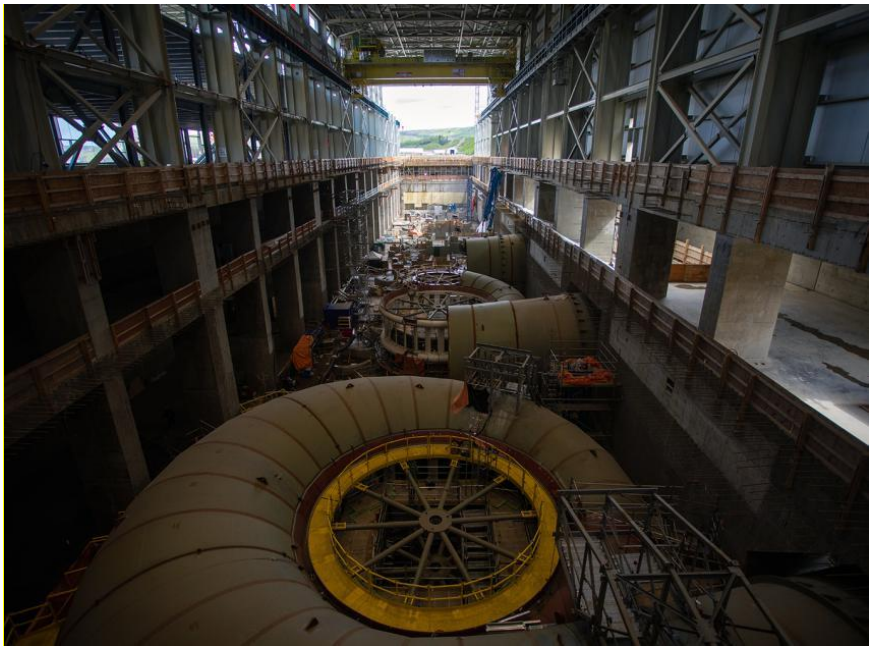

**Figure A-8 An aerial view of the installation underway on the Unit 5 intake transition penstock section (May 2021)**

**Figure A-9** **Highway 29 construction at Farrell Creek east. Current activities at Farrell Creek include construction of a 411-metre-long bridge and 1.9 kilometres of highway realignment (June 2021)**

**Figure A-10** **Workers inspect the roller-compacted concrete at the dam and core buttress after the formwork is removed (June 2021)**

**Figure A-11 The dam core trench showing the downstream shell of the dam (June 2021)**

**Figure A-12 An upstream view of the approach channel at top left and the powerhouse, generating station, and spillways at centre (June 2021)**

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# Site C Clean Energy Project

# Quarterly Progress Report No. 22

# Appendix B

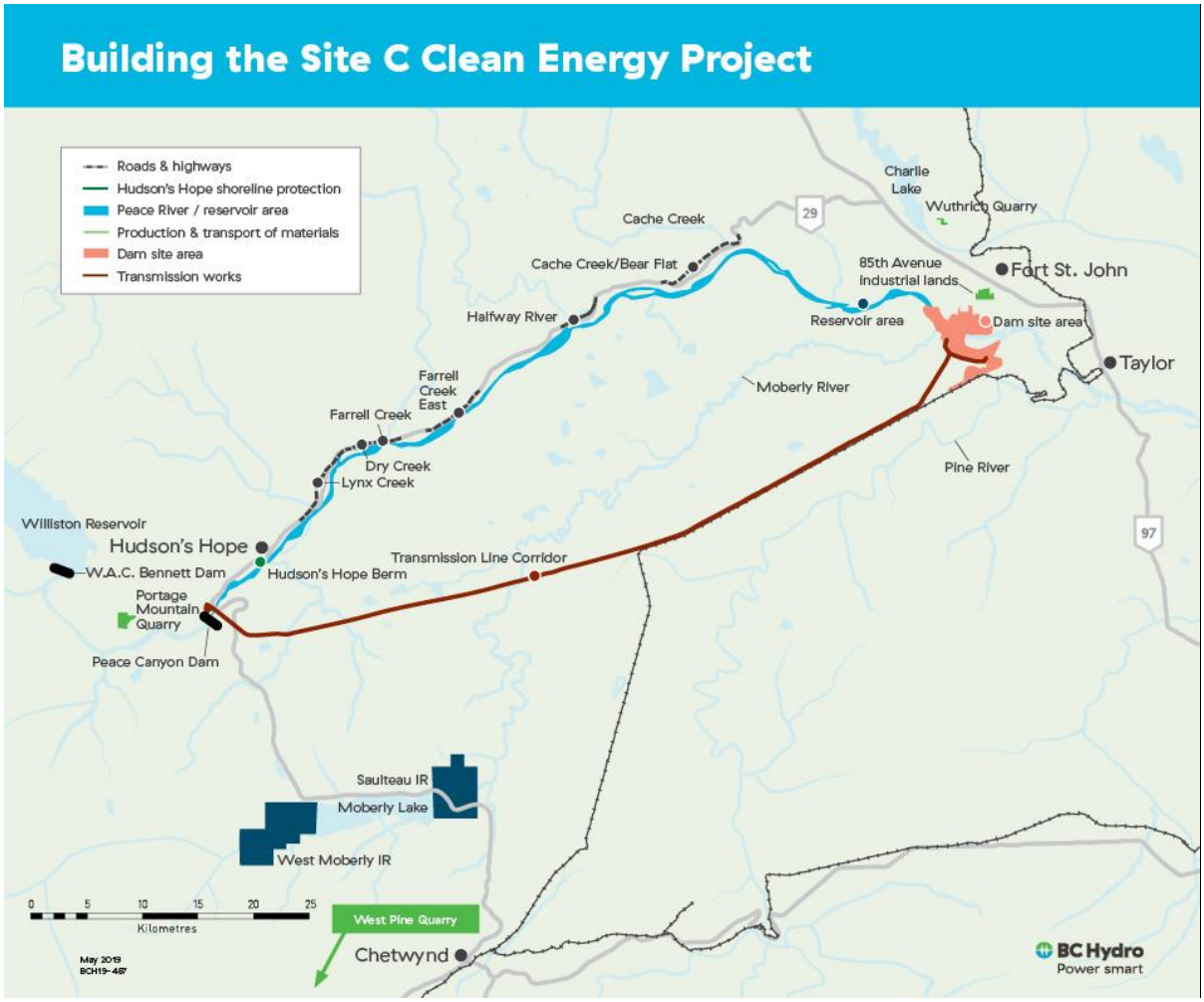
# Work Completed Since Project Commencement in 2015

Construction began on July 27, 2015 and is ongoing. Since the commencement of construction, the following work has been completed:

- Site preparation, including onsite access roads;
- Clearing of the left and right banks at the dam site and clearing of the lower reservoir area;
- Construction of the worker accommodation lodge and Peace River construction bridge;
- Powerhouse excavation, and placement of 414,000 cubic metres of roller-compacted concrete in the powerhouse buttress;
- Spillways excavation, and the placement of 586,000 cubic metres of roller-compacted concrete in the spillways buttress;
- Construction of dam site access public roads;
- Construction of the Site C viewpoint;
- The completion of 50 affordable housing units in Fort St. John.
- Fish habitat enhancements downstream of the dam site;
- Excavation of the diversion tunnel inlet (upstream) and outlet (downstream) portals, allowing for the commencement of diversion tunnel excavations;
- Excavation of the right bank drainage tunnel, which will be used to monitor and drain the water from within the foundation under the powerhouse, spillways and dam buttresses and will eventually be connected to services within the powerhouse;
- Clearing activities in the lower reservoir;

- Completion of two river diversion tunnels, which are used to reroute a short section of the Peace River to allow for the construction of the main earthfill dam;
- Completion of the upstream and downstream cofferdams;
- Construction and commissioning of the temporary fish passage facility;
- Diversion of the Peace River around the Site C construction site;
- Completion of the Peace Canyon 500 kV gas-insulated switchgear expansion to enable connection of Site C to the BC Hydro electrical system; and
- The completion of the Site C substation and first of two new 500 kV transmission lines.

**Figure B-1 Site C Project Components**



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# Site C Clean Energy Project

# Quarterly Progress Report No. 22

# Appendix C

# Safety and Security

## Safety Incidents

The following safety incidents occurred during the quarter from April 1, 2021, to June 30, 2021:

### Serious Safety Incidents

The five serious incidents that occurred during this reporting period include:

1. A worker was observed not being tied off to an approved anchor point and failed to follow the fall protection plan while working on top of the bulkhead;
2. A worker was observed not being tied off to an approved anchor point and failed to follow the fall protection plan while walking on top of a three-metre-high bulkhead;
3. A worker was standing on unsecured rebar approximately 1.2 metres above ground level when the rebar began to fall forward forcing the worker to jump down. The worker suffered a lower leg injury when they hit the ground requiring surgery. The worker subsequently returned to work and is expected to make a full recovery;
4. A worker was helping to load a conveyor onto the lowbed trailer, which slipped and pinned the worker between the lowbed trailer and conveyor. The worker is expected to make a full recovery; and
5. A zoom boom operator drove off the edge of Septimius Siding Road causing the zoom boom to rollover into a ditch. The operator sustained minor lacerations.

### All Injury Incidents

The 16 injury incidents that occurred during this reporting period include two lost-time injuries and 14 medical attention requiring treatment injuries. Note that

serious incidents resulting in an injury will be listed in both the list of serious incidents and the list of All Injury Incidents.

Lost time injuries:

1. A worker was standing on unsecured rebar approximately 1.2 metres above ground level when the rebar began to fall forward forcing the worker to jump down. The worker suffered a lower leg injury when they hit the ground requiring surgery. The worker subsequently returned to work and is expected to make a full recovery; and
2. A worker was helping to load a conveyor onto the lowbed trailer, which slipped and pinned the worker between the lowbed trailer and conveyor. The worker is expected to make a full recovery.

Medical attention requiring treatment injuries:

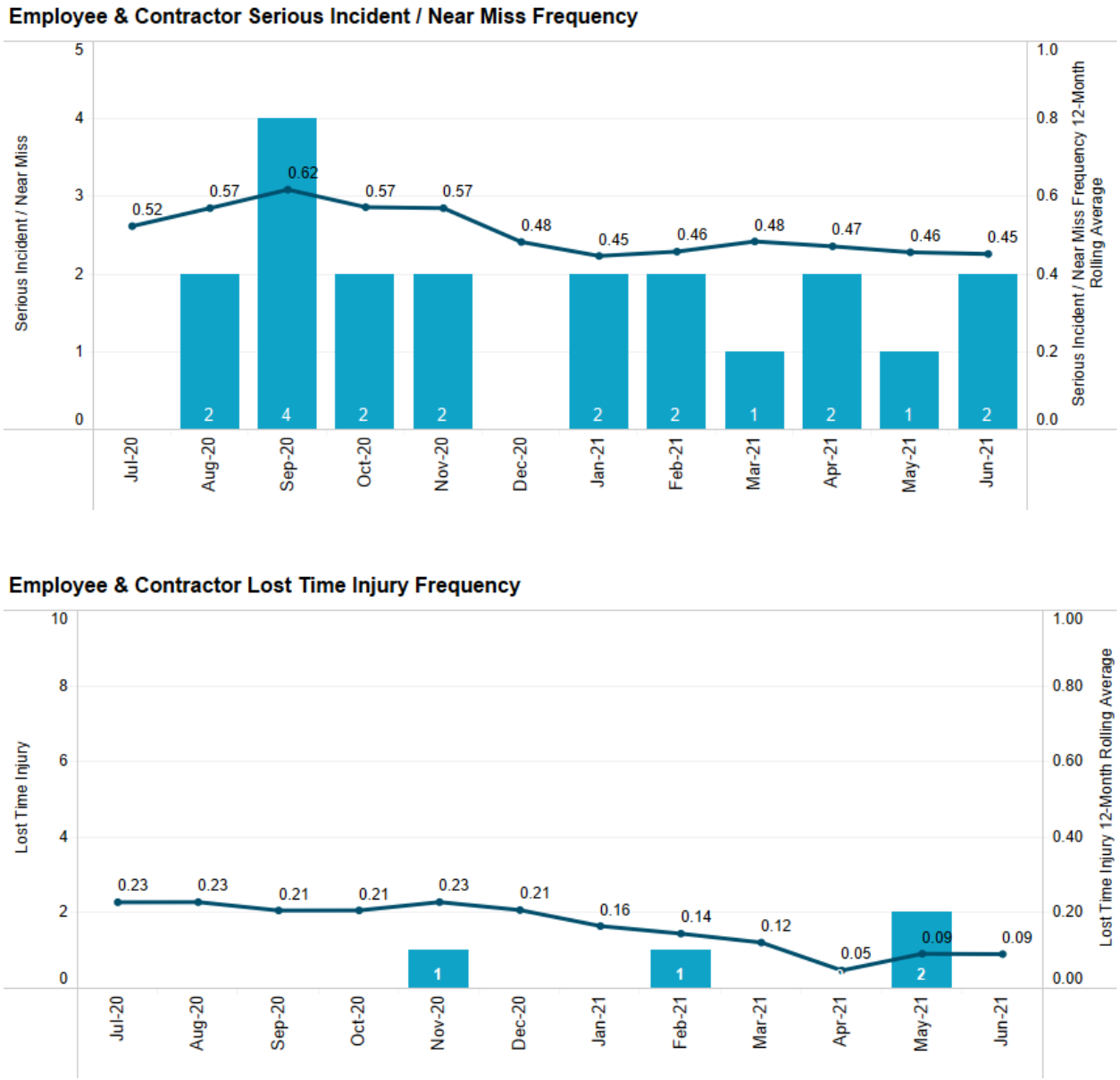
1. A worker walking along the roller-compacted concrete steps and brushed against a sharp wire. The worker suffered a laceration to their shin;
2. Two metal foreign objects were removed from a worker’s eye by a medical practitioner;
3. A worker slipped while descending from a ladder where a protruding nail. The worker suffered a laceration to their upper leg;
4. A worker was cutting coil rod with a band saw when the material fell forward after the cut and the deenergized band saw made contact with their finger. The worker suffered a laceration;
5. A worker lost their footing on an uneven surface. The worker sprained their ankle;
6. A worker was working underneath a formwork deck installing bolts with an impact drill when a foreign body entered their eye;

7. A pressure washer contacted a worker's boot which caused a small puncture. The worker suffered a wound to their leg;
8. A worker was pinched between a formwork component and a drill. The worker suffered a fracture to their finger;
9. A worker lost their footing on rebar then fell. The worker suffered a laceration to their arm;
10. A worker was drilling into a formwork when the drill jammed, and their finger contacted the flange of the drill. The worker received a laceration to their finger;
11. A worker was standing on unsecured rebar approximately 1.2 metres above ground level when the rebar began to fall forward forcing the worker to jump down. The worker suffered an injury to their lower leg when they hit the ground requiring surgery;
12. A worker suffered an allergic reaction to an insect bite;
13. A worker's wrist contacted the top of the vertical dowels. The worker received a laceration to their wrist; and
14. A zoom boom operator drove off the edge of Septimius Siding Road, causing the zoom boom to rollover into a ditch. The operator sustained minor lacerations.

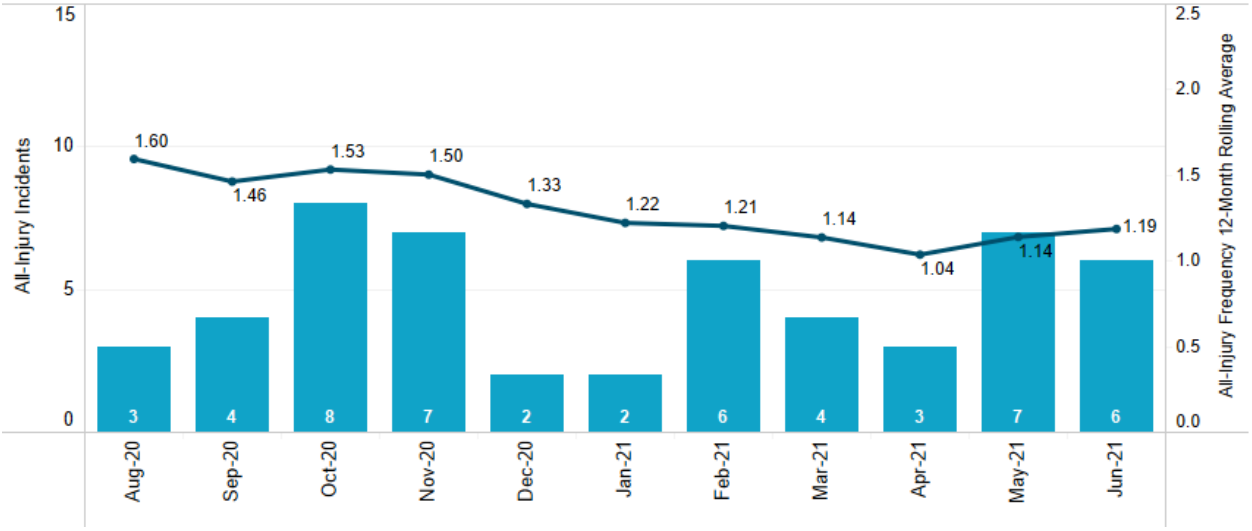
**Safety Performance Frequency Metrics**

Figure C-1 below provides information on employee and contractor serious incidents/near miss frequency, lost time injury frequency and all-injury frequency from April 1, 2021 to June 30, 2021.

**Figure C-1 Employee and Contractor Serious Incidents/Near Miss Frequency, Lost Time Injury Frequency and All-injury Frequency**



**Employee & Contractor All-Injury Frequency**



## Regulatory Inspections and Orders

Table C-1 lists the safety regulatory inspections and orders received from April 1, 2021 to June 30,2021.

**Table C-1 Safety Regulatory Inspections and Orders**

**WorkSafeBC**

| Risk Level | Theme | Inspection Reports and Orders Received | Date of Inspection |
|---|---|---|---|
| **Inspection #1:** WorkSafeBC conducted an inspection at the upstream section of the Site C Project. The purpose of the inspection is to review the contractor's response to the current COVID-19 pandemic in relation to worker health and safety at the workplace. | | | |
| | | **No Orders** | April 16, 2021 |
| **Inspection #2:** WorkSafeBC conducted an inspection at the upstream of the Site C Project, to assess compliance with the Occupation Health and Safety regulation and the Workers Compensation Act.<br>The workplace consists of a 2.6-kilometre-long shoreline protection berm along the shore of Hudson's Hope. The berm has been described as a large barrier made of riprap, rocks and gravel, that reinforces the Peace River shoreline from the potential erosion once the Site C reservoir is filled.<br>This inspection was conducted as part of the 2021-2023 – Construction High Risk Strategy. WorkSafeBC primary goal is prevention of injuries and prevention of serious/fatal injuries in the construction industry. The Construction High Risk Strategy will focus on four risk areas:<br>1. Falls from elevation<br>2. Struck by<br>3. Contact with electricity<br>4. Musculoskeletal Injury | | | |
| | | **No Orders** | April 16, 2021 |
| **Inspection #3:** WorkSafeBC contacted the contractor via telephone as a result of a reported COVID-19 transmission to workers at the Site C Project.<br>The Provincial Health Officer representatives, BC Hydro and worker accommodation contractor have been notified, and are currently engaged in conducting a joint review with the contractor to investigate the possible transmission of the COVID-19 virus at this workplace and review conditions and/or gaps with the contractors COVID-19 response plan and determine findings that may be deficient with the Provincial Health Officer orders and/or employers practices at this time. | | | |
| | | **No Orders** | April 16, 2021 |

| | | | |
|---|---|---|---|
| **Inspection #4:** WorkSafeBC conducted an inspection as result of an incident that involved a serious injury to a worker. It was stated that a worker was found lying on the ground in front of a rock truck operated by the worker. This incident is considered as a non-occupational incident. | | | |
| | | **No Orders** | April 24, 2021 |
| **Inspection #5:** WorkSafeBC did not attend the workplace as a result of an incident that involved a worker having a suspected abdominal injury in the left bank dam core operation, when a worker engaged in a blow-down activity, was struck in the abdominal area when the airline being utilized became disconnected from the Chicago-type fitting. | | | |
| | | **No Orders** | May 10, 2021 |
| **Inspection #6:** WorkSafeBC conducted site inspection as result of an incident that involved an injury of a worker. The incident occurred during the operation of the hopper at the main civil works roller-compacted concrete batch plant. A worker had been performing related operation/monitoring duties and controlling the product placement (roller-compacted concrete) loose material into the rock trucks for transportation on site. This work operation area was conducted at an elevated hopper control room situated adjacent to the material conveyor and above the hopper. It was stated the worker complained about feeling dizzy and having a headache on the access/egress catwalk to the control room, when the worker accessed the lunchroom, the emergency response team was initiated by co-workers. This incident is considered as a non-occupational incident. | | | |
| | | **No Orders** | May 12, 2021 |
| **Inspection #7:** WorkSafeBC participated in an informal virtual meeting to obtain information from the contractors involved in an upcoming shotcrete repair work activity at the left bank tunnel inlet portal area.<br>The contractor has been contracted by BC Hydro to conduct this particular high-risk work activity at the diversion tunnels, which involves re-mediation of two areas where the shotcrete has detached exposing the underlying rock surface in order to mitigate deterioration of the exposed rock surface and remaining shotcrete, also installation of additional protective measures for the remaining shotcrete on the west slope bench and north slope bench.<br>During this meeting, the health and safety items discussed with the representative of BC Hydro, main civil works prime contractor and the contractor, included the following:<br>- Scaling operations<br>- Rappelling ropes<br>- Variance orders<br>- Acceptances | | | |
| | | **No Orders** | May 17, 2021 |

| | | | |
|---|---|---|---|
| **Inspection #8:** WorkSafeBC participated in an informal meeting via teams to obtain information from the contractors involved in an upcoming shotcrete repair work activity at the left bank tunnel inlet portal area.<br>The contractor has been contracted by BC Hydro to conduct this particular high risk work activity at the diversion tunnels, which involves re-mediation of two areas where the shotcrete has detached exposing the underlying rock surface in order to mitigate deterioration of the exposed rock surface and remaining shotcrete, also installation of additional protective measures for the remaining shotcrete on the west slope bench and north slope bench.<br>During this meeting, the health and safety items that were discussed but were not limited to, with the representative of BC Hydro, main civil works prime contractor and the contractor were as follows:<br>- Scaling Operations<br>- Rappelling Ropes<br>- Variance Orders<br>- Acceptances | | | |
| | | **No Orders** | May 17, 2021 |
| **Inspection #9:** WorkSafeBC participated in an informal meeting via teams to obtain information from the contractors involved in an upcoming shotcrete repair work activity at the left bank tunnel inlet portal area.<br>The contractor has been contracted by BC Hydro to conduct this particular high risk work activity at the diversion tunnels, which involves re-mediation of two areas where the shotcrete has detached exposing the underlying rock surface in order to mitigate deterioration of the exposed rock surface and remaining shotcrete, also installation of additional protective measures for the remaining shotcrete on the west slope bench and north slope bench.<br>During this meeting, the health and safety items that were discussed but were not limited to, with the representative of BC Hydro, main civil works prime contractor and the contractor were as follows:<br>- Scaling Operations<br>- Rappelling Ropes<br>- Variance Orders<br>- Acceptances | | | |
| | | **No Orders** | May 17, 2021 |
| **Inspection #10:** WorkSafeBC contacted the contractor via a telephone conversation as a result of a reported incident that involved a worker sustaining a minor right finger injury, at the main civil works right bank maintenance shop.<br>A worker engaged in the of re-connection of a hitch-pin to the frame of the all-terrain forklift received a minor injury when the workers right finger got pinched between the hitch-pin and frame. | | | |
| | | **No Orders** | May 17, 2021 |

<table>
<tr><td colspan="4">Inspection #11: WorkSafeBC conducted a site inspection as a result of a reported incident that presented a high risk of serious injury to a worker.<br><br>That incident resulted from two workers accessing the internal portion of a rock impact crusher to replace the wear plates and were standing on the rotor assembly when one worker stepped off the rotor, causing the rotor to shift and rotate, pinning the other worker's leg between the rotor and the horizontal shaft impactor.<br><br>The orders cited in this report are to address items, noted at the workplace, that need attention prior to conducting more work with the horizontal shaft impactor crusher equipment and horizontal shaft impactor access.<br><br>An observation of the rotor locking pin assembly for horizontal shaft impactor revealed excessive wear to the receiver pocket and excessive play/movement to the locking pin engagement mechanism (device).</td></tr>
<tr><td>Low Risk</td><td>General requirement</td><td>Order #1 - OHS3.5: The contractor failed to ensure that regular inspections are made of the rotor locking pin assembly on the horizontal shaft impactor crusher equipment and work methods/practices, at intervals that would prevent the development of unsafe working conditions.</td><td rowspan="2">June 9, 2021</td></tr>
<tr><td>Low Risk</td><td>Remedy without delay</td><td>Order #2 - OHS3.9: The horizontal shaft impactor rotor locking pin assembly was found to be in an unsafe condition.</td></tr>
</table>

| | | | |
|---|---|---|---|
| **Inspection #12:** WorkSafeBC responded to a reported serious injury at the BC Hydro Site C Hydroelectric dam project located on the Peace River near Fort. St. John. A main civil works subcontractor has been contracted to provide the reinforcing steel erection and assembly at the main civil works roller-compacted concrete upstream wall portion at this location.<br>This incident resulted from a described fall from elevation to previously placed roller-compacted concrete when a worker accessed a vertical reinforcing steel (rebar) wall structure at the roller-compacted concrete upstream bay 2. The worker was stated to be assisting with the relocation of a horizontal reinforcing steel bar (rebar) to accommodate a waterstop component and while performing this task the bay 2 reinforcing steel (rebar) wall structure became unstable and became separated from the formwork panel causing the worker to loss balance and fall approximately 1.2 metres (4 feet) causing a serious lower leg injury.<br>The subsequent investigation indicated the wall structure was not unstable and did not become separated | | | |
| Low Risk | Safe access | **Order#1 - OHS20.4(1):** An observation of the work area and vertical rebar wall work location utilized by 3-4 workers to conduct the described activity revealed an approximate initial elevation step of 3 feet above grade with no other access/egress provided. A risk assessment / plan was not available nor explained by the employer for the work of untying/tying, re-positioning horizontal rebar and working from the elevated vertical rebar section prior to the work being performed and no ladder, steps and/or platforms were available for the workers use. | June 10, 2021 |
| Low Risk | Temporary support | **Order #2 - OHS20.14:** an inspection of the ~4.2 metres x 18 metres (14 feet height x 60 feet width) reinforcing steel (rebar) Bay 2 wall structure revealed the temporary support / securement (2-strand tie wire to 3/4' formwork panel via 3-1/2 duplex nail, or 4-strand tie wire wrapped around 2x6 waler) had been removed (cut) to accommodate a waterstop feature resulting in the reinforcing steel wall structure to be unsupported and unstable. The contractor has failed to ensure that the roller-compacted concrete upstream bay 2 reinforcing wall structure was supported. | |

| | | | |
|---|---|---|---|
| **Inspection #13:** A worker inadvertently contacted their hand with a hammer resulting in an injury that involved a worker having a suspected thumb fracture. WorkSafeBC discussed incident with the contractor. | | | |
| | | **No Orders** | June 29, 2021 |
| **Inspection #14:** As a result of a reported inadvertent concrete splash that contacted a worker's face and eyes during an adjacent concrete vibration activity, WorkSafeBC discussed this incident with the contractor | | | |
| | | **No Orders** | June 29, 2021 |
| **Inspection #15:** As a result of a reported heat related event involving a worker at the end of a roller-compacted concrete work area scheduled shift, WorkSafeBC discussed this incident with the contractor. | | | |
| | | **No Orders** | June 29, 2021 |
| **Inspection #16:** WorkSafeBC conducted a site inspection that is related to a telescopic handler equipment incident and worker injury.<br>The workplace consisted of a BC Hydro designed road to access the Septimus rail siding/lay down work location for the purpose of loading/unloading various materials from rail cars and/or transport trailers to support the construction activities at this BC Hydro Hydroelectric Dam Project.<br>The incident resulted when a telescopic handler had been traversing a temporarily constructed gravel road section to access the Septimus siding work location when the telescopic forklift inadvertently left the road surface and continued down a ~ 2.4 metre (8 feet) incline, flopped over on its right side and subsequently came to rest at the bottom right hand side ditch area adjacent to a water filled wetland/slew. | | | |
| Low Risk | Arrangement of work areas | **Order #1** - OHS4.33(1): BC Hydro failed to ensure a work area must be arranged to allow the safe movement of people, equipment and materials. | June 30, 2021 |
| **Inspection #17:** WorkSafeBC conducted a site inspection that is related to a telescopic handler equipment incident and worker injury.<br>The workplace consisted of a BC Hydro designed road to access the Septimus rail siding/lay down work location for the purpose of loading/unloading various materials from rail cars and/or transport trailers to support the construction activities at this BC Hydro Hydroelectric Dam Project.<br>The incident resulted when a telescopic handler had been traversing a temporarily constructed gravel road section to access the Septimus siding work location when the telescopic forklift inadvertently left the road surface and continued down a ~ 2.4 metres (8 feet) incline, flopped over on its right side and subsequently came to rest at the bottom right hand side ditch area adjacent to a water filled wetland/slew. | | | |
| Low Risk | Arrangement of work areas | **Order #1** - OHS4.33(1): The contractor failed to ensure a work area must be arranged to allow the safe movement of people, equipment and materials. | June 30, 2021 |

<table>
<tr><td colspan="4">Inspection #18: WorkSafeBC conducted a site inspection that is related to a telescopic handler equipment incident and worker injury.<br><br>The workplace consisted of a BC Hydro designed road to access the Septimus rail siding/lay down work location for the purpose of loading/unloading various materials from rail cars and/or transport trailers to support the construction activities at this BC Hydro Hydroelectric Dam Project.<br><br>The incident resulted when a telescopic handler had been traversing a temporarily constructed gravel road section to access the Septimus siding work location when the telescopic forklift inadvertently left the road surface and continued down a ~ 2.4 metres (8 feet) incline, flopped over on its right side and subsequently came to rest at the bottom right hand side ditch area adjacent to a water filled wetland/slew.</td></tr>
<tr><td>Low Risk</td><td>Arrangement of work areas</td><td>Order #1 - OHS4.33(1): The contractor failed to ensure a work area must be arranged to allow the safe movement of people, equipment and materials.</td><td>June 30, 2021</td></tr>
<tr><td colspan="4">Inspection #19: WorkSafeBC conducted a site inspection that is related to a telescopic handler equipment incident and worker injury.<br><br>The workplace consisted of a BC Hydro designed road to access the Septimus rail siding/lay down work location for the purpose of loading/unloading various materials from rail cars and/or transport trailers to support the construction activities at this BC Hydro Hydroelectric Dam Project.<br><br>The incident resulted when a telescopic handler had been traversing a temporarily constructed gravel road section to access the Septimus siding work location when the telescopic forklift inadvertently left the road surface and continued down a ~ 2.4 metres (8 feet) incline, flopped over on its right side and subsequently came to rest at the bottom right hand side ditch area adjacent to a water filled wetland/slew.</td></tr>
<tr><td>Low Risk</td><td>Special inspections</td><td>Order #1 - OHS3.7: A special inspection must be made when required by malfunction or accident.</td><td rowspan="3">June 30, 2021</td></tr>
<tr><td>Low Risk</td><td>Vehicle travel areas</td><td>Order #2 – OHS4.63: A curb must be installed, where practicable, whenever there is a danger of a vehicle or other equipment running off the edge of an elevated area.</td></tr>
<tr><td>Low Risk</td><td>Securing tools and equipment</td><td>Order #3 – OHS16.35: The operator failed to maintain the cab, floor and deck of mobile equipment free of material, tools or other objects which could create a tripping hazard, interfere with the operation of controls, or be a hazard to the operator or other occupants in the event of an accident.</td></tr>
</table>

**Ministry of Energy, Mines and Low Carbon Innovation**

| Risk Level | Theme | Inspection Reports and Orders Received | Date of Inspection |
|---|---|---|---|
| **Inspection #1:** Ministry of Energy, Mines and Low Carbon Innovations conducted site inspection at the West Pine Quarry. The quarry (benches, faces, dumps, access points) and explosives magazine area were inspected. Overall good mining practices were observed for the quarry. One order resulted for the explosives magazine area for danger trees. | | | |
| Low Risk | Workplace conditions | **Order #1 - Section 1.9.1 Health, Safety and Reclamation Code for Mines:** At the time of inspection, several danger trees were present at the explosive's magazine area. Some of the trees have dead and dry branches overhanging in the cleared magazine area itself. The danger trees pose the risk of falling into the magazine/work areas as well as pose a fire hazard. The immediate area is prone to lightning strikes and one tree that was previously struck by lightning was observed. | April 27, 2021 |
| **Inspection #2:** Ministry of Energy, Mines and Low Carbon Innovation conducted a site inspection at the West Pine Quarry's fuel island. | | | |
| Low Risk | Design and Construction | **Order #1 - Section 4.1.1 Health, Safety and Reclamation Code for Mines:** The contractor failed to ensure self-sealing breakaways fittings are installed on all fuel delivery hoses. | May 11, 2021 |

| Risk Level | Theme | Inspection Reports and Orders Received | Date of Inspection |
|---|---|---|---|
| Low Risk | Lifting Devices | **Order #2 - Section 4.4.9 (4) Health, Safety and Reclamation Code for Mines:** The contractor failed to ensure each component that may affect the safe operation of a lifting device shall be examined and tested by a qualified person before initial use and thereafter at intervals not exceeding one year, and a record shall be kept showing dates, findings and names of the qualified persons performing the examinations and tests and the record shall be kept available for inspection. | |
| Low Risk | Workplace Conditions and Storage of Hazardous Materials | **Order #3 - Sections 1.9.1 and 2.3.3 Health, Safety and Reclamation Code for Mines:** The contractor failed to store the potentially hazardous materials in the designated storage areas. | |
| Low Risk | Portable Ladders | **Order #4 - Section 4.4.20 Health, Safety and Reclamation Code for Mines:** the contractor failed to ensure portable ladders shall meet the requirements of CSA Standard CAN3-Z1 1-M81 "Portable Ladders" or other equivalent standard. | |
| Low Risk | Vehicle Requirements | **Order #5 - Section 4.9.4 (2d) Health, Safety and Reclamation Code for Mines:** the contractor failed to ensure all mobile equipment be maintained in working condition . | |

| Risk Level | Theme | Inspection Reports and Orders Received | Date of Inspection |
|---|---|---|---|
| Low Risk | Moving Parts of Machinery | **Order #6 - Section 4.4.2 Health, Safety and Reclamation Code for Mines:** the contractor failed to ensure every drive belt, chain, rope or pulley, sprocket, flywheel, geared wheel and every opening through which any belt, pulley or wheel operates, and every bolt, key, set screw and every part of any wheel or other revolving part that projects unevenly from the surface shall be effectively enclosed, covered or guarded. | |
| **Inspection #3:** Ministry of Energy, Mines and Low Carbon Innovation conducted a site inspection at the West Pine Quarry. The focus of the inspection was on the electrical and mechanical equipment located on the mine site. | | | |
| Low Risk | Codes and Standards | **Order #1 - Section 5.1.1 Health, Safety and Reclamation Code for Mines:** the contractor failed to ensure that the openings noted above are filled with an approved device by or under the supervision of, a certified worker in accordance with Section 12 of the Canadian Electrical Code (C22. 1-18). | May 11, 2021 |
| Low Risk | Codes and Standards | **Order #2 - Section 5.1.1 Health, Safety and Reclamation Code for Mines:** the contractor failed to ensure that all circuits on the panel identified above clearly and legibly indicate which portion of the installation they protect or control in accordance with Section 2 of the Canadian Electrical Code (C22. 1-18). | |

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# Site C Clean Energy Project

# Quarterly Progress Report No. 22

## Appendix D

## Workforce Overview

**Table D-1 Current Site C Jobs Snapshot (April 2021 – June 2021)[21]**

| | Number of B.C. Workers and Total Workers | Construction and Non-construction Contractors[22] (including some Subcontractors). Excludes Work Performed outside of B.C. (e.g., Manufacturing) | Engineers and Project Team[23] | Total |
|---|---|---|---|---|
| April 2021 | BC Workers | 2,589 | 680 | 3,269 |
| | Total Workers | 3,852 | 737 | 4,589 |
| May 2021 | BC Workers | 2,731 | 694 | 3,425 |
| | Total Workers | 4,124 | 744 | 4,868 |
| June 2021 | BC Workers | 2,874 | 699 | 3,573 |
| | Total Workers | 4,291 | 755 | 5,046 |

Employment numbers provided by Site C contractors are subject to revision. Data not received by the project deadline may not be included in the above numbers.

BC Hydro has contracted companies for major contracts, such as main civil works, who have substantial global expertise. During the month of June 2021, there was one worker in a specialized position working for Site C construction and non-construction contractors, which were subject to the Labour Market Impact Assessment process under the Federal Temporary Foreign Worker Program. Additionally, there were 34 management and professionals working for Site C construction and non-construction contractors through the Federal International Mobility Program.

21 Employment numbers are direct only and do not capture indirect or induced employment.

22 Construction and non-construction contractors total workforce employment number includes work performed on the Site C dam site, transmission corridor, reservoir clearing area, public roadwork, worker accommodation and services.

23 Engineers and Project team are comprised of both onsite and offsite workers. The Project team includes BC Hydro construction management and other offsite Site C Project staff. An estimate is provided where possible if primary residence is not given.

**Table D-2 Preliminary Site C Apprentices Snapshot (April 2021 to June 2021)**

| Month | Number of Apprentices |
|---|---|
| April 2021 | 186 |
| May 2021 | 168 |
| June 2021 | 176 |

Data is subject to change based on revisions received from the contractors.

**Table D-3 Current Site C Job Classification Groupings**

| | | | | | | |
|---|---|---|---|---|---|---|
| Biologists and laboratory | Carpenters | Inspectors | Construction managers/ supervisors | Crane operators | Electricians | Engineers |
| Foresters | Health care workers | Heavy equipment operators | Housing staff | Heating, ventilation, and air conditioning | Kitchen staff | Labourers |
| Mechanics | Millwrights | Office staff | Pipefitters | Plumbers | Sheet metal workers | Truck drivers |
| Underground mining | Welders | Surveyors | Security guards | Boilermakers | Cement Masons | Crane Operators |
| Ironworkers | | | | | | |

**Table D-4 Indigenous Inclusion Snapshot (April 2021 to June 2021)**

| Month | Number of Indigenous Workers |
|---|---|
| April 2021 | 366 |
| May 2021 | 372 |
| June 2021 | 375 |

The information shown has been provided by BC Hydro's onsite[24] construction and non-construction contractors and their subcontractors that have a contractual requirement to report on Indigenous inclusion in their workforce.

[24] Onsite includes work performed on Site C dam site, transmission corridor, reservoir clearing area, public roadwork, worker accommodation and services.

Employees voluntarily self-declare their Indigenous status to their employer and there may be Indigenous employees that have chosen not to do so; therefore, the number of Indigenous employees may be higher than shown in the above table.

As with any construction project, the number of workers, and the proportion from any particular location will vary month-to-month and reflects the seasonal nature of construction work. The number of workers will also vary as a contract's scope of work is completed by the contractor.

*Women*

In June 2021, there were 532 women working for Site C construction and non-construction contractors. The number of women was provided by onsite construction and non-construction contractors and engineers that have a contractual requirement to report on the number of women in their workforce.

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# Site C Clean Energy Project

# Quarterly Progress Report No. 22

## Appendix E

## Technical Advisory Board Report

# Site C Clean Energy Project

# Technical Advisory Board Meeting No. 24

# Report

**(May 10, 13 and 14, and June 16 and 17, 2021)**

**June 2021**

## Table of Contents



### List of Attachments

# 1. Introduction

The 24th meeting of the Site C Technical Advisory Board (TAB) was convened via MS Teams conference calls on May 10, 13 and 14, and June 16 and 17, 2021. The meeting did not include a site visit. The primary objectives were to assess the progress and performance of the project, as well as review some recent design re-assessments. Technical considerations focussed primarily on the Main Civil Works (MCW).

## 1.1 Meeting Organization

Since the last meeting, Meeting No. 23 in October 2020, the TAB has convened for a number of technical updates via MS Teams which are recorded in the following documents:

1. Notes from other technical updates of November 18, November 26 and December 21, 2020, and January 5, January 19, January 27, February 24, March 12, March 29 and April 23, 2021. These notes are filed on the TAB Sharepoint site and are available on request.

The agendas for these technical updates are included in Attachment A.

The agendas for this meeting are included as Attachment B.

## 1.2 Meeting No. 24

Most of the recent meetings concentrated on the critical right bank design issues of foundation enhancement and the approach channel design. This meeting was intended to be a more general update and assessment. No specific questions were put to the TAB. Instead, this report summarizes briefly the various updates to the TAB and where comments are warranted by the TAB, they are presented in a **bold font**.

Attachment C is a list of attendees during the meeting. A debriefing is scheduled to be conducted with members of the Project Team and Executives of BC Hydro (BCH), and the Project Assurance Board on June 24, 2021.

The TAB wishes to acknowledge the excellent overviews and presentations that it received. It recognizes the substantial effort that goes into the preparation for the TAB meeting and the technical update conference calls. It appreciates the frank and informative discussions that take place during the meetings.

# 2. Project Update

As indicated above, the TAB was updated on both the engineering as well as construction progress during the several meetings and workshops conducted during the later months

of 2020 and up to the present in 2021. Although held virtually, these meetings and workshops did keep the TAB up to date on the Project's progress. The focus of many meetings was concentrated on the Right Bank Foundation Enhancements as well as the improvements within and along the Approach Channel. A recent aerial photo of the project is shown below. The descriptions and updates below are concentrated on the Generating Station and Spillways (GSS) and Main Civil Works (MCW) areas.

## 2.1 GSS Update

The GSS Civil Works design and engineering is well advanced, with 99% of the drawings issued for construction (IFC) design. The photograph presented below illustrates the status of the activities.

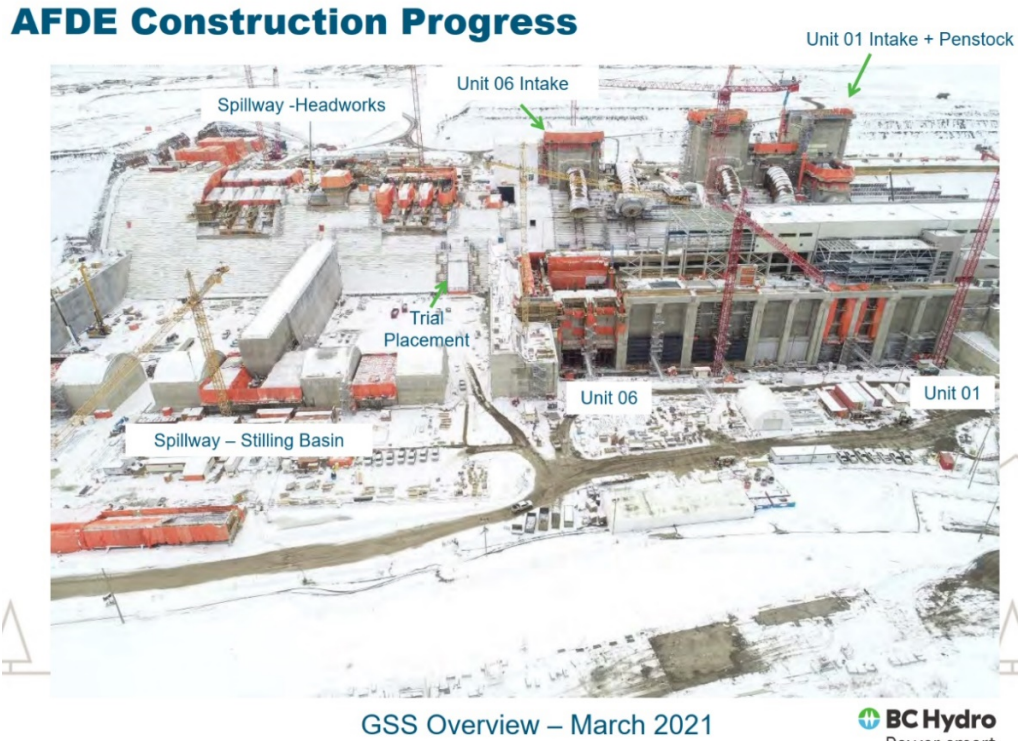
The work is divided into three main civil packages, namely (Intake/Penstocks/Transition Block, Powerhouse, Spillway). The IFC drawings for each package have been issued.

The package total and number of IFC drawings issued to date are:

- Intake, Penstock and Transition Block: 266 total and 266 issued
- Powerhouse: 1,141 total and 1,126 issued
- Spillway: 654 total and 654 issued

- **TOTAL: 2,061 and 2,046 (99%) issued**

**The TAB regards this as a significant achievement.**




### 2.1.1 Hydromechanical Equipment Update

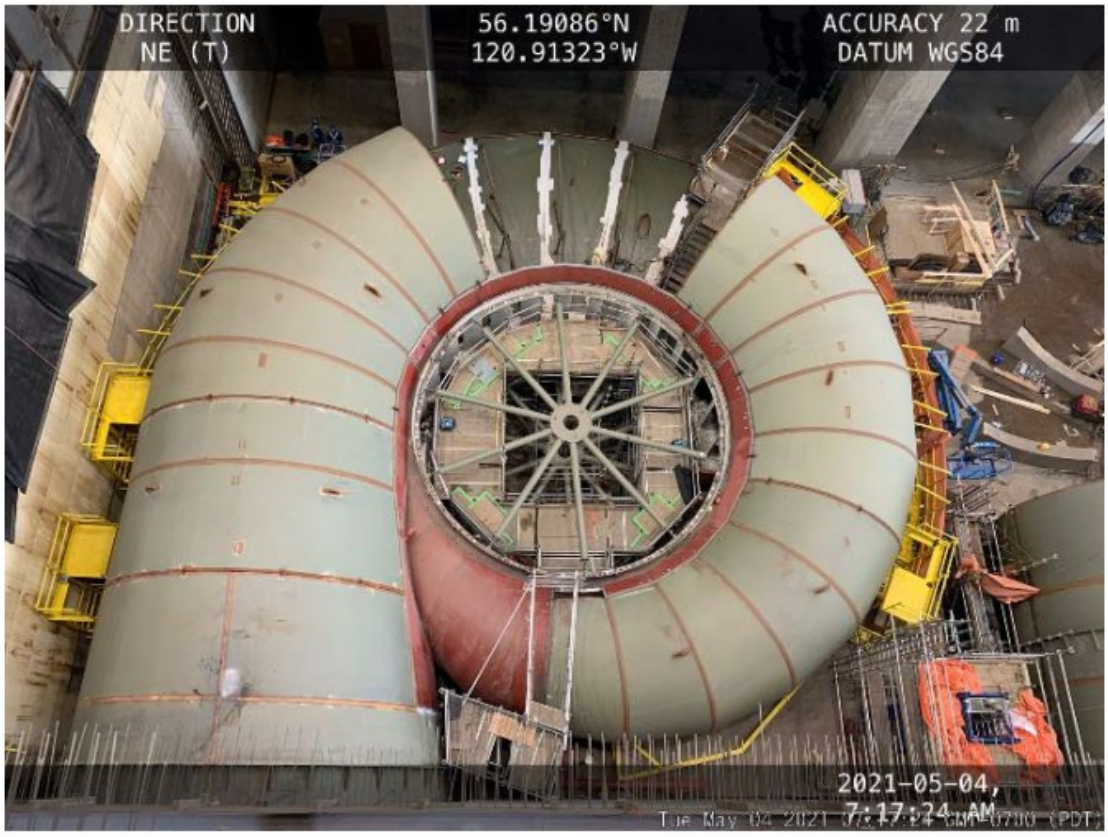
All the Hydromechanical Equipment, including the large gates, valves and stoplogs, are in design and manufacture with ATB Riva Calzoni. This equipment is presently on schedule for delivery and will be installed by AFDE. At present, the support to construction continues with either delivery to the site location or to storage facilities near the site.

**This is a significant achievement considering the problems associated with managing the worldwide supply as well as the effects of COVID-19.**

## 2.2 Turbine and Generator Update

The Turbines, Generators, Exciters, and Governors design, manufacture and installation are by Voith Hydro. The Turbine and Generator parts and equipment are being manufactured throughout the world and delivered and installed at the site on schedule. As with other equipment, it is either installed directly or stored on site or in a prepared and protected storage facility nearby. The magnitude of this undertaking is illustrated by the photograph of the Turbine scroll case installation shown below.

**The TAB note above also applies here.**




## 2.3 Balance of Plant Update

The original concept regarding Balance of Plant equipment (BoP) and installation was that it was to be a completion contract supplied and/or installed by a single large installation contractor. The one large contract was to encompass all the final completion items of the Project, essentially a completion contract. However, the bids for the completion contract were too excessive and above the Engineers Estimate. BCH chose to divide the BoP completion work into several smaller contracts and manage the various contracts.

**The TAB supports the judgement of BCH's decision in this regard and it is being implemented in an effective manner.**

## 2.4 Update on Quality

Quality is one of the Project's most significant areas of importance within the Project design and construction. It falls within the Project mission statements of Safety, Quality, Schedule, Budget and Environmental.

The Project quality areas of focus in 2021 are 1) the MCW and 2) the GSS Civil Works. Project quality is measured in the following areas and aspects:

- Each contractor is responsible for its own Quality Control
- BC Hydro is responsible for overall Quality Assurance
- For offsite manufacturing Quality Assurance, BC Hydro is supported by subcontractors skilled in Quality Assurance and BC Hydro's Powertech Labs for onsite welding quality assurance
- For onsite construction Quality Assurance, BC Hydro teams supporting the Quality Assurance processes are:
    - Site Quality Team
    - Resident Engineering Team
    - Construction Management Team
    - Engineering Design Team (Klohn Crippen and SNC Lavalin)
    - Owner's Engineering Team (BC Hydro)

The areas of focus in 2021 are:

- Main Civil Works
    - Foundation grouting for main dam
    - Earthworks construction
    - Roller Compacted Concrete (RCC) completion
    - MCW contractor (PRHP) materials testing laboratory and implementation of lessons learned from cofferdam construction
    - Monitoring of PRHP quality resources (inspectors)
- GSS Civil Works
    - Concrete (thermal control; strength)
    - Penstock welding and coating
    - Hydromechanical equipment installation
- Turbines and Generators (site)
    - Embedded part installation and alignment
    - Spiral case welding and testing
- Offsite manufacturing
    - Coordination of local inspectors (Italy, Brazil, Canada, USA, Korea)
    - BC Hydro remote participation in factory acceptance tests (COVID-19)

Each of the quality aspects were evaluated regarding engineering, manufacturing and construction. The TAB was advised that Quality Performance Indicators were developed that indicate that good quality is being obtained in a consistent manner. This is indicated by the table below.

**Quality Performance Indicators for May 1, 2021**

| | | Engineering | Manufacturing | Construction |
|---|---|---|---|---|
| Main Civil Works (MCW) | Main Dam (MND) | | *N/A* | |
| | RCC Buttress (RCC) | | *N/A* | |
| GSS Civil Works (GSS) | Generating Station (STA) | | | |
| | Intake and Penstocks (IAP) | | | |
| | Spillway (SPL) | | | |
| GSS Equipment Supply | Hydromechanical (HME) | | | |
| | Large Cranes (CRA) | | | |
| Turbines-Generators (TG) | | | | |
| Balance of Plant Contract (BoP) | Balance of Plant Contract (BoP) | | | |
| | Transformers (TXM) | | | |
| | Generator terminal Equipment (GTE) | | | |
| | AC Station Service (ACS) | | | |
| Transmission & Substation | Transmission Lines (TRM) | | | |
| Highway 29 Realignment (HWY) | | | | |
| | ***Legend:*** | | *= No Risk to Quality* | |
| | | | *= Potential Risk to Quality* | |
| | | | *= Actual Risk to Quality* | |

Another indicator of quality in the constructed Project is to monitor the number of non-conformance reports (NCRs). The majority of the NCRs for the GSS work are focused on thermal control of concrete, reinforcing bar detailing and procedural processes. With recognition of these aspects through the NCR process, these areas are being corrected and better quality can be maintained in these areas in the future.

As with the GSS work, the MCW can also be monitored and controlled by reviewing and studying the range and distribution of the NCR's.

**The TAB wishes to commend the project for its high diligence to addressing quality assurance matters and communicating the outcome in an effective manner.**

**On a matter of detail, the TAB was advised in May about an earlier steady decline in GSS concrete strengths during parts of 2020. Reasons for this were being explored and changed or modified. Fly ash supplies seem to be the likely culprit. The TAB was advised that strengths have now stabilized and remain at acceptable levels.**

**Given the high volumes of GSS concrete placement that are planned for 2021, and indeed which are currently underway, the TAB would emphasise the need for continued vigilance over this aspect of quality control of concrete.**

## 2.5 Earthfill Dam Construction Update

### i. Cofferdam

The TAB was presented with a summary of construction and testing of the Stage II cofferdams during several review meetings and on May 10, 2021. The Contractor performed their own QC; however, BCH utilized an independent testing firm and laboratory to check the procedures and testing of the cofferdam earthworks. The observation and testing of this cofferdam construction were determined to be beneficial to the future work of constructing the Main Dam. Since the Main Dam earthworks will begin this summer, this cofferdam earthwork placement, compacting and testing essentially served the purpose of a "test fill program" for the upcoming Main Dam. The following information and benefits were gained with these additional quality and control and testing verification efforts.

- Contractor utilized the cofferdam as an opportunity to fine tune testing procedures and communication protocols (QC to production) for the Main Dam work
- QA/QC testing demonstrated good agreement – offered more confidence in the contractor
- Contractor utilized seasoned inspectors and testing technicians
- Appeared to be good communication between contractor QC and production – minimized remove/replace corrective action
- Good relationship between BC Hydro QA and PRHP QC

The installation of the geomembrane placed on the upstream cofferdam was discussed in detail. The Contractor performed this work very well.

### ii. Foundation Preparation and Fill Placement

Now that the river has been diverted and the central portion of the dam has been dewatered and exposed, the original riverbed overburden materials have been excavated. The foundation rock is being exposed and the foundation is being mapped and studied. Sections of both the Right and Left Banks of the rock foundations are being treated with dental concrete and the foundation grouting is underway. The consolidation grouting is complete, and the curtain grouting is presently nearly complete. Refer to the grouting discussion and details in Section iii. Dam Foundation Grouting below.

Sections of the Main Dam foundations along both the left and right areas that have been mapped, grouted and treated, are prepared for the core placement in accordance with the specifications. These areas of the foundation that have been finally treated and photographed are prepared by moisture treatment and covered with the select core

materials and compacted in place. Water misters and portable blowers are used to moisten and clean small debris from the foundation ahead of the till placement. This is the first placement of the Main Dam embankment. Foundation preparation for the fill dam has been ongoing since April and has accelerated more recently as presented in the meeting on June 16.

The first fill on the foundation is illustrated in the photograph below.

**The TAB is favourably impressed with the careful attention being paid in the field to foundation mapping and treatment, control of construction equipment, and recognition of the care required at all material interfaces. The TAB is of the view that the direction of the data gathering, control of construction and material management are at the highest level. This early phase earthworks also validates that the material selections and specifications are fit for purpose.**

### iii. Dam Foundation Grouting

**Status**

On occasion of the workshop organized in September 2019, the TAB had inspected ongoing grouting works in the core foundation on the left bank. Since then, the river has been diverted and grouting works for the blanket/consolidation and the main curtain continued. BC Hydro recurrently informs on the progress of the grouting works. A teleconference dedicated specifically to this subject was held on April 23, 2021 (see Appendix A), and on May 10 (see Appendix B) a summary of the progress was presented. On June 16, BC Hydro updated on the progress of the grouting works and elaborated on previous comments of the TAB. To date, the consolidation grouting is complete, except

for the upper left abutment, and more than 90 % of curtain grouting has been accomplished (not considering the pending work at the approach channel).

**Criteria**

The following closure criteria for the grouting works had been considered:

1. absorption rate 0.3 litres/m/minute for a duration of 10 minutes
2. absorption 35 kg/m
3. hydraulic conductivity, final Lugeon value to be less than 3 l/m/min (at 10 bar)

Additionally, it was specified that the injection pressure should not exceed 25 kPa per metre of depth. However, during the performance of the work, pressures up to 40 kPa per metre have locally been admitted, subject to control of surface heave, limited to max. 2 mm. The Design Team recognized that such precautions taken in this relation are appropriate, as evidenced by the highly sensitive reaction of the rock mass to changes in pore pressures experienced during construction.

As BC Hydro explains, the criteria 1 and 2 derive from precedence with dams on comparable foundations. The Lugeon criterion is not conventional in Canada but was added for the deep curtain of Site C. As judged by standard practice, the criteria are conservative. But, in the context of Site C project, their individual weights are not identical and need to be assessed.

Criteria 1 and 2 essentially deal with the technical viability and efficiency of the applied methodology. The technical objectives of the grouting works have to be considered, as they are typically:

1. reducing seepage losses
2. homogenizing important areas of the dam foundation
3. preventing erosion from the embankment
4. preventing erosion/suffosion in the foundation
5. enhancing geotechnical characteristics in respects of shear strength and deformations
6. controlling uplift pressures

Item 1 is not critical at Site C. The experience with the cofferdams has demonstrated that underseepage discharge is insignificant. Regarding item 2, the variation of rock mass quality in the core foundation is moderate but the grout takes concentrated in the area

affected by the Little Ricky Shear indicate a favorable effect of the grouting works. Item 3 is addressed primarily by the thorough foundation treatment and, the observed limitation to the penetration of the particularly fine-grained cement shows that migration of fines from the core are not a hazard. The foundation rock itself is of moderate strength but the sequence does not include erodible strata. For item 5 the respective analyses, carried out with conservative parameters, show acceptable performance of the dam with its foundation. Thus, item 6 remains as a topic to be discussed. This item has to be viewed in relation with the Lugeon value, which informs on the permeability of the foundation rock. Another observation to be considered in this relation is the occurrence of confined water or gas found in some boreholes.

**Specific Observations**

The Project recognized that the Lugeon requirement does not correspond well with grout take and that strictly satisfying this criterion throughout as indicated in the specifications could be relaxed. While the information obtained by the Lugeon testing was of value, modifications had been made to the design basis to reduce the requirements of the Lugeon test results. High Lugeon values can be found in areas that have been adequately grouted in terms of grout acceptance criteria.

**Suspensions**

The suspensions are prepared with a Type III cement. It has a Blaine value of 6110 cm²/g and the maximum grainsize measures 0.045 mm. The following table states properties of batches prepared with this cement.

| Mix ID | W/C | Plasticizer | Marsh Viscosity |
|---|---|---|---|
| | by weight | % | sec |
| 1 | 1 | 1 | 29 |
| 2 | 0.85 | 0 | 32 |
| 3 | 0.75 | 0 | 35 |

Mixes 1 and 2 have a very favourable viscosity and should also display acceptable stability. The Blaine value is favorably high. The cement is considerably more-fine grained than commonly used for grouting in rock. The effectiveness of grouting is much related to grout mix adopted and the nature of the cement employed in the mixture. The Design Team has employed mixes appropriate for the intended application and cements which are finer than commonly used in rock. Even so, the grain size will limit penetration into fine fissures as reflected by the Lugeon data mentioned above.

**Methodology**

Site staff have judiciously raised the injection pressure, exploring the limits admissible at this specific site.

Some fairly wide seams of grout found in check holes indicate that jacking has occurred locally but that the applied grout mix has satisfactorily filled and effectively sealed the cracks.

**Concluding Remarks**

As the TAB suggested on previous occasions, the results of the grouting works are being assembled in a 3D model for visualization and analysis. Sections generated with this model show grout takes concentrating on the shear in the valley centre and on bedding plane BP32 at depth. Thus, the grouting has been effective on these particularly important elements.

The grout take of the curtain holes has accumulated 105 t of cement. In relation to the area covered by the completed holes, the take barely averages 10 kg/m². This is a low value but is consistent with the foundation consisting predominantly of massive shale, mudstone and marl.

The limit of technical viability of cement grouting in this kind of rock has been reached. Still, the aspired 3 LU have not been rigidly obtained. Reflecting on information provided from check holes and televiewer scans, a notable proportion of the high Lugeon values appears restricted to narrowly localized conditions, not pervasively affecting the rock mass.

The experience with the grouting works also expands our understanding of some general hydrogeological characteristics of the foundation rock:

- There is a significant anisotropy in hydraulic conductivity, capable of generating confined and even artesian conditions.

- The overall conductivity is very low but stratigraphic and structural conditions produce heterogeneous and complex hydrogeological conditions.

**One item of detail to be pursued as performance of the foundation continues to be monitored is the development of small deformations in the left abutment at BP28 reported to the TAB. The TAB looks forward to further information on these circumstances in the context on the remaining grouting to be completed on the upper Left Bank.**

**The TAB wishes to emphasize that the successful completion of the grouting to such a high standard is a major milestone of the Project. The grouting programs are developed with a model and when they are successfully completed without challenges to the model, it constitutes a significant achievement. The TAB wishes to complement the Project Team and the Contractors on achieving this milestone with such high quality.**

# 3. Earthfill Dam Ongoing Analysis

## 3.1 Right Bank – Shear Key Foundation Excavation and Powerhouse Interaction

The implications of a sliding plane loaded by the Earthfill Dam impacting the Powerhouse has been recognized for some time. To address this issue, a shear key was excavated to El. 390, extensive inclinometer installations were placed adjacent to the shear key, from the Earthfill Dam to the Service Bay at the Powerhouse, and monitoring was undertaken both during shear key excavation and backfilling. The local geology is complicated not only by the presence of bedding planes, but also due to a complex shear zone at this location. The TAB received a summary of the analyses that revealed the influence of the shear zone on the magnitude and direction of slip in the bedding planes.

**The TAB appreciates the detailed consideration of what might have been a complex interaction of the Earthfill Dam with the Powerhouse and the insightful analysis of the local movements. From a practical perspective, all movements observed are in favourable directions and no adverse interaction with the Powerhouse due to the construction of the Earthfill Dam is anticipated. This was further reinforced by comprehensive FLAC analyses that the TAB accepts.**

## 3.2 FLAC 3D Earthfill Dam – Modelling Approaches

Confirmation that the Earthfill Dam is behaving as intended will rely on FLAC 3D modelling. This modelling has already demonstrated its capability for including the substantial degree of complexity needed to assess the response of the foundation at Site C to dam construction. It is proposed to adopt two models to simulate the evolving complex behaviours:

i. Model 1 – will predict deformations at the end of Year 1 (El. 414 m) ignoring construction sequencing. It will adopt simplifying properties for the fill material but will conduct sensitivity checks on the influence of the strength of the bedding planes on foundation response.

ii. Model 2 – will initiate simulation in support of performance-based design by incorporating geological structures as uncovered and revisions of models of fill material behaviours and pressures to match observed behaviours. This incremental updating will continue to the end of construction and subsequent filling following the construction sequences.

The application of performance-based design relies on early installation of reliable instrumentation to a degree that is greater than normally adopted in precautionary-based design (the “Observational Method”) and this is recognized in the project planning. In

addition, a Leapfrog geological model for the Earthfill Dam has been created so that the results of ongoing mapping can be integrated in the Model 2 analysis.

**In keeping with current best practices, the Design Team is adopting performance-based design to verify that the Earthfill Dam is behaving as intended during construction and will ultimately satisfy design criteria. The TAB is content that the Design Team has formulated an effective approach to performance-based design, and it looks forward to receiving updates on findings throughout the period of construction and first filling. Performance-based design provides a more authoritative basis for assuring that dam safety is being addressed in a timely and effective manner than the more traditional Observational Method. The capacity for conducting projections to future performance based on continuous monitoring is embodied in performance-based design. One site issue already managed by performance-based design is the successful determination that the Earthfill Dam will not impact the construction of the adjacent Powerhouse as mentioned in section 3.1 above.**

**Successful execution of performance-based design involves an intimate interaction within the Design Team to assess all current information in a timely manner. This includes all instrumentation being monitored by GeoViewer, geological data being integrated within Leapfrog and other aspects of performance relevant to the process. The TAB recommends that the Project Team provide a brief on its current capacity to continue to conduct performance-based design for discussion and review with the TAB.**

## 3.3 Options to Add Passive Resistance

The Design Team has assessed the options available to improve downstream stability by adding passive resistance. There are two feasible choices: i) additional fill on the downstream slope, and ii) extend the downstream toe farther downstream. A comprehensive study of stability enhancement associated with alternative configurations has been conducted. In the short term, the Project proposes to exploit this opportunity temporarily by establishing a laydown area beyond the current location of the downstream toe of the dam, which would be removed incrementally for operation of the Powerhouse and Spillway. The laydown would be constructed to El. 418-420 m. The TAB was advised that the temporary stockpile and associated permitting are being undertaken, but any additional buttressing would remain a contingency measure.

**The TAB is pleased to see that these extra stabilization measures have been assessed. Design of the Earthfill Dam consistent with design criteria is based on a Most Likely Case (MLC), which is the current design basis and a Reasonably Worst Case (RWC), which requires a contingency design. The options to add passive**

**resistance has been recognized in the event that the RWC is encountered, and contingency measures are required.**

## 3.4 Left Bank Colluvium

A deposit of colluvium exists of about 18,000 $m^3$ along the left abutment downstream of the core of the Dam. Under normal circumstances, this would be removed; however, the TAB was advised that in the present circumstances due to stability considerations, it is difficult to remove. Characterization studies have been performed based on sampling and penetration testing. The deposit is about 6.6 m thick and partly saturated. Under its current condition, leaving it in place does not significantly impact stability and the anticipated settlements would not impact the coarse filter. The Design Team concludes that drainage trenches that had been proposed are not needed.

The TAB was also advised that the Project has recently undertaken FLAC analyses to explore whether wetting and softening of the colluvium might affect the functionality of the downstream filter or the core. These analyses have concluded that the potential deformations associated with these processes would not be significant.

**The TAB was pleased to learn about the more recent analyses that would support the view that the colluvium could be left in place untreated. However, before agreeing with this position, further degree of analyses should be conducted involving the following activities.**

1. **Undertake saturation collapse testing of undisturbed samples related to the Proctor density reference data to determine how collapsible the material might be.**

2. **If significant, repeat the analyses conducted by FLAC by using prescribed displacement to simulate the collapse and determine its implications.**

**At this time the TAB does not anticipate that the above recommendation will alter the conclusions presented so far.**

# 4. Dam and Core Buttress Updates

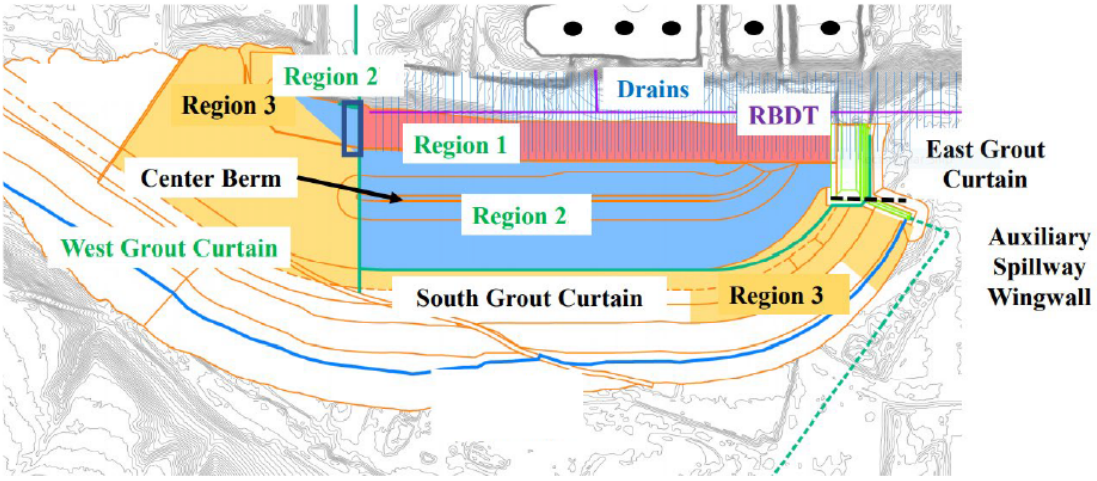
RCC placement of both Dam and Core Buttresses started in 2020 and the season finished with the Dam Buttress at El. 434.3 m sloping to the Core Buttress at El. 414.2 m. Placement has now re-commenced at the Core Buttress. In both cases, a 130/80 (fly-ash/cement) mix has been adopted. This mix has already been successfully used to construct both the Spillway and Powerhouse Buttresses. As trials have shown, exchanging 20 $kg/m^3$ of cement for fly-ash makes little change to temperature peaks and might well introduce other detrimental effects such as reduced early tensile strengths.

In terms of crack control, one key is minimizing temperature differentials within the buttresses and presented data indicated that acceptable differentials were being achieved. Cylinder strength testing also showed good batch control with 180 and 365 day mean strengths of 30.8 and 36.4 MPa, respectively, and low associated coefficients of variation of just 8.1 and 9.4%.

**In view of the above, the TAB would recommend no change to the 130/80 mix being used at this stage for the Dam and Core Buttresses. The TAB would, however, recommend continued core testing of the in-situ Dam and Core Buttresses concrete to confirm that the good control implied by the cylinder testing is being translated into an equally good final in-situ product.**

## 5. Approach Channel Update

The TAB was pleased to see the continued developments and elaboration of the arrangements for the Approach Channel and the clear delineation between region 1, incorporating Carpi membranes, region 2, incorporating HDPE membranes and outer regions 3 utilizing just plastic till protected by riprap and associated bedding material (see the plan below). However, these developments and elaborations have now also produced a total of 10 sub-regions within the umbrella of the main three.




**Simplified Plan of Approach Channel showing key regions**

Region 1 will be compartmentalized to ensure that any leakages stay localized and so facilitate leakage location detection. **The TAB would recommend that some form of compartmentalization, but perhaps less elaborate, is also extended into region 2 for the same reasons.**

The proposed connection details between the regions were also elaborated for the first time during the discussions. The TAB was pleased to note that these will now be further

discussed with the Contractors and with joint Contractor discussions where different contracts overlap. The TAB would stress the importance of these negotiations so that both Contractors buy into the details finally adopted. While appreciating that some intricacy may be inevitable at such interconnections, the TAB would stress the need for simplicity wherever possible. As already discussed, there may also be merit in amending some region boundaries so as to coincide with other features and changes, such as geometrical ones.

In the case of region 2, connections will also take place between smooth HDPE linings and textured linings and the TAB was pleased to note that this had also been thought through, as well as the need to ensure that any texturing was in place on both sides of the HDPE membrane concerned.

Regions 1 and 2 will be isolated by a triple grout curtain extending down to El.410 m installed on the south and east sides from an anchored concrete plinth. This will connect with a plinth and grouting gallery on the west side and with the central line of that grout curtain taken down to El. 380 m to transition into the main dam grout curtain. Similarly, the gallery concerned will connect to the main core buttress grouting gallery and the main headworks gallery via a water-tight bulkhead door. The TAB would commend the degree of detail to which all these works are now being developed and coordinated. At the same time, benefit can be gained by coordinating such aspects with the relevant Contractor. The TAB was pleased to note that the EDT fully appreciated the level of detail and quality to which the bulkhead door will need to be both manufactured and installed.

**The TAB was advised that while the critical path for Site C completion remains with the construction of the Main Dam, the completion of the Approach Channel is also now seen as having very little float. Some long-standing aspects of the design still remain to be confirmed, such as the final connection and interface arrangements between different regions. This is again why the TAB would stress the need for a focus on robustness, simplicity and ease of construction as arrangements are finalized. It is also why the TAB would again stress the need for associated discussions and agreements with the Contractors involved in developing final arrangements.**

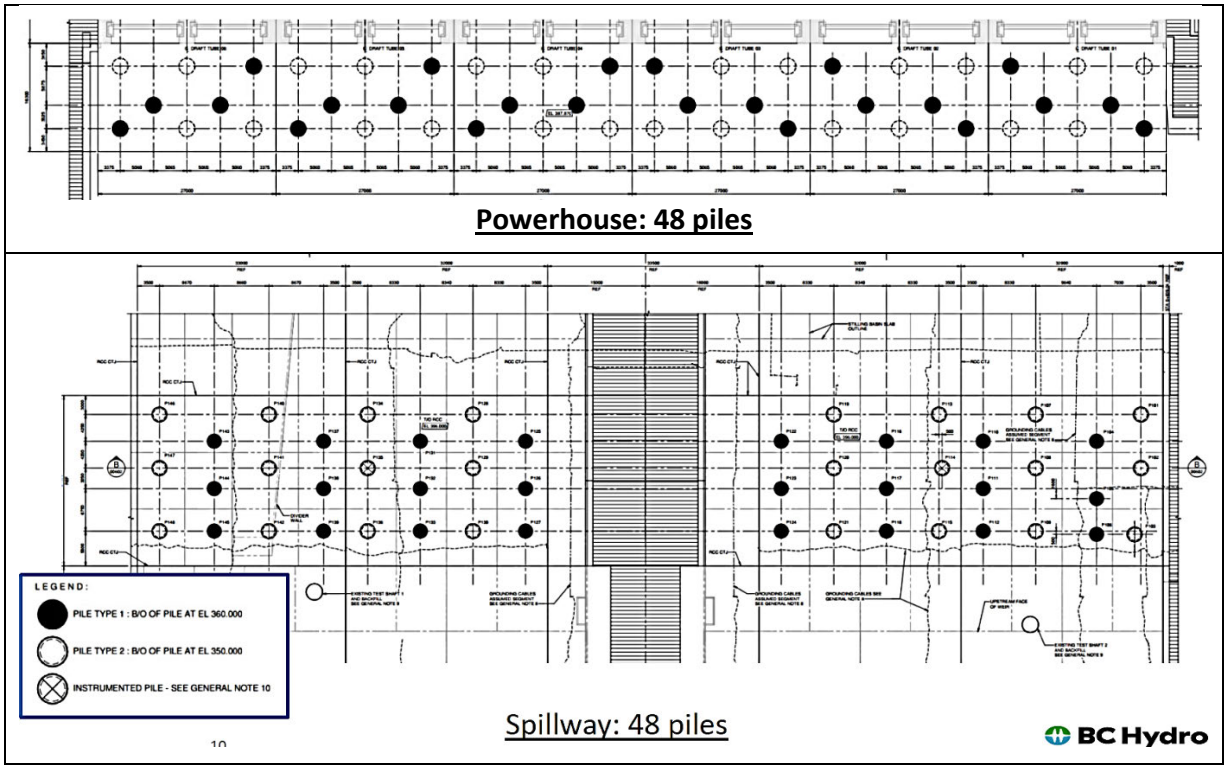
## 6. Powerhouse and Spillway Piles Update

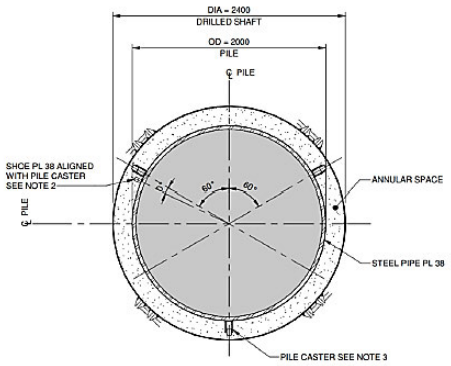
An uncommonly comprehensive program of geological and geotechnical investigations identified highly sensitive conditions and, considering the complexity of the combination of rock mass properties, geohydraulic effects and ambient stress patterns, an observational approach for the construction works had been adopted to handle inevitable uncertainties. This approach detected deformations in the rock mass beyond the depth to which likely responses had been envisaged. As these deformations threatened to affect

the shear strength of the rock mass and, in consequence, the stability of the structures, the need for intervention was seen.

A wide range of options, suitable for enhancing the performance of the foundation, was developed. From a meticulously performed Multiple Accounts Analysis, large diameter piles emerged as the optimal solution in all relevant regards. State-of-the-art geotechnical analysis demonstrated that limiting deformations on bedding planes to 10 mm would be required. Thus, stiffness of the pile system became decisively important for the stability of the structures built against the right bank slope. In-situ, full scale lateral load tests with complementary tests (e. g. pressuremeter), started in October 2020 and in combination with monitoring in the rock mass supplied the necessary information. Incidentally, the tests found an increase of the rock mass modulus over the values of the DBM starting at a depth of El. 370 m, helping the performance of the piles.

Coordinated analysis by FLAC 3D and ABAQUS guided the final design of the piles. The finally adopted design includes 48 piles each for spillway and powerhouse, arranged in parallel rows, drilled on laterally shifted centers and staggered in depth to El. 350 and 360 m, respectively (see the figures below).






**Layout of piles at powerhouse (above) and spillway and cross section of pile**

Stability and performance of the structures was evaluated by Finite Difference and Finite Element simulation as well as by sliding wedge analysis. The results demonstrate compliance with the guidelines of the Canadian Dam Association, applying the analysis defined by the USACE method and prevent inadmissible deformations in the foundation.

Whereas the piles at the spillway will be drilled through the concrete of the stilling basin and thus directly connect to the structure, at the powerhouse a pile capmust be added at the outlets. The required excavation has to proceed such as to avoid excessive relaxation effects and the most appropriate methodology for this target is still being assessed. Details currently under discussion concern the connection granting the load transfer between the existing powerhouse concrete and the pile cap.

Other features as alignment of boreholes, cleaning of the borehole, centering and concreting of the pile have been satisfactorily considered.

A selected number of piles will be instrumented for remote read-out. Options for the range of instrumentation – deformation, strain, pore pressures – and selection of suitable techniques have been discussed and respective decisions will be taken shortly.

The construction sequence for the Powerhouse pile caps currently envisages the excavation of the necessary pits and then constructing the piles and pile caps sequentially in discrete elements. The TAB notes that the excavated pits will become increasingly congested by the steel piles rising 3+ metres above excavated base level. This will restrict operational access for the necessary piling rigs, the plant and equipment needed to load and haul the muck from the excavations, any brushing or jet wash equipment for the piles, the equipment necessary for pile placement, pile cap rebar placement and concreting. The pile sequencing proposed suggests that all these operations could be taking place in a single pit at the same time. It will also involve considerable trafficking of the excavated base which then might need further treatment before concreting of the pile cap can take place.

**Alternative sequencing and staging options may be possible, and the TAB recommends that all potential options are explored, finalized and agreed in conjunction with the Contractors involved.**

## 7. Future Meetings

The TAB recommends that the next TAB meeting be virtual and the date to be determined. In addition, TAB update teleconferences will convene as follows: July 16 and August 5, 2021. Other conference calls will be scheduled as required.

Respectfully submitted,




# Attachment A – Technical Update Conference Calls Agendas

BC Hydro
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**Site C Clean Energy Project**
**Technical Advisory Board**
**Conference Call**
**18 November 2020**

**Location: Conference Call and Screenshare**

## AGENDA

1. Project update [redacted]
2. Approach Channel Region 2 Liner – HDPE versus LLDPE [redacted]
3. Right Bank Geological Model – Update [redacted]
4. Powerhouse and Spillway – Design Approach [redacted]

BC Hydro
Power smart

**Site C Clean Energy Project**
**Technical Advisory Board**
**Conference Call**
**26 November 2020**

**Location: Conference Call and Screenshare**

## AGENDA

1. Introduction [redacted]
2. Geomorphological information refresh on right bank [redacted]
3. Criteria & Stability Cases – continued discussion [redacted]

BC Hydro
Power smart

**Site C Clean Energy Project**
**Technical Advisory Board**
**Conference Call**
**21 December 2020**

**Location: Conference Call and Screenshare**

## AGENDA

1. Project update [redacted]
2. Right Bank Foundation Enhancement
   a) Lateral Load Tests – Update [redacted]
   b) Design Basis and Proposed Changes to DBM [redacted]
   c) Powerhouse and Spillway Stability Analyses Update [redacted]
   d) Powerhouse and Spillway Pile Options [redacted]
3. Approach Channel – Design Optimization Process
   a) Framework [redacted]
   b) Review of Right Bank Foundation Hydrogeology [redacted]
   c) Preferred Layout [redacted]

BC Hydro
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**Site C Clean Energy Project**
**Technical Advisory Board**
**Conference Call**
**05 January 2021**

**Location: Conference Call and Screenshare**

## AGENDA

1. Project Update [redacted]
2. Approach Channel Design Assessment
   a) Framework [redacted]
   b) Preferred Layout [redacted]
   c) Risk Assessment Approach [redacted]
   d) Right Bank Foundation Hydrogeology – Discussion [redacted]
3. Bedding Planes Pore Pressures [redacted]

BC Hydro
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**Site C Clean Energy Project**
**Technical Advisory Board**
**Conference Call**
**19 January 2021**

**Location: Conference Call and Screenshare**

## AGENDA

| | | |
|---|---|---|
| 1. Project Update | [redacted] | 20 min |
| 2. Right Bank Foundation | | |
| a) Lateral Load Test Results | [redacted] | 45 min |
| b) RCC Buttress Design Criteria | [redacted] | 30 min |
| c) Powerhouse and Spillway Stability Results | [redacted] | 30 min |
| d) Powerhouse and Spillway Economic Analysis and Pile Layout | [redacted] | 20 min |
| ~~3. Approach Channel FMEA~~ | [redacted] | ~~30 min~~ |
| ~~4. Right Bank Historical Buried Channel~~ | [redacted] | ~~20 min~~ |

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**Site C Clean Energy Project**
**Technical Advisory Board**
**Conference Call**
**27 January 2021**

**Location: Conference Call and Screenshare**

## AGENDA

1. Project Update [redacted]
2. Right Bank Foundation – Proposed changes to DBM (Discussion) [redacted]
3. Approach Channel FMEA [redacted]
4. Right Bank Historical Buried Channel [redacted]
5. Quality Assurance (QA) Update [redacted]

BC Hydro
Power smart

**Site C Clean Energy Project**
**Technical Advisory Board**
**Conference Call**
**24 February 2021**

**Location: Conference Call and Screenshare**

## AGENDA

1. Project Update [redacted]
2. Powerhouse and Spillway RCC Buttress
    a) Review of Loading Cases [redacted]
    b) Stability Analyses Update [redacted]
    c) Deformation Analyses under Static Loading Conditions (FLAC) [redacted]
    d) Deformation Analyses under Seismic Loading Conditions [redacted]
    e) Update on Pile Design [redacted]

**Break (10 min)**

3. Approach Channel Risk Assessment [redacted]
4. Discussion – Topics and timing for forthcoming meetings
    a) Mid to late March (Hydrogeology, RCC Buttress stability and final pile design)
    b) April (Earthfill Dam and Right Bank foundation drainage)
    c) May (Approach channel progress)

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**Site C Clean Energy Project**
**Technical Advisory Board**
**Conference Call**
**12 March 2021**

**Location: Conference Call and Screenshare**

## AGENDA

1. Project Update [redacted]
2. Powerhouse and Spillway RCC Buttress
    a) Action Items from previous TAB Meeting
        - Breakout Zone – Sensitivity analyses [redacted]
        - Extreme 5 Loading Case – Contribution of Cohesion to FoS [redacted]
        - Deformation Analyses under Seismic Loading Conditions [redacted]
        - Strain-Weakening and Tensile Strength Parameters [redacted]
        - Spillway Buttress – Reduction of piles vs. impact on deformations [redacted]
    b) Summary of Stability Analyses [redacted]
    c) Proposed Pile Layout and Design Update [redacted]
    d) Pile Parameters – Equivalent vs. Explicit Pile [redacted]
    e) Summary of Deformation Analyses under Static Loading Conditions (FLAC) [redacted]
    f) Powerhouse Buttress – Decompression Zone (Abaqus) [redacted]
3. Right Bank Foundation – Hydrogeology Review [redacted]

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**Site C Clean Energy Project**
**Technical Advisory Board**
**Conference Call**
**29 March 2021**

**Location: Conference Call and Screenshare**

## AGENDA
## Revision 1

1. Project Update [redacted]
2. Right Bank Foundation – Hydrogeology Review [redacted]
3. Powerhouse and Spillway Buttress – Pile Layout vs. Tensile Stresses in Rock [redacted]
4. Earthfill Dam
   a) Grouting Update [redacted]
   b) Earthfill Dam Foundation Preparation [redacted]

BC Hydro
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**Site C Clean Energy Project**
**Technical Advisory Board**
**Conference Call**
**23 April 2021**

**Location: Conference Call and Screenshare**

## AGENDA

1. Grouting Update [redacted]
2. Lugeon vs Grout Take [redacted]

# Attachment B – Meeting Agenda

BC Hydro
Power smart

**Site C Clean Energy Project**
**Technical Advisory Board**
**Conference Call**
**May 10, 13 and 14 2021**

**Location: Conference Call and Screenshare**

# AGENDA

## MAY 10, 2021

1. Project Update [redacted]
2. GSS Update [redacted]
3. BoP Update [redacted]
4. Project Quality Update [redacted]
5. Earthfill Dam
    a) Cofferdam Construction and QA/QC Results [redacted]
    b) Earthfill Dam Foundation Preparation and Fill Placement – Status Update [redacted]
    c) Earthfill Grouting Update [redacted]

## MAY 13, 2021

5. Earthfill Dam
    d) Shear Key Excavation and Backfilling – Review of BPs response [redacted]
    e) Shear Key Excavation – Flac3D Calibration [redacted]
    f) Simplified 3D Deformation Model – Prediction of Deformations at Service Bay [redacted]
    g) Work Plan for Flac3D deformation modelling [redacted]
    h) Benefit of Temporary Laydown Area on Dam Stability [redacted]

BC Hydro
Power smart

**Site C Clean Energy Project**
**Technical Advisory Board**
**Conference Call**
**May 10, 13 and 14 2021**

**Location: Conference Call and Screenshare**

i) Left Bank Abutment – Colluvium Berm Settlement Assessment [redacted]

6. Dam and Core RCC Buttress – Update [redacted]

**MAY 14, 2021**

7. Approach Channel – Update [redacted]
8. Powerhouse and Spillway Piles
   a) IFC drawings and Specifications Update [redacted]
   b) Tailrace Cap Connection to the Powerhouse [redacted]
   c) Tailrace Excavation and Sequence of Work [redacted]
   d) Instrumentation [redacted]

BC Hydro
Power smart

**Site C Clean Energy Project**
**Technical Advisory Board**
**Conference Call**
**June 16, 2021**

**Location: Conference Call and Screenshare**

# AGENDA

1. Project Update [redacted]
2. Earthfill Dam
    a) Grouting Update [redacted]
    b) Fill Placement [redacted]
    c) Left Bank Colluvium Berm – Assessment of Deformations using FLAC3D [redacted]
3. Powerhouse Pile Cap – Design Update
    a) Pile Cap Layout [redacted]
    b) Pile Cap Reinforcement [redacted]
    c) Rock Trap Serviceability [redacted]
    d) Instrumentation [redacted]

# Attachment C - List of Meeting Attendees

**TAB Members:**

[redacted]

**BC Hydro:**

[redacted]

**Other:**

[redacted]

**Site C Engineering:**

[redacted]

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# Site C Clean Energy Project

## Quarterly Progress Report No. 22

## Appendix F

## Summary of Individual Contracts Exceeding $10 Million

**PUBLIC**

# CONFIDENTIAL

# ATTACHMENT

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# Quarterly Progress Report No. 22

## Appendix G

## Project Progression

## PUBLIC

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# Quarterly Progress Report No. 22

## Appendix H

## Detailed Project Expenditure

## PUBLIC

# CONFIDENTIAL

# ATTACHMENT